

WHITMAN

Environmental & Engineering Excellence
from Concept to Completion

Pergament Mall / Corniche Dry Cleaners

2795 RICHMOND AVENUE, STATEN ISLAND, RICHMOND COUNTY,
NEW YORK

Site Management Plan

NYSDEC Site Number: 243012

Prepared for:

Pergament Properties

95 Froehlich Farm Blvd.

Woodbury, New York 11797

Prepared by:

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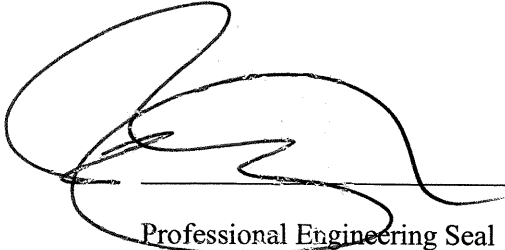
Cranbury, New Jersey

Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date
1	Nov. 13, 2012	Initial Site Management Plan	
2	May 16, 2014	Sub-Slab Sampling Frequency Changed From Quadrennial to Biennial	

MAY 2014

I Barry I. Skoultchi, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.



Professional Engineering Seal
State of New York

8/11/14

Date

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SITE MANAGEMENT PLAN

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 Introduction

This document is required as an element of the remedial program at Pergament Mall / Corniche Dry Cleaners (hereinafter referred to as the “Site”) under the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated in accordance with Orders on Consent Index W2-0751-95-09 and W2-0751-01-12, which were executed in 1996 and 2002 respectively.

1.1.1 General

Pergament Enterprises of Staten Island, Limited Partnership entered into Orders on Consent with the NYSDEC to remediate a portion of an 18 acre property located in Staten Island, Richmond County, New York. This Order on Consent required the Remedial Party, Pergament Enterprises, to investigate and remediate contaminated media at the site. A figure showing the site location and boundaries of this 18-acre site is provided in Figure 1. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Declaration of Covenants and Restrictions.

After completion of the remedial work investigation (described in prior submittals to NYSDEC), some contamination was left in the subsurface at the Controlled Property, which is hereafter referred to as “remaining contamination.” This Site Management Plan (SMP) was prepared to manage remaining contamination at the Controlled Property until the Deed Notice is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by WHITMAN, on behalf of Pergament Enterprises of Staten Island, Limited Partnership, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Declaration of Covenants and Restrictions for the Controlled Property.

1.1.2 Purpose

The Controlled Property portion of the site contains contamination left after completion of the remedial action. Engineering Controls have been incorporated into the site remedy to control exposure to remaining contamination during the use of the Controlled Property of the site to ensure protection of public health and the environment. A Declaration of Covenants and Restrictions, granted to the NYSDEC, and recorded with the County Clerk, will require compliance with this SMP and all ECs and ICs placed on the Controlled Property of site. The ICs place restrictions on site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the Declaration of Covenants and Restrictions for contamination that remains at the Controlled Property of the site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Declaration of Covenants and Restrictions and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports (Biennial Site Management Reports); and (5) defining criteria for termination of monitoring and/or treatment system operations.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual for complex systems).

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Declaration of Covenants and Restrictions. Failure to properly implement the SMP is a violation of the Declaration of Covenants and Restrictions, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Declaration of Covenants and Restrictions for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 Site Background

1.2.1 Site Location and Description

The site is located in Staten Island, Richmond County, New York and is identified as Block 2440 and Lot 2 on the New York City Tax Map. The site is an approximately 18-acre area bounded by Platinum Avenue to the north, Yukon Avenue to the south, residential properties to the east, and Richmond Avenue to the west (see Figures 1 and 2). The boundaries of the site are more fully described in Appendix 1 – Metes and Bounds.

The Pergament Mall/Corniche Dry Cleaners (Pergament) site is located within the 18-acre shopping center complex of Pergament Mall on Staten Island in Richmond County, New York. The shopping center complex consists of a main core building and four (4) satellite buildings. The remainder of the site is paved and used primarily for parking. Corniche Dry Cleaners was located in the middle of the eastern satellite building (Figure 1). The space is currently leased to a Chinese restaurant. Surrounding properties are a mix of residential, commercial and retail sites, with the Fresh Kills Landfill located west and across Richmond Avenue from the Pergament Mall site. The area of remaining contamination (soil and groundwater) is an approximately 208,967 sq foot area located at the eastern portion of the site near the former dry cleaners' leasehold. This Controlled Property is more particularly shown in Appendix B of the Declaration of Covenants and Restrictions and in Figure 7 of this SMP.

1.2.2 Geologic Conditions

Site Topography

The Corniche Dry Cleaners site is located within the 18-acre shopping center complex of Pergament Mall on Staten Island in Richmond County, New York. The shopping center complex consists of a main core building and four (4) satellite buildings. The remainder of the site surrounding the structure is paved and used primarily for parking. Corniche was located in the middle of the eastern satellite building. The location is currently a Chinese restaurant and is surrounded by other restaurants and retail stores. The western end of the building is adjacent to a paved low-lying area on Staten Island (average of 32 feet above sea level), with an average surface gradient of 3% toward the southwest. A 15-foot high elevated area is located along the northeastern boundary. Surface drainage is directed into underground storm sewers that drain southwest into Richmond Creek. Recharge from precipitation is limited to a few unpaved areas around the site. The majority of precipitation is runoff that is directed away from storm sewers.

Geology

Staten Island, the southernmost of the five (5) boroughs of New York City, lies at the junction of three (3) provinces: Triassic Lowland (Newark Basin), New England Upland, and the Atlantic Coastal Plain.

The complex geologic history of Staten Island is characterized by intermittent phases of active tectonism and sedimentation separated by long hiatuses of relative inactivity. The island has experienced two (2) or more orogenies, several inundations, and at least one (1) episode of glaciation. Consolidated and unconsolidated sediments range in age from Cambrian to Holocene and include schists, serpentinite, shales, sandstones, and diabase as well as various sands, silts, and clays.

Bedrock

Pergament Mall (and most of the surrounding area) is underlain by consolidated Proterozoic-Cambrian serpentinite bedrock. The serpentinite is a moderately weathered ovoid pluton formation, dark green to mottled brown in color. This formation occupies approximately 34 km² in the north-central portion of the island. The serpentinite body is believed to be a downward-extending, 1.3 km-long, wedge-shaped formation. The Staten Island serpentinite is zoned, with the outer zone forming a highly sheared, talcose,

magnetite-rich border and the interior zone comprising a partially altered, porphyritic olivine and enstatite rock (Behm). Prior to metamorphism, the original ultramafic igneous body consisted of Harzburgite-type peridotite, a very unstable mineral under atmospheric conditions (Roberts-Dolgin). There is extensive fracturing in the serpentinite mass and several faults are known to dissect the body. These faults were classified by Miller in 1970, as cited by Roberts-Dolgin according to their orientation in relation to the rate of upward movement of the body during emplacement.

The presence of high-relief serpentinite in relation to the enclosing host rocks resulted from a northeast-southwest Triassic gravity fault. The serpentinite body is unconformably overlain by glacial ground moraine at the study area, by Cretaceous sediment to the east and south, and by Triassic deposits to the west. It is uncertain whether the serpentinite is intrusive. Its structural relation with the schist is not clear, and therefore its age in the late Proterozoic to Cambrian span is also uncertain (Roberts-Dolgin).

Overburden

Upper Pleistocene deposits of Late Wisconsinian glacial drift unconformably mantle the bedrock units. The drift consists of outwash and terminal and ground moraine deposits. The bedrock at the Pergament Mall/Corniche Dry Cleaners site is covered by unconsolidated glacial ground moraine deposits. These deposits are mainly reddish-brown clay till derived chiefly from the Upper and Lower Triassic shales and sandstones. They range in thickness from 0 to about 150 feet over the island and from 3 to 15 on site. The ground moraine consists of poorly sorted material that has substantial amounts of clay. Local bodies of stratified sand and gravel commonly occur within the moraine.

Hydrogeology

Shallow (Upper) Zone

The shallow ground water occurs within the overburden made-up of glacial drift, with some alluvial material and man-made fill. The total thickness of the overburden ranges from 3 to 15 feet at the site and the water-saturated thickness is typically only about 5 feet thick. The dominant hydraulic gradient is to the southwest, averaging 0.02 ft/ft. Ground water flow direction is to the southwest, generally following the surface topography, which nearly mirrors the bedrock surface (Figure 5).

Results of slug testing conducted by Lawler, Matusky & Skelly Engineers (LMS), indicated that a typical hydraulic conductivity value for the saturated overburden in the vicinity of wells MW-2, 3, and 4 is 3.6 ft/day. This value (3.6 ft/day) coupled with a 5 foot saturated thickness indicates that a domestic well installed in the area would yield only an estimated 0.2 gal/min. This yield is insufficient even for a domestic supply. Results of slug testing, performed by Whitman, in monitoring wells MW-5 and MW-6 show that the average overburden hydraulic conductivity is slightly lower than the 3.6 ft/day previously reported, reducing the estimated yield of the overburden aquifer to less than 0.2 gal/min.

Grain-size analysis and the Atterberg limits test (for material sieved through a No. 40 sieve) were performed on samples retrieved from the screened zone of the monitoring wells (MW-1, 2, 3, and 4). The results indicated that the screened zone consisted of poorly sorted clayey to silty fine sand with gravel, with uniformity coefficients ranging from 91.2 to 478.6 and effective grain sizes ranging from 0.0042 to 0.0122 mm. These figures support the field permeability tests and accepted parameters for glacial fill in this area.

Eleven (11) samples were collected for sieve analysis during soil investigations conducted at the subject site. Additionally, hydrometer analysis was conducted on three (3) of the eleven (11) samples. Six (6) samples were collected from above the water table and five (5) samples were collected from below the water table. Additionally, hydrometer analysis was conducted on three (3) of the eleven (11) samples. Grain size distribution curves from the grain size analysis confirms prior findings that overburden material at the subject site consists of poorly sorted clayey to silty sands, silts and very fine sands with gravel.

Deeper (Lower) Zone

The deeper ground water system occurs within the serpentine bedrock. The Staten Island serpentine is known to be a poor aquifer. Very few wells tap this plutonic body, as the wells must be deep enough to intercept sufficiently transmissive fractures. One (1) well reportedly yielded 3.5 gal/min (Soren, 1988). A supply well tapping the serpentine would need to reach about 250 feet below the water table to yield 10 gal/min (ibidem).

Any development of ground water from the serpentine in an area located downgradient (i.e. south-southwest of the Corniche site) is precluded by the occurrence of the fresh salt water interface at shallower depth than the depth required for obtaining a

sufficient well yield. Available data show that no supply wells are known to ever be drilled into the serpentine bedrock anywhere downgradient of the site (Soren, 1988).

The significantly lower permeability of the serpentine bedrock, in relation to the permeability of overburden materials, tends to promote lateral ground water flow within the overburden unit with a secondary role of vertical flow across the top of the bedrock. Furthermore, the vertical flow across the top of bedrock is likely to be directed upward. The occurrence of an upward flow from the bedrock is expected considering the elevation of the site and its location within a regional ground water discharge zone near the Richmond Creek. The fact that the water level elevation in MW-1 (completed within bedrock) is typically more than 10 feet higher than water levels in the other monitoring wells (complete in overburden) is consistent with the postulated upward flow of ground water from the bedrock into the overburden unit. This upward flow creates a hydraulic barrier preventing the migration of dissolved contamination from the overburden unit into the bedrock.

Ground Water Recharge/Discharge

Precipitation on the island is the main source of recharge to ground water reservoirs. Annual recharge on Long Island, located to the east, is about 20 inches, which yields about one million gallons per day per square mile (1 mgd/mi²). Staten Island's land surface is hillier and less permeable than that of Long Island; also, paved areas greatly reduce infiltration of water to the water table and increase runoff to streams and sewers. Thus, the recharge conditions on Staten Island are probably comparable to those in Kings and Queens Counties, where estimated recharge ranges from about 0.25 to 0.5 mgd/mi², respectively. At such recharge rates, Staten Island's ground water reservoir would receive from 15 to 30 mgd.

Based on the New York-New Jersey U.S. Geological Survey (USGS) quad topographic map for the Arthur Kill and field observations, LMS reported that ground water from the Pergament Mall site discharges into an unnamed tributary of Richmond Creek. The USGS map shows the tributary starting approximately 500 feet southwest and downgradient of the site

Whitman field observations revealed that there is currently a strip mall in the area of this tributary's origin. Furthermore, as noted in section below, the exposed portion of the tributary closest to the site is now paved over. The majority of the stream flows through underground storm sewer piping. The tributary is now fed almost entirely through surface runoff. Due to the impermeable nature of the subsurface piping it is

unlikely that there is any direct interconnection between the overburden aquifer and the tributary.

Potential Ground Water Receptors

Information was obtained to identify any domestic, industrial, or water supply wells within a one-half mile radius of the site. As noted above, there are no supply wells drilled into the serpentine bedrock anywhere downgradient of the site (Soren, 1988). George Hyde, engineer with the NYSDEC, Roman Kensy with the New York City Department of Environmental Protection and Dr. Dave Dziejewski with the New York State Department of Health were contacted to confirm that there were no ground water users in the vicinity of the subject site. According to all three (3) sources, all potable and industrial water needs on Staten Island are met via the public water supply. Furthermore, the public water supply does not utilize ground water resources in the vicinity of the site. There are no known ground water users in the vicinity of the site and there are no future plans to tap ground water resources in the vicinity of the site.

Based on the preceding information there are no known receptors of ground water contaminants that could potentially migrate from the subject site.

1.3 Summary of Remedial Investigation Findings

1.3.1 Investigation Conducted by Atlantic Environmental Service, Inc. (1987)

Atlantic Environmental Services of Colchester CT, conducted an Environmental Site Assessment of the entire Pergament Mall in August/September 1987. Corniche was a tenant in the Pergament Mall at this time.

During the Atlantic site assessment, it was reported that several spills of Tetrachloroethylene (PCE) had occurred behind the Corniche shop. Corniche used PCE as a dry cleaning solvent. To assess the PCE spills, Atlantic conducted soil and ground water sampling. After Atlantic's sampling efforts, others were contracted to excavate the PCE spill. Atlantic did collect confirmatory sampling to document the effectiveness of the cleanup effort.

Atlantic collected soil samples in those locations to document the effectiveness of the remedial activities. Atlantic prepared a letter dated September 30, 1998 evaluating remedial activities conducted at the Pergament Mall.

Atlantic advanced three (3) soil borings (BH-2A through BH-2C) in the area remediated behind Corniche. Samples were collected from each boring at a depth of 5 to 7 ft. (the assumed depth of the soil excavation) and analyzed for volatile organic compounds (VOCs). PCE was detected in all of the samples at concentrations ranging from 0.235 milligrams per kilogram (mg/kg) [BH-2B] to 2.06 ppm (BH-2A). Trichlorethene (TCE) was detected in sample BH-2A (0.420 ppm) and 1,2-Dichloroethane (1,2 DCE) was identified in samples BH-2A and BH-2C (0.154 ppm and 0.172 ppm, respectively). The reported PCE concentration in sample BH-2A only slightly exceeded the NYSDEC Soil Objectives to Protect Ground Water Quality (SOP) of 1.4 mg/kg in effect at the time of sample collection.

1.3.2 Investigation Conducted by Lawler, Matusky & Skelly Engineers (1992)

Following Atlantic's investigation, Lawler, Matusky & Skelly Engineers (LMS), Pearl River, New York, under contract to the New York State Department of Environmental Conservation (NYSDEC), performed a Phase II Investigation at Pergament Mall. Phase II activities concentrated on investigating the impact of past discharges of PCE from Corniche. The following activities were conducted:

- Soil Gas Survey
- Subsurface Soil Sampling
- Installation and Sampling of Ground Water Monitoring Wells

A soil gas survey was conducted in May 1992. Fifty (50) soil gas points were installed, sampled. PCE and 1, 2-DCE were the predominant VOCs detected. The highest soil gas concentrations were located behind and the southwest of the building in which Corniche was located.

In May 1992, LMS collected soil samples. Five (5) samples were collected and analyzed for VOCs, Semivolatile Organics, EP Toxicity Metals, Polychlorinated Biphenols (PCBs), Pesticides and Total Metals. Concentrations of PCE, TCE and 1,2-DCE were below the laboratory method detection limits in all five samples.

During the soil boring investigation, four (4) monitoring wells (MW-1 through MW-4) were installed and sampled in June 1992. The initial round of ground water samples were analyzed for VOCs, Semivolatile Organics, Total Metals, PCBs, and Pesticides.

PCE, TCE, and 1,2-DCE were the predominant organic contaminants detected in the wells MW-2, MW-3, and MW-4. Ground water was determined to flow toward the southwest. MW-1, the upgradient well, reported no detectable compound concentrations. PCE was the contaminant detected at the highest concentration. PCE results ranged from 210 micrograms per liter ($\mu\text{g/L}$) in MW-2 to 4,100 $\mu\text{g/L}$ in MW-4. TCE concentrations ranged from 10 $\mu\text{g/L}$ in MW-2 to 160 $\mu\text{g/L}$ in MW-4. The highest 1,2-DCE concentration (320 $\mu\text{g/L}$) was reported in MW-4, while lowest result was reported in MW-2 at 10 $\mu\text{g/L}$.

1.3.3 Investigations Conducted By Whitman

In 1994 Whitman was contracted by Pergament Investment, Inc. to further investigate the Pergament site. In 1996, Pergament Investment, Inc. entered into the initial 1996 Remedial Investigation/Feasibility Consent Order with the NYSDEC to complete a remedial investigation and prepare a feasibility study evaluating remedial alternatives to address the identified contamination. Whitman's investigation activities consisting of further site characterization and delineation of the contaminants are summarized below.

1.3.4 Soil Source Investigation 1997

In June and July of 1997, Whitman completed a soil boring and sampling program. The goal was to identify any source soils contaminated with PCE and TCE. Sample locations were selected based upon the results of LMS's soil-gas survey. Specifically, boreholes were advanced in the areas in which the highest PCE/TCE concentrations were reported by LMS. With the exception of one sample, W-3, all reported VOC concentrations were below the current NYSDEC Soil Cleanup Objectives (SCO). Sample W-3 contained a PCE concentration of 2.1 mg/kg, slightly exceeding the NYSDEC Unrestricted Use SCO of 1.4 mg/kg but below the Residential Use SCO of 5.5 mg/kg.

Whitman conducted a supplementary soil investigation in November 1999 and January 2000. Soil borings were installed to the east, south and west of the strip mall and beneath the flooring of the former dry cleaners. All of the reported compound concentrations, including PCE and TCE, were below the NYSDEC SCO. Based on the investigations conducted by Whitman and others, no source area of soil contamination is present. Table 1 presents a summation of the soil findings obtained by Whitman. Figure 3 presents the locations of the soil borings and samples.

1.3.5 Surface Water Investigation 1994

In April and June 1994, Whitman collected surface water samples from a tributary to Richmond Creek. This tributary is located approximately 1/4 mile north of Corniche. Samples were collected directly opposite a storm water outfall (designated as an upstream sample), at a downstream bend in the stream, and at a second outfall point, located further downstream. and at a point downstream of the outfall. All reported VO concentrations were below the NYSDEC Surface Water Quality Standards. Table 2 summarizes the results of the surface water sampling and Figure 4 presents the sample locations.

1.3.6 Ground Water Investigation

In July 2001 a Record of Decision (ROD) was issued by NYSDEC for the site to formalize the selected remedy for the site. The selected remedy required no active remediation along with the design and implementation of an ongoing ground water monitoring program and institutional controls in the form of existing use and development restrictions limiting the use of ground water as a potable water source. Subsequent to the ROD order on consent W2-0751-01-12 was executed requiring Pergament Investments to prepare and implement an Operations Maintenance and Monitoring Plan detailing the ground water monitoring remedy.

The monitoring plan was prepared and implemented and since 1994, Whitman has completed (25) additional rounds of ground water from various combinations of on-site wells during the time period of 1994 to 2011. MW-4 was paved over sometime after 1994 and could not be located by Whitman for sampling. A replacement to MW-4, (MW 4R) was installed in 1999 by Whitman. During Whitman's tenure, four (4) additional ground water monitoring wells were installed and identified as MW-5, MW-6 MW-7 and MW-8. These three wells were installed to monitoring an area downgradient of the spill, but just upgradient of the site's southern property line. MW-1 was paved over circa 2006 and as approved by NYSDEC was not replaced. Figure 5 presents the locations of the ground water monitoring wells along with ground water elevation contours showing ground water flow direction at the site

Historic ground water sampling results are presented in Table 3. The historic results show that significant reductions in contaminant concentrations have occurred since ground water monitoring began in 1992 and ground water contaminant concentrations have reached asymptotic conditions. Additionally, ground water contaminants are contained within the site boundaries and are not migrating off site.

1.3.7 Vapor Intrusion (VI) Investigations

In 2000, Whitman conducted preliminary indoor air quality screening. The interiors of several leaseholds at the site were monitored using a Photoionization Detector (PID). The survey reported that no elevated readings above background were present.

Subsequent to the PID screening comments provided by the NYSDEC and New York State Department of Health (NYDOH) in a letter dated October 24, 2000, included a recommendation that a more extensive indoor air quality investigation be conducted to evaluate the potential for contaminated ground water beneath the building to adversely impact the air within the building. Specific areas requested by NYSDEC to be included in the investigation consisted of the following leaseholds:

- Leather and Fur Ranch (in 2000, currently Nails 21st Century)
- Former Corniche Dry Cleaners (in 2000, Good Chinese Kitchen; currently Dunkin Donuts)
- Caprice Bakery (in 2000, currently Allstate)
- Gino's Pizza
- Pagoda Delight (in 2000, Fabco Shoes; currently Karate Studio)
- Bella Vita II Restaurant
- Fabric Bonanza (in 2000, 99¢ City; currently Michael's)

On December 20, 2000, Whitman collected air samples in each of the seven (7) leaseholds and at two (2) exterior background locations. All indoor air samples were collected during a four (4) hour time period during normal business operations. Samples were collected using 6-liter (L) Summa canisters equipped with laboratory-calibrated 4-hour flow valves. All samples were analyzed using EPA Method TO-15 for VOCs.

Analytical results from the 2000 sampling event indicated that PCE was present in very low concentrations in four (4) of the indoor samples and non detectable in the five (5) remaining samples. Detectable PCE concentrations ranged from 2.4 to 12 micrograms per cubic meter (ug/m³).

Several organic solvents including Acetone, Ethanol, Ethyl Acetate, Isopropyl Alcohol, and Toluene were detected within portions of the subject building. The source of these solvents appeared to be the nail salon leasehold. These findings are consistent with chemicals utilized by the nail salon as part of their routine business practices and have been identified during subsequent sampling events.

In 2006, NYSDEC and NYSDOH requested that additional vapor intrusion investigation be conducted to evaluate the potential for subsurface contaminant vapors to enter the leaseholds.

A sampling work plan was prepared and in accordance with the sampling plan (approved by NYSDEC and NYSDOH, in February 2007), Whitman collected seven (7) sub-slab soil gas, seven (7) indoor air, and two (2) outdoor ambient air samples.

Sub-slab soil gas samples were collected during a one (1) hour time period during normal business operations. Indoor air samples and outdoor ambient air samples were collected during an eight (8) hour time period during normal business operations. All samples were collected using 6-liter (L) Summa canisters equipped with laboratory-calibrated flow valves. All samples were analyzed using EPA Method TO-15 for VOCs.

Analytical results for sub-slab soil gas samples indicated PCE was detected in all seven (7) of the samples at concentrations ranging from 8.9 to 506 ug/m³. TCE was detected in five (5) of the seven (7) samples at concentrations ranging from 3.8 to 57 ug/m³. Cis-1,2-Dichloroethene was detected in one (1) sample at a concentration of 21 ug/m³.

Analytical results for indoor air samples indicated PCE was detected in two (2) samples at concentrations of 4.2 and 4.3 ug/m³, respectively. TCE and cis-1,2-Dichloroethene were not detected in any of the indoor air samples.

In a December 11, 2007 teleconference, NYSDEC and NYSDOH required additional air and soil vapor sampling at the site. According to a sampling plan approved by NYSDEC, in February 2008 Whitman collected two (2) sub-slab soil gas, six (6) indoor air, and one (1) outdoor ambient air samples. All of the February 2008 samples were collected in the same manner as those collected in February 2007. All samples were again analyzed using EPA Method TO-15 for VOCs.

PCE was detected in both of the sub-slab samples at concentrations of 821 and 20 ug/m³ respectively. TCE was detected in one sample at a concentration of 85 ug/m³ and was not detected above laboratory method detection limits the other sub-slab sample. Cis-1,2-Dichloroethene was detected in both samples at concentrations of 4.4 and 2.3 ug/m³, respectively.

Analytical results for indoor air samples indicated PCE was detected in three (3) of the six (6) samples at concentrations ranging from 8.5 to 23 ug/m³. TCE and cis-1,2-Dichloroethene were only detected in indoor air sample IA-4A at concentrations of 1.6 and 0.87, respectively. Historical sub-slab and indoor air sampling results are summarized on Table 1 and Figure 2. Based on the 2008 results, Whitman recommended biennial monitoring of indoor air in five (5) leaseholds.

In February 2010, to further monitor indoor air at the site, Whitman collected five (5) indoor air samples and one (1) outdoor ambient air sample. All of the February 2010 samples were collected in the same manner as those collected in February 2008. All samples were again analyzed using EPA Method TO-15 for VOCs. Historical sub-slab vapor and indoor air sampling results are summarized on Table 4 and Figure 6.

1.3.8 Summary of Investigations

To date, the soils, downgradient surface water, the strip mall's indoor air quality and the shallow ground water table have been evaluated as a result of several site investigations.

The results of the soil sampling indicate that there are no source areas (i.e. soil contamination) for the solvent contamination detected in the ground water. Only one soil sample contained PCE with a PCE concentration of marginally exceeding the NYSDEC Unrestricted Use SCO of 1.4 mg/kg. Therefore, active remediation of soil is deemed unwarranted, as there is no source to remediate. Engineering and institutional controls in the form of site wide paving and a Declaration of Covenants and Restrictions are the selected remedy to address this location and any other contaminated soils that may remain at the site. Further details are presented in Section 2.

The results of surface water sampling conducted at tributary to Richmond Creek reported concentrations of PCE and TCE below the NYSDEC Surface Water Quality criteria. Recent field observations of the area reveal that there is now a strip mall in the area of this tributary's origin, which was a drainage ditch. The exposed portion of the drainage ditch closest to the Pergament Mall site is paved over. The majority of the stream flows through underground storm sewer piping and the tributary is now fed almost entirely through surface runoff. Due to the impermeable nature of the subsurface piping it is unlikely that there is any direct interconnection between the overburden aquifer and the tributary. No actions are required with regard to surface water and it is not a receptor of the site's ground water contamination.

Whitman conducted air monitoring and subsurface vapor sampling in the interior areas of the strip mall. Based on the survey results, moderately elevated volatile organic compound readings were recorded. Based on the concentrations detected no active remediation is necessary. However, based on the sampling results additional monitoring is warranted. The prescribed monitoring is detailed within this site management plan.

Based on the 26 rounds of ground water sampling data collected between 1994 and 2011 PCE and TCE concentrations at the site have significantly decreased due to natural attenuation. Downgradient wells continue to report no detectable concentrations of either PCE or TCE demonstrating the contaminants are not migrating off site. However, based on the sampling results additional monitoring is warranted. The prescribed monitoring is detailed within this site management plan along with proposed institutional controls to prohibit ground water use at the site.

1.4 Summary of Remedial Actions

As noted in Section 1.3, after Atlantic's 1987 soil and ground water investigation, others were contracted to excavate the PCE spill. No details regarding the excavation activities have been identified in the historic records reviewed for the site. No additional active remediation has been conducted at the site with monitored natural attenuation of the ground water contaminants selected as the remedial measure to address the remaining ground water contamination at the site.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

Since de minimis amount of contaminated soil, contaminated groundwater and associated contaminant vapors exists beneath the Controlled Property of the Site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the Controlled Property of the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the Controlled Property of the site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Declaration of Covenants and Restrictions
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs. Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 Engineering Controls

2.2.1 Engineering Control Systems

2.2.1.1 Composite Paving / Building and Soil Cover System

Exposure to any residual contaminated soil is prevented by an engineered composite cover system. This composite cover system is comprised of existing asphalt-covered roads and parking lots, concrete-covered sidewalks, and concrete building slabs.

The results of historic soil sampling at the site indicate that there are no source areas (i.e. soil contamination) for the PCE contamination detected in the ground water. Only one soil sample contained PCE with a PCE concentration of marginally exceeding the NYSDEC Unrestricted Use SCO of 1.4 mg/kg. This sample was collected from soils 11-12 feet beneath the ground surface (bgs).

More than 95 percent of the site is covered with buildings and asphalt paving. Small landscaped areas compose the remainder of the site. In order to prevent exposure to any residual contaminated soils that may remain at the Controlled Property of the site, the existing paving / building slabs and uncontaminated soils overlaying any potential remaining soil contaminants have been selected as the appropriate engineering controls for the Controlled Property of the site.

This cover system is comprised of a minimum of 12 inches of clean soil or 4 inches of asphalt pavement, concrete-covered sidewalks, and concrete building slabs.

All engineering controls on the Controlled Property of the site (i.e. the area of the site restricted by the Declaration of Covenants and Restrictions) must be inspected at a frequency and in a manner defined in the SMP. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 4 of this SMP.

2.2.1.2 Monitored Natural Attenuation

Historic ground water sampling results are presented in Table 3. The historic results show that significant reductions in contaminant concentrations have occurred since ground water monitoring began in 1992 and ground water contaminant concentrations have reached asymptotic conditions. Additionally, ground water contaminants are contained within the site boundaries and are not migrating off site. Moreover, the site is located in a non-ground water use area. Monitoring of the ground water contaminants has been selected as the appropriate remedy to protect human health at the Pergament Mall site. Monitoring will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3).

2.2.1.3 Vapor Intrusion Monitoring

Based on the historic sub-slab and indoor air sampling concentrations at the site, no active vapor remediation (i.e. installation and operation of a sub-slab depressurization system) is currently necessary. Monitoring of sub-slab vapors and indoor air has been selected as the appropriate remedy to protect human health at the Pergament Mall site. Monitoring will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3).

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10 (May 2010).

2.2.2.1 Composite Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity. Any disturbance to the cover system whether intentional (i.e. utility work at the site) or accidental (i.e. storm damage) will be repaired as expeditiously as is practical.

2.2.2.2 Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, on a biennial basis, until residual groundwater concentrations are found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

2.2.2.3 Vapor Intrusion Monitoring

Indoor air and sub-slab vapor monitoring activities to assess human health risk will continue, on a biennial basis (every two years), until sub-slab vapors are found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If indoor air levels are found to exceed the current NYSDEC standards, the need for additional mitigation requirements such as the installation / operation / monitoring of sub-slab depressurization systems or other mitigation systems will be evaluated.

2.3 Institutional Controls

A series of Institutional Controls is required by the NYSDEC to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the contaminated portion of site to commercial or industrial uses only. Adherence to these Institutional Controls on the site is required by the Declaration of Covenants and Restrictions and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Declaration of Covenants and Restrictions and this SMP by the Grantor and the Grantor's successors and assigns;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Groundwater, soil vapor and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Declaration of Covenants and Restrictions may not be discontinued without an amendment to or extinguishment of the Declaration of Covenants and Restrictions

The Controlled Property of the site has a series of Institutional Controls in the form of site use restrictions set forth in the Declaration of Covenants and Restrictions. Adherence to these Institutional Controls is required by the Declaration of Covenants and Restrictions. Site restrictions that apply to the Controlled Property are:

- The Controlled Property of the site (Figure 7) may be used for commercial or industrial use provided that the long-term Engineering and Institutional Controls included in this SMP are employed;
- Uses other than commercial or industrial on the Controlled Property of the site of property are prohibited. Specifically, Vegetable Gardens, farming, other agricultural and Residential use are prohibited on the Controlled Property of the site;
- The Controlled Property of the site may not be used for a higher level of use, such as residential or unrestricted use without additional remediation and amendment of the Declaration of Covenants and Restrictions, as approved by the NYSDEC;
- All future activities on the Controlled Property of the site that will disturb any remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the Controlled Property of the site is prohibited without treatment rendering it safe for intended use;

- The potential for vapor intrusion must be evaluated for any buildings developed in the Controlled Property of the site (Figure 7), and any potential impacts that are identified must be monitored or mitigated;
- The site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted biennially, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.3.1 Soil Vapor Intrusion Evaluation

Prior to the construction of any enclosed structures located over the Controlled Property that contain remaining contamination as to which the potential for soil vapor intrusion (SVI) has been identified (see Figure 7), an SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. Alternatively, an SVI mitigation system may be installed as an element of the building foundation without first conducting an investigation. This mitigation system will include a vapor barrier and passive sub-slab depressurization system that is capable of being converted to an active system.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan will be developed and submitted to the NYSDEC and NYSDOH for approval. This work plan will be developed in accordance with the most recent NYSDOH “Guidance for Evaluating Vapor Intrusion in the State of New York”. Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary (unvalidated) SVI sampling data will be forwarded to the NYSDEC and NYSDOH for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action, such as mitigation. SVI sampling results, evaluations, and follow-up actions will also be summarized in the next Periodic Review Report.

2.4 Inspections and Notifications

2.4.1 Inspections

Inspections of all remedial components installed at the Controlled Property of the site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive inspection of the Controlled Property will be conducted biennially (at least once every two years), regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Declaration of Covenants and Restrictions;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If site records for the Controlled Property of the site are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a casualty or natural disaster affecting the Controlled Property of the site or an unforeseen failure of any of the ECs occurs, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in the Controlled Property of the site use that are required under the terms of 6NYCRR Part 375, or Environmental Conservation Law.
- Notice within 48-hours of any damage or defect to the foundations or structures in the Controlled Property that reduces or has the potential to reduce the effectiveness of other Engineering Controls and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Controlled Property of the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site including the Controlled Property or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the Declaration of Covenants and Restrictions, and all approved work plans and reports, including this SMP
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related emergency situation or unplanned occurrence at the Controlled Property of the site requiring assistance to avoid, correct or mitigate a material threat to public health, safety or the environment, the Owner or

Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to WHITMAN or another qualified environmental professional. These emergency contact lists must be maintained in an easily accessible location at the site.

Table 5 Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Table 6 Other Contact Numbers

WHITMAN	(732) 390-5858

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: Pergament Mall, 2795 Richmond Ave, Staten Island, NY 10314

Nearest Hospital Name: Staten Island University Hospital, South Site

Hospital Location: 375 Seguine Ave, Staten Island, NY 10309

Hospital Telephone: (718) 226-2000

Directions to the Hospital:

1. Head south on Richmond Ave
2. Slight right onto Drumgoole Rd W (signs for Korean War Vets Pkwy/Outerbridge Cr)

3. Take the ramp on the left onto Korean War Veterans Pkwy/Richmond Pkwy
4. Take the exit toward Huguenot Ave/Foster Rd
5. Merge onto Drumgoole Rd W
6. Turn left onto Huguenot Ave
7. Turn right onto Amboy Rd
8. Turn left onto Seguine Ave
9. Turn left onto Melville St
10. Take the 1st left onto Ormsby Ave

Total Distance: 5.1 miles

Total Estimated Time: 12 minutes

Map Showing Route from the site to the Hospital:

2795 Richmond Ave, Staten Island, NY 10314 to Staten Island Universi... http://maps.google.com/maps?f=d&source=s_d&saddr=2795+Richmo...



Directions to Staten Island University Hospital

375 Segune Avenue, New York, NY 10309 - (718) 226-2000

5.1 mi – about 12 mins



2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the within this Contingency Plan. The list will also be posted prominently at the site and made readily available to all personnel at all times.

3.0 SITE MONITORING PLAN

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the site, the soil cover system, and all affected site media identified below. Monitoring of other Engineering Controls is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Assessing achievement of the remedial performance criteria.
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.
- To adequately address these issues, this Monitoring Plan provides information on:
 - Sampling locations, protocol, and frequency;
 - Information on all designed monitoring systems (e.g., well logs);
 - Analytical sampling program requirements;
 - Reporting requirements;

- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Biennial monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted for the first six years. The frequency thereafter will be recommended Pergament and implemented upon NYSDEC approval. Trends in contaminant levels in air, soil, and/or groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in the Table 5 below and outlined in detail in Sections 3.2 and 3.3 below.

Table 7 Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Soil Cover/Cap	Biennially	Soil	Visual Inspection
Ground Water	Annually through 2013, Biennially thereafter	Ground Water	VO+10 / EPA 624
Indoor Air	Biennially	Indoor Air	TO+15
Sub-Slab Vapor	Biennially	Sub –Slab Vapor	TO+15

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

3.2 Soil Cover System Monitoring/Maintenance

Monitoring of the institutional and engineering control will consist of a biennial inspection of the Controlled Property of the site, at a minimum, and an evaluation of the cap/cover. The results of all inspections and maintenance and any disturbances of the controls shall be documented in a logbook, which will be made available on site to the NYSDEC upon request.

Maintenance will be conducted as necessary to continually maintain the integrity of all cap materials. Prevent/minimize disturbance in the capped areas (i.e. excavation, intrusive construction).

Impermeable capped areas including building foundations, sidewalks, asphalt and concrete paved areas shall be routinely evaluated and maintained. All cracks, damage or wear shall be repaired.

Vegetative Capped areas shall be routinely evaluated for erosion, stressed vegetation, etc. A regular schedule for mowing and maintaining vegetative growth and reseeding / replanting will be maintained on an as needed basis.

3.3 Media Monitoring Program

3.3.1 Groundwater Monitoring

Groundwater monitoring will be performed on a periodic basis to assess the performance of the remedy.

Monitored Natural Attenuation was selected as the appropriate remedy for ground water at the site. In July 2001 a Record of Decision (ROD) was issued by NYSDEC for the site to formalize the selected remedy for the site. The selected remedy required no active remediation along with the design and implementation of an ongoing ground water monitoring program. The monitoring plan was prepared and implemented and since 1994, Whitman has completed (25) additional rounds of ground water sampling from various combinations of on-site wells during the time period of 1994 to 2011. Over that 17 year period, contaminant concentrations have reached asymptotic conditions. The following ground water monitoring program is in place to insure that the ground water contaminant plume does not migrate off-site (thereby protecting human health and the environment) and to monitor for further ground water contaminant concentrations decreases.

The original network of monitoring wells has been installed to monitor both up-gradient and down-gradient groundwater conditions at the site. The network of on- wells was designed based on the following criteria:

- Figure 5 shows the location of on-site monitoring well relative to the source area and ground water flow direction. Ground water flow is consistently toward the southwest.

- The wells are screened across the shallow water table, with the screen set on top of or just into the underlying serpentine bedrock. Depth to bedrock at the site ranges from approximately 6 feet below grade to 20 feet below grade.
- Monitoring well logs showing well construction details are included in Appendix 4
- MW-1 was installed up gradient of the source area was damaged and paved over. Reinstallation of this well was not required by NYSDEC. The remaining seven (7) wells were installed down and side gradient of the source area.

The wells to be sampled, sampling frequency and sampling parameters are shown in below

<u>Well ID</u>	<u>Sampling Frequency</u>	<u>Sampling Parameters</u>
MW-5	Annual through 2013 / Biennial thereafter	VO+10 / EPA 624
MW-6	Annual through 2013 / Biennial thereafter	VO+10 / EPA 624
MW-7	Annual through 2013 / Biennial thereafter	VO+10 / EPA 624
MW-2	Quadrennial beginning in 2017	VO+10 / EPA 624
MW-3	Quadrennial beginning in 2017	VO+10 / EPA 624
MW-7	Quadrennial beginning in 2017	VO+10 / EPA 624
MW-8	Quadrennial beginning in 2017	VO+10 / EPA 624

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log prepared and presented in the biennial site management report. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Ground water samples will be analyzed for Volatile Organic Compounds (VO+10) using EPA method 624. Analysis will be provided by a NYSDOH certified lab.

All site wells will be gauged during the sampling events to continue verification of ground water flow direction. Wells will be purged and sampled utilizing the standard well volume method outlined in USEPA's "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers" EPA 542-S-02-001. Wells will be sampled from lowest relative concentration to highest concentration to minimize the possibility of cross-contamination between wells. Sampling information will be recorded on well sampling logs and will be submitted with biennial reports. An example well sampling log is presented in Appendix 5.

3.3.1.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.3.2 Indoor Air/Sub Slab Vapor Monitoring Program

Based on the findings of historic indoor air quality investigation, chemicals associated with ground water and soil contamination beneath and near the building leaseholds on the site were not detected at significant concentrations within the building.

Considering the location of existing subsurface ground water contamination, the areas included in this investigation would be expected to have represented a worst-case scenario in terms of potential exposure. The last round of indoor air sampling was conducted in 2011. On-going monitoring to ensure that the sub-surface vapors are not entering on-site buildings will be conducted to protect human health at the site.

The next round of indoor air sampling will be conducted in 2013 and biennially thereafter. The next round of sub slab sampling will occur in 2013 and biennially thereafter. Sampling will be conducted during the winter heating season in the following leaseholds (Figure 6).

- Allstate
- Dunkin Donuts
- Nails
- Jennifer Convertibles
- Bella Vita II

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Deliverables for the indoor air/sub-slab vapor monitoring program are specified below.

3.3.2.1 Sampling Protocol

All of the proposed work is intended to be consistent with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 and with NYSDOH's Indoor Air Sampling Analysis Guidance, February 1, 2005.

For each leasehold, a pre-sampling inspection will be performed to evaluate the physical layout and conditions of the leasehold being investigated, and materials in the leasehold that could interfere with the evaluation of the sample analysis.

Because the leasehold spaces under investigation are retail operations, indoor air quality samples will be collected for 8 hours per location, with samples collected in 6-liter Summa canister, with flow rates that conform to the NYSDOH specifications.

All indoor air samples will be laboratory analyzed for TO+15 by a NYSDOH certified lab.

Concurrent with indoor air sampling, one (1) outdoor air samples will be collected, over an 8-hour period. This sample will be collected in the vicinity of the former dry cleaner leasehold.

In accordance with NYSDOH Guidance, the following steps will be followed in conducting sub-slab vapor sampling.

1. Normal indoor air temperatures will be maintained for twenty-four (24) hours prior to sampling.
2. Building's floors will be inspected to note any cracks or penetrations. Sampling will be conducted at locations where there is minimal potential for ambient air infiltration.
3. Vapor sampling will be conducted using temporary probes of polyethylene or Teflon tubing.
4. Vapor sampling tubing will be extended no more than two (2) inches into the sub-slab material.
5. The sampling implant will be sealed with non-VOC containing and non-shrinking material.
6. Vapors will be collected in 6-liter Summa canisters.
7. Purging and collecting flow rates will be controlled not to exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling.
8. Based on the flow rate, and the 6-liter canister volume, each sub-slab vapor sample will be collected over a one (1) hour period.
9. Conditions in the leasehold spaces to be sampled will be documented as specified in the Soil Vapor Intrusion Guidance.
10. The field sampling team will maintain a sample log sheet as specified by NYSDOH.
11. An appropriate tracer gas will be used to serve as a quality control, quality assurance measure.
12. Soil vapor samples will be analyzed by a certified laboratory for Volatile Organics by EPA Method TO-15.

All sample analytical results, appropriate QA/QC data, and field log sheets will be submitted to NYSDEC in biennial site management reports.

3.4 Site Inspections

Inspections of the Controlled Property of the site will be performed on a regular schedule at a minimum of once every two years (biennially). Inspections will also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix 6). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General conditions at the time of the inspection;
- The site management activities being conducted at the Controlled Property, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that site records for the Controlled Property are up to date.

3.5 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the site (Appendix 7). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement;
- Sampling Program:
 - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
 - Sample holding times will be in accordance with the NYSDEC ASP requirements.
 - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
 - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
 - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

3.6 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file on-site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report (Site Management Report), as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. The report will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized below

Table 8 Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*
Site Inspections, including soil cap/cover	Biennially
Ground Water Monitoring /Sampling	Biennially
Indoor Air /Sub-Slab Vapor Monitoring	Biennially

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC

4.0 OPERATION AND MAINTENANCE PLAN

4.1 Introduction

The site remedy does not rely on any mechanical systems, such as sub-slab depressurization systems or air sparge / soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 Site Inspections

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan and Section 4 Operation and Maintenance Plan of this SMP. At a minimum, Controlled Property inspections will be conducted biennially. Inspections will also occur whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms which are contained in Appendix 6. Additionally, a general site-wide inspection form

will be completed during the Controlled Property inspection (see Appendix 6). These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Controlled Property of site during the reporting period will be provided in electronic format in the biennial site management reports.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,
- The site remedy continues to be protective of public health and the environment.

5.2 Certification of Engineering and Institutional Controls

After the last inspection of the reporting period, a qualified environmental professional will prepare the following certification:

For each institutional or engineering control identified for the Controlled Property of the site, I certify that all of the following statements are true:

- The inspection of the Controlled Property of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this Controlled Property is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;

- Access to the Controlled Property of the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the Controlled Property of the site is compliant with the environmental Declaration of Covenants and Restrictions;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program; and
- The information presented in this report is accurate and complete.
- No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and
- Every five years the following certification will be added:
- The assumptions made in the qualitative exposure assessment remain valid.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of WHITMAN, am certifying as Owner’s Designated Site Representative: and I have been authorized and designated by all site owners to sign this certification for the site.

The signed certification will be included in the Periodic Review Report described below.

5.3 Periodic Review Report

A Periodic Review Report (Site Management Report) will be submitted to the Department every two years, beginning twenty four months after the No Further Action Letter, Certificate of Completion or equivalent document is issued. In the event that the Controlled Property of the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Controlled Property of site described in Appendix 1 (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the

end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Controlled Property of the site;
- Results of the required biennial site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the Controlled Property of the site during the reporting period in electronic format;
- A summary of any monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A site evaluation, which includes the following:
 - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;
 - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
 - The overall performance and effectiveness of the remedy.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Central Office and Regional Office in which the site is located, and in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 Corrective Measures Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

TABLES

**TABLE 1
PERGAMENT MALL
STATEN ISLAND, NEW YORK
HISTORIC SOIL SAMPLING RESULTS FOR VOLATILE ORGANIC COMPOUNDS**

Sample ID Lab Sample Number Sampling Date Sample Depth (feet) Units	Soil Cleanup Objectives to Protect GW Quality mg/kg	W-1 13176 07/23/97 7.0-8.0 mg/kg	W-2 13175 07/23/97 9.0-10.0 mg/kg	W-3 13174 07/23/97 11-12 mg/kg	W-4 13188 07/24/97 10.0-11.0 mg/kg	W-5 13187 07/24/97 10.0-11.0 mg/kg	W-6 13188 07/24/97 11.0-12.0 mg/kg	W-7 13185 07/24/97 10.0-12.0 mg/kg	W-8 13177 07/23/97 13.0-14.0 mg/kg	W-9 13182 07/24/97 10.0-12.0 mg/kg	W-10 13179 07/23/97 8.5-9.5 mg/kg	W-11 13189 07/24/97 13.0-14.0 mg/kg	W-12 13178 07/23/97 13.0-14.0 mg/kg	W-13 13180 07/23/97 7.5-8.5 mg/kg	W-14 13190 07/24/97 9.0-10.0 mg/kg	
VOLATILE COMPOUNDS																
Chloromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	0.1	0.005	0.001	ND	0.0033	0.0026	0.0043	0.0017	0.001	0.0014	0.0011	0.0053	0.0009	0.0012	0.0053	
Trichlorofluoromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethane	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1.4	0.0045	ND	2.1	ND	0.0009	0.046	0.015	0.03	0.13	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc.		0.0095	0.001	2.1	0.0033	0.0035	0.0503	0.0167	0.031	0.1314	0.0011	0.0053	0.0009	0.0012	0.0053	
Total Estimated Conc. VOA TICs (s)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	

- ☐ - Concentration Exceeds NYSDEC Soil Cleanup Objectives
- NC - No Criteria for Individual Contaminant
- ND - None Detected
- NA - Not Analyzed
- B - The analyte was found in the laboratory blank as well as the sample.
This indicates possible laboratory contamination of the environmental sample.
- J - The result is less than the specified detection limit but greater than zero.
The concentration given is an approximate value.
- * - W-16 is a Laboratory Blind duplicate of W-15
- ** - X-22 is a Laboratory Blind duplicate of W-22

**TABLE 1
PERGAMENT MALL
STATEN ISLAND, NEW YORK
HISTORIC SOIL SAMPLING RESULTS FOR VOLATILE ORGANIC COMPOUNDS**

Sample ID	Soil Cleanup Objectives to Protect GW Quality	W-15 13183 07/24/97 9.0-10.0 mg/kg	W-16* 13184 07/24/97 9.0-10.0 mg/kg	ISB-1 20272 09/05/97 2.0-2.5 mg/kg	ISB-1 20273 09/05/97 4.5-5.0 mg/kg	ISB-1 178182 01/07/00 8-9 mg/kg	MW-4 170389 11/19/99 12-12.5 mg/kg	W-17 170388 11/19/99 9-10 mg/kg	W-18 170386 11/19/99 1-2 mg/kg	W-18 170387 11/19/99 9-10 mg/kg	W-19 170385 11/19/99 12.5-13.5 mg/kg	W-20 170384 11/19/99 12-13 mg/kg	W-21 170383 11/19/99 11-12 mg/kg	W-22 170381 11/19/99 13-14 mg/kg	X-22** 170382 11/19/99 13-14 mg/kg	
VOLATILE COMPOUNDS																
Chloromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	0.1	0.0012	0.0014	0.0027	0.0027	ND	0.0021J	0.0019J	0.0026J	0.0023J	0.0039J	0.0021J	0.0024J	0.0027J	0.0026J	0.0026J
Trichlorofluoromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	NC	ND	ND	ND	ND	ND	ND	ND	0.0042J	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.7	ND	ND	ND	ND	ND	ND	0.0007J	0.0006J	0.0006J	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1.4	ND	ND	ND	ND	0.0039	ND	0.067	0.0007J	0.0008J	ND	0.025	0.0071	0.0008	ND	ND
1,1,2,2-Tetrachloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.5	ND	ND	ND	ND	ND	0.001J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc.		0.0012	0.0014	0.0027	0.0027	0.0039	0.0031J	0.0696J	0.0081J	0.0037J	0.0039J	0.0271J	0.0095J	0.0035J	0.0026J	0.0026J
Total Estimated Conc. VOA TICs (s)		0	0	0	0	0	0	0.047	0	0.033	0	0	0.037	0.029	0.027	0.027

- ☐ - Concentration Exceeds NYSDEC Soil Cleanup
- NC - No Criteria for Individual Contaminant
- ND - None Detected
- NA - Not Analyzed
- B - The analyte was found in the laboratory blank ± This indicates possible laboratory contamination
- J - The result is less than the specified detection limit The concentration given is an approximate value
- * - W-16 is a Laboratory Blind duplicate of W-15
- ** - X-22 is a Laboratory Blind duplicate of W-22

TABLE 2

**Pergament Mall/Corniche Dry Cleaners
Historic Surface Water Analytical Results**

Sampling Location Sampling Date	ST-1		ST-2		ST-3		NYSDEC Surface Water Criteria* (mg/l)
	4/15/1994	6/23/1994	4/15/1994	6/23/1994	4/15/1994	6/23/1994	
Volatile Organics (mg/l)							
Benzene	ND	ND	ND	NS	ND	ND	0.0007
1,2-Dichloroethene (total)	0.0027	0.0042	0.003	NS	ND	0.0042	0.050
trans-1,2-Dichloroethene	NR	ND	NR	NS	NR	ND	0.050
cis-1,2-Dichloroethene	NR	0.0042	NR	NS	NR	0.0042	0.050
Chloroform	0.0027	0.002	0.0027	NS	ND	0.001	0.007
Methylene Chloride	ND	0.0024	ND	NS	ND	0.0017	0.050
Tetrachloroethene	0.017	0.024	0.015	NS	ND	0.0093	0.050
Toluene	0.014	0.0077	0.013	NS	0.0007 J	0.017	0.050
1,1,1-Trichloroethane	0.0016	0.004	ND	NS	ND	0.0047	0.050
Trichlorofluoromethane	ND	ND	ND	NS	ND	ND	0.050
Xylenes (total)	ND	ND	ND	NS	ND	ND	0.050
Total Concentration Target Compounds	0.0353	0.0443	0.337	NS	0.0007 J	0.0379	0.100
Concentration Library Search Compounds	0.010	0.017	ND	NS	0.0007	0.019	NC

Key:

- ND - None Detected
 - J - The result is less than the specified detection limit but greater than zero (0). The result is given an approximate value.
 - B - Substance detected in laboratory blank
 - NA - Not analyzed
 - NR - Not reported by laboratory
 - NC - No Criteria
- Surface water criteria derived from the NYSDEC Water Quality Regulations Title 6, Chapter X Parts 702.15, 7-2.16 and 703.5 (Table 1) Soil Cleanup Criteria, Revised 3/3/94

TABLE 3
PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-1 6/1/1992 ug/l	MW-1 3/25/1994 ug/l	MW-1 6/23/1994 ug/l	MW-1 9/23/1997 ug/l	MW-1 2/25/1998 ug/l	MW-1 1/7/2000 ug/l	MW-1 7/30/2003 ug/l	MW-1 10/28/2003 ug/l	MW-1 1/29/2004 ug/l	MW-1 5/5/2004 ug/l	MW-1 7/22/2004 ug/l	MW-1 11/4/2004 ug/l	MW-1 2/15/2005 ug/l	MW-1 4/27/2005 ug/l	MW-1 7/28/2005 ug/l	MW-1 10/27/2005 ug/l	MW-1 1/25/2006 ug/l
Volatile Organic Compounds																		
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acrylonitrile	5*	NR	NR	NR	NR	NR	NR	NR	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acrolein	5*	NR	NR	NR	NR	NR	NR	NR	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chloromethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Bromomethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vinyl Chloride	2	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chloroethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Methylene Chloride	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Trichlorofluoromethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethene	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
trans-1,2-Dichloroethene	5*	NR	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
cis-1,2-Dichloroethene	5*	NR	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chloroform	7	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloroethane	0.6	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1,1-Trichloroethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbon Tetrachloride	5	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Bromodichloromethane	50(b)	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloropropane	1	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
cis-1,3-Dichloropropene	0.4(a)	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Trichloroethene	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibromochloromethane	50 (b)	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1,2-Trichloroethane	1	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzene	1	ND	NS	0.5	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
trans-1,3-Dichloropropene	0.4(a)	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chloroethyl Vinyl Ether	NC	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Bromoform	NC	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Tetrachloroethene	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1,2,2-Tetrachloroethane	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Toluene	5*	ND	NS	0.8	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chlorobenzene	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Ethylbenzene	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Xylene (Total)	5*	ND	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Confident Conc. VOAs (s)		ND	NS	1.3	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

- █ - Results above NYSDEC Ground Water Standards/
Criteria - GA Water Class
- ND - Not detected
- NC - No criteria
- NS - Not sampled
- NR - Not reported by laboratory
- B - Compound detected in laboratory blank
- J - The result is less than the specified detection limit
but greater than zero. The result is an approximate
value.
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TABLE 3
PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-1 4/18/2006 ug/l	MW-1 7/27/2006 ug/l	MW-1 8/4/2010 ug/l	MW-2 6/1/1992 ug/l	MW-2 3/25/1994 ug/l	MW-2 6/23/1994 ug/l	MW-2 9/23/1997 ug/l	MW-2 2/25/1998 ug/l	MW-10** 2/25/1998 ug/l	MW-2 1/7/2000 ug/l	MW-2 7/30/2003 ug/l	MW-2 10/28/2003 ug/l	MW-2 1/29/2004 ug/l	MW-2 5/5/2004 ug/l	MW-2 7/22/2004 ug/l	MW-2 11/4/2004 ug/l	MW-2 2/15/2005 ug/l
Volatile Organic Compounds																		
Acetone	50(b)	NS	NS	NS	19	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrolein	5*	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chloromethane	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Bromomethane	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Vinyl Chloride	2	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Chloroethane	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Methylene Chloride	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Trichlorofluoromethane	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,1-Dichloroethene	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,1-Dichloroethane	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
trans-1,2-Dichloroethene	5*	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
cis-1,2-Dichloroethene	5*	NS	NS	NS	NR	NR	5.8	90	92	86	40	56.5	35.4	32.1	36.6	34.6	NS	NS
Chloroform	7	NS	NS	NS	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,2-Dichloroethane	0.6	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,1,1-Trichloroethane	5*	NS	NS	NS	ND	ND	6.8	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Carbon Tetrachloride	5	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Bromodichloromethane	50(b)	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,2-Dichloropropane	1	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
cis-1,3-Dichloropropene	0.4(a)	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Trichloroethene	5*	NS	NS	NS	10 J	ND	ND	58	68	66	32	45.6	55	46.6	46.5	47.8	NS	NS
Dibromochloromethane	50 (b)	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,1,2-Trichloroethane	1	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Benzene	1	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
trans-1,3-Dichloropropene	0.4(a)	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
2-Chloroethyl Vinyl Ether	NC	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Bromoform	NC	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Tetrachloroethene	5*	NS	NS	NS	210	960	194	1000	1000	970	380	611	763	572	487	602 D	NS	NS
1,1,2,2-Tetrachloroethane	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Toluene	5*	NS	NS	NS	ND	87	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Chlorobenzene	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Ethylbenzene	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Xylene (Total)	5*	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Total Confident Conc. VOAs (s)		NS	NS	NS	229	1047	208	1148	1160	1122	452	713	853	651	570	82.4	NS	NS

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TABLE 3
PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-2 4/27/2005 ug/l	MW-2 7/28/2005 ug/l	MW-2 10/27/2005 ug/l	MW-2 1/25/2006 ug/l	MW-2 4/18/2006 ug/l	MW-2 7/27/2006 ug/l	MW-2 10/26/2006 ug/l	MW-2 1/25/2007 ug/l	MW-2 4/27/2007 ug/l	MW-2 7/30/2007 ug/l	MW-2 11/7/2007 ug/l	MW-2 8/4/2010 ug/l	MW-3 6/1/1992 ug/l	MW-3 3/25/1994 ug/l	MW-3 6/23/1994 ug/l	MW-3 9/23/1997 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	NR	NR	NR
Acrolein	5*	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	NR	NR	NR
Chloromethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	NS	4.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	NR	ND	ND
cis-1,2-Dichloroethane	5*	NS	4.64	3.26	3.73	2.55	1.90	2.81	4.44	2.87	2.76	0.454	1.57	NR	NR	78	14
Chloroform	7	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.352	ND	ND	ND	6.4
1,2-Dichloroethane	0.6	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	19	49	ND
Carbon Tetrachloride	5	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	NS	7.2	3.88	4.4	3.46	3.05	4.09	5.25	3.56	4.62	1.05	3.12	52	ND	ND	ND
Dibromochloromethane	50(b)	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18
1,1,2-Trichloroethane	1	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	NS	67.2	56	52	43.6	36.0	45.9	48.5	37.0	42.4	22.3	30.7	1800	2000	1500	1100
1,1,2,2-Tetrachloroethane	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5*	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc. VOAs (s)		NS	83.7	63.1	60.1	49.6	41.0	52.8	58.2	43.4	49.8	23.8	35.7	1852	2019	1627	1138

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STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-3 2/25/1998 ug/l	MW-3 1/7/2000 ug/l	MW-3 7/30/2003 ug/l	MW-3 10/28/2003 ug/l	MW-3 1/29/2004 ug/l	MW-3 5/5/2004 ug/l	MW-3 7/22/2004 ug/l	MW-3 11/4/2004 ug/l	MW-3 2/15/2005 ug/l	MW-3 4/27/2005 ug/l	MW-3 7/28/2005 ug/l	MW-3 10/27/2005 ug/l	MW-3 1/25/2006 ug/l	MW-3 4/18/2006 ug/l	MW-3 7/27/2006 ug/l	MW-3 10/26/2006 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND
Acrolein	5*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND
Chloromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethane	5*	ND	40	80.5	23.6	23	24.5	15.4	8.64	7.43	8.2	8.37	11.3	11.3	11.6	15.6	14.0
Chloroform	7	8.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	13	38	31.6	17.7	26	36.2	27.6	17.9	17.4	15	14.8	18.7	14.5	14.9	15.0	15.9
Dibromochloromethane	50 (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	940	1200	811	478	752	946	867	602	601	573	527	543	457	491	471	392
1,1,2,2-Tetrachloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc. VOAs (s)		961	1278	923	519	801	1007	910	629	626	596	550	573	483	518	502	422

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round; original well was damaged
- (a) Applies to the sum of cis- and trans-1,3-dichloropropene.
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PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-3 1/25/2007 ug/l	MW-3 4/27/2007 ug/l	MW-3 7/30/2007 ug/l	MW-3 11/7/2007 ug/l	MW-3 8/4/2010 ug/l	MW-4 6/1/1992 ug/l	MW-4 3/25/1994 ug/l	MW-4 6/23/1994 ug/l	MW-4*** 1/7/2000 ug/l	MW-4 7/31/2003 ug/l	MW-4 10/28/2003 ug/l	MW-4 1/29/2004 ug/l	MW-4 5/5/2004 ug/l	MW-4 7/22/2004 ug/l	MW-4 11/4/2004 ug/l	MW-4 2/15/2005 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrolein	5*	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chloromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5*	ND	ND	ND	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5*	12.2	7.12	8.92	10.0	4.75	NR	NR	94	0.7	0.693	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.19	ND	0.394	1.83	1.11	0.595	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	ND	ND	91	70	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	16.1	12.1	12.7	17.5	11.8	160 J	ND	ND	0.3	0.703	ND	ND	ND	ND	ND	ND
Dibromochloromethane	50 (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	472	462	509	542 D	464	4100	5600	4400	18	5.65	1	1.59	10.2	5.04	3.27	1.63
1,1,2,2-Tetrachloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc. VOAs (s)		500	481	531	570	481	4260	5691	4564	19	8.24	1	1.98	12.0	6.15	3.87	1.63

- - Results above NYSDEC Ground Water Standards/
Criteria - GA Water Class
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- B - Compound detected in laboratory blank
- J - The result is less than the specified detection limit
but greater than zero. The result is an approximate
value.
- D - The compound was reported from the diluted analysis
- * - The principal organic contaminant standard for
ground water applies to this compound.
- ** - MW-9 is a laboratory blind duplicate of MW-6
- ** - MW-10 is a laboratory blind duplicate of MW-2
- *** - MW-4 had been replaced before this sampling
round; original well was damaged
- (a) Applies to the sum of cis- and trans-1,3-dichloropropene.
- (b) Guidance Value only.

TABLE 3
PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-4 4/27/2005 ug/l	MW-4 7/28/2005 ug/l	MW-4 10/27/2005 ug/l	MW-4 1/25/2006 ug/l	MW-4 4/18/2006 ug/l	MW-4 7/27/2006 ug/l	MW-4 7/30/2007 ug/l	MW-4 8/4/2010 ug/l	MW-5 9/23/1997 ug/l	MW-5 2/25/1998 ug/l	MW-5 1/7/2000 ug/l	MW-5 7/30/2003 ug/l	MW-5 10/28/2003 ug/l	MW-5 1/29/2004 ug/l	MW-5 5/5/2004 ug/l	MW-5 7/22/2004 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NR	NR	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR
Acrolein	5*	NR	NR	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR
Chloromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	2.64	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	1.34	ND	ND	ND	ND	ND	ND	0.693	ND	2.1	0.937	1.57	1.96	2.60	2.94
1,2-Dichloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	0.263 J	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	50 (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	1.88	2.68	3.49	1.79	2.67	4.62	3.14	2.92	0.3	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	0.832	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5*	ND	ND	ND	ND	ND	ND	ND	ND	3.4	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc. VOAs (s)		2.71	6.66	3.49	1.79	2.67	4.62	3.14	3.18	4.39	ND	2.1	0.937	1.57	1.96	2.60	2.94

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TABLE 3
PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-5 11/4/2004 ug/l	MW-5 2/15/2005 ug/l	MW-5 4/27/2005 ug/l	MW-5 7/28/2005 ug/l	MW-5 10/27/2005 ug/l	MW-5 1/25/2006 ug/l	MW-5 4/18/2006 ug/l	MW-5 7/27/2006 ug/l	MW-5 7/30/2007 ug/l	MW-5 8/4/2010 ug/l	MW-5 8/25/2011 ug/l	MW-6 9/23/1997 ug/l	MW-9* 9/23/1997 ug/l	MW-6 2/25/1998 ug/l	MW-6 1/7/2000 ug/l	MW-6 7/30/2003 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR
Acrolein	5*	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR
Chloromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	ND	ND	2.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	2.74	1.60	1.44	1.34	0.843	1.03	0.746	0.871	1.02	1.9	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	50 (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0605
1,1,2,2-Tetrachloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	0.5	ND	ND	ND
Chlorobenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.8	6.7	5.7	3.6	4.01
Xylene (Total)	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	28	17	17	12	3.4
Total Confident Conc. VOAs (s)		2.74	1.60	1.44	3.40	0.843	1.03	0.746	0.871	1.02	1.9	ND	39	23.2	22.7	15.6	7.47

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 round; original well was damaged
 (a) Applies to the sum of cis- and trans-1,3-dichloropropene.
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STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-6 10/28/2003 ug/l	MW-6 1/29/2004 ug/l	MW-6 5/6/2004 ug/l	MW-6 7/22/2004 ug/l	MW-6 11/4/2004 ug/l	MW-6 2/15/2005 ug/l	MW-6 4/27/2005 ug/l	MW-6 7/28/2005 ug/l	MW-6 10/27/2005 ug/l	MW-6 1/25/2006 ug/l	MW-6 4/18/2006 ug/l	MW-6 7/27/2006 ug/l	MW-6 7/30/2007 ug/l	MW-6 8/4/2010 ug/l	MW-6 8/25/2011 ug/l	MW-7 3/21/2000 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR
Acrolein	5*	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR
Chloromethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	ND	ND	ND	NS	NS	NS	2.87	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	0.422	0.683	0.729	NS	NS	NS	1.1	0.852	0.878	0.709	0.592	0.987	1.47	ND	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	50(b)	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	ND	ND	4.47	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	ND	0.278	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5*	ND	ND	ND	ND	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc. VOAs (s)		0	0.7	5.15	0.729	NS	NS	NS	3.97	0.852	0.878	0.709	0.592	0.987	1.47	ND	ND

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- (a) Applies to the sum of cis- and trans-1,3-dichloropropene.
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PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-7 7/30/2003 ug/l	MW-7 10/29/2003 ug/l	MW-7 1/29/2004 ug/l	MW-7 5/5/2004 ug/l	MW-7 7/22/2004 ug/l	MW-7 11/4/2004 ug/l	MW-7 2/15/2005 ug/l	MW-7 4/27/2005 ug/l	MW-7 7/28/2005 ug/l	MW-7 10/27/2005 ug/l	MW-7 1/25/2006 ug/l	MW-7 4/18/2006 ug/l	MW-7 7/27/2006 ug/l	MW-7 7/30/2007 ug/l	MW-8 10/28/2003 ug/l	MW-8 1/29/2004 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NS	NR	NS	NS	NR	NS	NS	NS	NS	NS	NR	NS	NR	NR
Acrylonitrile	5*	NR	NR	NS	NR	NS	NS	NR	NS	NS	NS	NS	NS	ND	NS	NR	NR
Acrolein	5*	NR	NR	NS	NR	NS	NS	NR	NS	NS	NS	NS	NS	ND	NS	NR	NR
Chloromethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Bromomethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Vinyl Chloride	2	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Chloroethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Methylene Chloride	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Trichlorofluoromethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
1,1-Dichloroethene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
1,1-Dichloroethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
trans-1,2-Dichloroethene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
cis-1,2-Dichloroethene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	3.47	3.08
Chloroform	7	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
1,2-Dichloroethane	0.6	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Carbon Tetrachloride	5	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Bromodichloromethane	50(b)	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
1,2-Dichloropropane	1	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Trichloroethene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	2.68	3.76
Dibromochloromethane	50 (b)	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
1,1,2-Trichloroethane	1	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Benzene	1	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Bromoform	NC	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Tetrachloroethene	5*	ND	ND	NS	ND	NS	NS	1.63	NS	NS	NS	NS	NS	ND	NS	164	250
1,1,2,2-Tetrachloroethane	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Toluene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	11.2	NS	ND	ND
Chlorobenzene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Ethylbenzene	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Xylene (Total)	5*	ND	ND	NS	ND	NS	NS	ND	NS	NS	NS	NS	NS	ND	NS	ND	ND
Total Confident Conc. VOAs (s)		ND	ND	NS	ND	NS	NS	1.63	NS	NS	NS	NS	NS	11.2	NS	170	257

- - Results above NYSDEC Ground Water Standards/
Criteria - GA Water Class
- ND - Not detected
- NC - No criteria
- NS - Not sampled
- NR - Not reported by laboratory
- B - Compound detected in laboratory blank
- J - The result is less than the specified detection limit
but greater than zero. The result is an approximate
value.
- D - The compound was reported from the diluted analysis
- * - The principal organic contaminant standard for
ground water applies to this compound.
- ** - MW-9 is a laboratory blind duplicate of MW-6
- ** - MW-10 is a laboratory blind duplicate of MW-2
- *** - MW-4 had been replaced before this sampling
round; original well was damaged
- (a) Applies to the sum of cis- and trans-1,3-dichloropropene.
- (b) Guidance Value only.

TABLE 3
PERGAMENT MALL
STATEN ISLAND, NEW YORK
SUMMARY OF HISTORIC VOLATILE ORGANIC COMPOUND RESULTS FOR GROUND WATER
AUGUST 2011

Sample ID Sampling Date Units	1998 NYSDEC Ground Water Standards / Criteria ug/l	MW-8 5/5/2004 ug/l	MW-8 7/22/2004 ug/l	MW-8 11/4/2004 ug/l	MW-8 2/15/2005 ug/l	MW-8 4/27/2005 ug/l	MW-8 7/22/2005 ug/l	MW-8 10/27/2005 ug/l	MW-8 1/25/2006 ug/l	MW-8 4/18/2006 ug/l	MW-8 7/27/2006 ug/l	MW-8 10/26/2006 ug/l	MW-8 1/25/2007 ug/l	MW-8 4/27/2007 ug/l	MW-8 7/30/2007 ug/l	MW-8 11/7/2007 ug/l	MW-8 8/4/2010 ug/l
Volatile Organic Compounds																	
Acetone	50(b)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acrylonitrile	5*	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein	5*	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5*	2.05	1.78	1.6	ND	1.27	2.66	2.56	0.918	1.31	4.18	6.70	2.47	0.968	2.87	8.16	1.13
Chloroform	7	ND	ND	0.687	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.196	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50(b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	2.82	3.34	3.39	3.59	3.01	3.76	3.7	1.89	2.51	3.24	4.04	2.51	1.44	2.71	5.23	1.56
Dibromochloromethane	50 (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.4(a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	153	194	148	210	173	174	173	124	140 D	129 D	159	138	93.9	182	209 D	94.9
1,1,2,2-Tetrachloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (Total)	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc. VOAs (s)		158	199	154	214	177	180	179	127	144	136	170	143	96.3	188	223	97.6

■ - Results above NYSDEC Ground Water Standards/
 Criteria - GA Water Class
 ND - Not detected
 NC - No criteria
 NS - Not sampled
 NR - Not reported by laboratory
 B - Compound detected in laboratory blank
 J - The result is less than the specified detection limit
 but greater than zero. The result is an approximate
 value.
 D - The compound was reported from the diluted analysis
 * - The principal organic contaminant standard for
 ground water applies to this compound.
 ** - MW-9 is a laboratory blind duplicate of MW-6
 ** - MW-10 is a laboratory blind duplicate of MW-2
 *** - MW-4 had been replaced before this sampling
 round; original well was damaged
 (a) Applies to the sum of cis- and trans-1,3-dichloropropene.
 (b) Guidance Value only.

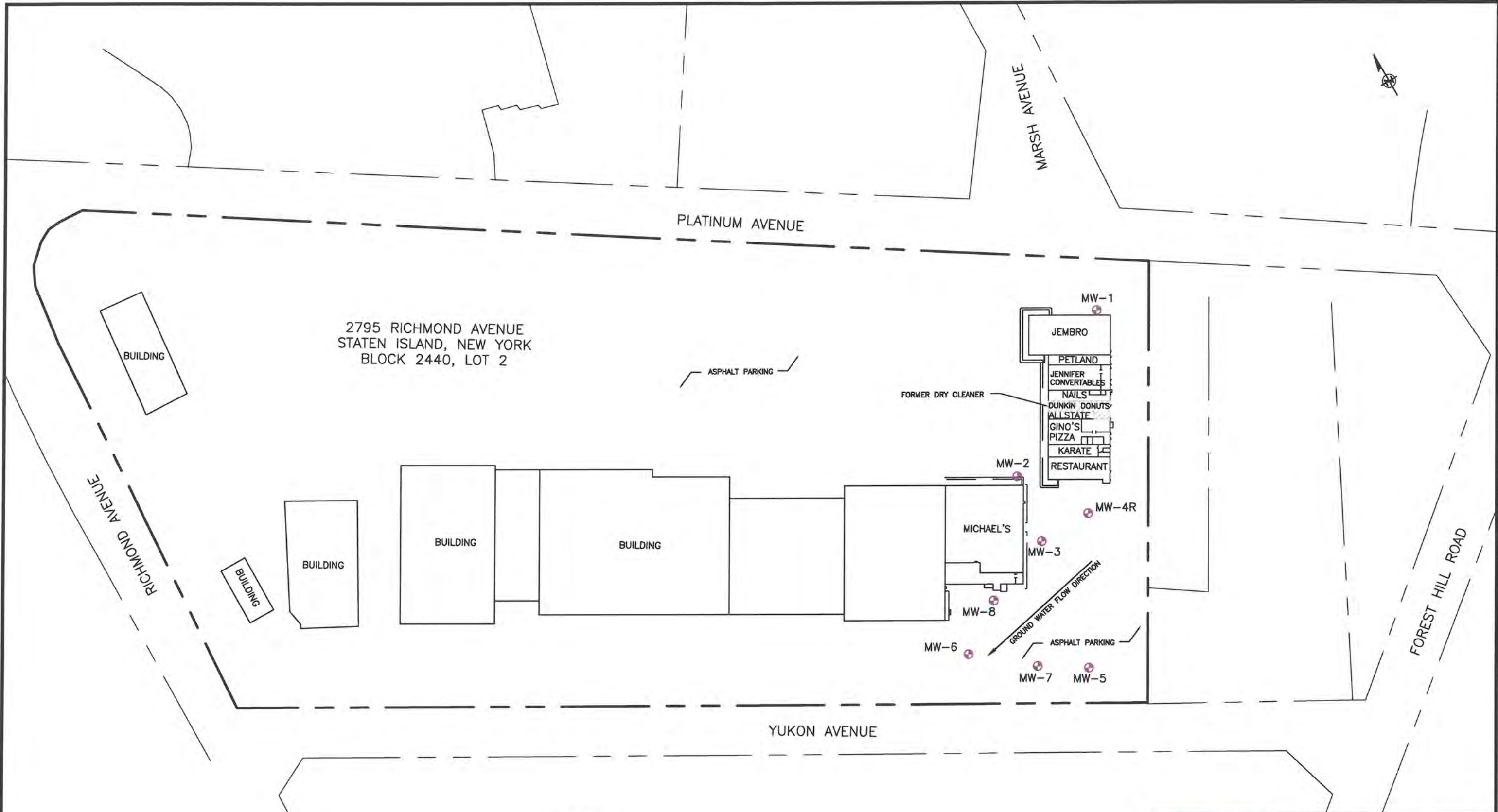


Table 4
Historic Vapor Intrusion Sampling Results
Pergament Mall
Staten Island, New York

Sample Location	February 23, 2007 Sample Results (ug/m ³)				February 23, 2007 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 1 (TCE)	February 23, 2007 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 2 (PCE)	February 27, 2008 Sample Results (ug/m ³)				February 27, 2008 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 1 (TCE)	February 27, 2008 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 2 (PCE)	February 4, 2010 Sample Results (ug/m ³)		February 4, 2010 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 1 (TCE)	February 4, 2010 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 2 (PCE)	March 24 and April 5, 2011 Sample Results (ug/m ³)		March 24 and April 5, 2011 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 1 (TCE)	March 24 and April 5, 2011 Recommendation Based on NYSDOH Soil Vapor/Indoor Air for Matrix 2 (PCE)		
	Sub-Slab		Indoor Air				Sub-Slab		Indoor Air				Indoor Air				TCE	PCE			TCE	PCE
	TCE	PCE	TCE	PCE			TCE	PCE	TCE	PCE			TCE	PCE			TCE	PCE			TCE	PCE
Michael's	ND	12	ND	ND	No Further Action	No Further Action	NS	NS	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action		
Karate	ND	12	ND	ND	No Further Action	No Further Action	NS	NS	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action		
Gino's Pizza	5.1	8.9	ND	ND	No Further Action	No Further Action	NS	NS	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action		
Allstate	9.2	372	ND	ND	No Further Action	Monitor	NS	NS	1.6	23	Monitor	Monitor/Mitigate	ND	2.9	No Further Action	Monitor	ND	ND	No Further Action	Monitor		
Dunkin Donuts	3.8	252	ND	4.2	No Further Action	Monitor/Mitigate	NS	NS	ND	23	No Further Action	Monitor/Mitigate	ND	3.1	No Further Action	Monitor/Mitigate	ND	ND	No Further Action	Monitor		
Nails	57	506	ND	4.3	Monitor	Monitor/Mitigate	NS	NS	ND	ND	Monitor	Monitor	ND	ND	Monitor	Monitor	ND	ND	Monitor	Monitor		
Jennifer Convertibles	6.9	145	ND	ND	No Further Action	Monitor	NS	NS	ND	8.5	No Further Action	Monitor/Mitigate	ND	ND	No Further Action	Monitor	ND	ND	No Further Action	Monitor		
Bella Vita II	NS	NS	NS	NS	NS	NS	85	821	ND	ND	Monitor	Monitor	ND	ND	Monitor	Monitor	ND	ND	Monitor	Monitor		
Petland	NS	NS	NS	NS	NS	NS	ND	20	ND	ND	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action	NS	NS	No Further Action	No Further Action		

Notes:
NS - not sampled
ND - not detected

FIGURES



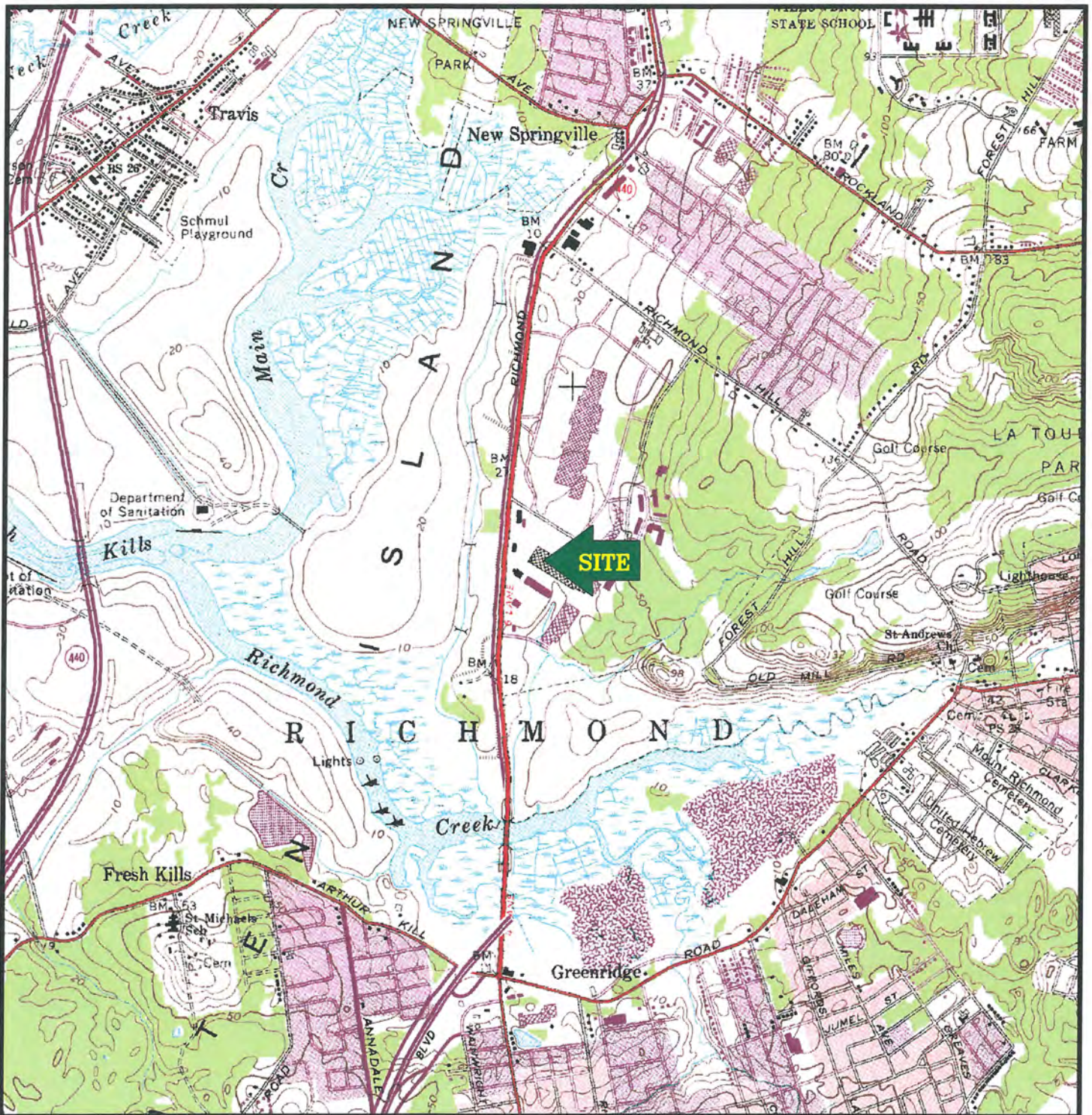
LEGEND

- - PROPERTY BOUNDARY
- MW-8 - MONITORING WELL LOCATION
- LOCATION OF FORMER DRY CLEANER

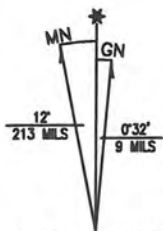
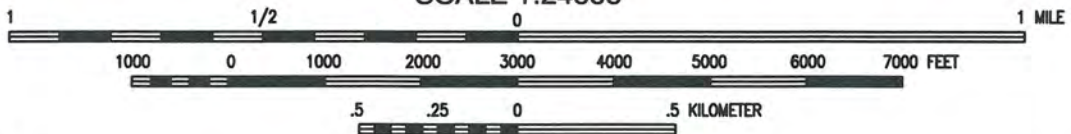
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 WHITMAN	PERGAMENT MALL STATEN ISLAND, NEW YORK	
	SITE MAP	
PROJECT MANAGER: G.W.	DRAWN BY: C.A.	PROJECT NO: 94-01-03T
CHECKED BY: G.W.	DATE: JUNE 2012	FIGURE NO: 1



SCALE 1:24000



UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

NEW YORK



QUADRANGLE LOCATION



WHITMAN

PERGAMENT MALL
STATEN ISLAND, NEW YORK

SITE LOCATION ON USGS
ARTHUR KILL, N.Y. QUADRANGLE

ORIGINAL BY: G.W.

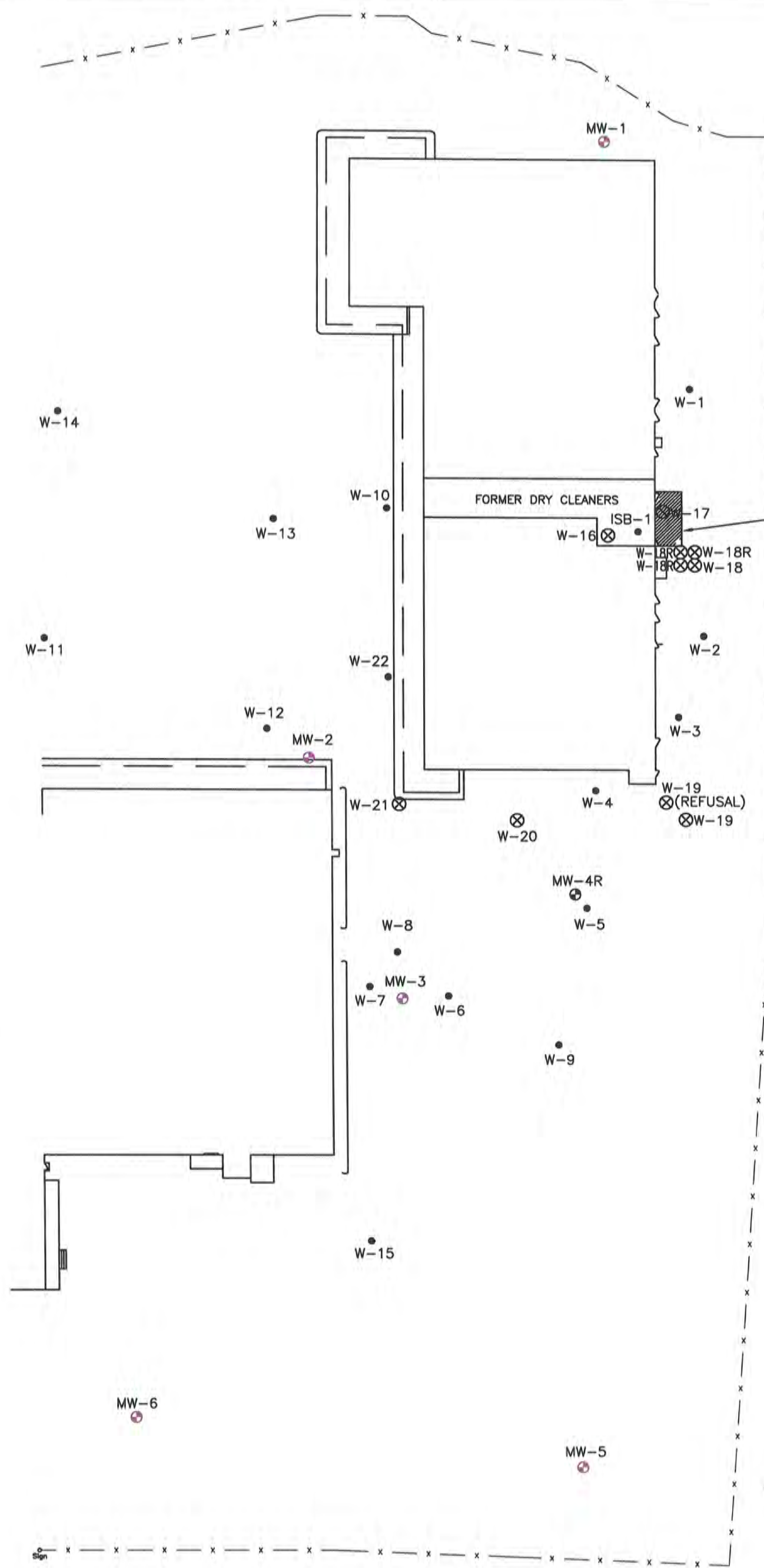
DRAWN BY: R.R.

DRAWING NO:
940103

CHECKED BY: G.W.

DATE: JUNE 2012

FIGURE NO:
2




AREA EXCAVATED BY ATLANTIC ENVIRONMENTAL
TO DEPTH 5-7' POST-EX: 2.1 ppm PCE

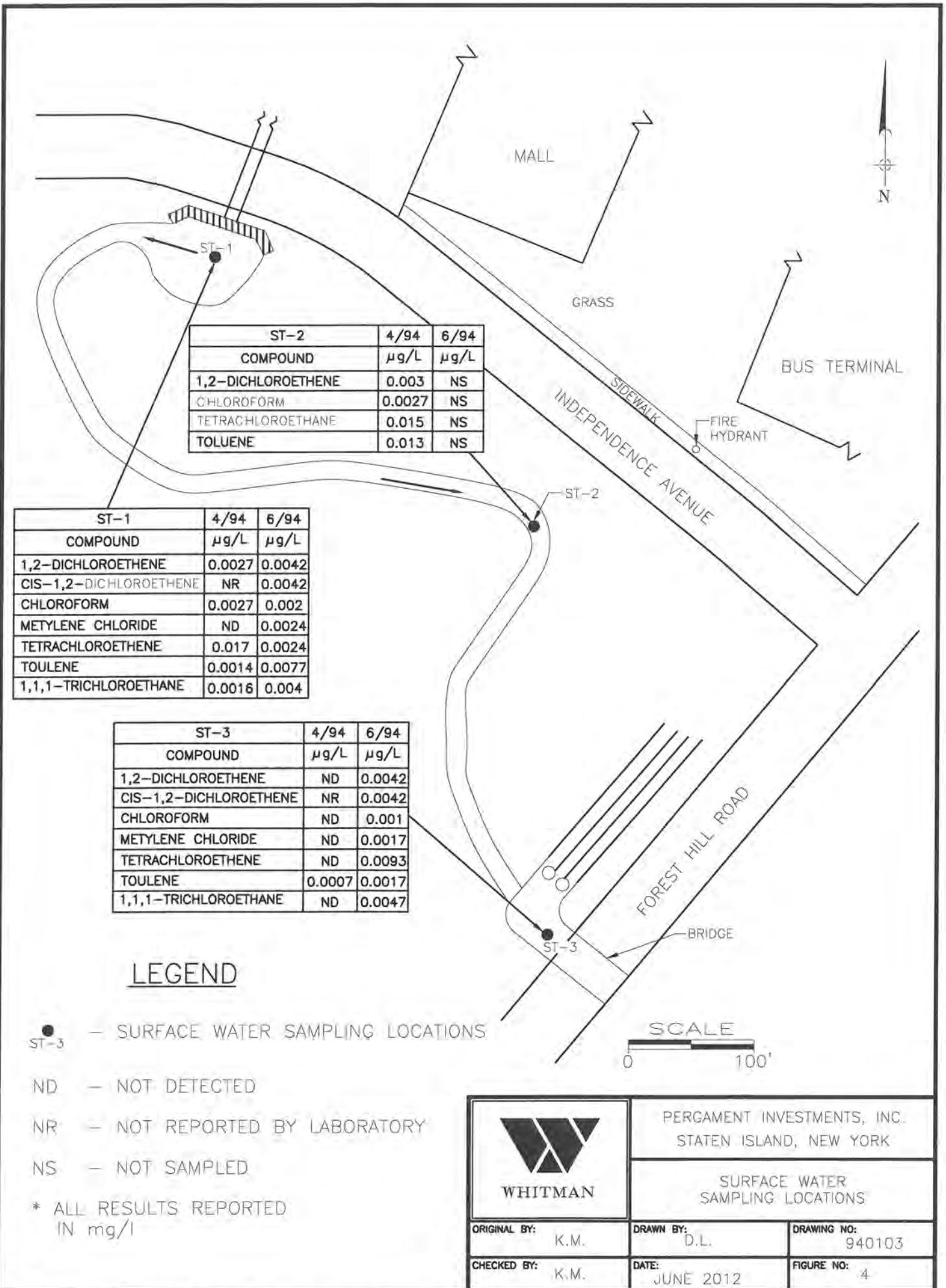
LEGEND

- MW-6 ⊕ - MONITORING WELL LOCATION
- MW-4R ⊕ - PROPOSED MONITORING WELL LOCATIONS
- W-20 ⊗ - SOIL BORING LOCATION
- W-15 ● - SOIL BORING LOCATION
- x - x - - FENCE & PROPERTY BOUNDARY
- W-18R - SOIL BORING REFUSAL

NOTE:
DATUM ESTABLISHED FROM AN ASSUMED BENCHMARK
PREVIOUSLY ESTABLISHED BY L.M.S.



 WHITMAN	PERGAMENT INVESTMENTS, INC. STATEN ISLAND, NEW YORK	
	HISTORIC SOIL SAMPLING LOCATIONS	
ORIG. BY: GW	DWG. BY: TAG	CHK. BY: GW
DWG.#: 940103	DATE: JUNE 2012	FIGURE: 3





MW-2	
PCE	30.7
TCE	3.12
CIS-1,2-DCE	1.57

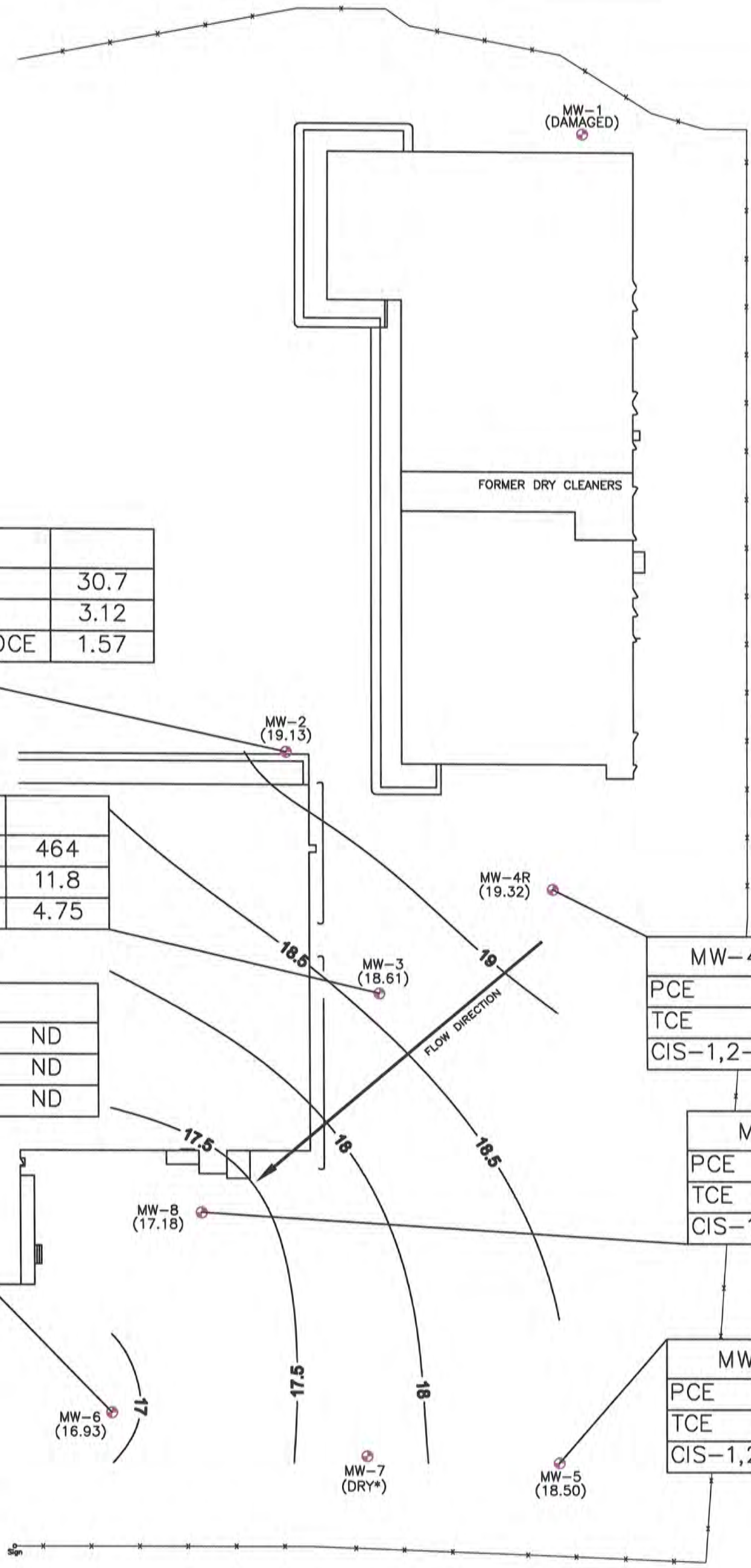
MW-3	
PCE	464
TCE	11.8
CIS-1,2-DCE	4.75

MW-6	
PCE	ND
TCE	ND
CIS-1,2-DCE	ND

MW-4R	
PCE	2.92
TCE	0.263
CIS-1,2-DCE	ND

MW-8	
PCE	94.9
TCE	1.56
CIS-1,2-DCE	1.13

MW-5	
PCE	ND
TCE	ND
CIS-1,2-DCE	ND



LEGEND


- * - NOT USED IN CONTOUR CALCULATIONS
- FENCE & PROPERTY BOUNDARY
- MW-8 (17.06) - MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION
- 18 - GROUND WATER ELEVATION CONTOUR
- GROUND WATER FLOW DIRECTION

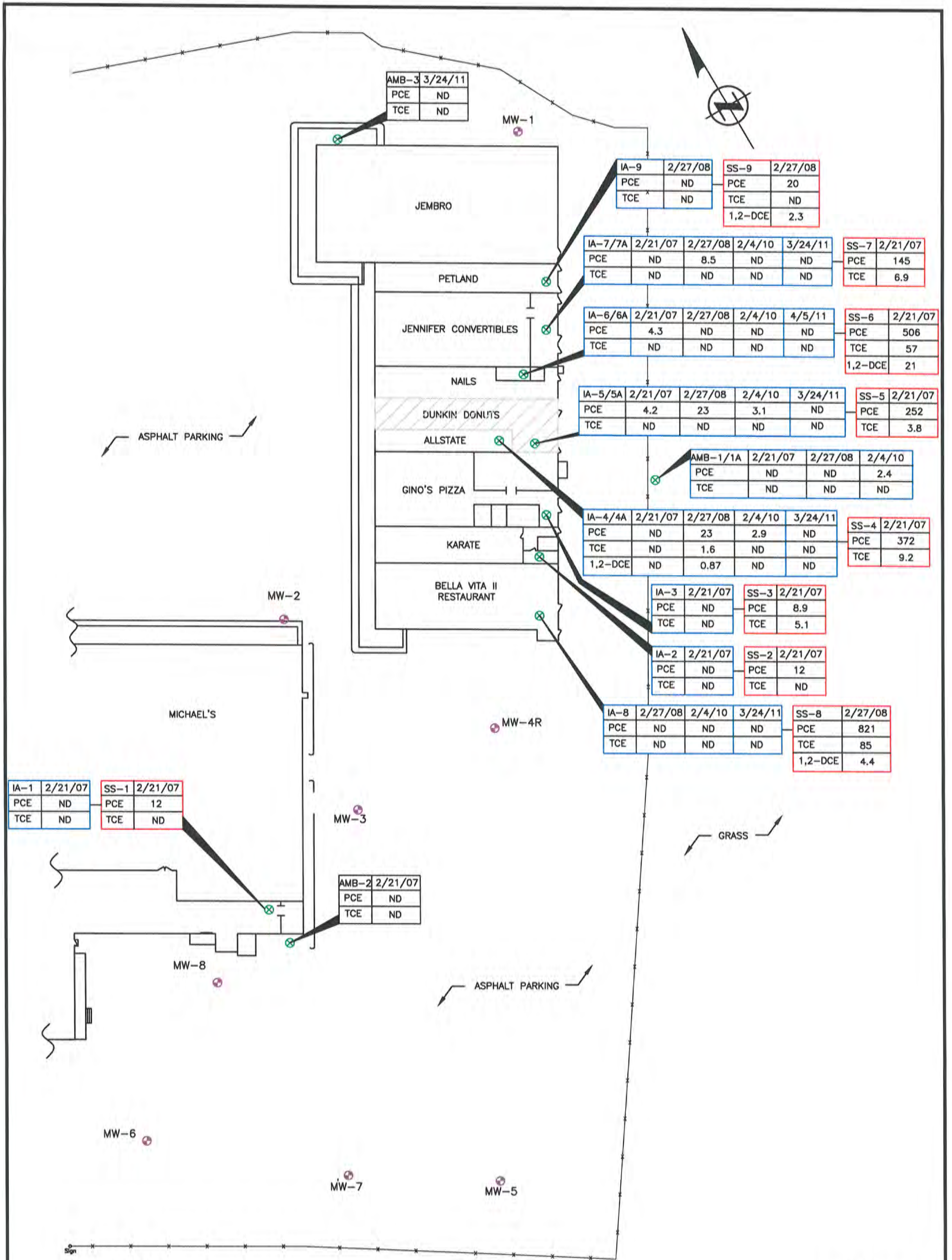
PCE - TETRACHLOROETHENE
 TCE - TRICHLOROETHENE
 CIS-1,2-DCE - CIS-1, 2-DICHLOROETHENE
 ND - NONE DETECTED

RESULTS IN mg/l



NOTE: CONTOUR INTERVAL = 0.5 FEET

 WHITMAN <small>CERTIFICATE OF AUTHORIZATION No. 540000000</small>	PERGAMENT MALL STATEN ISLAND, NEW YORK	
	MONITORING WELL LOCATIONS WITH GROUND WATER FLOW DIRECTION AUGUST 4, 2010	
ORIGINAL BY: K.H.	DRAWN BY: C.A.	DRAWING NO: 940103
CHECKED BY: G.W.	DATE: JUNE 2012	FIGURE NO: 5



IA-1	2/21/07
PCE	ND
TCE	ND

SS-1	2/21/07
PCE	12
TCE	ND

AMB-2	2/21/07
PCE	ND
TCE	ND

AMB-3	3/24/11
PCE	ND
TCE	ND

IA-9	2/27/08
PCE	ND
TCE	ND

SS-9	2/27/08
PCE	20
TCE	ND
1,2-DCE	2.3

IA-7/7A	2/21/07	2/27/08	2/4/10	3/24/11
PCE	ND	8.5	ND	ND
TCE	ND	ND	ND	ND

SS-7	2/21/07
PCE	145
TCE	6.9

IA-6/6A	2/21/07	2/27/08	2/4/10	4/5/11
PCE	4.3	ND	ND	ND
TCE	ND	ND	ND	ND

SS-6	2/21/07
PCE	506
TCE	57
1,2-DCE	21

IA-5/5A	2/21/07	2/27/08	2/4/10	3/24/11
PCE	4.2	23	3.1	ND
TCE	ND	ND	ND	ND

SS-5	2/21/07
PCE	252
TCE	3.8

AMB-1/1A	2/21/07	2/27/08	2/4/10
PCE	ND	ND	2.4
TCE	ND	ND	ND

IA-4/4A	2/21/07	2/27/08	2/4/10	3/24/11
PCE	ND	23	2.9	ND
TCE	ND	1.6	ND	ND
1,2-DCE	ND	0.87	ND	ND

SS-4	2/21/07
PCE	372
TCE	9.2

IA-3	2/21/07
PCE	ND
TCE	ND

SS-3	2/21/07
PCE	8.9
TCE	5.1

IA-2	2/21/07
PCE	ND
TCE	ND

SS-2	2/21/07
PCE	12
TCE	ND

IA-8	2/27/08	2/4/10	3/24/11
PCE	ND	ND	ND
TCE	ND	ND	ND

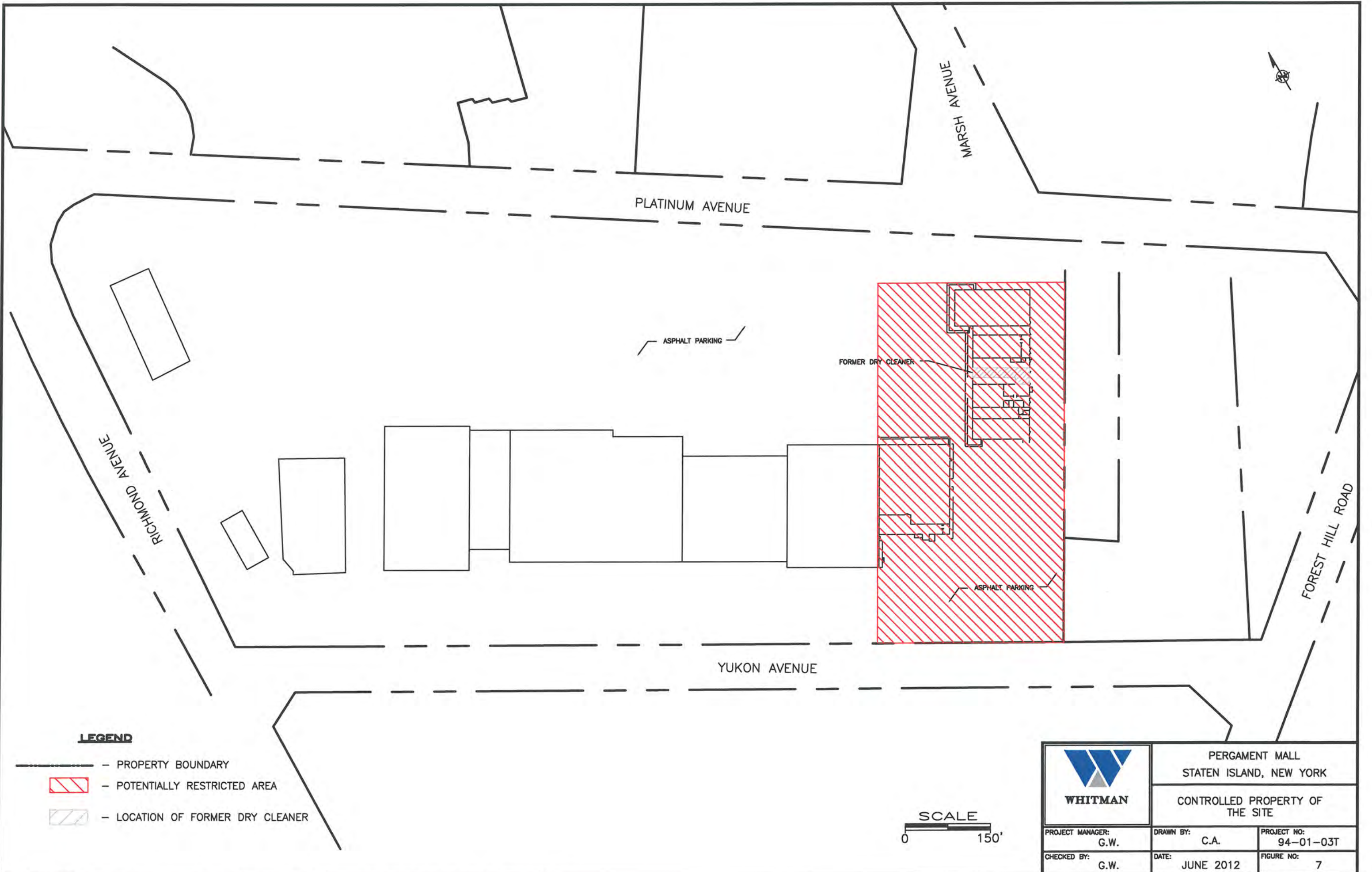
SS-8	2/27/08
PCE	821
TCE	85
1,2-DCE	4.4

LEGEND

- — — — — FENCE & PROPERTY BOUNDARY
- MW-8 - MONITORING WELL LOCATION
- VAPOR INTRUSION SAMPLE LOCATIONS
- SS-1 - SUB SLAB AIR SAMPLE
- IA-1 - INDOOR AIR SAMPLE
- AMB-1 - OUTDOOR AMBIENT AIR SAMPLE
- PCE - TETRACHLOROETHENE
- TCE - TRICHLOROETHENE
- 1,2- DCE - CIS-1,2-DICHLOROETHENE
- NOTE: ALL RESULTS SHOWN IN MICROGRAMS/ CUBIC METER
- LOCATION OF FORMER DRY CLEANER



	PERGAMENT MALL STATEN ISLAND, NEW YORK	
	HISTORIC VI SAMPLE LOCATIONS	
ORIGINAL BY: E.C.	DRAWN BY: C.A.	DRAWING NO: 940103
CHECKED BY: G.W.	DATE: JUNE 2012	FIGURE NO: 6



LEGEND

- - - - - PROPERTY BOUNDARY
- POTENTIALLY RESTRICTED AREA
- LOCATION OF FORMER DRY CLEANER



 WHITMAN	PERGAMENT MALL STATEN ISLAND, NEW YORK	
	CONTROLLED PROPERTY OF THE SITE	
PROJECT MANAGER: G.W.	DRAWN BY: C.A.	PROJECT NO: 94-01-03T
CHECKED BY: G.W.	DATE: JUNE 2012	FIGURE NO: 7

Map Showing Route from the site to the Hospital:

2795 Richmond Ave, Staten Island, NY 10314 to Staten Island University Hospital http://maps.google.com/maps?f=d&source=s_d&saddr=2795+Richmo...



Directions to Staten Island University Hospital

375 Segune Avenue, New York, NY 10309 - (718) 226-2000

5.1 mi – about 12 mins



APPENDIX 1

METES AND BOUNDS

**CONTROLLED PROPERTY OF THE SITE
DESCRIPTION OF PROPERTY KNOWN AS A PORTION OF 2797 RICHMOND AVENUE,
LOT 2, BLOCK 2440, SECTION 10, BOROUGH OF STATEN ISLAND, RICHMOND
COUNTY, CITY & STATE OF NEW YORK**

BEGINNING at a point in the northerly line of Yukon Avenue (80 feet wide) said point 1159.37 feet on a course of S 57° 35' 11" E from the intersection formed by the easterly line of Richmond Avenue (a.k.a. Bridge Avenue, 160 feet wide) with the northerly line of Yukon Avenue (80 feet wide) and running thence;


1. N 32° 24' 48" E, 613.90 feet on a line through Lot 2 Block 2440 Section 10 above to a point within Lot 2 Block 2440 Section 10, thence;
2. S 57° 40' 13" E, 314.91 feet through Lot 2 Block 2440 Section 10 to a point in common with the most northeast corner of the whole tract, thence;
3. S 32° 24' 48" W, 614.36 feet along the easterly line of Lot 2 Block 2440 Section 10 to a point and common corner in the northerly line of Yukon Avenue (80 feet wide), thence;
4. N 57° 35' 11" W, 314.91 feet along the northerly line of Yukon Avenue (80 feet wide) to the point and place of BEGINNING.

Being a portion of Lot 2 Block 2440 Section 10 as shown on a plat titled "Final Survey, The Pergament Mall of Staten Island, 2797 Richmond Avenue, Lot 2 Block 2440 Section 10, Borough of Staten Island, Richmond County, City and State of New York", prepared by Control Point Associates, Inc., 30 Technology Drive, Warren, NN.J. dated 5-29-2009 and revised to 6-5-2009.

Restricted area contains 193,395 s.f. +/- or 4.440 acres +/-.

Together with any easements, restrictions and exceptions as contained in a Title Report prepared by First American Title Insurance Company of New York. Title No. NY-00006362-NYRX with an effective date of 01/12/01, re dated 06/28/02.

Description prepared by:
Whitman

 _____ Date 11/8/12

APPENDIX 2

HEALTH AND SAFETY PLAN

SITE LOCATION



← Indicates Approximate Site Location

JOB-SITE HAZARDS

Physical State of Contaminants:

Liquid Solid Gas/Vapor Sludge Unknown Other, specify:

Characteristics of Contaminants:

Corrosive Reactive Explosive Flammable Irritant
 Toxic Unknown Biological Radiological Volatile
 Other, specify:

Principal Hazards on Job-Site:

<input checked="" type="checkbox"/> Heat Stress	<input checked="" type="checkbox"/> Cold Stress	<input checked="" type="checkbox"/> Physical Hazards
<input checked="" type="checkbox"/> Noise	<input checked="" type="checkbox"/> Organic Chemicals	<input type="checkbox"/> Inorganic Chemicals
<input type="checkbox"/> Explosive/Flammable	<input type="checkbox"/> Oxygen Deficient	<input type="checkbox"/> Radiological
<input type="checkbox"/> Biological	<input type="checkbox"/> Confined Space*	<input checked="" type="checkbox"/> Electrical
<input checked="" type="checkbox"/> Cutting/Welding	<input checked="" type="checkbox"/> Heavy Equipment	<input type="checkbox"/> Excavation
<input type="checkbox"/> Other, specify:	<input checked="" type="checkbox"/> Overhead Hazards	

Location of On-site Hazardous Materials:

<input type="checkbox"/> Underground Storage Tanks	<input type="checkbox"/> Drums	<input type="checkbox"/> Pit or Lagoon
<input type="checkbox"/> Landfill	<input type="checkbox"/> Lined Sump	<input type="checkbox"/> Unlined Sump
<input type="checkbox"/> Aboveground Tanks	<input type="checkbox"/> Open Dump	<input checked="" type="checkbox"/> Unknown
<input type="checkbox"/> Other, specify:	<input type="checkbox"/> Surface Discharge	<input type="checkbox"/> Subsurface Discharge

*If confined space entry is required, proper permitting and lock-out tag-out procedures must be followed.

TOXIC LIQUID//GAS CONTAMINANT DATA*

Potential Contaminant(s) Of Concern	Highest Site Conc. (ug/L)	PEL ppm,	IDLH ppm,	Ionization Potential (eV)	Instrument Response Factor	LEL	Symptoms/Effects of Acute Exposure
PCE**	464 ug/L	100 ppm	150 ppm	9.32	NA	NA	Headache; dizziness; nausea; fatigue; vertigo; eye, skin, nose, and throat irritant.
TCE**	11.8 ug/L	100 ppm	1000 ppm	9.5	NA	8%	Headache; dizziness; nausea; fatigue; vertigo; eye, skin, nose, and throat irritant.
Cis-1,2-DCE	4.75 ug/L	200 ppm	NA or NE	10.0	NA	3.6%	Drowsiness, blurred vision, tingling and numbness in the extremities.

NA = Not Available NE = None Established U = Unknown

* - NIOSH and/or MSDS listings for contaminants are included in Attachment HASP-4.

** - Suspected carcinogen

PEL – Permissible Exposure Limit (OSHA)

IDLH – Immediately Dangerous to Life or Health

Toxic Material Concentration/Exposure Potential:

Low Medium High Unknown

Fire/Explosion Potential:

Low Medium High Unknown

Overall Hazard Evaluation:

Low Medium High Unknown

Justification: OSHA & MSDS emphasize skin protection and respiratory protection for the above contaminants with special emphasis on skin protection. Potential contamination existing onsite would be in the subsurface vapors. Proper PPE use will minimize exposure.

Required Training for Site Personnel:

- 40-hr OSHA for field technicians & supervisors with 8 hours annual update.

Task Description (Describe Major Tasks from Page One - Attach additional pages if necessary.)

#1 Perform ground water monitoring sampling in onsite monitoring wells. _____

#2 Conduct vapor intrusion investigation: drill through sub-slab to collect sub-slab samples; place indoor air canisters in leaseholds to sample indoor air. _____

#3 _____

#4 _____

#5 _____

Personal Protective Equipment Required for Tasks Described Above.

<u>Task</u>	<u>Level (Circle One)</u>			
#1	A	B	C	<input checked="" type="radio"/> D
#2	A	B	C	<input checked="" type="radio"/> D
#3	A	B	C	D
#4	A	B	C	D
#5	A	B	C	D

Description of PPE included in Attachment 3. Modified PPE is as follows: N/A

Field Monitoring Equipment (Check under appropriate column.)

Task #	Not Needed	LEL Meter	10.6 eV PID	11.7 eV PID	FID	Detector Tubes	Other (Describe)
#1							X-Sampling Pump
#2							X -Helium meter
#3							
#4							
#5							

Action Levels for PPE Upgrade (Describe):

DECONTAMINATION INFORMATION

Attach Site map indicating exclusion, decontamination, and support zones.

Personnel Decontamination (Describe/or attach diagram.) Not Needed

Dispose of any gloves properly; and wash hands thoroughly to remove any remaining residual material.

Sampling Equipment Decontamination (Describe/or attach diagram.) Not Needed

See Attachment 2

Heavy Equipment Decontamination (Describe/or attach diagram) Not Needed

Disposal Method for Liquids and Solids (Describe/or attach diagram) Not Needed

Drum the purge/development water and hold for the sampling results to determine disposal.

CONTINGENCY INFORMATION

Site Emergency Contact to be Notified: Gary Weissberger

Location of Nearest Telephone: Onsite Leaseholds

<u>Local Emergency Response Contacts:</u>	<u>Name</u>	<u>Phone</u>
Ambulance/EMS:	Richmond County Ambulance 1355 Castleton Avenue	911 or (718) 273-3555
Fire Department:	Richmond Engine Co. No.1 3664 Richmond Road	911 or (718) 351-0252
Sheriff/Police Dept:	Staten Island 122 Precinct 2320 Hylan Boulevard	911 or (718) 667-2211
Whitman Project Manager:	Gary Weissberger	Office: (732) 390-5858 Cell: (215) 840-5925
Whitman LSRP	Ira Whitman	Office: (732) 390-5858 Cell: (732) 740-9098
NY Department of Environmental Conservation Hotline		1-800-457-7362
USEPA Environmental Response Team		(202)-321-6660
USEPA RCRA Hotline		(800) 424-9346
CHEMTREC		(800)-424-9300
National Response Center		(800) 424-8802
Substance Identification (CAS)		(800) 848-6538
Nearest Local Hospital:	Staten Island Hospital	(718) 226-9000
Hospital Address:	475 Sea View Avenue	

Route to Hospital: Head South on Richmond Ave
 Turn Left onto Forest Hill Rd
 Turn Right onto Richmond Hill Rd
 Take the 2nd left onto Richmond Rd
 Turn Right to stay on Richmond Rd
 Turn left to stay on Richmond Rd
 Turn right onto Midland Ave
 Turn left onto Hylan Blvd
 Turn right onto Seaview Ave
 Staten Island Hospital is on the left

Contingency Plans - Summarize Below

PERSONAL HYGIENE

Whitman employees or Contractor(s) personnel have the following personal hygiene requirement:

1. No eating, drinking, smoking, gum or tobacco chewing is allowed in the active work zone.
2. Wash hands and face before leaving work area.
3. Contact with contaminated surface or surfaces suspected of being contaminated will be avoided while unprotected.
4. Any person under a physician's care and/or taking medication must inform the site supervisor.
5. Personnel using respirators must be fit tested, clean shaven and trained in respiratory protection.

MEDICAL SURVEILLANCE PROGRAM

See Health and Safety Officer for Standard list of medical surveillance program. Additionally medical surveillance above the Standard will include:

None Required

EMERGENCY/PROBLEMS CHAIN-OF-COMMAND

If a release, emergency or other unexpected situation arises onsite, Whitman should be notified immediately. If Whitman is not on site when the event occurs, please use the following contact list.

<u>Name</u>	<u>Office # and Address</u>	<u>Home #</u>
Gary Weissberger, Project Manager	Whitman 7 Pleasant Hill Road Cranbury, NJ 08512 (732) 390-5858	(215) 840-5925 (Cell)
Dr. Ira Whitman, Principal	Whitman 7 Pleasant Hill Road Cranbury, NJ 08512 (732) 390-5858	(732) 740-9098 (Cell)

Active Work Zone Emergencies

Fire/Explosion: A severe emergency such as a fire or explosion could require immediate evacuation of the site. The emergency response notification process should take place as soon as an incident occurs.

In the event of an evacuation of the Active Work Area, affected personnel will leave immediately, go through decontamination if time permits and reassemble at the closest street. The signal for an evacuation is three (3) long bursts of an air or vehicle horn. Contact local emergency services if needed and contact Whitman.

Emergency Spill Containment/Control Plan

Spill/Release: Upon a detected spill or release of a hazardous substance or waste, there must be notification to the state (NJDEP), Local Authorities, client, and Whitman. Spills/Releases should be contained where possible by diking or otherwise isolating the spill/release. If necessary, an emergency response contractor will be contacted to provide assistance. If product is encountered during soil investigation activities, there must be notification to Whitman.

In the event of a spill or leak of a liquid chemical or hazardous waste, personnel in the area of the spill will do the following:

- Inform the Site Supervisor immediately
- Determine if adequate protective equipment is available to enter area of the spill i.e., IDLH conditions
- Get spill kit materials
- Identify source of spill
- Contain, absorb and recover spilled substance in proper containers
- Dispose of spilled materials properly, according to local, state and federal regulations

Spill Prevention

The prevention of spills through good work practice is the most important aspect of the spill containment/control plan. The following standard work practices for material handling will minimize the potential for spills.

- All drums and containers used during the cleanup shall meet the appropriate DOT, OSHA and EPA regulations for the wastes that they will contain.
- Drums and containers shall be inspected and their integrity assured prior to moving them. Drums or containers that cannot be inspected before being moved because of storage conditions shall be positioned in an accessible location and inspected prior to further handling.
- Operations on site will be organized so as to minimize the amount of drum or container movement.
- Where spills, leaks, or ruptures may occur, adequate quantities of spill containment equipment will be stationed in the immediate area. The spill containment program must be sufficient to contain and isolate the entire volume of hazardous substances being transferred.
- Drums or containers that cannot be moved without rupture, leakage, or spills, shall be emptied into a sound container.
- Fire extinguishing equipment meeting 29 CFR 1910 Subpart L shall be on hand ready for use to control fires.

PLAN REVISIONS

The site Health and Safety Plan will be revised whenever the following events occur:

1. The Plan fails in an emergency
2. New physical or chemical hazards are discovered
3. Changes occur in telephone numbers, personnel, etc.

All personnel will be briefed when pertinent changes occur.

Project Manager Approval _____ Date: _____

HEALTH & SAFETY SUMMARY SHEET

1. ACTIVITIES

Conduct ground water sampling and sub-slab/indoor air sampling.

2. PRINCIPAL HAZARDS

Chlorinated volatile organic solvents; cold/heat stress; noise

3. PPE EQUIPMENT

Level D.

4. HOSPITAL & EMERGENCY NUMBERS

The nearest hospital is Staten Island Hospital, 475 Sea View Avenue, Staten Island, New York. The hospital telephone number is 718-226-9000. In the event of an emergency, dial 911.

5. H & S BRIEFING

The Whitman Field Supervisor will coordinate a health & safety briefing prior to the beginning of the day's work activities. This briefing must be given to all Whitman personnel and Whitman subcontractors working on-site and will include a summary of all the information contained in this Health & Safety Plan.

6. SIGNOFF SHEETS

All personnel attending the health and safety briefing will sign the Health & Safety Plan Signoff Sheet. Copies of the completed Signoff Sheet must be forwarded to the Whitman Office Safety & Health Coordinator and to the main Whitman file on the project.

ATTACHMENT HASP-1

ROUTE TO HOSPITAL



A 2795 Richmond Ave, Staten Island, NY 10314

-  1. Head south on **Richmond Ave**
About 45 secs go 0.4 mi
total 0.4 mi
-  2. Turn left onto **Forest Hill Rd**
About 3 mins go 1.1 mi
total 1.6 mi
-  3. Turn right onto **Richmond Hill Rd**
About 2 mins go 0.7 mi
total 2.3 mi
-  4. Take the 2nd left onto **Richmond Rd**
About 3 mins go 1.2 mi
total 3.5 mi
-  5. Turn right to stay on **Richmond Rd** go 0.2 mi
total 3.7 mi
-  6. Turn left to stay on **Richmond Rd**
About 2 mins go 0.8 mi
total 4.5 mi
-  7. Turn right onto **Midland Ave**
About 59 secs go 0.5 mi
total 5.0 mi
-  8. Turn left onto **Hylan Blvd**
About 2 mins go 0.8 mi
total 5.8 mi
-  9. Turn right onto **Seaview Ave**
About 57 secs go 0.3 mi
total 6.2 mi
-  10. Make a U-turn at **Nugent Ave**
Destination will be on the right
About 45 secs go 92 ft
total 6.2 mi

B 475 Seaview Ave, Staten Island, NY 10305

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2012 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

ATTACHMENT HASP-2
DECONTAMINATION PROCEDURES

A. NON-AQUEOUS SAMPLING EQUIPMENT¹

1. Detergent and tap water - scrub to remove visual contamination.
2. Generous tap water rinse.
3. Distilled and deionized water rinse.

B. AQUEOUS SAMPLING EQUIPMENT

1. Detergent and tap water wash.
2. Generous tap water rinse.
3. Distilled and deionized water rinse.
4. 10% nitric acid rinse².
5. Distilled and deionized water rinse¹.
6. Acetone rinse³.
7. Total air dry or nitrogen blow out³.
8. Distilled and deionized water rinse².

NOTES:

¹ - If visual contamination persists or gross contamination is suspected, the full 8 step decontamination procedure in Item B is required.

² - Only if sample is to be analyzed for metals.

³ - Only if sample is to be analyzed for organics.

ATTACHMENT HASP-3

PERSONAL PROTECTIVE EQUIPMENT LEVELS

LEVEL D Includes:

1. Boots/shoes, chemical-resistant steel toe and shank.
2. Boots, outer, chemical-resistant (disposable).*
3. Safety glasses or chemical splash goggles.
4. Coveralls.*
5. Hard hat.
6. Escape mask.*
7. Face Shield.*

LEVEL C Includes:

1. All of Level D equipment.
2. Full-face or half-mask, air purifying respirators (NIOSH approved).
3. Hooded chemical-resistant clothing (coveralls; two-piece chemical-splash suit; disposable chemical-resistant coveralls).
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.

LEVEL B Includes:

1. Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).
2. Hooded chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant coveralls).
3. Coveralls. *
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots, outer, chemical-resistant, steel toe and shank.
7. Boot-covers, outer, chemical resistant (disposable).*
8. Hard hat.
9. Face shield.*

LEVEL A Includes:

1. All of level B equipment.
2. Totally encapsulating chemical-protective suit.
3. Long underwear.*

* optional equipment (Project Managers decision).

ATTACHMENT HASP-4
MATERIAL SAFETY DATA SHEETS



Right to Know Hazardous Substance Fact Sheet

Common Name: **TETRACHLOROETHYLENE**

Synonyms: Ethylene Tetrachloride; Perchloroethylene

Chemical Name: Ethene, Tetrachloro-

Date: March 2002 Revision: October 2011

CAS Number: 127-18-4

RTK Substance Number: 1810

DOT Number: UN 1897

Description and Use

Tetrachloroethylene is a clear, colorless liquid with a sweet *Ether*-like odor. It is used as a dry cleaning solvent, heat transfer medium, degreaser, solvent, and drying agent for metals.

- ▶ **ODOR THRESHOLD = 5 to 50 ppm**
- ▶ Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

Reasons for Citation

- ▶ **Tetrachloroethylene** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA and EPA.
- ▶ This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

FIRST AID

Eye Contact

- ▶ Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while rinsing.

Skin Contact

- ▶ Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Inhalation

- ▶ Remove the person from exposure.
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.
- ▶ Medical observation is recommended for 24 to 48 hours after overexposure, as pulmonary edema may be delayed.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE LAST PAGE

Hazard Summary

Hazard Rating	NJDHSS	NFPA
HEALTH	3	2
FLAMMABILITY	-	0
REACTIVITY	-	0
CARCINOGEN POISONOUS GASES ARE PRODUCED IN FIRE DOES NOT BURN		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ **Tetrachloroethylene** can affect you when inhaled and by passing through the skin.
- ▶ **Tetrachloroethylene** should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
- ▶ **Tetrachloroethylene** can cause reproductive damage.
- ▶ Contact can irritate and burn the skin and eyes. Prolonged or repeated exposure can cause drying and cracking of the skin with rash, redness and blisters.
- ▶ Exposure can irritate the eyes, nose and throat.
- ▶ Inhaling **Tetrachloroethylene** can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency.
- ▶ Exposure can cause headache, dizziness, lightheadedness, nausea, vomiting, and passing out.
- ▶ **Tetrachloroethylene** may damage the liver and kidneys and affect the nervous system and heart.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **100 ppm** averaged over an 8-hour workshift, **200 ppm**, not to be exceeded during any 15-minute work period, and **300 ppm** as a maximum peak for 5-minutes during any 3-hour period.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The threshold limit value (TLV) is **25 ppm** averaged over an 8-hour workshift and **100 ppm** as a STEL (short-term exposure limit).

- ▶ **Tetrachloroethylene** is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- ▶ The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

Determining Your Exposure

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet, available on the RTK Program website (www.nj.gov/health/eoh/rtkweb) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act and the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Tetrachloroethylene**:

- ▶ Contact can irritate and burn the skin and eyes.
- ▶ Exposure can irritate the eyes, nose and throat.
- ▶ Inhaling **Tetrachloroethylene** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- ▶ Exposure can cause headache, dizziness, lightheadedness, incoordination, nausea, vomiting, and passing out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Tetrachloroethylene** and can last for months or years:

Cancer Hazard

- ▶ **Tetrachloroethylene** is a PROBABLE CARCINOGEN in humans. There is evidence that it causes cancer of the liver, esophagus, bladder, and other types of cancer in humans. It has also been shown to cause cancer of the liver and leukemia in animals.

- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- ▶ **Tetrachloroethylene** may damage the developing fetus.
- ▶ **Tetrachloroethylene** may decrease fertility in males and females and may damage the male (testes) and female (ovaries) reproductive systems in animals.
- ▶ There is limited evidence that **Tetrachloroethylene** causes spontaneous abortions.

Other Effects

- ▶ Prolonged or repeated exposure can cause drying and cracking of the skin with rash, redness and blisters.
- ▶ **Tetrachloroethylene** may damage the liver and kidneys and affect the nervous system and heart

Medical

Medical Testing

For frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- ▶ Liver and kidney function tests

If symptoms develop or overexposure is suspected, the following are recommended:

- ▶ Consider chest x-ray after acute overexposure
- ▶ Exam of the nervous system
- ▶ EKG

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

You have a legal right to request copies of your medical testing under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures

- ▶ Smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems. It may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- ▶ More than light alcohol consumption can cause liver damage. Drinking alcohol can increase the liver damage caused by **Tetrachloroethylene**.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Where possible, transfer **Tetrachloroethylene** from drums or other containers to process containers in an enclosed system.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- ▶ Avoid skin contact with **Tetrachloroethylene**. Wear personal protective equipment made from material that can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- ▶ The recommended glove materials for **Tetrachloroethylene** are Polyvinyl Alcohol, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier®.
- ▶ The recommended protective clothing materials for **Tetrachloroethylene** are Tychem® F, CPF3, BR, CSM and TK; and Trellechem® HPS and VPS, or the equivalent.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear indirect vent goggles when working with liquids that may splash, spray or mist. A face shield is also required if the liquid is severely irritating or corrosive to the skin and eyes.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure to **Tetrachloroethylene**, use a NIOSH approved respirator with an organic vapor cartridge. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
- ▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Tetrachloroethylene**, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- ▶ Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- ▶ Where the potential exists for exposure over **25 ppm**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus or an emergency escape air cylinder.
- ▶ Exposure to **150 ppm** is immediately dangerous to life and health. If the possibility of exposure above **150 ppm** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ Extinguish fire using an agent suitable for type of surrounding fire. **Tetrachloroethylene** itself does not burn.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Hydrogen Chloride* and *Phosgene*.
- ▶ Use water spray to keep fire-exposed containers cool.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **Tetrachloroethylene** is spilled or leaked, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.
- ▶ Ventilate area of spill or leak.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **Tetrachloroethylene** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **Tetrachloroethylene** you should be trained on its proper handling and storage.

- ▶ **Tetrachloroethylene** reacts violently with *finely dispersed* or *finely divided* METALS (such as ALUMINUM, BARIUM, LITHIUM, BERYLLIUM and ZINC).
- ▶ **Tetrachloroethylene** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFURIC ACID; NITRIC ACID; SODIUM HYDROXIDE; and POTASSIUM HYDROXIDE.
- ▶ **Tetrachloroethylene** slowly decomposes in WATER to form acids such as *Hydrogen Chloride*.
- ▶ **Tetrachloroethylene** decomposes slowly with heating, and with exposure to ultraviolet light or on contact with hot surfaces, to form toxic *Hydrogen Chloride* and *Phosgene gases*.
- ▶ Store in tightly closed containers in a cool, well-ventilated area.

Occupational Health Information Resources

The New Jersey Department of Health and Senior Services, Occupational Health Service, offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health & Senior Services
Right to Know Program
PO Box 368
Trenton, NJ 08625-0368
Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.state.nj.us
Web address: <http://www.nj.gov/health/eoh/rtkweb>

The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

The **critical temperature** is the temperature above which a gas cannot be liquefied, regardless of the pressure applied.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database on human health effects that may result from exposure to various chemicals, maintained by federal EPA.

LEL or Lower Explosive Limit, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

Protective Action Criteria (PAC) are values established by the Department of Energy and are based on AEGLs and ERPGs. They are used for emergency planning of chemical release events.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or Upper Explosive Limit is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Air*), at the same temperature and pressure.

The **vapor pressure** is a force exerted by the vapor in equilibrium with the solid or liquid phase of the same substance. The higher the vapor pressure the higher concentration of the substance in air.



Right to Know Hazardous Substance Fact Sheet

Emergency
Responders
Quick Reference

Common Name: TETRACHLOROETHYLENE

Synonyms: Ethene, Tetrachloro-; Ethylene Tetrachloride; Perchloroethylene

CAS No: 127-18-4

Molecular Formula: $Cl_2C=CCl_2$

RTK Substance No: 1810

Description: Clear, colorless liquid with a sweet *Ether*-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1897 ERG Guide #: 160 Hazard Class: 6.1 (Toxic)	Extinguish fire using an agent suitable for type of surrounding fire. Tetrachloroethylene itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i> . Use water spray to keep fire-exposed containers cool.	Tetrachloroethylene reacts violently with <i>finely dispersed or finely divided</i> METALS (such as ALUMINUM, BARIUM, LITHIUM, BERYLLIUM and ZINC). Tetrachloroethylene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFURIC ACID; NITRIC ACID; SODIUM HYDROXIDE; and POTASSIUM HYDROXIDE. Tetrachloroethylene slowly decomposes in WATER to form acids such as <i>Hydrogen Chloride</i> . Tetrachloroethylene decomposes slowly with heating, and with exposure to ultraviolet light or on contact with hot surfaces, to form toxic <i>Hydrogen Chloride</i> and <i>Phosgene</i> gases.

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)
Fire: 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.

Tetrachloroethylene is toxic to aquatic organisms and may cause long term effects on the aquatic environment.

PHYSICAL PROPERTIES

Odor Threshold: 5 to 50 ppm
Flash Point: Noncombustible
Vapor Density: 5.8 (air = 1)
Vapor Pressure: 14 mm Hg at 68°F (20°C)
Specific Gravity: 1.62 (water = 1)
Water Solubility: Very slightly soluble
Boiling Point: 250°F (121°C)
Freezing Point: -2°F (-19°C)
Ionization Potential: 9.32 eV
Molecular Weight: 165.8

EXPOSURE LIMITS

OSHA: 100 ppm, 8-hr TWA; 200 ppm, Ceiling; 300 ppm, Peak
NIOSH: Lowest feasible concentration
ACGIH: 25 ppm, 8-hr TWA; 100 ppm, STEL
IDLH: 150 ppm

The Protective Action Criteria values are:
 PAC-1 = 35 ppm PAC-2 = 230 ppm
 PAC-3 = 1,200 ppm

PROTECTIVE EQUIPMENT

Gloves: Polyvinyl Alcohol, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr breakthrough)

Coveralls: Tychem® F, CPF3, BR and CSM; Trelchem® HPS and VPS (>8-hr breakthrough)

Respirator: <25 ppm - full facepiece APR with *Organic vapor filters*
 Spills or Fire - SCBA

HEALTH EFFECTS

Eyes: Irritation and burns

Skin: Irritation and burns (skin absorbable)

Inhalation: Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
 Headache, dizziness, lightheadedness, and passing out

Chronic: Cancer (liver, esophagus and bladder)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.

Medical observation is recommended as symptoms may be delayed.



Right to Know Hazardous Substance Fact Sheet

Common Name: **TRICHLOROETHYLENE**

Synonyms: Ethylene Trichloride; TCE; Trichloroethene

Chemical Name: Ethene, Trichloro-

Date: January 2000 Revision: December 2008

CAS Number: 79-01-6

RTK Substance Number: 1890

DOT Number: UN 1710

EMERGENCY RESPONDERS >>>> SEE PAGE 6

Description and Use

Trichloroethylene is a clear, colorless liquid with a sweet odor. It is used as a degreaser for metal parts, as a solvent and fumigant, and to make other chemicals.

- ▶ **ODOR THRESHOLD = 1.4 ppm**
- ▶ Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

Reasons for Citation

- ▶ **Trichloroethylene** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA and EPA.
- ▶ This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

FIRST AID

Eye Contact

- ▶ Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention.

Skin Contact

- ▶ Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Seek medical attention.

Inhalation

- ▶ Remove the person from exposure.
- ▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- ▶ Transfer promptly to a medical facility.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

Hazard Summary

Hazard Rating	NJDHSS	NFPA
HEALTH	3	2
FLAMMABILITY	-	1
REACTIVITY	-	0

CARCINOGEN
POISONOUS GASES ARE PRODUCED IN FIRE
CONTAINERS MAY EXPLODE IN FIRE

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ **Trichloroethylene** can affect you when inhaled and by passing through the skin.
- ▶ **Trichloroethylene** should be handled as a CARCINOGEN-- WITH EXTREME CAUTION.
- ▶ Contact can irritate and burn the skin and eyes with possible eye damage.
- ▶ Exposure can cause headache, dizziness, lightheadedness, and passing out. Very high exposure can cause irregular heartbeat, which can be fatal.
- ▶ **Trichloroethylene** may cause a skin allergy.
- ▶ Repeated exposure may cause personality changes such as depression, anxiety or irritability.
- ▶ **Trichloroethylene** may damage the liver and kidneys.

Workplace Exposure Limits

- OSHA: The legal airborne permissible exposure limit (PEL) is **100 ppm** averaged over an 8-hour workshift, **and 200 ppm**, not to be exceeded during any 15-minute work period, and **300 ppm** as a 5-minute peak in any 2-hour work period.
- NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.
- ACGIH: The threshold limit value (TLV) is **10 ppm** averaged over an 8-hour workshift **and 25 ppm** as a STEL (short-term exposure limit).

- ▶ **Trichloroethylene** is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- ▶ The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

Determining Your Exposure

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet, available on the RTK Program website (www.nj.gov/health/eoh/rtkweb) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Trichloroethylene**:

- ▶ Contact can irritate and burn the skin and eyes with possible eye damage.
- ▶ Exposure can cause headache, dizziness, lightheadedness, visual disturbances, nausea and vomiting, and passing out. Very high exposure can cause irregular heartbeat, which can be fatal.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Trichloroethylene** and can last for months or years:

Cancer Hazard

- ▶ **Trichloroethylene** is a PROBABLE CARCINOGEN in humans. There is evidence that it causes liver, kidney, and lung cancer in animals.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- ▶ There is limited evidence that **Trichloroethylene** is a teratogen in animals. Until further testing has been done, it should be treated as a possible teratogen in humans.
- ▶ There is limited evidence that **Trichloroethylene** may affect fertility and may damage the male reproductive system (including decreasing the sperm count) in animals.

Other Effects

- ▶ **Trichloroethylene** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- ▶ Repeated exposure may cause personality changes such as depression, anxiety or irritability, and memory loss.
- ▶ **Trichloroethylene** may damage the liver and kidneys.

Medical

Medical Testing

For frequent or potentially high exposure (half the TLV or greater, or significant skin contact) the following are recommended before beginning work and at regular times after that:

- ▶ Liver and kidney function tests

If symptoms develop or overexposure is suspected, the following are recommended:

- ▶ Exam of the nervous system
- ▶ Evaluation by a qualified allergist can help diagnose skin allergy.
- ▶ Urinary *Trichloroacetic Acid* level (for repeated exposures) or blood **Trichloroethylene** levels (for acute exposure)
- ▶ Special 24-48 hour EKG (Holter monitor) to observe and record abnormal heart rhythms

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures

- ▶ More than light alcohol consumption can cause liver damage. Drinking alcohol can increase the liver damage caused by **Trichloroethylene**.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Where possible, transfer **Trichloroethylene** from drums or other containers to process containers in an enclosed system.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- ▶ Avoid skin contact with **Trichloroethylene**. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- ▶ Safety equipment manufacturers recommend Silver Shield®/4H®, Viton and Barrier® for gloves, and Tychem® F, BR, LV, Responder®, and TK; Zytron® 500; ONESuit® TEC; and Trellechem® HPS and VPS, or the equivalent, as protective materials for clothing.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- ▶ Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- ▶ Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure over **10 ppm**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- ▶ Exposure to **1,000 ppm** is immediately dangerous to life and health. If the possibility of exposure above **1,000 ppm** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ **Trichloroethylene** may burn, but does not readily ignite.
- ▶ Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Hydrogen Chloride* and *Phosgene*.
- ▶ CONTAINERS MAY EXPLODE IN FIRE.
- ▶ Use water spray to keep fire-exposed containers cool.
- ▶ Use water spray to reduce vapors.
- ▶ **Trichloroethylene** accumulates static charge.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **Trichloroethylene** is spilled or leaked, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Absorb liquids in vermiculite, dry sand, earth, fly ash or cement powder and place into sealed containers for disposal.
- ▶ Use water spray to keep containers cool.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **Trichloroethylene** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **Trichloroethylene** you should be trained on its proper handling and storage.

- ▶ **Trichloroethylene** will react explosively with *finely divided* or *powdered* BARIUM, BERYLLIUM, and MAGNESIUM.
- ▶ **Trichloroethylene** reacts with ACTIVE METALS (such as LITHIUM, SODIUM and TITANIUM) to cause flashing and sparks and will react with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and EPOXIDES to form spontaneously flammable *Dichloroacetylene*.
- ▶ **Trichloroethylene** is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ISOCYANATES; EPICHLOROHYDRIN; ALCOHOLS; and GLYCOLS.
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from COMBUSTIBLES, LIGHT and MOISTURE.
- ▶ Use only non-sparking tools and equipment, especially when opening and closing containers of **Trichloroethylene**.
- ▶ Metal containers involving the transfer of **Trichloroethylene** should be grounded and bonded as **Trichloroethylene** accumulates static charge.

Occupational Health Information Resources

The New Jersey Department of Health and Senior Services, Occupational Health Service, offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health & Senior Services
 Right to Know Program
 PO Box 368
 Trenton, NJ 08625-0368
 Phone: 609-984-2202
 Fax: 609-984-7407
 E-mail: rtk@doh.state.nj.us
 Web address: <http://www.nj.gov/health/eoh/rtkweb>

The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGs) are established by the EPA. They describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database on human health effects that may result from exposure to various chemicals, maintained by federal EPA.

LEL or **Lower Explosive Limit**, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

Protective Action Criteria (PAC) are values established by the Department of Energy and are based on AEGs and ERPGs. They are used for emergency planning of chemical release events.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

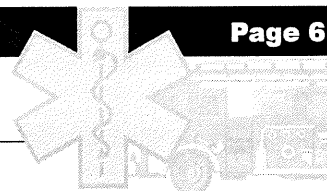
STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or **Upper Explosive Limit** is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a force exerted by the vapor in equilibrium with the solid or liquid phase of the same substance. The higher the vapor pressure the higher concentration of the substance in air.



Common Name: TRICHLOROETHYLENE

Synonyms: Ethylene Trichloride; TCE; Trichloroethene

CAS No: 79-01-6

Molecular Formula: C₂HCl₃

RTK Substance No: 1890

Description: Clear, colorless liquid with a sweet, *Chloroform-like* odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
<p>3 - Health</p> <p>1 - Fire</p> <p>0 - Reactivity</p> <p>DOT#: UN 1710</p> <p>ERG Guide #: 160</p> <p>Hazard Class: 6.1 (Poison)</p>	<p>Trichloroethylene may burn, but does not readily ignite.</p> <p>Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents.</p> <p>POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i> and <i>Phosgene</i>.</p> <p>CONTAINERS MAY EXPLODE IN FIRE.</p> <p>Use water spray to keep fire-exposed containers cool.</p> <p>Use water spray to reduce vapors.</p> <p>Trichloroethylene accumulates static charge.</p>	<p>Trichloroethylene will react explosively with <i>finely divided</i> or <i>powdered</i> BARIUM, BERYLLIUM, and MAGNESIUM.</p> <p>Trichloroethylene reacts with ACTIVE METALS (such as LITHIUM, SODIUM and TITANIUM) to cause flashing and sparks.</p> <p>Trichloroethylene will react with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and EPOXIDES to form spontaneously flammable <i>Dichloroacetylene</i>.</p> <p>Trichloroethylene is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ISOCYANATES; EPICHLOROHYDRIN; ALCOHOLS; and GLYCOLS.</p>

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, fly ash or cement powder and place into sealed containers for disposal.

DO NOT wash into sewer.

Use only non-sparking tools and equipment, especially when opening and closing containers of **Trichloroethylene**.

Metal containers should be grounded and bonded as **Trichloroethylene** accumulates static charge.

Trichloroethylene is slightly toxic to aquatic life.

PHYSICAL PROPERTIES

Odor Threshold: 1.4 ppm

Flash Point: >200°F (93°C)

LEL: 8%

UEL: 10.5%

Auto Ignition Temp: 788°F (420°C)

Vapor Density: 4.5 (air = 1)

Vapor Pressure: 58 mm Hg at 68°F (20°C)

Specific Gravity: 1.5 (water = 1)

Water Solubility: Slightly soluble

Boiling Point: 189°F (87°C)

Melting Point: -99°F (-73°C)

Ionization Potential: 9.5 eV

Molecular Weight: 131.4

EXPOSURE LIMITS

ACGIH: 10 ppm, 8-hr TWA; 25 ppm, 15-min STEL

IDLH: 1,000 ppm

The Protective Action Criteria values are:

PAC-1 = 130 ppm

PAC-2 = 450 ppm

PAC-3 = 3,800 ppm

PROTECTIVE EQUIPMENT

Gloves: Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)

Coveralls: Tychem® F, BR, LV, Responder®, and TK; Zytron® 500; ONESuit® TEC; and Trellechem® HPS and VPS (>8-hr breakthrough)

Respirator: >10 ppm - Supplied air or SCBA

HEALTH EFFECTS

Eyes: Irritation and burns

Skin: Irritation and burns

Inhalation: Headache, dizziness, lightheadedness, visual disturbances, nausea and vomiting, and passing out

Chronic: Cancer (liver, kidney, and lung) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.

Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility.



New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **1,2-DICHLOROETHYLENE**

CAS Number: 540-59-0
DOT Number: UN 1150

RTK Substance number: 0653
Date: September 1996 Revision: July 2002

HAZARD SUMMARY

- * **1,2-Dichloroethylene** can affect you when breathed in.
- * **1,2-Dichloroethylene** can irritate the skin causing a rash or burning feeling on contact.
- * **1,2-Dichloroethylene** can irritate the eyes on contact.
- * Breathing **1,2-Dichloroethylene** can irritate the nose, throat and lungs.
- * Exposure to a high concentration can cause you to become dizzy, lightheaded and to pass out.
- * Repeated exposure may affect the liver and kidneys.
- * **1,2-Dichloroethylene** is a **FLAMMABLE** and **REACTIVE** chemical and a **FIRE** and **EXPLOSION HAZARD**.

IDENTIFICATION

1,2-Dichloroethylene is a colorless liquid with an *Ether*-like odor. It is used as a solvent for organic materials.

REASON FOR CITATION

- * **1,2-Dichloroethylene** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, NFPA and EPA.
- * This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE** and **REACTIVE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **200 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **200 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **200 ppm** averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to **1,2-Dichloroethylene** and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **1,2-Dichloroethylene** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **1,2-Dichloroethylene**:

- * **1,2-Dichloroethylene** can irritate the skin causing a rash or burning feeling on contact.
- * **1,2-Dichloroethylene** can irritate the eyes on contact.
- * Breathing **1,2-Dichloroethylene** can irritate the nose, throat and lungs.
- * Exposure to a high concentration can cause you to become dizzy, lightheaded and to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **1,2-Dichloroethylene** and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health and Senior Services, **1,2-Dichloroethylene** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * According to the information presently available to the New Jersey Department of Health and Senior Services, **1,2-Dichloroethylene** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

- * Repeated exposure may affect the liver and kidneys.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following are recommended:

- * Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

- * Because more than light alcohol consumption can cause liver damage, drinking alcohol may increase the liver damage caused by **1,2-Dichloroethylene**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid **1,2-Dichloroethylene** from drums or other storage containers to process containers.
- * Before entering a confined space where **1,2-Dichloroethylene** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by **1,2-Dichloroethylene** should change into clean clothing promptly.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **1,2-Dichloroethylene**.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with **1,2-Dichloroethylene**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **1,2-Dichloroethylene**, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where **1,2-Dichloroethylene** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, applying cosmetics, smoking, or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with **1,2-Dichloroethylene**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- * Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
- * Contact lenses should not be worn when working with this substance.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS.

Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposure over **200 ppm**, use a NIOSH approved full facepiece respirator with an organic vapor cartridge. Increased protection is obtained from full facepiece powered-air purifying respirators.
- * If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **1,2-Dichloroethylene**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.

- * Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- * Exposure to **1,000 ppm** is immediately dangerous to life and health. If the possibility of exposure above **1,000 ppm** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

- * Prior to working with **1,2-Dichloroethylene** you should be trained on its proper handling and storage.
- * **1,2-Dichloroethylene** forms explosive hazards with METAL and METAL ALLOYS (such as POTASSIUM, LITHIUM, MAGNESIUM, ALUMINUM DUSTS, COPPER and COPPER ALLOYS).
- * Mixtures with NITRIC ACID can be detonated by HEAT, IMPACT or FRICTION.
- * **1,2-Dichloroethylene** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); DIFLUOROMETHYLENE DIHYPOFLUORITE; and NITROGEN TETRAOXIDE.
- * Store in tightly closed containers in a cool, well-ventilated area away from AIR, LIGHT and MOISTURE as **1,2-Dichloroethylene** will decompose to form *Hydrogen Chloride*.
- * Sources of ignition, such as smoking and open flames, are prohibited where **1,2-Dichloroethylene** is used, handled, or stored.
- * Metal containers involving the transfer of **1,2-Dichloroethylene** should be grounded and bonded.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of **1,2-Dichloroethylene**.
- * Wherever **1,2-Dichloroethylene** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEL is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

APPENDIX 3

MONITORING WELL BORING AND CONSTRUCTION LOGS

TEST BORING LOG/WELL CONSTRUCTION DIAGRAM

Project Name: Pergament Mall Site

Boring/Well I.D. PMMW-3

Project Location: Staten Island, Richmond County, N.Y.

Surface Elevation (ft): 29.15

LMS Project #: 576-057

Location Coordinates: East of JemBro store, SW Corniche Cleaner

Date Started/Completed: 5-20-92

Total Depth (ft): 16.97

Drilling Company: Delta Well & Pump Inc.

Geologist: Tarik Zarrouk

Drilling Method: 4.25 in HSA

Initial Water Depth (ft): 10.86

DEPTH FT.	SAMPLE NUMBER	BLOWS/5ft.	RECOVERY	PID/FID (units)		GEOLOGIC DESCRIPTION	LITHOLOGY	WELL DIAGRAM
				VALUES	PROFILE			
						Concrete and asphalt.		
	SS-1		BG			Reddish brown silty clay, little v.f. sand, trace gravel (dry).		
			0.9			Same as above (little silt, moist).		
	SS-2							
5			1.5			Reddish brown v. f. well sorted sand, little coarse sand and gravel (moist).		
	SS-3							
			1.5			Reddish brown v.f. sand, some gravel (moist).		
	SS-4							
			1.1			Brown fine to medium sand, some gravel, little silty clay (wet).		
10	SS-5							
			0.9			Reddish brown silty clay, mixed with green rock fragments (wet)		
15	SS-6					Refusal at 15 ft (augered 2 ft into bedrock, wet).		
			0.6			The monitoring well was installed at 16.97 ft below grade (screen interval 6.97-16.97 ft).		

PID: White profile bar

FID: Black profile bar

TEST BORING LOG/WELL CONSTRUCTION DIAGRAM

Project Name: Pergament Mall Site

Boring/Well I.D. PMMW-1

Project Location: Staten Island, Richmond County, N.Y.

Surface Elevation (ft): 34.13

LMS Project #: 576-057

Location Coordinates: 10 ft North of Trader Horn store.

Date Started/Completed: 5-21-92

Total Depth (ft): 17.18

Drilling Company: Delta Well & Pump Inc.

Geologist: Tarik Zarrouk

Drilling Method: 4.25 in HSA

Initial Water Depth (ft): 3.36

DEPTH FT.	SAMPLE NUMBER	BLOWS/.5ft.	RECOVERY	PID/FID (units)		GEOLOGIC DESCRIPTION	LITHOLOGY	WELL DIAGRAM
				VALUES	PROFILE			
0						Dark gray top soil, little grass (dry).		
0.5	SS-1		1.0	BG		Reddish brown silty clay, little v.f. sand, trace gravel (moist).		
1.5	SS-2		1.3	BG		Green v.f. sand, some silty clay, trace gravel (moist).		
5.0	SS-3		1.2	P8.5		Same as above (trace rock fragemnts, moist to wet).		
6.5	SS-4		0.2	F40		Green weathered rock fragments (hit refusal and augered to 14 ft through weathered green bedrock, wet).		
10.0						Augered to 17.5 ft through solid green bedrock (wet).		
15.0						The monitoring well was installed at 17.18 ft below grade (screen interval 7.18-17.18 ft).		

PID: White profile bar
FID: Black profile bar

THE WHITMAN COMPANIES, INC.

Environmental Engineering & Management

Client : Pergament Investments	MW-8
Site Location : Staten Island, NY	
Project No. : 94-01-03	Date Installed: <u>20-Jun-03</u>
Drilling Co. : <u>Advanced Drilling</u> Driller's Name : <u>Scott Alberalla</u>	Geologist : <u>Gary Weissberger</u>
Type of Rig : <u>Hollow Stem Auger/Air Rotary</u> Hole Diameter : <u>10"</u>	Total Depth : <u>20 ft</u>
Sampler Type : <u>2 ft Split Spoon (2" Dia.)</u> Well Diameter : <u>4"</u>	
Hammer Weight : <u>140 lbs.</u> Fall : <u>30"</u>	

Well Diagram	Depth (ft)	MAXIMUM PID READING	Lithology	Remarks
	1	0.0	0-0.5' ASPHALT 0.5-5' CLAY, RED WITH SAND, GRAVEL AND SILT, POORLY SORTED	FLUSH MOUNT MANHOLE MASTER LOCK: 0210 CONCRETE: 0'-1' CEMENT/BENTONITE: 1'-7' BENTONITE: 7'-8' GRAVEL PACK: 8'-20' RISER (10 FEET) : 0'-10' : 4 INCH ID : PVC : SCHEDULE 40 SCREEN:(10 FEET) : 10'-20' : 4 INCH ID : PVC : SCHEDULE 40 : 0.010" SLOT BOTTOM CAP
	2	0.0		
	3	0.0		
	4	0.0		
	5	0.0	5'-7' GRANITE BOULDER	
	6	0.0		
	7	0.0	7'-11' SILT, RED	
	8	0.0		
	9	0.0		
	10	0.0		
	11	0.0	11'-17' CLAY, RED WITH SAND AND WEATHERED SERPENTINE FRAGMENTS	
	12	0.0		
	13	0.0		
	14	0.0		
	15	0.0		
	16	0.0		
	17	0.0	17'-20' SERPENTINE	
	18	0.0		
	19	0.0		
	20	0.0		

Client : Pergament Investments	MW-4R
Site Location : Staten Island, NY	
Project No. : 94-01-03	Date Installed: <u>18-Nov-99</u>
Drilling Co. : <u>Summit Drilling Co</u> Driller's Name : <u>Matt Raab</u>	Geologist : <u>Gary Weissberger</u>
Type of Rig : <u>Hollow Stem Auger</u> Hole Diameter : <u>10"</u>	Total Depth : <u>12 ft</u>
Sampler Type : <u>2 ft Split Spoon (2" Dia.)</u> Well Diameter : <u>4"</u>	
Hammer Weight : <u>140 lbs.</u> Fall : <u>30"</u>	

Well Diagram	Depth (ft)	Lithology	Remarks
	1	0-0.5' ASPHALT	FLUSH MOUNT MANHOLE MASTER LOCK: 0210 CEMENT: 0'-2' BENTONITE: 2'-3' GRAVEL PACK: 3'-12' RISER (5 FEET) : 0'-5' : 4 INCH ID : PVC : SCHEDULE 40 SCREEN:(7 FEET) : 5'-12' : 4 INCH ID : PVC : SCHEDULE 40 : 0.020" SLOT BOTTOM CAP
	2	0.5-3' SILT, RED, WTH SAND, GRAVEL AND CLAY, POORLY SORTED	
	3	3-3.5' SAND, RED, COARSE	
	4	3.5-5' CLAY, RED, FIRM	
	5	5-12' CLAY, RED, WTH SAND, GRAVEL AND SILT, POORLY SORTED	
	6		
	7		
	8		
	9		
	10		
	11		
	12	SERPENTINE FRAGMENTS AT 12 FT	
	13		
	14		
	15		
	16		
	17		
	18		

Client : Pergament Investments	MW-7
Site Location : Staten Island, NY	
Project No. : 94-01-03	Date Installed: <u>18-Nov-99</u>
Drilling Co. : <u>Summit Drilling Co</u>	Driller's Name : <u>Matt Raab</u>
Type of Rig : <u>Hollow Stem Auger</u>	Hole Diameter : <u>10"</u>
Sampler Type : <u>2 ft Split Spoon (2" Dia.)</u>	Well Diameter : <u>4"</u>
Hammer Weight : <u>140 lbs.</u>	Fall : <u>30"</u>
Geologist : <u>Gary Weissberger</u>	
Total Depth : <u>7.5 ft</u>	

Well Diagram	Depth (ft)	MAXIMUM PID READING	Lithology	Remarks
	1	0.0	0-0.5' ASPHALT	FLUSH MOUNT MANHOLE MASTER LOCK: 0210 CEMENT: 0'-1' BENTONITE: 1'-1.5' GRAVEL PACK: 1.5'-7.5' RISER (2.5 FEET) : 0'-2.5' : 4 INCH ID : PVC : SCHEDULE 40 SCREEN:(5 FEET) : 2.5'-7.5 : 4 INCH ID : PVC : SCHEDULE 40 : 0.020" SLOT BOTTOM CAP
	2	0.0	5-12' CLAY, RED, WITH SAND, GRAVEL AND SILT, POORLY SORTED	
	3	0.0		
	4	0.0		
	5	0.0		
	6	0.0		
	7	0.0	7-7.5' WEATHERD SERPENTINE FRAGMENTS	
8			SERPENTINE FRAGMENTS AT 12 FT	
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

CLIENT: PERGAMENT INVESTMENTS

WELL LOG

WELL No. MW-6

PROJECT No. 940103 SITE LOCATION: STATEN ISLAND, NY

THE WHITMAN COMPANIES, INC.

SHEET 1 OF 1

DRILLING Co. SUMMIT DRILLING CO DRILLER: RALPH AQUINO

DATE STARTED: 3/28/98

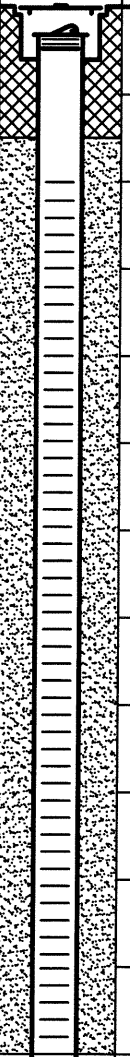

TYPE OF RIG: AIR ROTARY HOLE DIA.: 8"

GEOLOGIST: GARY WEISSBERGER

SAMPLER TYPE: SPLIT SPOON DIA.: 2 IN.

TOTAL DEPTH 12'

HAMMER WT.: 140 LBS. FALL: 30 IN.

WELL COMPLETION DIAGRAM	DEPTH (FEET)	GRAPHIC LOG	MAXIMUM PID READING	LITHOLOGY	REMARKS
	0 1 2 3 4 5 6 7 8 9 10 11 12		0.0 410	0-0.5' ASPHALT 0.5-4' CLAY, RED 4-6' SILT, RED 6-12' SERPENTINE FRAGMENTS GRADING TO COMPETENT SERPENTINE COMPETENT SERPENTINE	FLUSHMOUNT MANHOLE MASTER LOCK: : #2010 PVC LOCKING CAP CEMENT : 0'-1.5' GRAVELPACK : 1.5'-12' RISER (2 FEET) : 0'-2' : 4 INCH ID : PVC : SCHEDULE 40 SCREEN (10 FEET) : 2'-12' : 4 INCH ID : PVC : SCHEDULE 40 : 0.020" SLOT BOTTOM CAP

CLIENT: PERGAMENT INVESTMENTS

WELL LOG

WELL No. MW-5

PROJECT No. 940103 SITE LOCATION: STATEN ISLAND, NY

THE WHITMAN COMPANIES, INC.

SHEET 1 OF 1

DRILLING Co. SUMMIT DRILLING CO DRILLER: RALPH AQUINO

DATE STARTED: 3/28/98

TYPE OF RIG: AIR ROTARY HOLE DIA.: 8"

GEOLOGIST: GARY WEISSBERGER

SAMPLER TYPE: SPLIT SPOON DIA.: 2 IN.

TOTAL DEPTH 17'

HAMMER WT.: 140 LBS. FALL: 30 IN.

WELL COMPLETION DIAGRAM	DEPTH (FEET)	GRAPHIC LOG	MAXIMUM PID READING	LITHOLOGY	REMARKS
	0		0.0	0-0.5' ASPHALT	FLUSHMOUNT MANHOLE MASTER LOCK: : #2010 PVC LOCKING CAP CEMENT : 0'-2' BENTONITE : 2'-3' GRAVELPACK : 3'-17' RISER (5 FEET) : 0'-5' : 4 INCH ID : PVC : SCHEDULE 40 SCREEN (10 FEET) : 5'-17' : 4 INCH ID : PVC : SCHEDULE 40 : 0.020" SLOT BOTTOM CAP
	1		0.0	0.5-3' SILT AND CLAY, FIRM, RED (WETHERED SHALE)	
	2		0.0		
	3		0.0	3-4' SHALE, RED BOULDER	
	4		0.0	4-8' CLAY, RED WITH SHALE AND SERPENTINE FRAGMENTS	
	5				
	6		0.0		
	7				
	8		0.0	8-10' SILT, SAND AND CLAY, RED POORLY SORTED	
	9		0.0		
10					
11					
12	0.0				
13					
14					
15	0.0				
16	0.0				
17	0.0		16-17' SERPENTINE FRAGMENTS REFUSAL AT 17'		

APPENDIX 4

GROUNDWATER MONITORING WELL SAMPLING LOG FORM

WHITMAN
Well Sampling Worksheet

SITE: _____ WELL NO.: _____
 DATE: _____ WEATHER: _____
 PERSONNEL: _____

PID READING

PRIOR TO PURGING

CASING DIAMETER: _____ in.
 DEPTH OF WELL: _____ ft.
 DEPTH TO WATER: _____ ft.
 SATURATED THICKNESS: _____ ft.
 DEPTH TO SCREEN: _____ ft.
 VOLUME OF WATER: _____ gal.
 VOLUME TO PURGE: _____ Gal.

Conversion Factors

1" = 0.04
2" = 0.16
4" = 0.65
6" = 1.46
8" = 2.61
10" = 4.08
12" = 5.87

PURGING

METHOD USED: _____ PUMP INTAKE: _____ Ft.
 TIME STARTED: _____ TOTAL PURGED: _____ Gal.
 TIME FINISHED: _____ PURGE RATE: _____ Gpm
 TOTAL TIME: _____ min.
 COMMENTS: _____

AFTER PURGING

DEPTH OF WATER: _____ ft. TIME: _____

SAMPLING

METHOD USED: _____ TIME: _____
 DEPTH OF WATER: _____ ft.
 COMMENTS: _____

WATER QUALITY

GROUND WATER ANALYZER MODEL _____

Time	pH	Cond. μs ms	Turb. (NTU)	Dis.O ₂ (ppm)	Temp °F °C	Eh (mV)	PumpRate (ml/min)	Depth to Water (ft)	Notes

Type of Samples Collected: _____
 Information: 2 in. = 617 ml/ft, ½ in. I.D. Tubing = 39 ml/ft: Vol_{cyl} = πr²h,

APPENDIX 5

CONTROLLED PROPERTY INSPECTION FORM

**ANNUAL MONITORING REPORT FORM FOR INSTITUTIONAL &
ENGINEERING CONTROLS**

I. Background Site Information

A. Facility Name and Location:

Business Name as it appears on the Deed Notice:

Name of the current operator at the site (if different than above): _____

Property Street Address: _____

Municipality (-ies): _____ County (-ies): _____

Blocks: _____

Lots: _____

Year of Tax map from which this information is obtained: _____

B. Person responsible for submitting the annual monitoring report:

Person's Name: _____

Person's Title: _____

Business Name: _____

Relationship to the Site (check as appropriate): Owner _____ Operator _____

Lessee _____ Person Who Conducted the Cleanup _____

Other (describe) _____

Street Address: _____

City: _____ State: _____

Telephone Number: (____) ____ - ____

FAX Number: (____) ____ - ____

E-mail Address: _____

C. All Current Owner, Lessee(s) and Operator(s)

Name of Person: _____

Business Name: _____

Relationship to the Site: Owner _____ Operator _____ Lessee _____

Street Address: _____

City: _____ State: _____

Telephone Number: (____) ____ - ____

FAX Number: (____) ____ - ____

E-mail Address: _____

D. Case Specific Information (Complete all that apply)

- NYSDEC Site Name _____
- NYSDEC Site # _____
- NYSDEC Case Manager _____
- Name and Bureau of assigned Case Manager at the time the VCA/DCR was issued.

E. Existing Site Conditions

- Describe the physical characteristics of the Site.
- Describe the current site operations.
- Describe each engineering control that applies to the Restricted Areas.

II. Protectiveness Evaluation

A. Deed Notice & Engineering Control Information

- Provide the following information for the recorded Deed Notice:

Book Number: _____
Page Number: _____
Date the date the Deed Notice was filed in the office of the county recording officer: _____

- Have any amendments and/or additional filings been recorded that may modify or supersede the Deed Notice and Exhibits?

Yes ____ No ____

If you answered “Yes”, provide an explanation. Also provide the Book and Page Number of the amendment and/or additional filing and the date it was filed in the office of the county recording officer. Attach a copy of the amendment and/or additional filing in Attachment 2: Deed Notice Amendment.

B. Evaluation of Institutional and Engineering Controls

1. Zoning or Land Use Changes

a. Land use at the time the Deed Notice was filed (check all that apply):
Non-Residential ____ Residential ____ Agricultural ____ Other ____

b. Current land use (check all that apply):
Non-Residential ____ Residential ____ Agricultural ____ Other ____

If the current land use is different than the land use at the time the Deed Notice was filed, explain how the remedial action, which included the Deed Notice, remains protective of public health and safety. Include the Case Manager's name and Bureau that approved this change, if applicable.

c. Has there been an actual or pending zoning or land-use change for the Restricted Area on which the Deed Notice is filed?

Yes ____ No ____ (If No, proceed to #2, below)

There is an actual or pending zoning or land-use change on the Restricted Area which is consistent with the use restrictions. That change will not undermine the protectiveness of the remedial action in a manner such that could prevent the remedial action from meeting the applicable health risk standard, and protection of public health, safety, and of the environment.

The result of the evaluation was either (1) the control remains protective, (2) an actual change occurred, the control was no longer protective and a description of what was done to make the control protective, or (3) a pending change will occur which will result in the control no longer being protective and a description of what was/will be done to make the control protective.

The details of the actual or pending zoning or land-use changes and any potential impact are provided below:

2. Inspections

Have periodic inspections of the site identified any excavation or other disturbance activities that have taken place within the restricted areas?

Yes ___ No ___ (If No, proceed to "3")

An excavation or other disturbance activity has taken place within the restricted areas and any disturbances of the soil at the site have not resulted in unacceptable exposure to the soil contamination. A full description of the disturbance and the method to restore all controls, compliance with all guidelines of the SoMP, applicable health and safety laws and regulations and methods to ensure that exposure to contamination in excess of the applicable remediation standard did not occur are provided below. If the disturbance resulted in an unacceptable exposure to the soil contamination explain how this was remedied.

Date(s) of Disturbance: _____

Duration of Disturbance: Years ___ Months ___ Days ___

Date the NYSDEC was notified: _____

Description of the disturbance and methods to address the disturbance:

Name of Contact Person Relative to the Disturbance:

Title: _____

Street Address: _____

City: _____ State: _____ Zip Code: _____

Telephone Number: _____

Email Address: _____

Was all soil excavated and returned to the Restricted Area?

Yes ___ No ___ (If No, provide an explanation)

Quantity of soil generated for disposal (if applicable): _____ tons
Provide the destination of all materials removed from the Site during work performed.

Attach Transportation/disposal/approvals for receipt documentation.

Provide an explanation of how the engineering control was replaced following the disturbance?

Provide an explanation of how the engineering control was replaced following the disturbance?

3. Changes to Laws and Regulations

- a. Are there any subsequently promulgated or modified environmental laws or regulations, which apply to the site?

Yes ___ No ___ (If No, proceed to #4 below)

- b. If Yes, has the evaluation also determined that the each DCR and engineering control, as applicable, meets the requirements of the new laws and regulations?

Yes ___ No ___ (If Yes, proceed to #4 below)

- c. Each engineering control, as applicable that did not meet the requirements of the new laws and regulations has been addressed in the following manner to bring them into compliance:

APPENDIX 6

QUALITY ASSURANCE PROJECT PLAN

WHITMAN

Environmental & Engineering Excellence
from Concept to Completion

QUALITY ASSURANCE PROJECT PLAN

FOR

PERGAMENT MALL/CORNICHE DRY CLEANERS

2795 RICHMOND AVENUE
STATEN ISLAND, NEW YORK

NYSDEC SITE CODE #240312

PREPARED BY

WHITMAN

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**QUALITY ASSURANCE PROJECT PLAN
FOR
PERGAMENT MALL/CORNICHE DRY CLEANERS
2795 RICHMOND AVENUE
STATEN ISLAND, NEW YORK**

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**QUALITY ASSURANCE PROJECT PLAN
FOR
PERGAMENT MALL/CORNICHE DRY CLEANERS
2795 RICHMOND AVENUE
STATEN ISLAND, NEW YORK**

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) provides a description of the quality assurance procedures for sampling activities at the property located at 2795 Richmond Avenue, Staten Island, Richmond County, New York. The investigation activities conducted at the site will comply with the applicable New York State Department of Environmental Conservation (NYSDEC) standards, criteria and guidance.

2.0 PROJECT SCOPE

2.1 Background

The Pergament Mall/Corniche Dry Cleaners (Pergament Mall) property is located at 2795 Richmond Avenue, Staten Island, Richmond County, New York. The site is located within the 18-acre shopping center complex of Pergament Mall. The shopping center complex consists of a main building and four (4) satellite buildings. The remainder of the property is paved and used primarily for parking. Corniche Dry Cleaners was located in the middle of the eastern satellite building.

Previous investigations identified tetrachloroethene (PCE) and trichloroethene (TCE) in the ground water at concentrations exceeding the NYSDEC Ground Water Quality Standards/Criteria. Analytical data obtained to date indicates that these compounds are likely a result of historical discharges from Corniche Cleaners. Additional information regarding the site history, setting, geology, bedrock, hydrogeology, climatology and demography was provided in Whitman's Remedial Investigation Report for Pergament Mall/Corniche Dry Cleaners dated August 1998 and Whitman's Phase II Remedial Investigation Report (RIR) dated June 2000.

The intent of the sampling proposed in this QAPP is to further investigate ground water beneath the site and address any indoor air quality issues that may be affecting the onsite building.



In July 2001 a Record of Decision (ROD) was issued by NYSDEC for the site to formalize the selected remedy for the site. The selected remedy required no active remediation along with the design and implementation of an ongoing ground water monitoring program and institutional controls in the form of existing use and development restrictions limiting the use of ground water as a potable water source. Subsequent to the ROD order on consent W2-0751-01-12 was executed requiring Pergament Investments to prepare and implement an Operations Maintenance and Monitoring Plan detailing the ground water monitoring remedy.

The monitoring plan was prepared and implemented and since 1994, Whitman has completed (25) additional rounds of ground water from various combinations of on-site wells during the time period of 1994 to 2011. MW-4 was paved over sometime after 1994 and could not be located by Whitman for sampling. A replacement to MW-4, (MW 4R) was installed in 1999 by Whitman. During Whitman's tenure, four (4) additional ground water monitoring wells were installed and identified as MW-5, MW-6 MW-7 and MW-8. These four wells were installed to monitor an area downgradient of the spill, but just upgradient of the site's southern property line. MW-1 was paved over circa 2006 and as approved by NYSDEC was not replaced.

Historic ground water sampling results show that significant reductions in contaminant concentrations have occurred since ground water monitoring began in 1992 and ground water contaminant concentrations have reached asymptotic conditions. Additionally, ground water contaminants are contained within the site boundaries and are not migrating off site.

2.2 Proposed Ground Water Sampling

Groundwater monitoring will be performed on a periodic basis to assess the performance of the remedy. The original network of monitoring wells has been installed to monitor both up-gradient and down-gradient groundwater conditions at the site.

The following ground water monitoring program is in place to insure that the ground water contaminant plume does not migrate off-site (thereby protecting human health and the environment) and to monitor for further ground water contaminant concentrations decreases.

The wells to be sampled, sampling frequency and sampling parameters are shown in the table below:

<u>Well ID</u>	<u>Sampling Frequency</u>	<u>Sampling Parameters</u>
MW-5	Annual through 2013 / Biennial thereafter	VO+10 / EPA 624
MW-6	Annual through 2013 / Biennial thereafter	VO+10 / EPA 624
MW-7	Annual through 2013 / Biennial thereafter	VO+10 / EPA 624
MW-2	Quadrennial beginning in 2017	VO+10 / EPA 624
MW-3	Quadrennial beginning in 2017	VO+10 / EPA 624
MW-7	Quadrennial beginning in 2017	VO+10 / EPA 624
MW-8	Quadrennial beginning in 2017	VO+10 / EPA 624

The sampling frequency may be modified with the approval of the NYSDEC. The Site Management Plan (SMP) will be modified to reflect changes in sampling plans approved by NYSDEC.

2.3 Proposed Indoor Air and Sub-Slab Sampling

Based on the findings of historic indoor air quality investigations, chemicals associated with ground water and soil contamination beneath and near the building leaseholds on the site were not detected at significant concentrations within the building.

Considering the location of existing subsurface ground water contamination, the areas included in this investigation would be expected to have represented a worst-case scenario in terms of potential exposure. The last round of indoor air sampling was conducted in 2011. On-going monitoring to ensure that the sub-surface vapors are not entering on-site buildings will be conducted to protect human health at the site.

The next round of indoor air sampling will be conducted in 2013 and biennially thereafter. The next round of sub slab sampling will occur in 2013 and biennially thereafter. Sampling will be conducted during the winter heating season in the following leaseholds:

- Allstate
- Dunkin Donuts
- Nails
- Jennifer Convertibles
- Bella Vita II

The sampling frequency may be modified with the approval of the NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

3.0 DATA QUALITY OBJECTIVES

The laboratory data collected during ground water monitoring will be utilized to characterize the condition of the subsurface ground water and assess the performance of the remedy.

The laboratory chosen for the analysis of any aqueous samples for a parameter or category for which laboratory certification exists pursuant to the NYSDEC Analytical Services Protocol (ASP), requires that the laboratory shall be certified for that specific parameter or category of parameters pursuant to NYSDEC ASP.

4.0 LABORATORY

In order to obtain data of appropriate quality to meet the objectives, the laboratory selected by Whitman and Pergament Mall will use EPA method 624 with New York State Department of Health (NYSDOH) Reduced Deliverable Documentation. Any lab utilized must also be NYSDOH accredited.

5.0 SAMPLING METHODS, STORAGE AND HANDLING

A description of sampling methods, sample preservation requirements, sample handling times, decontamination procedures for field equipment, and frequency for blanks is provided below. These items must be conducted to comply with NYSDOH standards for sampling, as specified in USEPA's "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers" EPA 542-S-02-001 or, if appropriate, other applicable industry methods.

5.1 Sampling Methods

5.1.1 Ground Water Samples

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log prepared and presented in the biennial site management report. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Ground water samples will be analyzed for Volatile Organic Compounds (VO+10) using EPA method 624. Analysis will be provided by a NYSDOH certified lab.

All site wells will be gauged during the sampling events to continue verification of ground water flow direction. Wells will be purged and sampled utilizing the standard well volume method outlined in USEPA's "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers" EPA 542-S-02-001. This information may be presented as an appendix, such as a Field Sampling Plan. Wells will be sampled from lowest relative concentration to highest concentration to minimize the possibility of cross-contamination between wells. Sampling information will be recorded on well sampling logs and will be submitted with biennial reports.

5.1.2 Indoor Air Samples

All of the proposed work is intended to be consistent with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 and with NYSDOH's Indoor Air Sampling Analysis Guidance, February 1, 2005.

For each leasehold, a pre-sampling inspection will be performed to evaluate the physical layout and conditions of the leasehold being investigated, and materials in the leasehold that could interfere with the evaluation of the sample analysis.

Because the leasehold spaces under investigation are retail operations, indoor air quality samples will be collected for 8 hours per location, with samples collected in 6-liter Summa canisters, with flow rates that conform to the NYSDOH specifications.

All indoor air samples will be laboratory analyzed for TO+15 by a NYSDOH certified lab.

Concurrent with indoor air sampling, one (1) outdoor air sample will be collected, over an 8-hour period. This sample will be collected in the vicinity of the former dry cleaner leasehold.

5.1.3 Sub-Slab Samples

In accordance with NYSDOH Guidance, the following steps will be followed in conducting sub-slab vapor sampling.

- Normal indoor air temperatures will be maintained for twenty-four (24) hours prior to sampling.
- Building's floors will be inspected to note any cracks or penetrations. Sampling will be conducted at locations where there is minimal potential for ambient air infiltration.



- Vapor sampling will be conducted using temporary probes of polyethylene or Teflon tubing.
- Vapor sampling tubing will be extended no more than two (2) inches into the sub-slab material.
- The sampling implant will be sealed with non-VOC containing and non-shrinking material.
- Vapors will be collected in 6-liter Summa canisters.
- Purging and collecting flow rates will be controlled not to exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling.
- Based on the flow rate, and the 6-liter canister volume, each sub-slab vapor sample will be collected over a one (1) hour period.
- Conditions in the leasehold spaces to be sampled will be documented as specified in the Soil Vapor Intrusion Guidance.
- The field sampling team will maintain a sample log sheet as specified by NYSDOH.
- An appropriate tracer gas will be used to serve as a quality control, quality assurance measure.
- Soil vapor samples will be analyzed by a certified laboratory for Volatile Organics by EPA Method TO-15.

All sample analytical results, appropriate QA/QC data, and field log sheets will be submitted to NYSDEC in biennial site management reports.

5.2 Sample Handling and Storage in Field

- Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers and preservative will be tagged as such.
- All sample containers will be marked before sample collection. After collection, the container will be sealed, and a sample label will be attached to the container.
- Ground water samples will be placed in a cooler packed with ice and/or ice packs to maintain a temperature of 4°C +/- 2°C. Samples will be recorded on the Chain-of-Custody form. A copy of a Chain-of-Custody form is included as Attachment 1.
- Coolers will be stored in a cool location in the field.



- Coolers holding sample containers and blanks will be allowed one (1) day travel from the laboratory, two (2) days in the field and one (1) day travel back to the laboratory. Transportation of the coolers to the laboratory will occur as soon as possible. Laboratory service will provide delivery of coolers and supplies. Chain-of-Custody will be signed accordingly.
- Laboratory personnel will be responsible for the care and custody of the sample once it is transferred to them.
- Sample holding times will be in accordance with NYSDEC ASP.

5.3 Field and Trip Blanks and Ambient Air Samples

Field QC samples will be collected as necessary.

Field blanks are collected by pouring water supplied by the laboratory over the sampling instrument and collecting it in a bottle containing the appropriate preservative.

Trip blanks are collected at a rate of one (1) per a sample shipment (not to exceed two consecutive field days) for volatile organic compounds. Trip blanks for water samples will consist of laboratory supplied bottles filled at the laboratory with laboratory demonstrated analyte free water. The blanks will remain sealed and accompany sample jars to and from the field.

Ambient air samples will be collected directly into laboratory provided 6-liter stainless steel Summa canisters equipped with 8-hour flow controllers.

5.4 Equipment Decontamination Procedures

5.4.1 Aqueous Sampling Equipment

The following procedure will be followed for all non-dedicated sampling equipment:

1. Detergent and tap water wash.
2. Generous tap water rinse.
3. Distilled and deionized water rinse.
4. Total air dry or nitrogen blow out.



5.4.2 Indoor Air and Sub-Slab Samples

No equipment decontamination is necessary.

6.0 CALIBRATION AND PREVENTATIVE MAINTENANCE PROCEDURES FOR INSTRUMENTATION

Prior to the initiation of the field investigation, a preventative maintenance and calibration program will be implemented to ensure proper operation of the field instruments. The field personnel will be familiar with the maintenance, calibration, and operation of field equipment and will perform the prescribed field operating procedures outlined in the Operations Manuals accompanying each instrument.

Field instruments used during sampling will be checked for calibration consistent with manufacturer-recommended procedure. All field analytical equipment will be calibrated immediately prior to each days use. Field equipment will be supplied and maintained by Whitman or a qualified rental company.

The laboratory will follow calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to instruments used for analytical methods.

7.0 SAMPLE CUSTODY PROCEDURES

Sample Chain-of Custody is initiated to maintain control of samples until delivered to the laboratory. To reduce the chance for error, the number of personnel assuming custody of the samples will be held to a minimum.

On-site monitoring and sampling data will be controlled and entered onto appropriate records. Personnel involved in the Chain-of-Custody and transfer of the samples will be trained on the purpose and procedures prior to implementation.

7.1 Field Sample Custody

Chain-of-Custody forms are to be initiated by the sampling crew in the field. A Chain-of-Custody form will accompany the sample from the field for sample containment and preservation, through its return to the laboratory. The Chain-of-Custody form will trace the path



of each individual sample by means of a unique identification number. A sample Chain-of-Custody form is included in Attachment 1.

The Project Manager will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped and the anticipated date of arrival. Samples collected will be shipped in containers (coolers) provided by the laboratory. The shipping containers will be insulated.

Field and laboratory personnel relinquishing and receiving the sample containers will sign the Chain-of-Custody form as having relinquished and received the sample containers. Different columns of the Chain-of-Custody form will be used to record specific considerations associated with sample acquisition such as sample collection time, sample designation, sample depth, sample type, analysis, preservatives and special handling instructions. The laboratory will maintain on file copies of the completed form. The completed, original form will be submitted as part of the final analysis report.

7.2 Laboratory Sample Custody

Receipt, storage and tracking of samples submitted to the laboratory are conducted according to strict protocol to prevent sample contamination or loss, and to prevent the production of invalid data as a result of sample deterioration or tampering.

8.0 DUPLICATE AND SPLIT SAMPLES

Duplicate samples, if collected, will be provided with a different sample designation as the original sample and submitted to the laboratory for the appropriate analysis. Whenever the samples are split with a facility or government agency, a separate Sample Receipt will be prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representative signatures acknowledging sample receipt. If the representative is unavailable or refuses to sign, this should be noted in the "Received By" space.



9.0 LABORATORY SAMPLE STORAGE

9.1 Laboratory Sample Receipt

Upon sample receipt, the sample custodian will open the cooler or package and inspect the contents against the Chain-of-Custody. The project manager will be contacted in the event of any discrepancies between the sample containers and the Chain-of-Custody. The sample custodian will then log the samples in and assign each a unique laboratory sample identification number, which will be placed on each sample bottle. A laboratory internal Custody Record is initiated at this time. Recorded in the laboratory information system will be the project name and code, sampling location, date sampled, date received and analyses required. The samples will then be placed in secure storage.

The laboratory analysts will be alerted to the arrival of samples with the use of a work order. The work order contains all the information pertinent to the analysis of the samples.

9.2 Laboratory Sample Storage

The analysts will initial and date the internal Custody Record when removing samples from storage. The sample custodian is responsible for filing all Custody Records forms in the project file.

Laboratory personnel will be responsible for the care and custody of the sample once it is transferred to them. Once the analysis is complete, the unused portion of the sample will be returned to the sample custodian.

Samples and sample extracts will be maintained in secure storage until disposal.

All Custody Records and associated paperwork will be maintained in a separate file for the project.

10.0 DATA REDUCTION AND VALIDATION

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of 100% of all QC sample results (both qualitative and quantitative);

- Verification of the identification of 100% of all sample results (both positive hits and non-detects);
- Recalculation of 10% of all investigative sample results; and
- A Data Usability Summary Report (DUSR) which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

10.1 Laboratory Data Deliverable Formats

Whitman will compile and review the laboratory data in electronic copy format and submit it to NYSDEC as part of the Annual Site Management Report. Electronic data will be submitted in accordance with the electronic format per the NYSDEC ASP Category B deliverables.



ATTACHMENT 1
SAMPLE CHAIN-OF-CUSTODY



