

New City Plaza
2-88 North Main Street

NEW CITY, NEW YORK

Site Management Plan

NYSDEC Brownfield Cleanup Program Site Number: C344065

Prepared for:

K/BTF New City LLC
Co: KABR Group - Jacky Huang
100 Challenger Road
Suite 401
Ridgefield Park NJ 07660

Prepared by:

LaBella Associates
45 Main Street, Suite 1018
Brooklyn, New York 11201

Revisions to Final Approved Site Management Plan:

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0002	November 2019	Indoor Air Sampling Modification	April 2021
0003	April 2023	Groundwater Sampling Modification and Owner / Tenant Updates	April 2023
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DECEMBER 2015

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CERTIFICATION

I, Daniel Noll, certify that I am currently a NYS registered Professional Engineer as defined in 6 NYCRR Part 375 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).



06/09/2023

Date

A handwritten signature in blue ink, appearing to read "D. P. Noll", written over a horizontal line.

Signature

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

SITE MANAGEMENT PLAN**ES EXECUTIVE SUMMARY**

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: New City Plaza – Site No. C344065

Institutional Controls:	1. The property may be used for commercial use;
	2. Institutional controls include: <ul style="list-style-type: none">• Compliance with the Environmental Easement 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;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.

Site Identification:

New City Plaza – Site No. C344065

Engineering Controls:	<p>1. A Site cover system that encompasses the entire site and is comprised of:</p> <ul style="list-style-type: none"> • The existing concrete floor slab for the New City Plaza building footprint within the BCP Site; or • An asphalt paved parking lot with underlying aggregate sub-base; or • One foot of soil in the landscaped area that meets the Site-Specific Soil Cleanup Objectives (SSCOs).
	<p>2. A sub-slab depressurization system (SSDS) installed in each of the following tenant spaces:</p> <ul style="list-style-type: none"> • Space #10 – • Space #11 – • Space #12 – • Space #13 – • Space #14 – • Space #15 – <p>Five of the tenant spaces (Space #10 through Space #14) containing an SSDS are located on the BCP site, and one tenant space (Space #15) containing an SSDS is located south-adjacent to the BCP site.</p>
Inspections:	Frequency
1. Cover inspection	Annually
2. SSDS Inspection	Quarterly for 1 year, annually thereafter

Site Identification: New City Plaza – Site No. C344065

Monitoring:	
<p>1. Groundwater Monitoring and Sampling from:</p> <p>On-Site monitoring wells MW-2R, MW-4, MW-6, MW-7, MW-8, and MW-14; and off-site monitoring wells MW-11, MW-12, MW-13, MW-18, MW-19, MW-24, MW-25, and MW-28.</p>	Annual (April)
1. Indoor Air Sampling – On-site	Not Scheduled - Only to be performed in the event of SSDS failure/disturbance
2. Sub-slab and Indoor Air Sampling – Off-site – 7 East Evergreen Residence	Not Scheduled – Only to be performed if requested by NYSDEC and NYSDOH.
Maintenance:	
1. SSDS Maintenance	As needed
Reporting:	
1. Inspection Report	Annually
2. Periodic Review Report	Annually

**FURTHER DESCRIPTIONS OF THE ABOVE REQUIREMENTS ARE
PROVIDED IN DETAIL IN THIS 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 the New City Plaza shopping center site located at 2-88 North Main Street, New City, New York (Tax Block 89, Lot 43.15-1-22) (hereinafter referred to as the “Site”) under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index #A3-0561-0806, Site #C344065, which was executed on October 20, 2006.

1.1.1 General

Newton Associates LLC (Newton) entered into a BCA with the NYSDEC as a Participant to remediate a 1.17-acre portion of a 12-acre shopping plaza property located in Rockland County, New City, New York. The BCA required the Remedial Party, Newton, to investigate and remediate contaminated media at the Site. The location and boundaries of this 1.17-acre Site are shown on Figure 1 and 2. The boundaries of the Site are more fully described in the Schedule “A” Property Description that is included as part of the Environmental Easement (Appendix A).

After completion of the remedial work described in the Remedial Action Work Plan, there is a potential for soil contamination to remain at this Site, and groundwater and soil vapor contamination are still present. An Environmental Easement granted to the NYSDEC, and recorded with the Rockland County Clerk [add date], requires compliance with the Site Management Plan (SMP) and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement 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 originally prepared by AKRF Engineering, P.C. (AKRF), on behalf of Newton Associates, LLC in December 2015, 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’s Brownfield Cleanup Program (BCP). The SMP has undergone multiple revisions and this SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

1.1.2 Purpose

The Site contains residual 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 Site to ensure protection of public health and the environment. An Environmental Easement (EE) granted to the NYSDEC, and recorded with the Rockland County Clerk, will require compliance with this SMP and all ECs and ICs placed on the Site.

The EE is included in Appendix A. 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 Environmental Easement for contamination that remains at the Site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement 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 residual 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 sub-slab depressurization systems (SSDS's); (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports; and (5) defining criteria for termination of 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) and an Operation and Maintenance Plan for implementation of the SSDS's. 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 Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC) issued by NYSDEC; and
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA, (Index #A3-0561-0806, Site #C344065) for the Site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement 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 project site is located within the New City Plaza shopping center in New City, Town of Clarkstown, New York and includes Lot 43.15-1-22 of Tax Block 89 of Rockland County. The Site is zoned H4 Commercial and Industrial (Hamlet Center) and is currently utilized for commercial uses. The BCP project site encompasses a portion of the southern commercial/retail building (containing five tenant spaces), a portion of the parking lot to the west and north of the building, and a section of West Evergreen Street to the east of the building. The boundaries of the project Site (as shown in Figure 2) are based on the location of a former dry cleaning facility where subsurface investigations revealed soil and groundwater contamination. Areas to the north and south of the BCP project site include the remainder of the shopping plaza and parking lot, and a gasoline station. Properties to the east of the site contain residential dwellings, and properties to the west include the Rockland County Probation Department and County Court House. The boundaries of the site are more fully described in the Environmental Easement included in Appendix A.

The owner of the site parcel at the time of issuance of this SMP is: K/BTF New City LLC.

1.2.2 Site History

The history of the site and the surrounding area is summarized in Phase I Environmental Site Assessments conducted by Land America Assessment Corporation and Aaron & Wright Technical Services, Inc. dated September 28, 2005 and July 23, 1997, respectively. Prior to the construction of the shopping plaza, the land was primarily undeveloped with some commercial and residential structures in the southern and northern portions. The existing shopping plaza was constructed in phases beginning in 1970 and ending by around 1980. Surrounding areas contained commercial and residential structures since prior to 1940.

1.2.3 Geologic Conditions

The overburden material beneath the site consists of a shallow layer (1 to 4 feet) of fill comprised of a reddish/brown mixture of sand, silt, and gravel, followed by a dense, reddish/brown glacial till consisting of fine sand and silt with varying amounts of gravel and clay. The till material is underlain by bedrock that is mapped by the New York State Museum and Science Service as the Brunswick Formation, which consists of sandstone and conglomerate. The depth to bedrock varies beneath the site; bedrock was encountered at 17 feet below grade at MW-28 (west of Shop Rite), to greater than 150 feet below grade at MW-17 (east adjacent to the former Robbie J Cleaners). A geologic cross section is shown in Figure 3. Site specific boring logs are provided in Appendix E.

The BCP site is located on a topographical crown, sloping down to the northwest, north, and northeast. The overall topography for the New City Plaza property slopes gently to the north and east. Groundwater is present at a depth between 6 and 10 feet below grade. Depth to water measurements indicated that the on-site groundwater flows in a radial pattern from the project site building to the northwest and north towards the Demerest Kill Creek, and to the northeast towards Route 304. Regional groundwater likely follows topography flowing to

the northeast to Route 304, which is the elevation low point for the area, and then north towards tributaries that meander into Lake Deforest. Lake Deforest is located approximately 1.5 miles east of the site. A groundwater contour map is shown in Figure 4. Groundwater elevation data is provided in Table 7. Groundwater monitoring well construction logs are provided in Appendix E.

The Demerest Kill Creek runs southwest to northeast through a concrete culvert beneath the northwestern portion of the New City Shopping Plaza. An unnamed tributary located east of the site flows from south to north and joins the creek near the northeastern corner of the Plaza. The stream system flows north, then east before discharging into Lake DeForest. The stream flow distance to Lake DeForest is over two miles.

1.3 Summary of Remedial Investigation and Interim Remedial Measures Findings

The BCP Remedial Investigation (RI) and Interim Remedial Measures (IRM) documented that tetrachloroethylene (PCE) contaminated soil was located east-adjacent to the former Robbie J Cleaners (current Dunkin Donuts) tenant space in an area approximately 12 feet by 15 feet by 6 feet deep (below grade). Figure 5 includes a summary of the laboratory results for soil characterization borings that were collected to define the release area. Figure 6 includes a summary of the laboratory results for endpoint soil samples collected after the identified extent of PCE contaminated soil was removed as part of the IRM. The investigation and post-excavation endpoint sampling results were compared to the Commercial and Groundwater Soil Cleanup Objectives (SCOs) included in Table 1. Site cover sampling was completed to confirm that the portion of the BCP site that contained a soil cover met the SCOs. Soil samples SB-1 and SB-2 were collected from 0 to 1 feet below grade and analyzed for VOCs using EPA Method 8260, semivolatile organic compounds (SVOCs) using EPA Method 8270, PCBs using EPA Method 8082, Pesticides using EPA Method 8081, and Metals using EPA Methods 6010 and 7470. Table 2 includes a summary the soil analytical results for volatile organic compounds (VOCs) for all investigation, endpoint, and soil cover samples. Tables 3 through 5 include the soil cover (0 to 1 feet below grade) laboratory results for semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs)/pesticides, and metals, respectively.

Soil vapor sampling completed during the RI and IRM showed that PCE and trichloroethylene (TCE) vapors were present below the foundation of the site building-, resulting in a potential for vapor intrusion. The soil vapor and indoor air analytical results are shown on Figure 7, and are included in Table 6. A summary of the off-site soil vapor and indoor air sampling results are shown on Figure 8

The groundwater plume associated with the project site consists of dissolved solvent compounds, consisting mainly of PCE at concentrations less than 100 µg/l. The plume flows in a radial pattern to the northwest, north, and northeast. Groundwater sampling has shown that PCE was detected at similar concentrations in groundwater samples collected from wells located hydraulically upgradient of the soil source area, indicating the contaminated groundwater is flowing onto the site. A summary of target compounds (PCE, TCE, and cis-1,2-Dichloroethene (DCE)) documented during the 2014 quarterly groundwater monitoring events is shown on Figure 9, and a complete summary of groundwater monitoring results is included in Table 8.

1.4 Conceptual Site Model

A conceptual site model identifies each known or potential release area, discusses how a release can occur, the migration pathway of the released material, and what impacts contaminants have on human health and the environment. The area of soil contamination at the site is related to solvent products associated with dry cleaning activities. The contamination area appears to be the result of a spill of liquid dry cleaning waste (PCE, with breakdown components TCE and cis,1,2-DCE) onto asphalt pavement in the vicinity of MW-2. The spill area is a low point that contained cracks and deteriorated asphalt. The spilled liquid would settle into the low point, enter directly into the underlying soil, and migrate vertically downward through the pore space of the soil and in soil vapor until it reached the water table. Separate phase solvent, which is denser than water, can sink through the saturated zone or shallow aquifer. Separate phase solvent would also dissolve into groundwater and disperse downgradient within the shallow aquifer under natural groundwater flow conditions. The area of dissolved contamination that is flowing within groundwater is often referred to as a “plume” zone. Since solvent compounds evaporate quickly when exposed to air, the contamination can evaporate from a soil source area or the groundwater table within the plume zone and migrate in a vapor phase through the pore spaces in unsaturated soil. The contaminated vapors can build up beneath structures such as pavement and building foundations. The affected media for each existing or potential releases at the property includes soil, groundwater, and soil vapor.

1.5 Remedial Action Objectives

Based on the results of the Remedial Investigation completed, the following Remedial Action Objectives (RAOs) were identified for the Site as listed in the NYSDEC’s Decision Document dated August 2015.

1.5.1 Groundwater RAOs

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

1.5.2 Soil RAOs

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

1.5.3 Soil Vapor RAOs

RAOs for Public Health Protection

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

1.6 Description of Selected Remedy

The Site was remediated in accordance with the remedy selected and approved by the NYSDEC in the Decision Document dated August 2015, and AKRF's NYSDEC-approved Remedial Action Work Plan (RAWP) dated September 2015; Remedial Design Work Plan dated September 2015; NYSDEC's June 2013 Decision Document, and NYSDEC approval letters for the RAWP. These documents are included in Appendix C of the Final Engineering Report (FER).

The factors considered during the selection of the remedy are those listed in 6NYCRR 375-1.8. The following are the components of the selected remedy as outlined in the NYSDEC's August 2015 Decision Document:

1. Remedial Design

A remedial design program was implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques were implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

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

2. Cover System

A site cover was required to allow for commercial use of the site. The cover will consist of the existing building, pavement, sidewalks, and a soil cover in area where the upper one foot of exposed surface soil does not exceed the applicable soil cleanup objectives (SCOs). Where the soil cover exists, the upper six inches of soil is of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

3. In-Situ Chemical Treatment

In-situ chemical oxidation (ISCO) or reduction (ISCR) was implemented to treat chlorinated volatile organic compounds in groundwater. A chemical oxidant or a was

injected into the subsurface between 6 to 15 feet below grade to destroy the contaminants in an approximately 2000 square foot area located just east of the former Robbie J Cleaners via temporary injection points. The chemical method and depth of injection will be determined during the remedial design.

4. Institutional Control

An institutional control in the form of an environmental easement for the controlled property was imposed and:

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

5. Site Management Plan

This Site Management Plan will be implemented and includes the following:

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

Institutional Controls: The Environmental Easement discussed in Paragraph 4 above.

Engineering Controls: The soil cover discussed in Paragraph 2 and the six sub-slab depressurization systems installed during the Interim Remedial Measure.

This plan includes:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- a provision for further investigation and remediation should redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment. This includes the portion of the shopping plaza located within site boundaries;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;

- a provision for evaluation of the potential for soil vapor intrusion in future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

- B. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes:
- monitoring of groundwater for site-related contamination and performance indicators to assess the effectiveness of remedy with provisions to evaluate and implement additional injections if necessary or to evaluate alternative remedies should the injections be ineffective or unsatisfactory to the Department; evaluation of monitoring will be performed as part of the periodic review;
 - long-term monitoring of groundwater to assess the performance and effectiveness of the natural attenuation with provisions to evaluate and implement contingency remedial action should the natural attenuation not be effective; groundwater will be monitored for site-related contamination and continue until tetrachloroethylene and its degradation products achieve either ambient water quality standards or asymptotic levels acceptable to the Department; a schedule of monitoring and frequency of submittals to the Department; and
 - monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.
- C. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s). The plan includes:
- procedures for operating and maintaining the system(s);
 - compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.
 - Development and implementation of a Site Management Plan for long term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting.
 - Periodic certification of the Institutional and Engineering controls listed above.

1.7 Applicable Remedial Standards

The data compiled during RI and IRM were compared to the following standards, criteria, and guidance to determine the nature and extent of the contamination area associated with the site:

- **Soil** –NYSDEC Protection of Public Health Commercial SCOs, and NYSDEC Protection of Groundwater SCOs;
- **Groundwater** – Class GA (Drinking Water) AWQVs; and
- **Soil Vapor** – NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

1.8 Summary of Remedial Actions

The Site was remediated during the IRM and Remedial Action phases at the site. Each phase was completed in accordance with AKRF's NYSDEC-approved Interim Remedial

Measures Work Plan dated July 2010; Remedial Action Work Plan dated September 2015; Remedial Design Work Plan dated September 2015; and the NYSDEC's Decision Document dated September 2015.

The following is a summary of the IRM and Remedial Actions performed at the Site:

1. Excavation of soil/fill exceeding NYSDEC Part 375 SSCOs listed in Table 1 was completed as part of the IRM program;
2. IRM construction, maintenance, and operation of an active SSDS to prevent migration of vapors into the building;
3. Construction, and/or confirmation of a site cover system during remedial action consisting of the existing concrete floor slab and SSDS pits, an asphalt parking lot underlain by gravel aggregate, or a clean soil cover to prevent human exposure to potential contaminated soil/fill remaining at the Site;
4. Execution and recording of an Environmental Easement (Appendix A) during the Remedial Action to restrict land use and prevent future exposure to any contamination remaining at the Site;
5. In-situ treatment of contaminated groundwater beneath the Site during Remedial Action by injection of a chemical oxidant into the overburden aquifer;
6. Development and implementation of this Site Management Plan (SMP) for long term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) Monitoring, (3) Operation and Maintenance, and (4) Reporting.

Remedial activities were completed at the Site between November 2010 and September 2015.

1.8.1 IRM Removal of Contaminated Soil from the Site

During the IRM in November 2010, AKRF directed excavation and removal of the PCE contamination source area. The excavation was initiated in the vicinity of MW-2 where the pre-excavation soil investigation confirmed the source area for PCE contamination. The pre-excavation soil characterization boring results are shown on Figure 5. The excavation was expanded laterally in each direction, and in depth until evidence of soil contamination was no longer observed. Visual, olfactory, and instrument-based soil screening was performed during the excavation determine whether evidence (odors, staining, Photoionization detector (PID) readings) of contamination was present. The final excavation limits measured approximately 10 feet by 12 feet, and the depth ranged from 6.5 feet below grade on the eastern side of the excavation to 11.5 feet below grade on the western side of the excavation. The water table was measured in MW-2 as approximately 6 feet below grade, and removal of contaminated soil that extended into the saturated zone eliminated the previous contamination pathway to groundwater. Approximately 55 tons of soil was removed from the excavation and disposed off-site.

A schematic of the excavation, and the location and depth of post-excavation endpoint soil samples collected from the bottom and sidewalls of the excavation are shown on Figure 6. The soil analytical results are shown in Table 2, and a summary is provided on Figure 6. The laboratory results confirmed that the known soil source area was effectively removed.

1.8.2 Site Cover and Surface Soil Sampling

On August 6, 2015, AKRF collected soil samples from 0 to 1 feet below grade [SB-1 (0-1) and SB-2 (0-1)] in the green space area to confirm that the portion of the BCP site that contained a soil cover met the SCOs. On November 18, 2015, AKRF collected soil samples from 0 to 0.5 feet below grade [SB-3(0-.5) and SB-4 (0-.5)] from the greenspace area in support of an exposure assessment. The soil samples were analyzed for VOCs using EPA Method 8260, SVOCs using EPA Method 8270, PCBs using EPA Method 8082, Pesticides using EPA Method 8081, and Metals using EPA Methods 6010 and 7470. The sampling locations are shown on Figure 10, and a summary of the laboratory results are included in Tables 2 through 5. The laboratory results for site cover samples showed that VOCs PCBs, and Pesticides were not detected in the samples. Residual metals and SVOC detections were below the SSCOs and met the analytical requirements for soil that is designated to be used as part of the site cap. The laboratory results for surface soil samples showed that VOCs PCBs, and Pesticides were not detected in the samples. Metals detections were below the SSCOs and consistent with natural conditions. Residual SVOCs were detected at concentrations that were below the SSCOs, with the exception of benzo(a)pyrene in sample SB-4 (0-0.5), which was detected at a concentration of 1.2 milligrams per kilogram (mg/kg). The Commercial Use SCO for benzo(a)pyrene is 1.0 mg/kg. Benzo(a)pyrene is a typical byproduct of combustion of organic material, and is found in wood burning smoke, charbroiled food, and automobile exhaust. It is also a main component of asphalt. The green space area at the Site is where excess snow is stockpiled after snow removal from the parking lot. The concentration of benzo(a)pyrene found in SB-4 (0-0.5) is not associated with contamination, and is consistent with commercial sites that include automobile use.

IRM Phase Installation of SSDS's

The Remedial Investigation (RI) completed at the site included a vapor intrusion assessment at six commercial/retail tenant spaces in the northern end of the New City Plaza building, which is located on the southern end of the shopping plaza. Five of the commercial/retail tenant spaces are located on the BCP Site. A comparison of the sub-slab vapor concentrations, in conjunction with the indoor air data, to Matrices 1 and 2 of the New York State Department of Health (NYSDOH) Vapor Intrusion Guidance, indicated that mitigation was warranted to prevent future potential exposure. Between January 2011 and July 2014 during the IRM, Keystone Companies (Keystone) installed an SSDS in each the following tenant spaces:

- Space #10 - HS500 High Suction Fan – Two Suction Points
- Space #11 - HS5000 High Suction Fan – Two Suction Points
- Space #12 - FR250 High Volume/Low Vacuum Fan – Two Suction Points
- Space #13 - HS 5000 High Suction Fan – Three Suction Points
- Space #14 - GP 501 Exhaust Fan – Two Suction Points
- Space #15 - GP 501 Exhaust Fan – Two Suction Points

Each SSDS consisted of two to three vertical suction points and the SSDS layout and monitoring point network is shown on Figure 11. Communication testing

completed after the final installation measures confirmed that a sufficient amount of vacuum was being applied below the concrete floor slab for the target tenant spaces, and established baseline readings for vacuum at each suction point and differential pressure (induced vacuum) readings at sub-slab communication test points.

1.8.3 IRM Phase Off-Site Mitigation Measures

Off-site soil vapor sampling during the RI confirmed that TCE was detected in the indoor air sample collected from the basement of the residence located at 7 East Evergreen at concentrations that exceeded the NYSDOH guidance. The pathway for vapor intrusion was identified as a sump pump located in the northeastern corner of the basement was that situated below an opening in the concrete floor that measured approximately two square feet and was exposed to the sub-slab sediments. The floor opening, which was in close proximity to the water table, allowed for an unimpeded pathway for contaminated vapors to enter the basement.

In July 2011 during the IRM, Keystone constructed a plexiglass cover to seal the floor opening and eliminate the direct sub-slab vapor pathway into the residence. The plexiglass cover was fabricated with sealed penetrations to allow the sump pump to remain in operation yet maintain the seal over the open hole in the floor.

Between March 2012 and July 2014 during the IRM, indoor air sampling results confirmed that a permanent seal over the open sump could be effective in reducing the TCE concentration to compliant levels. During the August 26, 2014 meeting with NYSDEC and NYSDOH, Newton offered to remove the current open sump and install a contained sump that would be permanently sealed to the concrete floor and eliminate the open pathway to the underlying sediments. The homeowner agreed, and the sump installation was completed in January 2015.

In March 2015 during the IRM, laboratory results for an indoor air sample (IA-17) collected from the basement of 7 East Evergreen indicated that TCE was detected at a concentration of 4.1 $\mu\text{g}/\text{m}^3$, which was below the NYSDOH guidance value at the time of sampling, but slightly above the newly revised NYSDOH guidance value of 2.0 $\mu\text{g}/\text{m}^3$. The results indicated the concentration of TCE was the lowest since sampling began and the sealed sump was being effective at mitigating vapor intrusion.

1.8.4 Indoor Air Sampling

Between July 2011 and March 2015, several rounds of indoor air sampling were completed as part of the IRM to determine whether the SSDSs were achieving the RAOs. Ambient (outdoor) samples were collected during each sampling event to document background conditions, and indoor air sampling results were compared to NYSDOH Air Guidance Values (AGVs). The indoor air analytical results are provided in Table 6, and a summary of the results are shown on Figure 7. The indoor air sampling locations and IDs were repeated during each sampling event to be able to compare trends from event to event. Indoor air samples were collected from locations IA-7 through IA-13 during each sampling round, with locations IA-22 through IA-24 being added over the last three sampling rounds, and IA-25 through IA-30 being added over the final sampling round. The indoor air sampling locations included the following tenant spaces:

The indoor air sampling locations included the following tenant spaces:

- Space #10 - IA-7
- Space #11 - IA-5 and IA-6
- Space #12 - IA-8
- Space #13 - IA-9 and IA-11
- Space #14 - IA-12
- Space #15 - IA-13 and IA-24
- Space #16 - IA-25
- Space #17 - IA-22 and IA-23
- Space #18 - IA-26
- Space #19 - IA-27
- Space #20 - IA-28
- Space #21 - IA-29
- Space #22 - IA-30

The results of the indoor air sampling program were used to determine the source of detections associated with the target compounds, modify and improve each SSDS system to operate at its maximum potential, and modify business practices to mitigate the potential for the future presence of target compounds in indoor air. The final testing rounds confirmed that the SSDSs were effective at preventing vapor intrusion into the Site building.

1.8.5 In-Site Groundwater Treatment

1.8.5.1 In-Situ Groundwater Treatment

In-situ groundwater treatment performed in accordance with AKRF's NYSDEC-approved September 2015 Remedial Design Work Plan (RDWP) included chemical injection in an approximately 2,000-square foot (sf) area located in the central portion of the Site in the area of the former PCE soil source area.

One round of chemical injection was performed in the saturated zone at and within the overburden groundwater table from approximately 6 to 15 feet below grade through twenty-four (24) temporary injection points. During the injection event completed in September 2015, approximately 6,480 gallons of 5 to 6 percent permanganate solution were delivered to 24 injection points at the Site.

Approximately four to six weeks (minimum 30 days) after the initial injection round, confirmatory groundwater samples were collected to evaluate the effectiveness of the in-situ treatment. This SMP was prepared prior to receipt of verified laboratory results, and the results will be included in the FER. Groundwater samples will be collected from the following monitoring wells: MW-2R, MW-4, MW-6, MS-7, MS-8, and MW-14 (Shown on Figure 9). Each sample will be analyzed for VOCs by EPA Method 8260, and sodium/manganese by EPA Method 6010.

Approximately eight to 10 weeks (minimum 60 days) after the initial injection round, a second round of confirmatory groundwater samples were collected. The second round of performance samples were collected as part of the fourth quarter groundwater monitoring event, which included all of the monitoring wells on the

New City Plaza property. This sampling event was completed after preparation of the SMP and FER and the results were included as part of the reporting requirements included in this SMP. Each groundwater sample were analyzed for VOCs by EPA Method 8260, with samples collected from MW-2R, MW-4, MW-6, MS-7, MS-8, and MW-14 also being analyzed for sodium/manganese by EPA Method 6010.

1.9 Remaining Contamination

The following section includes a summary of the contamination that remains at the site after completion of the IRM and Remedial Action.

1.9.1 Soil

Data collected during the RI and IRM, as discussed in Section 1.3 and 1.8, confirmed that there are no documented areas of soil contamination remaining at the site with compounds that exceed the SSCOs. Post excavation endpoint samples confirmed that any residual compounds in soil were below the SSCOs. This SMP includes measures to address any unknown areas of contaminated soil that are encountered during future work.

1.9.2 Groundwater

Remedial investigation confirmed that the groundwater plume associated with the project site consisted of dissolved solvent compounds, consisting mainly of PCE at concentrations less than 100 µg/l. The plume flows in a radial pattern to the northwest, north, and northeast. Table 8 and Figure 9 summarize the results of all samples of groundwater that exceed the SCGs prior to completion of the remedial action. Post-remediation groundwater monitoring is being completed as part of the remedy, and the results are included in the FER.

1.9.3 Soil Vapor

Data collected during the RI and IRM, as discussed in Section 1.3 and 1.8, confirmed that there was a potential for vapor intrusion associated with PCE and TCE at commercial/retail tenant spaces associated with the BCP Site in the northern end of the New City Plaza. An SSDS was installed and is in operation at six separate commercial/retail tenant spaces (six total SSDSs). Table 6 summarizes the results of the sub-slab and indoor air sampling results. Figure 7 includes a summary of the sub-slab and indoor air sampling results for the commercial/retail tenant spaces in the New City Plaza building, and Figure 8 includes the summary of sub-slab and indoor air sampling results for off-site residences and the Shop Rite building. Soil vapor samples are not collected during the operation of each SSDS, which is being operated to remove vapors and mitigate vapor intrusion, as system operation would not allow for an accurate depiction of sub-slab conditions. PCE soil source removal and groundwater treatment measures were completed to reduce the potential for contaminated soil vapors to build-up beneath the building floor slab.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

Since there is a potential for remaining contaminated soil, and contaminated groundwater and soil vapor exists beneath the Site, Engineering Controls and Institutional Controls (EC/ICs) are being implemented 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 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 Site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- 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, such as the implementation of the Excavation Work Plan (as provided in Appendix B) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- 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 Site Cover System

Exposure to remaining contamination in soil/fill beneath the Site building is prevented by a cover system placed over the entire Site. The cover system installed at the Site is comprised of:

- The pre-existing concrete floor slab for the entire plaza building footprint within the BCP Site;
- An asphalt paved parking lot with underlying aggregate sub-base; and
- One foot of soil in the landscaped area that meets the SCOs.

The site cover system is shown on Figure 10. The integrity of the concrete floor slab and other underlying components of the site cover system will be maintained at all times. The Excavation Work Plan included as Appendix B outlines the procedures required to be implemented in the event that any portion of the cover system is breached, penetrated, or temporarily removed, and any

underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 3 of this SMP.

2.2.1.2 Sub-Slab Depressurization System

Intrusion of contaminated soil vapor within the Site building is prevented by an active SSDS installed in each of the six commercial/retail tenant spaces within the northern portion of the New City Plaza building. Each SSDS applies negative pressure under the building slab areas correlating to the six commercial/retail tenant spaces, and manufacturer's literature for the blower components of each SSDS is provided in Appendix C. Vacuum piping was installed in each of the suction points by drilling a hole in the floor and excavating a small sump area beneath the foundation. A minimum of one to two feet of soil was removed from each sump, PVC pipe was extended below the floor into the void space, and a concrete cover was poured over the sump to create an air-tight seal and restore the floor to its original condition. The PVC pipe for each suction point was extended vertically from the floor through the drop ceiling, manifolded together into one influent line, and connected to a vacuum fan. Individual fans were installed outside of the building for each tenant space and furnished with a vent stack terminated above the roof of the building. Each blower was connected to the building power supply by a licensed electrician in accordance with building department and UL requirements. A high vacuum magnehelic manometer was installed on each suction point that was connected to a HS500 high suction fan. A U-Tube manometer was installed on each suction point that was connected to a GP 501 or FR250 exhaust fan. The manometers are used to confirm vacuum and monitor the performance of each blower fan. Communication testing completed after the final installation measures established baseline readings for vacuum at each suction point and differential pressure (induced vacuum) readings at sub-slab communication test points.

Each active SSDS will operate continually, 24 hours a day, 7 days a week, 365 days a year. Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (Section 4 of this SMP). Procedures for monitoring the SSDS are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition (e.g. weather), which may affect controls at the Site, occurs.

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 6.6 of NYSDEC DER-10.

2.2.2.1 Site Cover System

The site cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity as outlined in Section 3 of this SMP.

2.2.2.2 Sub-Slab Depressurization System (SSDS)

The operation of the active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC in consultation with NYSDOH. In the event that monitoring data collected under the Monitoring Plan (Section 3 of this SMP) indicates that the SSDS or one or more of its components is no longer required, a proposal to discontinue or reduce controls associated with the SSDS and/or the applicable components will be submitted by the property owner to the NYSDEC and NYSDOH.

2.2.2.3 Groundwater Monitoring and In-Situ Treatment

Groundwater monitoring activities to assess the effectiveness of the remedy will continue, as determined by the NYSDEC, until residual groundwater concentrations are found to be consistently below NYSDEC AWQS or have become asymptotic at an acceptable level over an extended period. Groundwater monitoring will continue (in accordance with Section 3 of this SMP) until permission to discontinue or reduce monitoring is granted in writing by the NYSDEC.

2.2.2.4 Groundwater In-Situ Treatment Contingencies

If groundwater contaminant levels identified during the implementation of the Monitoring Plan become asymptotic at a level that is not acceptable to the NYSDEC, additional groundwater treatment will be completed and/or other control measures will be evaluated. Additional in-situ chemical oxidation (ISCO) injections may be required based on the results of ongoing monitoring. See section 4.2.3 of this SMP for details on groundwater treatment contingencies.

2.3 Institutional Controls

A series of Institutional Controls is required by the NYSDEC's June 2013 Decision Document for the Site 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 Site to Commercial uses only as described in 6 NYCRR Part 375-1.8(g)(2)(iii). Adherence to these Institutional Controls on the Site is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Environmental Easement and this SMP must be maintained 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 Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The property may only be used for Commercial and Industrial use, provided that the long-term Engineering and Institutional Controls included in this SMP are employed;
- The property may not be used for a higher level of use, such as unrestricted, residential, or restricted residential use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Rockland County Department of Health rendering it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the NYSDEC;
- The potential for vapor intrusion must be evaluated for any future buildings developed on the Site, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the property are prohibited;
- 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 this 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 annually, or an alternate period of time that NYSDEC may allow or will be deemed appropriate by an expert that the NYSDEC finds acceptable.

2.3.1 Excavation Work Plan

The Site has been remediated for Commercial use. Any future intrusive work that will penetrate the site cover system, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix B to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the Site. A Site specific HASP and CAMP are included as Appendix D to this SMP. These documents are in current compliance with DER-10, 29 CFR 1910, 29 CFR 1926, and all other applicable State, Federal, and local regulations. Based on future changes to State and Federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section B-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included

in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The Site owner and associated parties preparing the remedial reporting documents submitted to the State, and parties performing this work, are responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper management and disposal of excavated soil, any associated de-watering fluids, control of runoff into open excavations from remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The Site owner will ensure that site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

As part of the completed remedy, intrusion of contaminated soil vapor is prevented by active SSDS's that apply negative pressure under the first floor building slab for six tenant spaces within the northern end of the New City Plaza building. Five of the tenant spaces containing an SSDS are located within the BCP Site boundary, and one tenant space containing an SSDS is located south-adjacent to the BCP site boundary. Therefore, a soil vapor intrusion (SVI) evaluation is not required for the existing tenant spaces on the BCP Site

Prior to any demolition/redevelopment of the existing structure, or construction of a new building located within the Site boundary, a SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed location of the structure. Alternatively, an SSDS may be installed to be included as an element of the newly developed building foundation without first conducting an investigation. This updated mitigation system, at a minimum, would include a vapor barrier and passive SSDS piping capable of being converted an active system.

Prior to conducting an SVI investigation or installing or modifying the existing 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/or construction details of the proposed structure.

In the event that an SVI evaluation is performed, 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 the applicable follow-up action. If any indoor air test results associated with the SVI evaluation conducted as a result of desired redevelopment exceed NYSDOH guidelines, relevant NYSDOH fact sheets will be provided to all tenants and occupants of the property within 15 days of receipt of validated data.

In the event that an SVI evaluation is performed, 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 Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted annually, 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 Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If Site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring systems;

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 natural disaster 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:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the Brownfield Cleanup Agreement (BCA), 6NYCRR Part 375, and/or Environmental Conservation Law.
2. 15-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
3. Notice within 48-hours of any damage or defect to the foundation, structures or engineering control that reduces or has the potential to reduce the effectiveness of an Engineering Control and likewise any action to be taken to mitigate the damage or defect.
4. 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 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.
5. 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 or the responsibility for implementing this SMP will include the following notifications:

6. 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 Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.
7. 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.

Notifications*

Name	Contact Information	Required Notification**
Emily Barry NYSDEC Project Manager	845-633-5457 Emily.barry@dec.nyc.gov	All Notifications
Kiera Thompson, P.G. NYSDEC Section Chief	518-402-9629 Kerry.maloney@dec.ny.gov	All Notifications
David Pollock, P.E. Region 3 EQ Supervisor/RHWRE	845-256-3138 David.pollock@dec.ny.gov	All Notifications
Kelly Lewandowski, P.E. NYSDEC Site Control	518-402-9569 Kelly.lewandowski@dec.ny.gov	Notifications 1 and 7
Renata Ockerby NYSDOH Project Manager	518-402-7867 Renata.ockerby@health.ny.gov	Notifications 4, 5, and 6

*Note: Notifications are subject to change and will be updated as necessary.

**Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.5 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions. The appropriate action for on-site emergencies are detailed in the attached HASP, provided as Appendix D.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance, 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 AKRF's Project Principal or Project Manager or the current property manager/owner's representative for the Site. These emergency contact lists must be maintained in an easily accessible location at the Site.

Emergency Contact Numbers

Contact	Number
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

Site Contact Numbers

Company/Regulator	Contact Name	Contact Title	Contact Number
LaBella Associates	Richard Kampf, PG	Program Manager/QEP	917-280-6364
LaBella Associates	Evan Ward, PE	Project Manager/Environmental Engineer	845-321-2152
NYSDEC	Rachel Savarie, PE	Project Manager	518-402-9717 (office)
NYSDOH	Renata Ockerby	Project Manager	518-402-7860 (office)
K/BTF New City LLC	Ben Malinsky	Owner	917-750-0726 (cell)
Keystone Companies	Rick Tarnowski	SSDS Contractor	607-722-1100 (office)

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

QEP – Qualified Environmental Professional

2.5.2 Map and Directions to Nearest Health Facility

Helen Hayes Hospital

51-55 Route 9W North West, Haverstraw NY 10993

(845) 786-4000

8. Head north on N Main St toward Spruce Dr – go 0.2 mi
9. Turn right onto W Cavalry Dr – go 0.2 mi
10. Turn left onto NY-304 N – go 1.5 mi
11. Turn left onto Ridge Rd – go 0.8 mi
12. Turn right onto Haverstraw Rd – go 0.3 mi
13. Continue onto Short Clove Rd – go 0.3 mi
14. Slight left onto US-9W N/Conger Ave into Helen Hayes Hospital at 51-55 Route 9W North West, Haverstraw NY 10993
15. The total trip distance = 6.2 miles

Map Showing Route from the Site to Helen Hayes Hospital:



2.5.3 Response Procedures

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

2.5.3.1 Procedure for Disturbance of Site Cover System

Prior to any planned disturbance of the site cover system, the location of existing monitoring points, groundwater monitor wells, and ECs located within or beneath the concrete floor slab including SSDS pits and SSDS piping, will be identified using Figures 2, 10, and 11. The following procedures will be required if the site cover system is accidentally disturbed, is required as part of a planned building improvement/repair, or if damage to the site cover system is discovered during a monitoring/inspection event:

16. Notification of NYSDEC in accordance with applicable guidance outlined in Section 2.4.2 and the Excavation Work Plan (Appendix B) of this SMP;
17. Submittal of a written plan detailing the disturbance location and proposed repair or replacement activities to return the cover system or associated underlying components to the appropriate operating condition;
18. Performance of the planned disturbance in accordance with the Excavation Work Plan included as Appendix B; and
19. Scheduling of a follow-up inspection to be performed under the direct oversight of a qualified environmental professional.

The appropriate actions for other on-Site emergencies are detailed in the attached HASP, provided in Appendix D. The HASP may require revisions as necessitated by changes to Site conditions and project personnel. The plan will be updated as necessary or at a minimum of once every five years to ensure accuracy.

3.0 SITE MONITORING PLAN

3.1 Introduction

3.1.1 General

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

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

20. Sampling and analysis of all appropriate media (e.g., groundwater and indoor air);
21. Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly NYSDEC Ambient Groundwater Quality Standards (AWQS) and NYSDOH Air Guideline Values (AGVs);
22. Assessing achievement of the remedial performance criteria;
23. Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
24. Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

25. Sampling locations, protocol, and frequency;
26. Information on all designed monitoring systems (e.g., well logs);
27. Analytical sampling program requirements;
28. Reporting requirements;
29. Quality Assurance/Quality Control (QA/QC) requirements;
30. Inspection and maintenance requirements for groundwater monitoring wells and SSDS components;
31. Monitoring well decommissioning procedures; and
32. Annual site-wide inspection* and periodic certification.

*Site-wide inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix H – Site Management Forms. The form will compile sufficient information to assess the following:

Monitoring programs are outlined in detail in Sections 3.2 and 3.3 below. Monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted in accordance with the following table:

Monitoring and Site-Wide Inspection Schedule

Monitoring Program	Frequency*	Purpose	Analysis
Site Cover System	Annually. First Inspection no more than 18 months after COC, then at least Annually Thereafter	Cover System Integrity	Visual Inspection of Conditions
Groundwater Monitoring and Sampling	Annually (as described below)	Groundwater remediation performance	VOCs by EPA Method 8260
Inspection of each SSDS	Quarterly Basis for 1 Year, and Annually Thereafter	SSDS System Operations	Visual Inspection, Field Screening (PID) and recording system readings (vacuum/flow) and vacuum at monitoring points
On-Site Indoor Air Sampling	Not Required	SSDS system performance	VOCs by EPA Method TO-15
Off-Site Indoor Air Sampling	Not Required	Vapor intrusion mitigation performance	VOCs by EPA Method TO-15

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

** Confirmatory indoor air sampling was performed throughout the SSDS installation and confirmatory sampling was completed in March 2015. On-Site indoor air sampling was completed during the first SMP period heating season (2016/2017), and future sampling will only be performed in the event of a system failure or disturbance as outlined in this SMP.

*** Sub-slab and/or indoor air sampling at 7 East Evergreen was completed during the heating seasons of the 2016 through 2019 reporting years. Based on the heating season results and consultation with NYSDEC/NYSDOH, no further sampling is required.

COC – Certificate of Completion issued by NYSDEC

VOCs – Volatile Organic Compounds

PID – Photoionization Detector

3.2 Cover System Monitoring

Exposure to potentially contaminated soil remaining at the Site is being prevented by an engineered site cover system that is made up of the pre-existing concrete floor slab. The location and details of the site cover system are shown on Figure 10.

The site cover system will remain intact 24-hours a day, 7 days a week, for 365 days a year. Disturbance of the site cover system or EC components is prohibited by the

Environmental Easement. In the unlikely event of an unanticipated accidental or required disturbance of the site cover system, the response procedure is outlined in Section 2.5.3.1.

Monitoring of the site cover system will occur on an annual basis as long as the Environmental Easement is in effect to ensure the system's integrity. Monitoring will consist of visual inspection, which shall evaluate the structural integrity of the concrete floor slab of the partial basement and first floors, support columns into the floors and the wall joints. If any cracks or openings are identified, they shall be screened for organic vapors with a PID and any readings shall be noted. In addition, any cracks or openings in the floor shall then be properly sealed. The results of the inspection will be included in the Periodic Review Report. In addition, the site cover system must be inspected and certified any time a disturbance in the system occurs. The inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the site cover system has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

3.3 Media Monitoring Program

3.3.1 Groundwater Monitoring

A network of 17 monitoring wells were installed during the RI to delineate the nature and extent of the PCE groundwater plume, and included well locations on-Site, across the entire New City Plaza property, and on adjacent properties to the south and east. Soil boring and monitoring well construction logs are included in Appendix E, Table 7 includes a summary of the well construction details, and the locations of the groundwater monitoring wells are shown on Figure 9.

The complete network of monitoring wells were sampled on a quarterly basis during the first two years after the COC to assess the performance of the remedy. Based on the results of the previously completed quarterly monitoring program, groundwater monitoring was continued on a semi-annual basis until September 2022. The NYSDEC PRR Response Letter dated October 5, 2022 approved the sampling frequency change from semi-annual to annually.

Groundwater monitoring will be completed on an annual basis to assess VOC concentrations. The following wells will be sampled:

- MW-2R, MW-4, MW-6, MW-7, MW-8, MW-11, MW-12, MW-13, MW-14, MW-18, MW-19, MW-24, MW-25, and MW-28.
- Monitoring wells removed from the program: MW-9, MW-20, and MW-26.

The groundwater sampling results will be reviewed as part of the annual reporting requirements, and monitoring will continue as determined in consultation with NYSDEC and NYSDOH, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. This SMP will be modified to reflect any future changes in sampling plans approved by NYSDEC. Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Groundwater Sampling Protocol

All groundwater sampling activities will be recorded by taking applicable notes in a field book and by collecting the readings listed on the groundwater sampling field log presented in Appendix F. Pertinent observations or Site conditions at the time of the sampling (e.g., well integrity, etc.) will also be noted on the well sampling log. One well sampling log will be filled out for each sampled monitoring well and serve as the inspection form associated with the groundwater monitoring well network.

Groundwater samples will be collected using low flow sampling techniques as described in U.S. EPA's Ground-Water Sampling Guidelines for the collection of groundwater samples from monitoring wells. Sampling will be conducted according to the following procedure during evening or weekend hours, or when the building is not fully occupied, and as detailed in the Quality Assurance Project Plan (QAPP) included as Appendix G:

33. Slowly remove the access manhole and locking cap and immediately measure the vapor concentrations in the well with a PID calibrated to the manufacturer's specifications;
34. Measure the depth to water and total well depth of all seven wells prior to conducting any purging, and check for the presence of non-aqueous phase liquid (NAPL) using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and the well sampling field log. Collect a sample of NAPL (if present) using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL;
35. Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a well where the total depth is 30 feet, screened interval is 20 to 30 feet, and depth to water is 24 feet, the mid-point of the water column within the screened interval would be 27 feet.
36. Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Horiba Quanta multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing into a five-gallon bucket.
37. Activate the applicable pump at the lowest flow rate setting of the pump.
38. Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be approximately 100 milliliters/minute and will be no greater than 300 milliliters/minute.
39. Transfer discharged water from the 5-gallon buckets to 55-gallon drums designated for well-purge water.
40. During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and

specific conductivity) with measurements collected approximately every five minutes.

41. Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Parameter	Stabilization Criteria
PH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter
mV = millivolts
NTU = nephthalometric turbidity units
mg/l = milligrams per liter

42. If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
43. After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 4.7 of the QAPP. Label the containers as described in Section 4.7 of the QAPP and place in a chilled cooler. Samples should be collected for VOCs.
44. Collect one final field sample and analyze for turbidity and water quality parameters (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity).
45. Once sampling is complete, remove the pump and tubing from the well. Dispose of the sample tubing and any associated PPE used for sampling in a 55-gallon drum designated for disposable sampling materials and PPE. The purge water will be managed as described in Section 3.6 of the QAPP included as Appendix G.
46. Decontaminate the pump, oil/water interface probe, and flow-through cell, as described in Section 3.4 of the QAPP included as Appendix G.
47. Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume), and observations in the project field book and the well sampling field log included as Appendix F.

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 redeveloped in accordance with the details outlined in Section 3.2 of the QAPP included as Appendix G. Additionally, monitoring wells will be properly decommissioned and replaced (as per the requirements of this 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 Review 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 CP-43: Groundwater Monitoring Well Decommissioning Policy. 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 SSDS Inspection

An inspection of each SSDS will be completed on a quarterly basis for the first year and on an annual basis thereafter, as shown in the table listed in Section 3.1.2. Each inspection will include exterior and interior inspections. A layout of each SSDS with monitoring points is provided as Figure 11. The schematic identifies the location of system piping, vacuum points, and communication test points (temporary and permanent sub-slab soil vapor points). An exterior inspection will be completed to determine whether any unusual conditions exist (e.g., unusual odors, spills, leaks, damaged blower, or blower noise, etc.). The interior inspection will follow and will consist of collecting vacuum pressure readings from the manometers at each suction point to confirm that each blower is applying sub-slab vacuum. The interior monitoring will also include the collection of differential pressure readings at each permanent sub-slab soil vapor sampling point to confirm that the system is achieving the sub-slab vacuum goal. The vacuum pressure and differential pressure readings will be compared to the baseline readings established during the system construction and previous monitoring visits. Attached Table 9 includes the communication test results compiled during system installation. The interior inspections will also include a review of the products utilized at 2.99 Cleaners to confirm that chlorinated solvents are not being used for dry cleaning and/or during routine business practices such as spot or stain removal.

The sub-slab vacuum monitoring point network (SG-5 through SG-8, and SG-12) is shown on Figure 10, and the performance monitoring is described in further detail in Section 4.3 of this SMP. All sampling activities will be recorded in a field book and documented on the SSDS Monitoring and Site Inspection Form provided in Appendix H. If readings are still outside of range or damage is noted, the owner's representative will immediately notify a Site Contact (see Section 2.5.1 of this SMP). If damage requiring repair is identified during the inspections, repairs will be made promptly.

The monitoring frequency outlined above and listed in Section 3.1.2 may be modified based on field screening and associated laboratory analytical results with the approval of NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

3.3.3 Indoor Air Sampling

To confirm indoor air quality during the operation each SSDS, one round of indoor air samples were collected after issuance of the COC during the 2015-

2016 heating season. The need to perform additional rounds of indoor air sampling will be determined based on field screening, system failure, or the request to decommission or terminate components of the SSDS with the approval of NYSDEC. This SMP will be modified to reflect any changes in sampling plans approved by NYSDEC.

3.3.3.1 Indoor Air Sampling Protocol

Following the completion of a pre-sampling inspection and chemical inventory of the Site building, indoor air samples will be collected from target locations (IA-5 through IA-9, IA-11 through IA-13, and IA-23) utilized during the IRM and RI. The sampling locations are shown on Figure 7. Sampling will include the resident located at 7 East Evergreen to confirm that the new sump is continuing to prevent vapor intrusion. The samples will be collected in 6-liter Summa canisters set approximately 3 to 5 feet above the first floor slab in accordance with NYSDOH guidance and the sampling procedure detailed in the QAPP. All samples will be submitted to a NYSDOH ELAP-certified laboratory for analysis of VOCs by EPA Method TO-15.

All sampling activities will be recorded in a field book and the Indoor Air Sampling Log included in Appendix H. Field observations (e.g., potential VOC sources, etc.) will be noted on the sampling log, which will be subject to the reporting requirements and system checks as discussed in Section 5.0 of this SMP. Complete indoor air sampling procedures are detailed in the QAPP (Appendix G).

3.4 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the QAPP prepared for the site (Appendix G). 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 and 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.

3.5 Inspection and Monitoring Reporting Requirements

An email report will be generated after each quarterly sampling and/or inspection event that will describe the actions completed, the data compiled, and include any supporting field documents (i.e., well sampling logs, inspection forms). Each Quarterly Report, and any other relevant reporting information/forms/formats used during the monitoring/inspection events, will be subject to approval by NYSDEC and submitted as part of the annual Periodic Review Report. The Quarterly and Periodic Review Reports will be compiled and submitted as specified in the Reporting Plan (Section 5) of this SMP. All data generated in support of the Periodic Review Report will be submitted with each Periodic Review Report in accordance with NYSDEC's electronic data deliverable (EDD) requirements.

4.0 OPERATION AND MAINTENANCE PLAN

4.1 Introduction

This Operation and Maintenance Plan describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain each SSDS;
- Includes an operation and maintenance contingency plan; and,
- Will be updated periodically to reflect changes in Site conditions or the manner in which the each SSDS will be operated and maintained.

Information on non-mechanical Engineering Controls (the site cover system) is provided in Section 2 - Engineering and Institutional Control Plan and Section 3.2 of this SMP. A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 Engineering Control System Operation and Maintenance

4.2.1 Sub-Slab Depressurization Systems (SSDSs)

Intrusion of contaminated soil vapor within the Site building is prevented by active SSDSs that applies negative pressure under the first floor building slab. The Site-specific design for the SSDS was confirmed during communication and indoor air testing performed from January 2011 through March 2015 as part of the IRM.

The major components of the SSDS include:

48. Space #10 - high suction fan (Radon Away GS5000) with two vertical suction points

- 49. Space #11 - high suction fan (Radon Away GS5000) with two vertical suction points
- 50. Space #12 — high air volume/low suction fan (FanTech FR 250) with two vertical suction points
- 51. Space #13 - high suction fan (Radon Away GS5000) with three vertical suction points
- 52. Space #14 - low suction fan (Radon Away GP501) with two vertical suction points
- 53. (Off-site) Space #15 - low suction fan (Radon Away GP501) with two vertical suction points

The SSDS blowers, pits, and associated piping were installed at the Site between January 2011 and May 2012.

4.2.1.1 SSDS Scope

Each SSDS is designed to operate continuously, 24 hours a day, 7 days a week, 365 days a year, without any required adjustments or repairs, beyond routine maintenance items discussed in Section 4.2.1.4. Manufacturer's specifications for each of the SSDS components are included in Appendix C. Regular system inspections, operation parameter documentation and performance assessment guidelines are detailed in Section 4.3 of this SMP.

4.2.1.2 System Start-Up and Testing

Each SSDS is already in operation at the Site. After any future event, such as a downtime due to equipment repair that requires SSDS start-up, the following inspections and testing will be performed to ensure the system is balanced:

- 54. Confirmation of air flow with U-Tube and/or manometer readings; and
- 55. Confirmation of acceptable vacuum readings from each communication test point below the first floor concrete slab.

4.2.1.3 System Operation: Routine Operation Procedures

Operation of each SSDS will be monitored in accordance with the frequency and detail set forth in Sections 3.3.2 and 4.3 of this SMP. Monitoring of each SSDS will consist of a visual inspection of the complete system including checking to confirm that the SSDS blower is operating properly, observing all associated air flow gauges, and identification and repair of any system malfunctions or problems (i.e., leaks, cracks, collection of condensation, etc.).

Each SSDS will operate continuously at the Site and not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the SSDS will be submitted by the property owner based on confirmatory data that justifies the request. Each SSDS will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH. Details pertaining to performance monitoring are included in Section 4.3 of this SMP.

4.2.1.4 System Operation: Routine Equipment Maintenance

A tentative schedule for routine equipment maintenance work for each SSDS is provided in the following table, and will be completed as needed during the appropriate routine or detailed inspections:

SSDS Routine Maintenance Details

Monitoring Inspection or Sampling Type	Frequency	Maintenance Task
SSDS Detailed Operation Inspection	Quarterly Basis for 1 Year, and at least Annually Thereafter	System Components

4.2.1.5 System Inspections:

The system inspection will consist of a visual inspection to confirm that each SSDS is operating properly. The inspection will also note any unusual conditions (e.g., unusual odors, spills, leaks, blower noise). Typical routine maintenance items that should be addressed during these inspections include:

56. Confirmation that the blower is operating, there are no signs of faulty performance, and air is discharging through the exhaust piping to the roof;
57. Confirmation that the gauges on each manifold leg are clean and reading air flow within normal ranges;
58. Confirmation of any unusual condition, including odors, spills, leaks, cracked pipes, blower noise, etc;
59. Confirmation/assessment the structural integrity of concrete floor slabs overlying constructed SSDS pits and piping runs; and
60. Confirmation of the gate valve settings for each SSDS suction point.

In the event that a condition warranting system component maintenance is identified, the appropriate reporting and maintenance should be conducted immediately. Manufacturer's specifications and recommended maintenance for each SSDS blower are included in Appendix C. Any maintenance completed for the SSDS should be documented in the SSDS Inspection Form located in Appendix H.

4.2.1.6 System Operation: Non-Routine Equipment Maintenance and Repair

Non-routine maintenance and repair may be required at times for issues that require contractor expertise. These issues may include replacement of cracked or damaged suction piping, blower replacement, electrical issues, diagnostic testing, and system balancing after equipment replacement. The SSDS contractor is included in the contact information in Section 2.5.1, and any issues requiring contractor assistance will be scheduled and completed immediately upon discovery.

4.3 Maintenance and Performance Monitoring Reporting Requirements

Maintenance reports and any other information generated during regular operations at the Site will be kept on-file on-site. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Quarterly Report and Periodic Review Report, as specified in the Sections 3.5 and 5.3.1 of this SMP.

4.3.1 SSDS Inspection Report

The data compiled during the inspection and/or repair of each SSDS will be documented on the SSDS inspection form (Appendix H). Checklists/forms will include, but not be limited to the following information:

61. Date;
62. Name, company, and position of person(s) conducting maintenance activities;
63. Manometer and/or differential pressure readings;
64. Maintenance activities conducted;
65. Any unusual observations (leaks, cracks, collection of condensation, etc.);
66. Any modifications or repairs to the system;
67. Where appropriate, the report will include color photographs or sketches showing the approximate location of any problems or incidents noted (on an attached sheet); and,
68. Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the inspection form).

5.0 INSPECTIONS, CERTIFICATIONS, AND REPORTING

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 4.0 - Operation and Maintenance Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any treatment system component has occurred or 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 for the SSDS and site cover inspections. The inspection forms are included in Appendix H. 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 site during the reporting period will be provided in electronic format in the Periodic Review Report.

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:

69. EC/ICs are in place, are performing properly, and remain effective;
70. The Monitoring Plan is being implemented;
71. Operation and maintenance activities are being conducted properly; and, based on the above items,
72. The Site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 Certification of Engineering and Institutional Controls

After the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare the following certification:

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

- The inspection 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 engineering controls employed at this Site are unchanged from the date the controls were put in place, or last approved by the NYSDEC;
- 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 Site will continue to be provided to the NYSDEC to evaluate the remedy, including access to evaluate the continued maintenance of the engineering controls;
- 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 Site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- 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
- 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 generally accepted engineering practices; and
- The information presented in this report is accurate and complete.
- 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 [business address], am certifying as [Owner or Owner's Designated Site Representative] and [I have been authorized and designated by all site owners to sign this certification] for the Site.

Every five years the following certification will be added:

- The assumptions made in the qualitative exposure assessment remain valid.

The signed certification will be included in the Periodic Review Report described in Section 5.3 below.

5.3 Reporting

The reporting requirements include a quarterly email report that will be generated after each quarterly sampling and/or inspection event, and a Periodic Review Report that will be generated and submitted every year beginning 18 months after the Certificate of Completion is issued by NYSDEC. Each report will be prepared and submitted based on the requirements of this Section. The schedule for Inspection Reports and Periodic Review Reports is included in the following table:

Task/Report	Reporting Frequency*
Inspection Report	Annual
Periodic Review Report	Annually, or as otherwise determined by the Department

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

5.3.1 Periodic Review Report

A Periodic Review Report will be prepared that addresses the Site described in the Environmental Easement included as Appendix A (Schedule A). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

73. Identification, assessment and certification of all ECs/ICs required by the remedy for the site;
74. Results of the required annual site inspections and severe condition inspections, if applicable;
75. All applicable inspection forms and other records generated for the site during the reporting period in electronic format;
76. A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
77. 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;
78. 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;
79. A site evaluation, which includes the following:
 80. The compliance of the remedy with the requirements of the site-specific RAWP or Decision Document;
 81. The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 82. Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
 83. Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
 84. The overall performance and effectiveness of the remedy.
85. A performance summary for all treatment systems at the site during the calendar year, including information such as:
 86. The number of days the system was run for the reporting period;
 87. A description of breakdowns and/or repairs along with an explanation for any significant downtime;
 88. A description of the resolution of performance problems;
 89. A summary of the performance, effluent, and/or effectiveness monitoring; and
 90. Comments, conclusions, and recommendations based on data evaluation.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC and NYSDOH project manager for review and approval.

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.

6.0 GROUNDWATER TREATMENT CONTINGENCY PLAN

The need to continue groundwater treatment will be determined in consultation with NYSDEC. Groundwater monitoring will continue, as determined by NYSDEC and NYSDOH, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period of time. Monitoring will continue under this NYSDEC-approved Site Management Plan (SMP) until permission to discontinue is granted in writing by NYSDEC. In the event that the results of post-injection groundwater monitoring described in the RDWP, or post-remediation monitoring required by the SMP indicate that remedial action has been ineffective in achieving the Remedial Action Objectives (RAOs), a contingency investigation and/or treatment plan will be implemented. The contingency plan would be designed after compiling the groundwater monitoring results and could include, but not limited to, additional injection events, modification of the treatment program (i.e., number/location of injection points, changes to volume, dosage, or type of reagent used), and revaluation of remedial alternatives. The approach would require review and approval by NYSDEC and NYSDOH.

6.1 Periodic Assessments/Evaluations

6.1.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding, and provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments.

The BCP Site is not located in a flood plain, and low lying areas on the site are not known to be prone to flooding during a severe rain event. The nearest water body is the Demerest Kill Creek, which enters an underground culvert approximately 300 feet west of the BCP Site, remains below ground in the culvert through the northwestern end of New City Plaza, and leaves the culvert approximately 700 feet north of the BCP Site. The Site cover consists of either the retail building, asphalt pavement, or a green space area that is covered in vegetation.

The Site building discharges rainwater to the asphalt cover, and the asphalt cover area uses a network of catch basins to manage precipitation. Erosion or ponding has not been observed within the green space area as rainwater can infiltrate directly into the ground, and the vegetative cover minimizes erosion. The site is not considered to be in the high risk category when it comes to potential for wind damage as the asphalt area and one-story Site building contain only a few small trees. Underground lines provide power for the tenant spaces located on the BCP Site, which minimizes the potential for above-grade interference, such as fallen trees or lightning strikes. Power loss associated with area storms is not uncommon, but is typically addressed in a timely manner.

The remedy for the site included installation of SSDS's, which are inspected, monitored, and maintained as part of the inspection requirements of this SMP. The previous and/or potential future chemical injections are temporary active measures that are not associated with active systems such as groundwater pump and treat. The only fluid storage at the Site includes purge water generated during groundwater monitoring that is stored in one to two 55-gallon drums stored on a drum spill containment pallet.

A vulnerability assessment will be included as part of the monthly and annual Site Wide Assessments that are completed in accordance with this SMP. Observations will be made to determine whether existing or potential vulnerabilities exist that would affect site conditions. Assessments associated with the condition of the site cap, including asphalt damage, building floor slab damage, or green space erosion, is included as part of the site cap inspections completed as part of this SMP. Any water build-up in the SSDS's will be managed through the SSDS inspection and maintenance requirements. Additional assessments will include an inspection of the drum storage area to confirm the spill containment box is empty and functional and the drums are secure, inspection of parking area for evidence of ponding water or flooding, and inspection of the buildings rainwater discharge system.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

Low flow sampling is utilized to minimize sample agitation and the amount of waste generated during post remediation groundwater monitoring. The SSDS system uses blowers designed to be efficient and minimize power usage. The chemical injection program required only temporary power and water usage to complete the injections. There is currently no additional waste generation, energy usage, or water usage associated with groundwater remediation. Any additional groundwater remediation, if necessary, will include a green remediation evaluation.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 Remedial Systems

Remedial systems will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate. The SSDS's are the only active systems at the Site. Each SSDS utilizes a low energy blower to create suction, they do not generate waste, and there are no treatment features associated with air discharge.

6.2.3 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks and or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. The site inspections are combined with the post-remediation groundwater sampling events to minimize the amount of labor and trips needed to complete the requirements of this SMP.

6.2.4 Metrics and Reporting

Metrics reporting for green remediation is required for state-funded projects however it is strongly recommended for all other sites.

As discussed in Section 7.0 and as shown in Appendix H – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits; a set of metrics has been developed.

6.3 Remedial Site Optimization

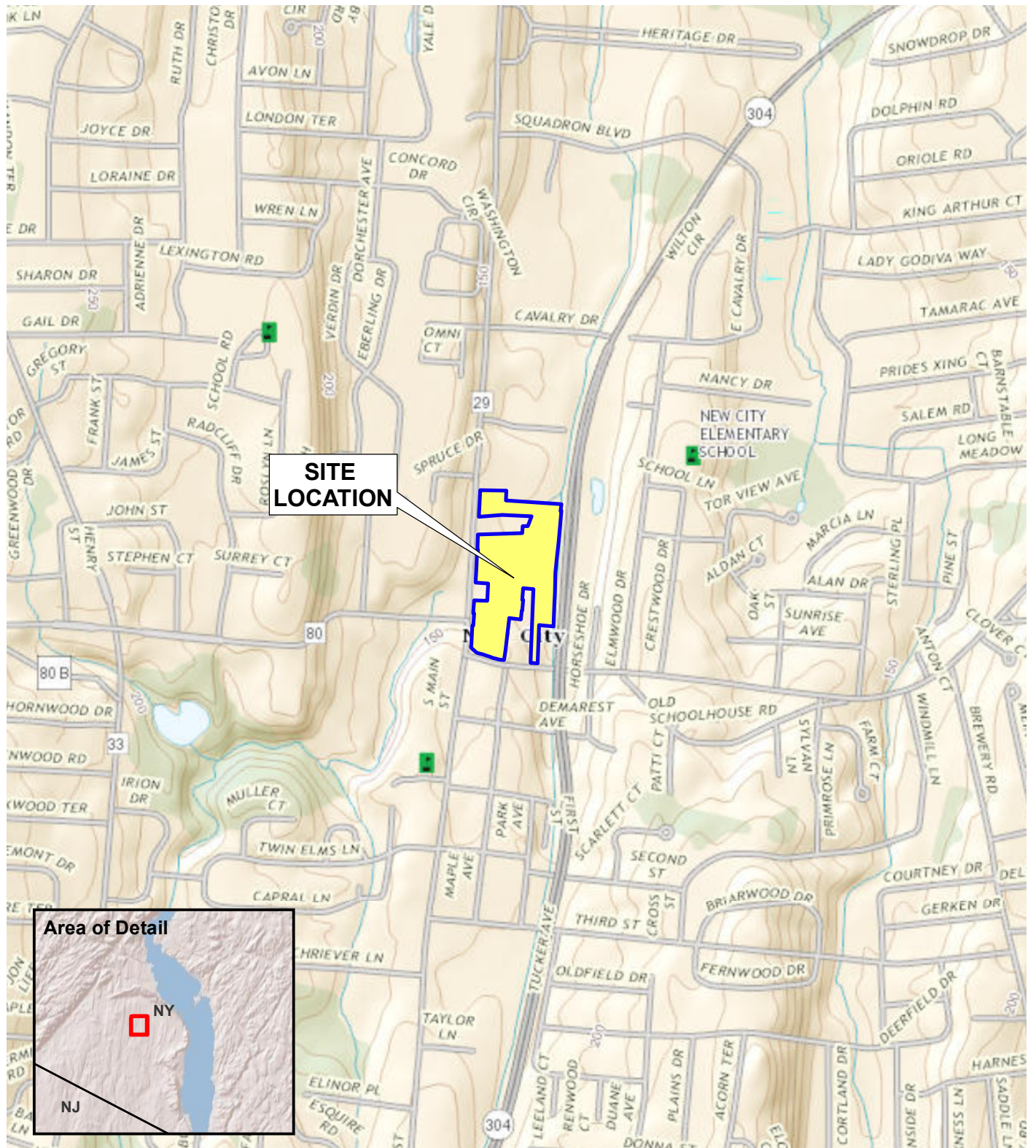
A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

FIGURES



SOURCE
USGS 7.5 Minute Topographic Map
Haverstraw Quad 2011

0 1,000 2,000
Feet



New City Plaza
New City, New York

SITE LOCATION



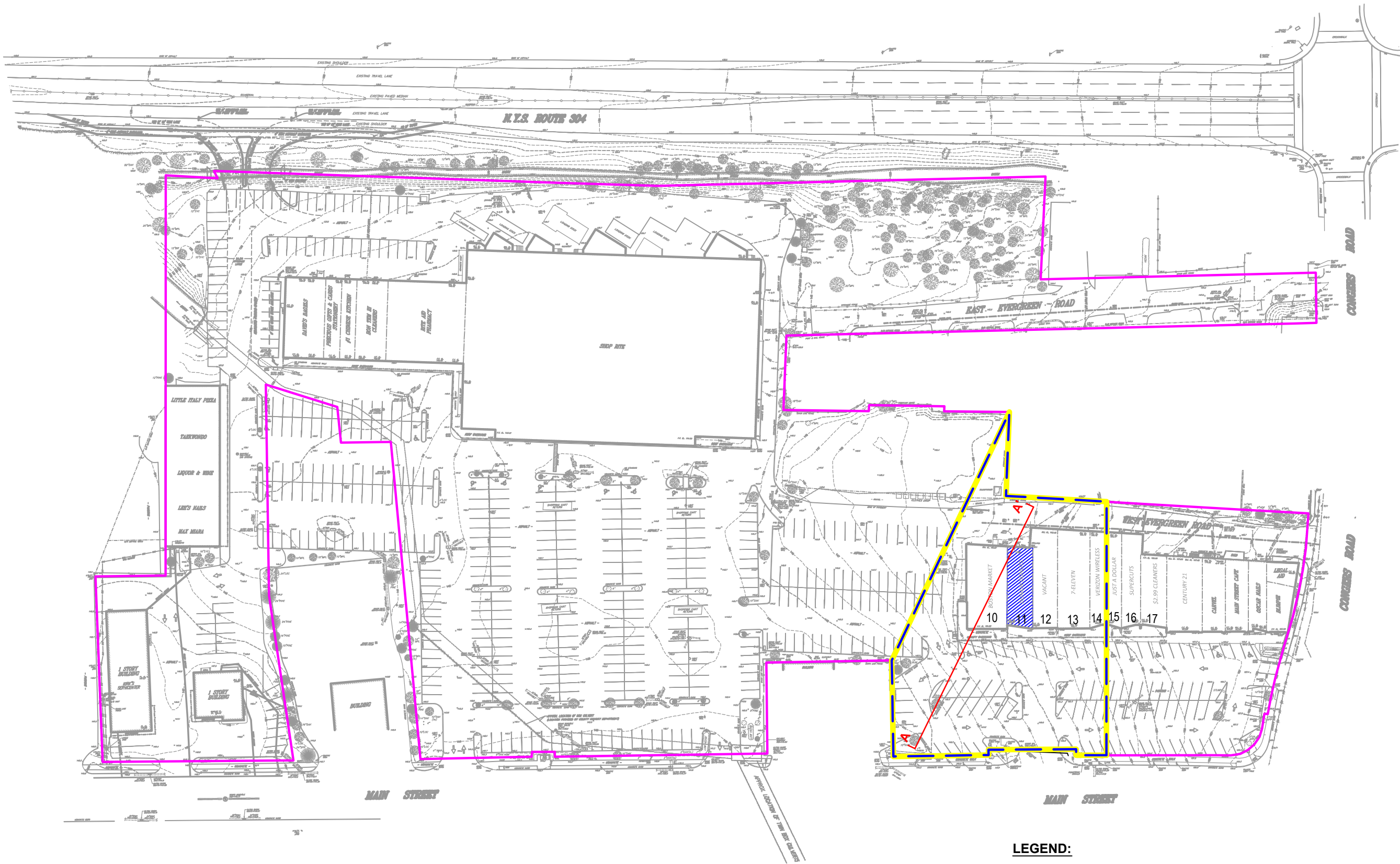
Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE
2/23/2015

PROJECT No.
40217

FIGURE
1

© 2015 AKRF, Inc. Environmental Consultants Q:\Westchester Data\AKRFData\40217 - New City Plaza S\MP\Figures\40217 Fig 2 Site Plan.dwg



- LEGEND:**
- PROPERTY BOUNDARY
 - BCP SITE BOUNDARY
 - FORMER ROBBIE J CLEANERS
 - TENANT SPACE NUMBER
 - GEOLOGIC CROSS SECTION LINE A-A'



NEW CITY PLAZA
New City, New York
SITE PLAN

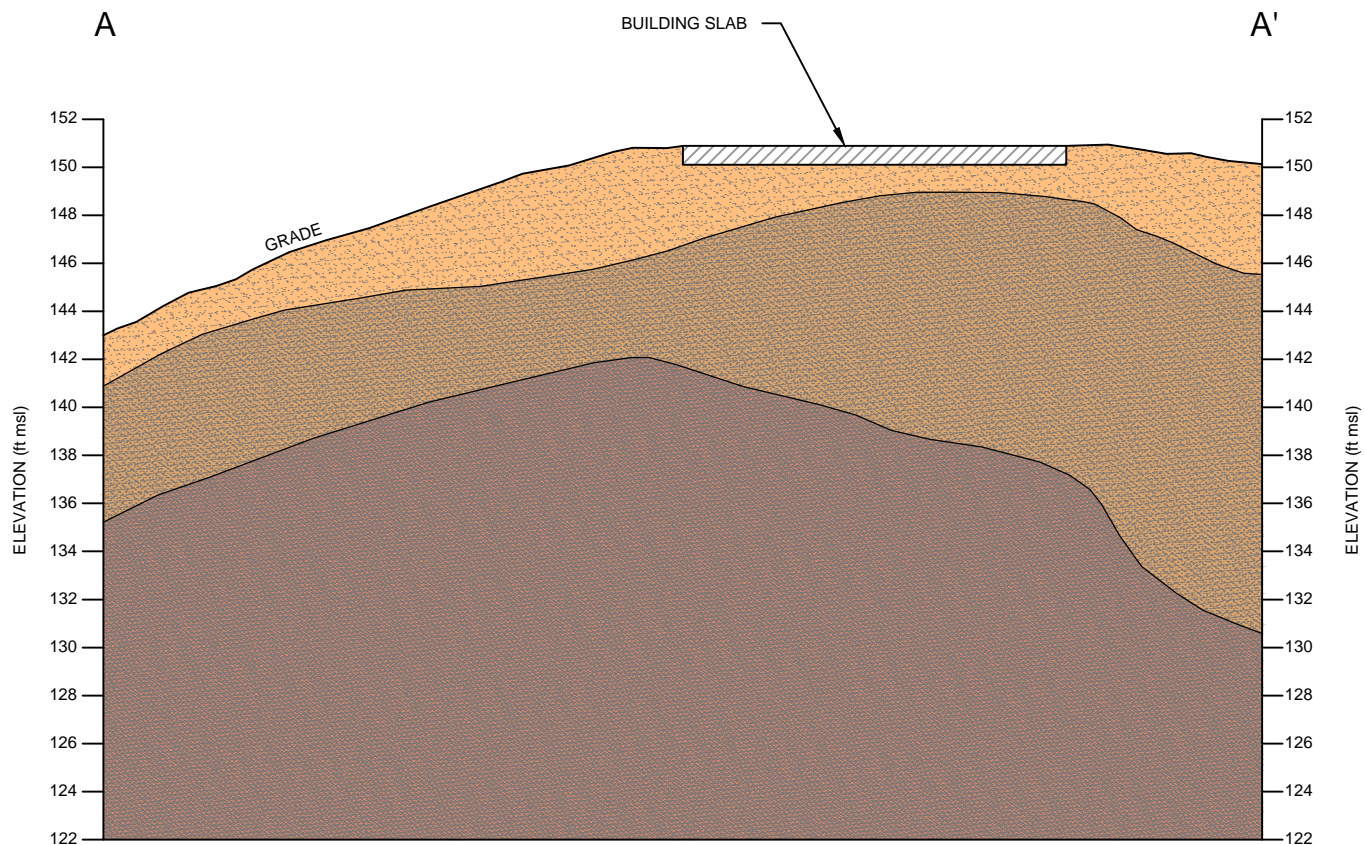
AKRF
Environmental Consultants
440 Park Avenue South, New York, NY 10016

DATE
11/5/2015

PROJECT NO.
40217

SCALE
as shown

FIGURE
2



LEGEND



ft msl

LOOSE SAND AND SILT (FILL), SOME FINE GRAVBEL, RED/BROWN
 MEDIUM TO DENSE FINE SAND (TILL), SOME SILT, RED/BROWN
 VERY DENSE FINE SAND AND SILT (TILL), RED/BROWN

FEET ABOVE MEAN SEA LEVEL

NEW CITY PLAZA
 NEW CITY, NEW YORK

GEOLOGIC CROSS SECTION A-A'



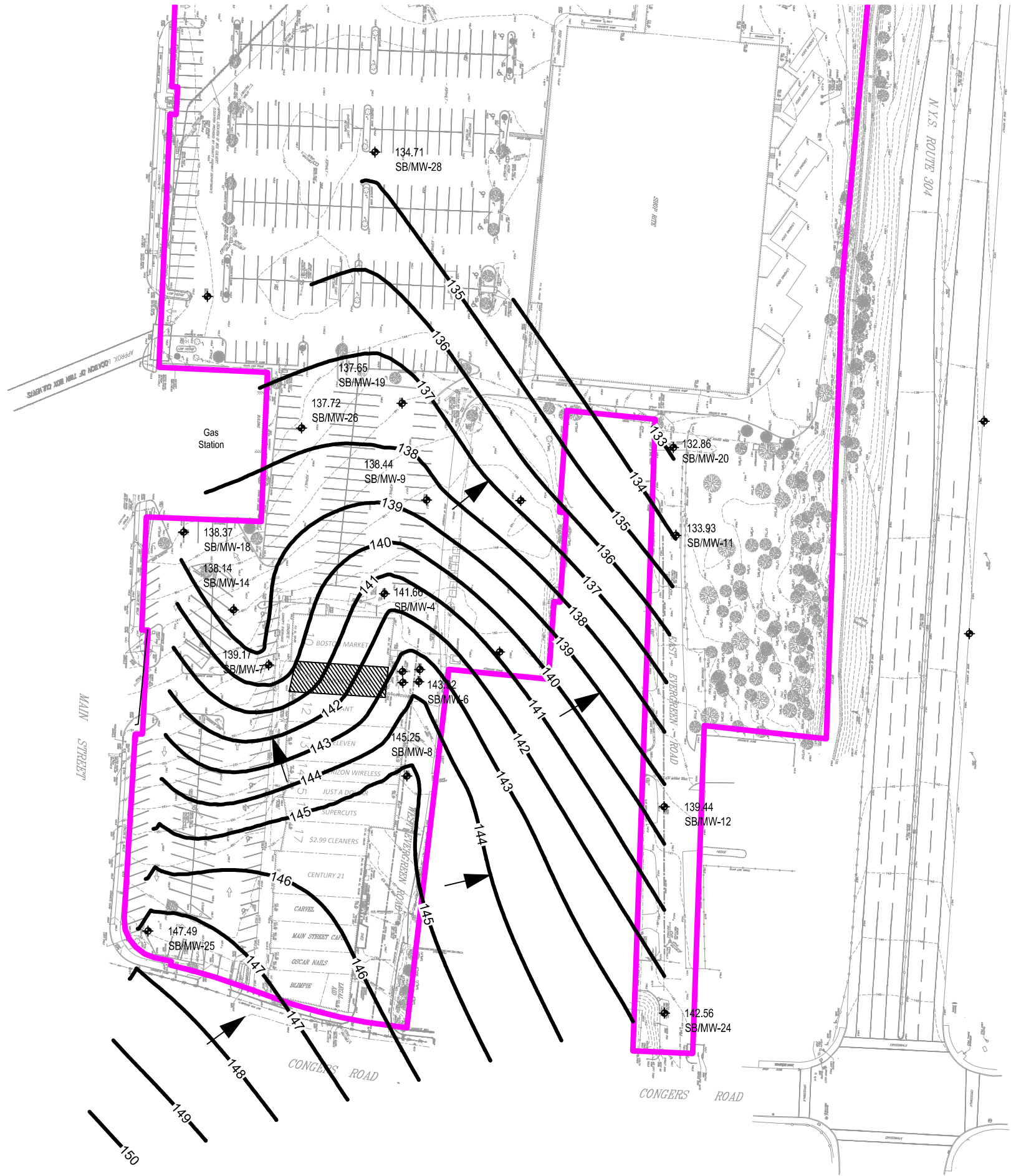
Environmental Consultants
 34 S. Broadway, White Plains, N.Y. 10601

DATE
11/5/2015

PROJECT No.
40217

SCALE
nts

FIGURE
3



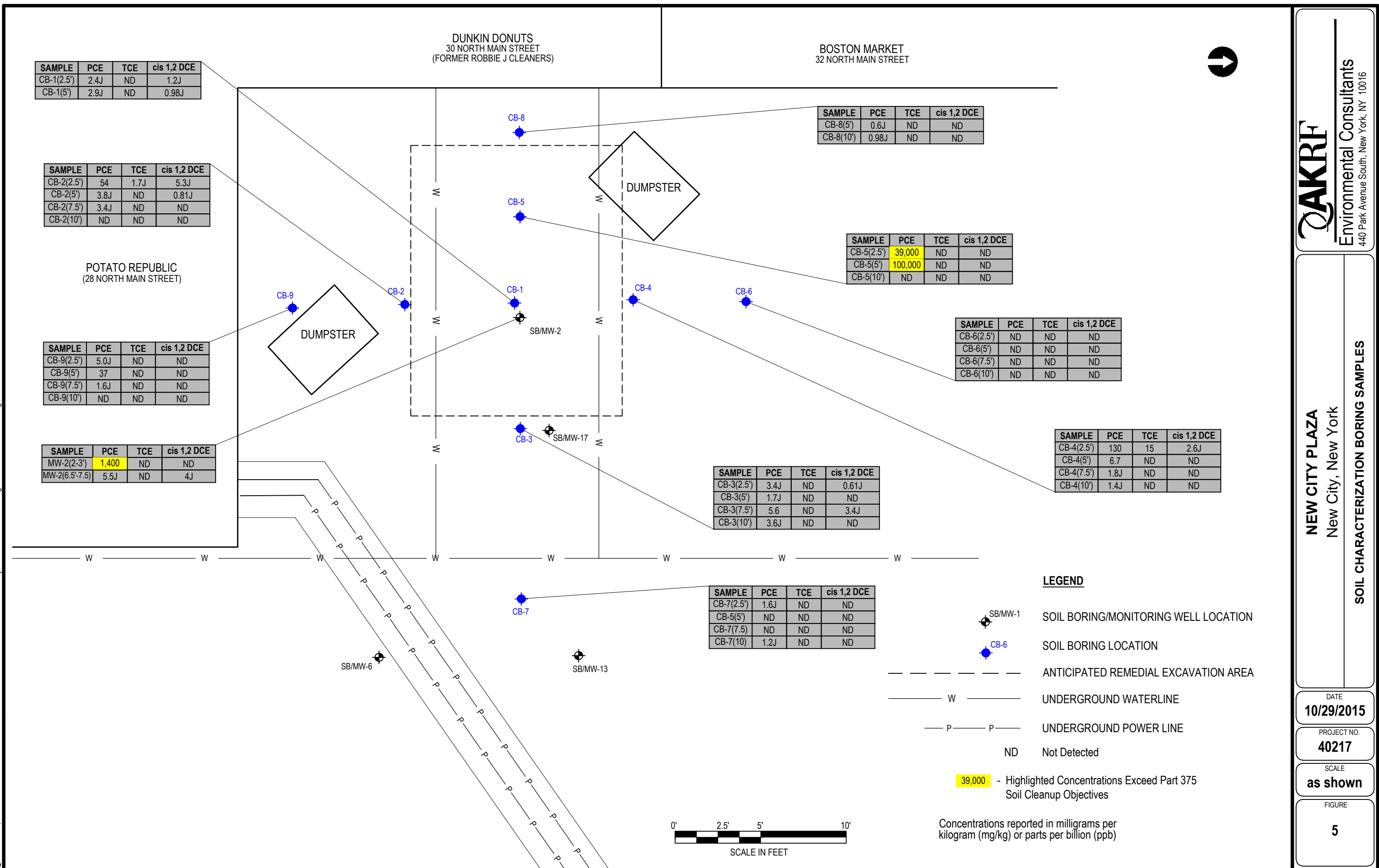
LEGEND:

- ◆ 141.66 SB/MW-4 SOIL BORING/MONITORING WELL WATER TABLE ELEVATION IN FEET
- 140 — ELEVATION CONTOUR IN FEET
- ➔ ANTICIPATED GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY
- ▨ 10 FORMER ROBBIE J CLEANERS TENANT SPACE WITHIN NEW CITY PLAZA

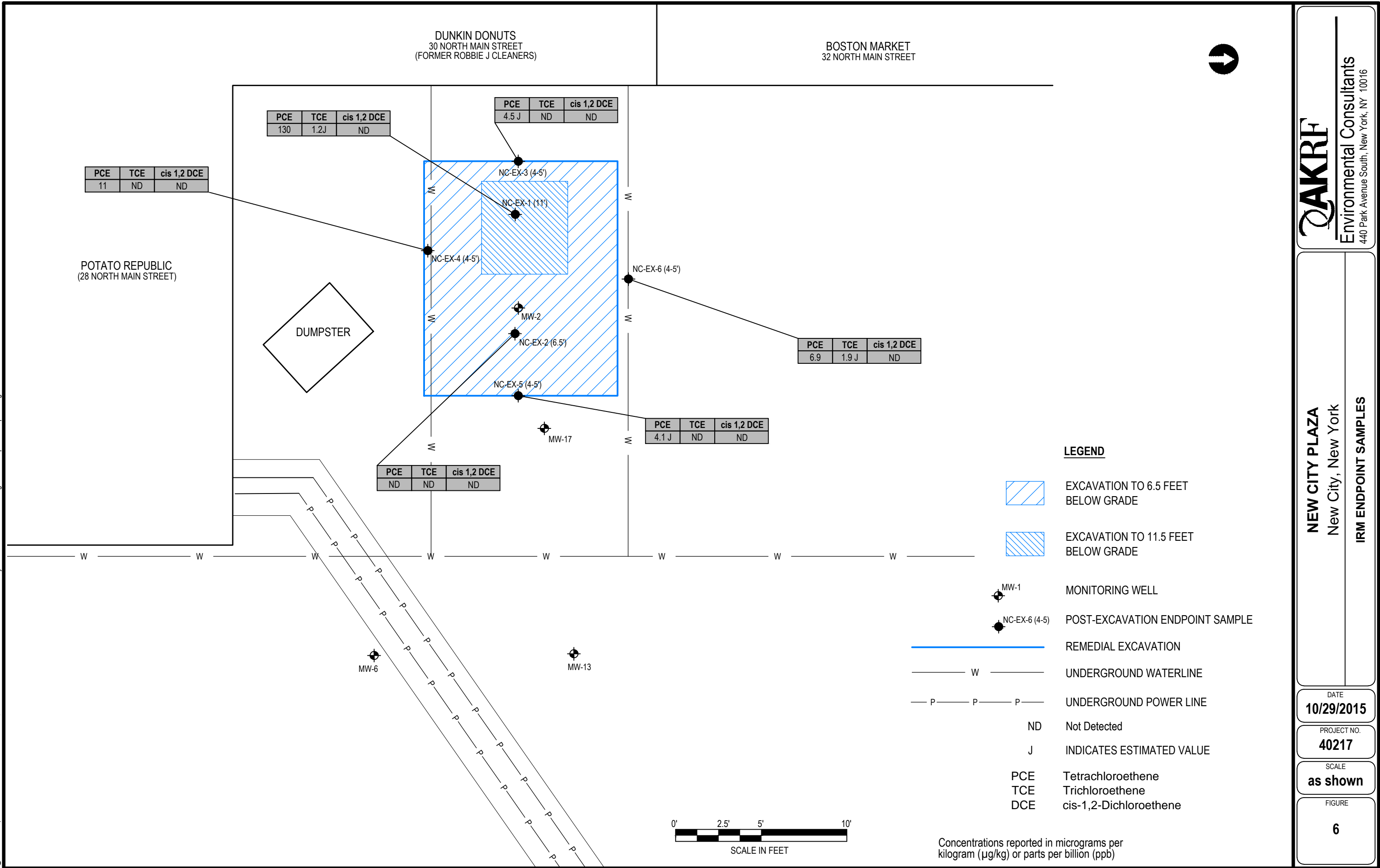
TENANT SPACE	ADDRESS	CURRENT TENANT
10	32 North Main St.	Boston Market
11	30 North Main St.	Dunkin Donuts
12	28 North Main St.	Vacant
13	26 North Main St.	7-Eleven
14	24 North Main St.	Wireless Depot
15	22 North Main St.	Dollar Store

Notes
1. Elevations are relative to Assumed Site Datum





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DUNKIN DONUTS
30 NORTH MAIN STREET
(FORMER ROBBIE J CLEANERS)

BOSTON MARKET
32 NORTH MAIN STREET

PCE	TCE	cis 1,2 DCE
11	ND	ND

POTATO REPUBLIC
(28 NORTH MAIN STREET)

PCE	TCE	cis 1,2 DCE
130	1.2J	ND

DUMPSTER

PCE	TCE	cis 1,2 DCE
4.5 J	ND	ND

PCE	TCE	cis 1,2 DCE
6.9	1.9 J	ND

PCE	TCE	cis 1,2 DCE
4.1 J	ND	ND

PCE	TCE	cis 1,2 DCE
ND	ND	ND

NC-EX-3 (4-5')

NC-EX-1 (11')

NC-EX-4 (4-5')

MW-2

NC-EX-2 (6.5')

NC-EX-5 (4-5')

MW-17

NC-EX-6 (4-5')

MW-6

MW-13

MW-1

NC-EX-6 (4-5)

SG/IA-7	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-7	IA-7	SG-7	IA-7	IA-7	IA-7	IA-7	IA-7	IA-7	IA-7	IA-7	IA-7	IA-7
PCE	1400	2.8	2.8	2.4	0.75	0.27	ND	0.4	0.66	0.95	ND	ND
TCE	130	ND	ND	0.54	0.76	2.1	13	19	21	1	ND	ND
cis-1,2 DCE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SG/IA-8	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-8	IA-8	SG-8	IA-8	IA-8	IA-8	IA-8	IA-8	IA-8	IA-8	IA-8	IA-8	IA-8
PCE	8800	7.5	9500	8.1	2	1.8	ND	ND	3.6	1.0	ND	0.55
TCE	120	ND	120	5.4	4.7	43	270	280	65	6.4	0.28	ND
cis-1,2 DCE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SG/IA-9	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-9	IA-9	SG-9	IA-9	IA-9	IA-9	IA-9	IA-9	IA-9	IA-9	IA-9	IA-9	IA-9
PCE	460	1.4	130	1.3	1.2	ND	ND	ND	1.9	0.64	0.28	0.45
TCE	2.6	ND	3.8	5.4	10	120	330	320	58	4.9	0.78	0.74
cis-1,2 DCE	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
SG/IA-9B	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-9B	IA-9B	SG-9B	IA-9B	IA-9B	IA-9B	IA-9B	IA-9B	IA-9B	IA-9B	IA-9B	IA-9B	IA-9B
PCE			10						2.2		0.29	
TCE			9.1						68		0.89	
cis-1,2 DCE			3.4						ND		ND	

SG/IA-12	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-12	IA-12	IA-12	IA-12	IA-12	IA-12	IA-12	IA-12	IA-12	IA-12	IA-12
PCE	20	0.57	1	ND	ND	ND	3.5	0.95	0.33	0.5
TCE	1.3	1.6	10	67	210	400	140	15	3.1	0.38
cis-1,2 DCE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SG/IA-13	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-13	IA-13	IA-13	IA-13	IA-13	IA-13	IA-13	IA-13	IA-13	IA-13	IA-13
PCE	6.8	1.9	0.71	ND	ND	ND	3.4	0.58	1.1	0.59
TCE	7	11	5	29	160	150	86	4	12	0.6
cis-1,2 DCE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

IA-24	May-14	Jul-14
PCE	0.59	0.63
TCE	19	4.3
cis-1,2 DCE	ND	ND

IA-22	May-14	Jul-14
PCE	0.96	0.55
TCE	29	3.5
cis-1,2 DCE	ND	ND

IA-28	Mar-15
PCE	0.79
TCE	ND
cis-1,2 DCE	ND

IA-25	Mar-15
PCE	0.33
TCE	ND
cis-1,2 DCE	ND

IA-23	May-14	Jul-14	Nov-14	Mar-15
PCE	1.5	1.2	3.4	4.5
TCE	1000	5.7	34	2.5
cis-1,2 DCE	ND	ND	ND	ND

IA-27	Mar-15
PCE	1.1
TCE	ND
cis-1,2 DCE	ND

IA-29	Mar-15
PCE	1.9
TCE	ND
cis-1,2 DCE	ND

IA-30	Mar-15
PCE	0.3
TCE	ND
cis-1,2 DCE	ND

IA-26	Mar-15
PCE	1.9
TCE	0.73
cis-1,2 DCE	ND

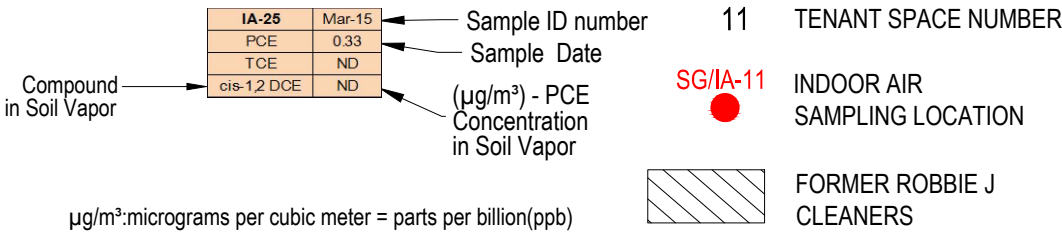
SG/IA-11	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14
SG-11	IA-11	SG-11	IA-11	IA-11	IA-11	IA-11	IA-11	IA-11	IA-11
PCE	NS	0.81	880	1.1	ND	ND	ND	1.3	0.59
TCE	NS	2.7	ND	8.2	110	370	480	34	4.4
cis-1,2 DCE	NS	ND	ND	ND	ND	ND	ND	ND	ND

SG-/IA-6	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14
SG-6	IA-6	SG-6	IA-6	IA-6	IA-6	IA-6	IA-6	IA-6	IA-6	IA-6
PCE	110	1.4	50	1.8	0.83	ND	ND	0.77	ND	1.2
TCE	ND	1.7	ND	0.75	1.9	0.62	77	14	27	3.6
cis-1,2 DCE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SG/IA-5	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-5	IA-5	SG-5	IA-5	IA-5	IA-5	IA-5	IA-5	IA-5	IA-5	IA-5	IA-5	IA-5
PCE	2.8J	1.4	100	1.8	ND	ND	ND	1.8	1.2	0.43	0.3	
TCE	ND	1.1	14	1.5	0.95	0.86	64	45	56	4.2	ND	ND
cis-1,2 DCE	ND	ND	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
SG/IA-5B	Jun-07	Jun-07	Aug-08	Aug-08	Jul-11	Mar-12	Nov-12	Jan-13	Apr-14	Jul-14	Nov-14	Mar-15
SG-5B	IA-5B	SG-5B	IA-5B	IA-5B	IA-5B	IA-5B	IA-5B	IA-5B	IA-5B	IA-5B	IA-5B	IA-5B
PCE	40J				0.71	ND	ND	1.2				
TCE	1.8				1.2	0.76	64	61				
cis-1,2 DCE	ND				ND	ND	ND	ND				



LEGEND:



NEW CITY PLAZA
New City, New York

SUB-SLAB AND INDOOR AIR ANALYTICAL SUMMARY

DATE
11.5.2015

PROJECT NO.
40217

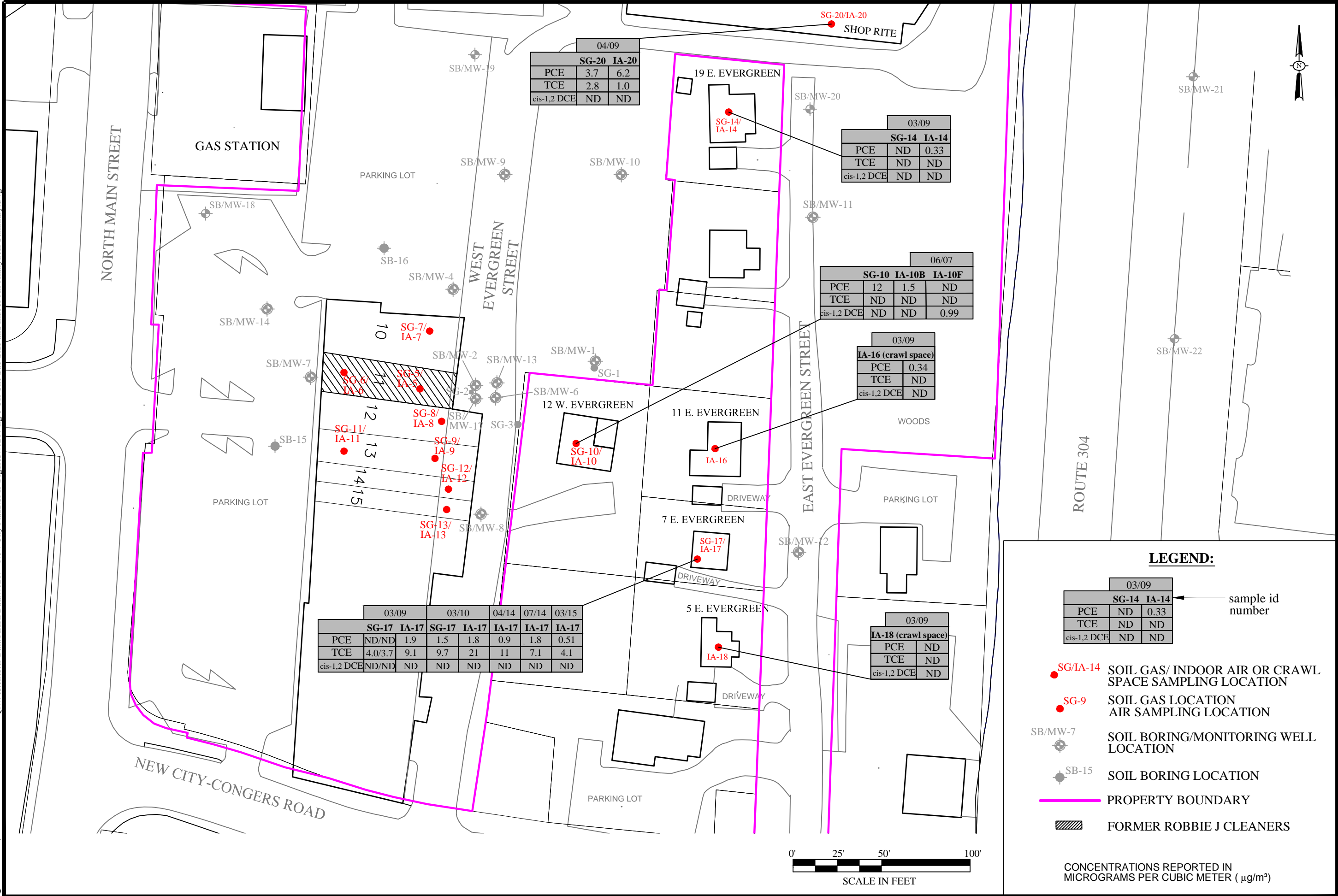
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FIGURE
7



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Environmental Consultants
34 S. Broadway White Plains, NY 10601

NEW CITY PLAZA
New City, New York

OFF-SITE SUB SLAB AND INDOOR AIR ANALYTICAL SUMMARY

DATE
11/19/2015

PROJECT NO.
40217

SCALE
as shown

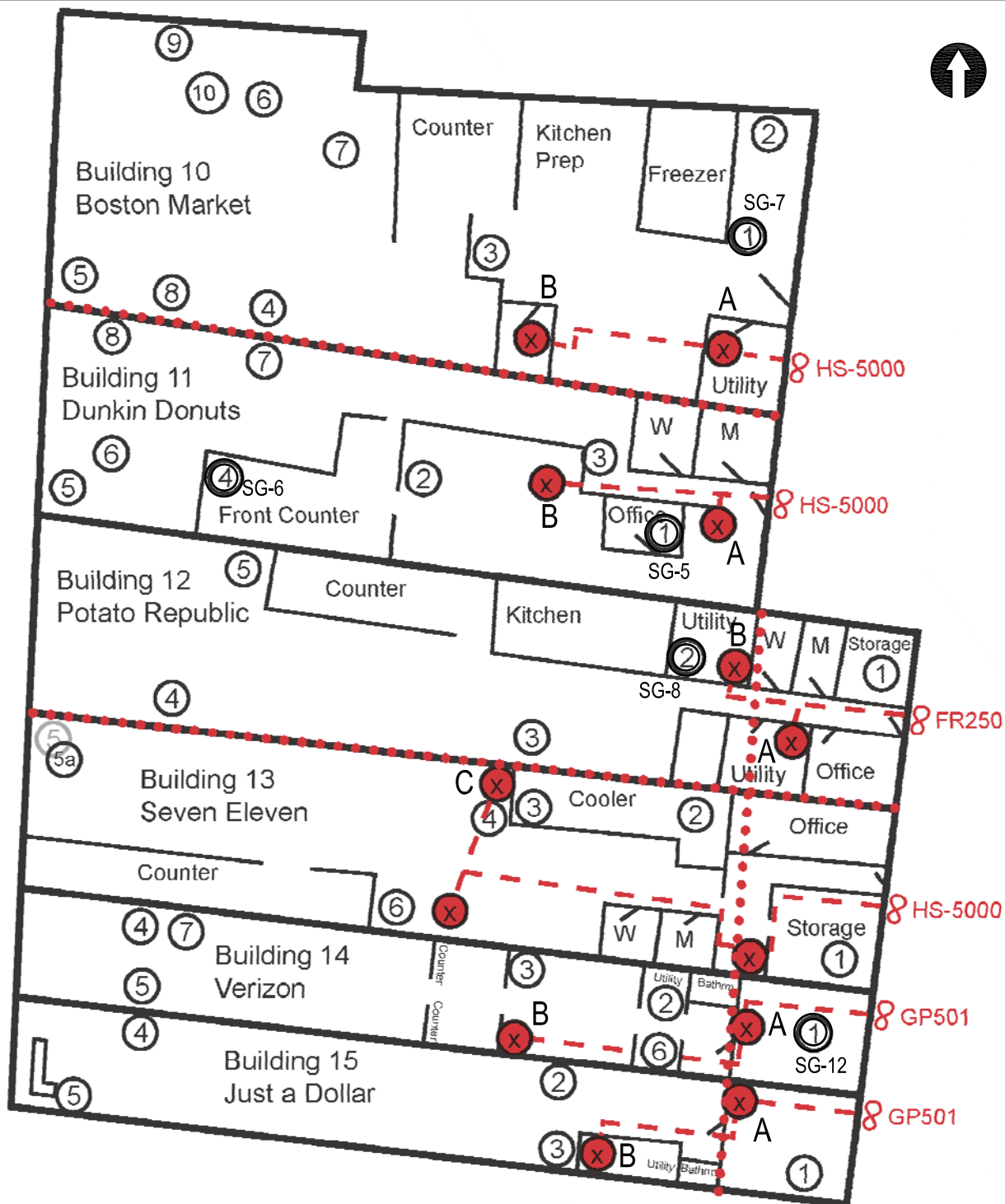
FIGURE
8

C:\Users\jgarcia\OneDrive\Documents\New City Plaza\SWS\SWS-Expanded\0217-FG-1-GW-Analytical-Summary.dwg





Front
Parking
Lots



LEGEND:

- B ● SUCTION POINT
- ⑥ COMMUNICATION TEST POINT
- ① COMMUNICATION TEST POINT/SOIL GAS POINT
- - PROBABLE FOOTER LOCATED BETWEEN SLABS
- - - PIPE ROUTE
- ∞ - EXTERIOR FAN/FAN MODEL #

NEW CITY PLAZA
NEW CITY, NEW YORK

**SSDS SYSTEM AND
MONITORING POINTS**



Environmental Consultants
34 S. Broadway, White Plains, N.Y. 10601

DATE
11/19/2015

PROJECT No.
40217

SCALE
nts

FIGURE
11

APPENDIX A
ENVIRONMENTAL EASEMENT

Paul Piperato, County Clerk
1 South Main St., Ste. 100
New City, NY 10956
(845) 638-5070

Rockland County Clerk Recording Cover Sheet

Received From :

FIRST AMERICAN TITLE INSURANCE CO-NY
666 THIRD AVE
5TH FLOOR
NY, NY 10017

Return To :

FIRST AMERICAN TITLE INSURANCE CO-NY
666 THIRD AVE
5TH FLOOR
NY, NY 10017

Method Returned : ERECORDING

First GRANTOR

NEWTON ASSOCIATES LLC

First GRANTEE

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Index Type : Land Records

Instr Number : 2015-00032455

Book : **Page :**

Type of Instrument : Easement

Type of Transaction : Ease, R-Way, Asmt Rent-Lease

Recording Fee: \$96.00

Recording Pages : 10

The Property affected by this instrument is situated in Clarkstown, in the
County of Rockland, New York

Real Estate Transfer Tax

RETT # : 1780

Deed Amount : \$0.00

RETT Amount : \$0.00

Total Fees : \$96.00

State of New York

County of Rockland

I hereby certify that the within and foregoing was
recorded in the Clerk's office for Rockland County,
New York

On (Recorded Date) . 11/09/2015

At (Recorded Time) . 7:45:00 AM



Paul Piperato, County Clerk



**ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36
OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW**

THIS INDENTURE made this 22nd day of October, 2015 between Owner(s) Newton Associates, LLC, having an office at c/o Kamber Management Company, LLC, 551 Fifth Avenue, Suite 2200, New York, New York 10176, County of New York, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 44 North Main Street in the Town of Clarkstown, County of Rockland and State of New York, known and designated on the tax map of the County Clerk of Rockland as tax map parcel numbers: Section 43.15 Block 1 Lot 22, being a portion of the property conveyed to Grantor by deed dated March 6, 1998 and recorded in the Rockland County Clerk's Office in Instrument No. 1998-00018495. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.1387 +/- acres, and is hereinafter more fully described in the Land Title Survey dated August 30, 2015 prepared by Aidan C. McCann, NYSPLS of Sound View Engineers and Surveyors, LLC, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

Section
43.15
Block
1
Lot
22

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: A3-0561-0806, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Rockland County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining

contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential or Restricted Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i) and (ii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

**This property is subject to an Environmental Easement held
by the New York State Department of Environmental Conservation**

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:
(i) are in-place;
(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to: Site Number: C344065
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to: Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233


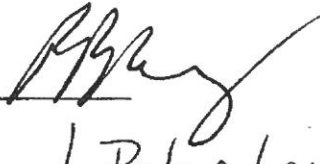
All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.
8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.
9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.
10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Newton Associates, LLC:

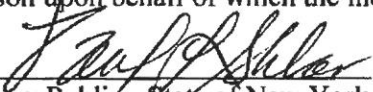
By:  
Print Name: Steven Levy / Peter Levy

Title: Members Date: 10/7/15

Grantor's Acknowledgment

STATE OF NEW YORK)
COUNTY OF New York) ss:

On the 7th day of October, in the year 20 15, before me, the undersigned, personally appeared Steven Levy / Peter Levy personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.


Notary Public - State of New York

PAUL R. SKLAR
Notary Public, State of New York
No. 4752724
Qualified in New York County
Commission Expires 11/30/17 2017

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By:


Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 22 day of October, in the year 2015, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.


Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

All that certain lot, piece or parcel of land, situated in the Town of Clarkstown, County of Rockland and State of New York, being an Environmental Easement on property known as 44 North Main Street. Said Easement more particularly bounded and described as follows:

Beginning at a stone monument on the easterly boundary of Main Street, County Highway Route 29 distant 393.33 feet northerly from the northerly side of Congers Road;

Thence in a easterly direction along lands now or formerly of Leemilt's Petroleum, South 74° 56' 45" East a distance of 95.93 feet. Thence in a southeasterly direction through lands now or formerly of Newton Associates, LLC, South 48° 39' 41" East a distance of 273.74 feet, to the northeast corner of lands now or formerly of Ramnauth; thence in a westerly direction along lands now or formerly of Ramnauth; North 71° 43' 25" West a distance of 83.67 feet, to the northwest corner of lands now or formerly of Ramnauth. Thence continuing along lands now or formerly of Ramnauth, in a southerly direction, South 19° 16' 35" West a distance of 100.31 feet point on the easterly side of West Evergreen Road and lands now or formerly of Newton Associates, LLC. Thence continuing westerly through lands now or formerly of Newton Associates, LLC, North 73° 56' 21" West a distance of 252.60 to the easterly side of Main Street. Thence generally in a northerly direction along the easterly line of Main Street, North 15° 58' 53" East a distance of 30.15 feet, South 74° 01' 08" East a distance of 5.98 feet, North 15° 58' 52" East a distance of 52.49 feet, North 15° 05' 54" East a distance of 34.78 feet, North 74° 54' 11" West a distance of 5.19 feet, and North 15° 05' 52" East a distance of 94.80 feet to the point or place of beginning containing 1.1387 Acres, more or less.

LEGAL DESCRIPTION OF PROPERTY
IN BARGAIN AND SALE DEED RECORDED
ON APRIL 23rd, 1998 AT
ROCKLAND COUNTY INSTRUMENT ID 1998-00018495

Parcel I

All that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Town of Clarkstown, County of Rockland, Tax Map Designation Section 58, Block G, Lots 22, 23, 7, 7.01, 42, 43, 45, and being particularly bounded and described as follows:

Beginning at a point marking the intersection of the easterly street line of Main Street with the northerly street line of Congress Road, said point being the southeasterly corner of the herein described parcel;

Thence running along the easterly street line of said Main Street the following two courses and distances: North 16.60 21.7° East 210.69 feet to a point; Thence North 15.03° 15' East 129.05 feet to a point marking the southwestery property corner of lands belonging now or formerly to Lecomitis Petroleum, Inc. as described in Liber 725 Page 5450;

Thence running along the southerly property line of said Lecomitis Petroleum, South 74.56° 45' East 105.00 feet to a point marking the southeasterly property corner of said Lecomitis Petroleum;

Thence running along the easterly property line of said Lecomitis Petroleum, North 15.03° 15' East 125.00 feet to a point marking the northwesterly property corner of said Lecomitis Petroleum;

Thence running along the northerly property line of said Lecomitis Petroleum, North 74.56° 45' West 105.00 feet to a point on the easterly street line of said Main Street, said point also marking the northwesterly property corner of said Lecomitis Petroleum;

Thence running along the easterly street line of said Main Street, North 15.03° 15' East 345.15 feet to a point marking the southwestery property corner of lands belonging now or formerly to Automotive Ceresnau, trustee as described in Liber 582 Page 2052;

Thence running along the southerly property line of said Ceresnau South 79.16° 45' East 331.70 feet to a point marking the southeasterly property corner of said Ceresnau;

Thence running along the easterly property line of said Ceresnau the following three courses and distances: North 15.03° 15' East, 50.00 feet to a point; Thence South 79.16° 45' East 35.54 feet to a point;

Thence North 33.56° 54' East 75.01 feet to a point marking the northwesterly property corner of said Ceresnau;

Thence RUNNING along the northerly property line of said Ceresnau the following two courses and distances: North 74.56° 12° West 209.43 feet to a point;

Thence North 82.28° 45' West 182.20 feet to a point on the easterly street line of said Main Street, said point also being the northwesterly property corner of said Ceresnau;

Thence RUNNING along the easterly street line of said Main Street North 15.39° 50' East 191.90 feet to a point marking the southwestery property corner of lands belonging now or formerly to Woodland Associates as described in Liber 263 Page 2226, said point also being the northwesterly corner of herein described parcel;

Thence RUNNING along the southerly property line of said Woodland Associates the following three courses and distances: South 76.15° 44' East 199.54 feet to a point;

Thence South 15.31° 08' West 70.03 feet to a point;

Thence South 73.59° 58' East 398.81 feet to a point on the westerly property line of lands belonging now or formerly to Rauch Construction Company, said point being the southerly property corner of said Woodland Associates and the northwesterly corner of the herein described parcel;

Thence RUNNING along the westerly property line of said Rauch Construction Company South 19.14° 54' West 52.02 feet to a point marking the southwestery property corner of said Rauch Construction Company;

Thence RUNNING along the southerly property line of said Rauch Construction Company, North 78.36° 25' East 8.29 feet to a point on the westerly highway line of New York State Route 98;

Thence RUNNING along said Route 304 the following two courses and distances: South 17.56° 29' West 436.17 feet to a point;

Thence South 14.36° 41' West 144.18 feet to a point;

Thence RUNNING through the herein described parcel along a closing line and past a property line, North 70.13° 21' West 152.61 feet to a point, said point marking the northwesterly property corner of lands belonging now or formerly to Rodney Locke;

Thence RUNNING along the northerly property line of said Locke in part and along the northerly property line of lands belonging now or formerly to Gold Circle Holding Corp. as described in Liber 331 Page 1222 in part North 71.43° 25' West 146.95 feet to a point marking the northwesterly property corner of said Gold Holding Corp.;

Thence RUNNING along the westerly property line of said Gold Circle Holding Corp. in part and along the westerly property line of lands belonging now or formerly to Derindamian Ramnath as described in Liber 585 Page 1148 in part, and along the westerly property line of lands belonging now or formerly of the Town of Clarkstown in part and along the westerly property line of land belonging now or formerly to Raul F. Salowicz in part, South 19.16° 35' West 526.63 feet to a point on the northerly street line of the aforementioned Congress Road, said point marking the southwestery property corner of said Salowicz;

Thence RUNNING along the northerly street line of Congress Road the following four courses and distances: North 71.33° 14' West 0.77 feet to a point;

Thence along a curve to the right, having a delta angle of 15.22° 35", a radius of 474.00 feet, an acre length of 127.21 feet and a chord of North 63.51° 56' West 126.83 feet to a point;

Thence along a curve to the left having a delta angle of 10.53° 00", a radius of 526.00 feet, an arc length of 99.91 feet and a chord of North 61.37° 09' West 99.76 feet to a point;

Thence along a curve to the right, having a delta angle of 83.02° 32", a radius of 30.00 feet, an arc length of 43.48 feet, and a chord of North 25.32° 25' West 59.77 feet to the point or place of BEGINNING;

Said partial boundary containing 451,897 square feet, or 10.374 acres.

The foregoing legal description describes the same property as shown in the vesting deed, recorded in deed Liber 543/687.

Parcel II

All that certain plot, piece or parcel of land with the buildings thereon erected, situate, lying and being in the Town of Clarkstown, County of Rockland and State of New York and more particularly bounded and described as follows:

BEGINNING at a point on the easterly line of lands belonging now or formerly to Newton Associates as described in Liber 543 Page 687, said point also marking the northwesterly property corner of lands belonging now or formerly to Derindamian Ramnath as described in Liber 585 Page 1148 and the southwestery corner of the herein described parcel;

Thence RUNNING along the northerly property line of said Ramnath South 71.43° 25' East 83.67 feet to a point marking the northwesterly corner of said Ramnath, the northwesterly property corner of lands belonging now or formerly to Bonomo & Lillian Yarnalzone as described in Liber 585 Page 1148 and the southwestery corner of lands belonging now or formerly to Adina H. So as described in Liber 079 Page 586, and also marking the southeasterly corner of the herein described parcel;

Thence RUNNING along the westerly property line of said so the following three courses and distances: North 16.41° 45' East 65.02 feet to a point;

Thence South 71.43° 25' East 5.00 feet to a point;

Thence North 16.47° 45' East 75.02 feet to a point on the southerly property line of lands belonging now or formerly to Rodney Locke as described in Liber 603 Page 179;

Thence RUNNING along the southerly property line said Locke North 71.43° 25' West 6.11 feet to a point marking the southwestery property corner of said Locke;

Thence RUNNING along the westerly property line of said Locke North 16.47° 15' East 85.02 feet to a point on the southerly property line of said Newton Associates, said point also marking the northwesterly corner of the herein described parcel;

Thence RUNNING along the southerly property line of said Newtown Associates North 71.43° 25' West 72.70 feet to a point marking the northwesterly corner of the herein described parcel;

Thence RUNNING along the easterly property line of said Newton Associates South 19.16° 35' West 225.00 feet to the point or place of BEGINNING;

Said partial boundary containing 17,988 feet, or 0.413 acres.

ENVIRONMENTAL EASEMENT

All that certain lot, piece or parcel of land, situated in the Town of Clarkstown, County of Rockland and State of New York, being an Environmental Easement on property known as 44 North Main Street, Said Easement more particularly bounded and described as follows:

Beginning at a stone monument on the easterly boundary of Main Street, County Highway Route 29, distant 393.33 feet northerly from the northerly side of Congress Road;

Thence in a easterly direction along lands now or formerly of Lecomitis Petroleum, South 74.56° 45' East a distance of 95.93 feet; Thence in a southwestery direction through lands now or formerly of Newton Associates, North 16.39° 59' East a distance of 12.00 feet; Thence in a east direction through lands now or formerly of Newton Associates, North 16.39° 59' East a distance of 12.00 feet; Thence in a northwesterly direction through lands now or formerly of Ramnath, North 71.43° 25' West a distance of 53.67 feet, to the northwest corner of lands now or formerly of Ramnath; Thence continuing along lands now or formerly of Ramnath, in a southerly direction, South 19.16° 35' West a distance of 100.31 feet point on the easterly side of West Evergreen Road and lands now or formerly of Newton Associates, LLC; Thence continuing westerly through lands now or formerly of Newton Associates, LLC, North 73.56° 21' West a distance of 252.60 to the easterly side of Main Street; Thence generally in a northerly direction along the easterly line of Main Street, North 15.58° 53' East a distance of 30.13 feet, South 19.16° 35' East a distance of 538 feet; North 15.58° 52' East a distance of 72.49 feet; North 15.03° 54' East a distance of 34.28 feet; North 15.03° 54' West a distance of 5.19 feet and North 15.03° 52' East a distance of 9.60 feet to the point or place of beginning containing 1.1387 Acres, more or less.

Sound View

ENGINEERS & LAND SURVEYORS, LLC

239 Glenville Road, Suite 300
Greenwich, CT 06831

(203) 532-1300 PHONE info@soundviewengineers.com
(203) 532-1301 FAX www.soundviewengineers.com

CONSULTING

DESIGN

STRUCTURAL

SITE DEVELOPMENT

LAND SURVEYING

PREPARED FOR:

NEWTON ASSOCIATES, LLC

PROPERTY LOCATION:

NEW CITY PLAZA
44 NORTH MAIN STREET
TOWN OF CLARKSTOWN
ROCKLAND COUNTY, NEW YORK

PARCEL ID:
TAX MAP 43.15 BLOCK 1 LOT 22

DRAWING TITLE:

ENVIRONMENTAL EASEMENT

SHEET 2 OF 2

DWG. NO. 1241-S-E-0
SCALE: 1" = 20'
DATE: AUGUST 30, 2015

STATE OF NEW YORK
COUNTY OF ROCKLAND
CLERK

THIS DEED IS FILED
WITH RECORDS SECTION

E-1

APPENDIX B

EXCAVATION WORK PLAN

B-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the Site owner or their representative will notify the NYSDEC. Currently, this notification will be made to:

Notifications*

Name	Contact Information	Required Notification**
Emily Barry NYSDEC Project Manager	845-633-5457 Emily.barry@dec.nyc.gov	All Notifications
Kiera Thompson, P.G. NYSDEC Section Chief	518-402-9629 Kerry.maloney@dec.ny.gov	All Notifications
David Pollock, P.E. Region 3 EQ Supervisor/RHWRE	845-256-3138 David.pollock@dec.ny.gov	All Notifications
Kelly Lewandowski, P.E. NYSDEC Site Control	518-402-9569 Kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Renata Ockerby NYSDOH Project Manager	518-402-7867 Renata.ockerby@health.ny.gov	Notifications 4, 5, and 6

* Note: Notifications are subject to change and will be updated as necessary.

**Note: Numbers in this column reference the numbered bullets in the notification list in this section.

This notification will include:

1. A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
2. A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
3. A schedule for the work, detailing the start and completion of all intrusive work;
4. A summary of the applicable components of this Excavation Work Plan (EWP);
5. A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
6. A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix D of the SMP;

7. Identification of disposal facilities for potential waste streams; and
8. Identification of sources of any anticipated backfill, along with all required chemical testing results.

B-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soil will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

B-3 STOCKPILE METHODS

Soil stockpiles generated outside of the Site building will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

B-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under the SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site if deemed appropriate by NYSDEC. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials

derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

B-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Trucks will enter and exit the site using appropriate routes that take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; (f) overall safety in transport; and (g) community input. Trucks will be prohibited from stopping and idling in the neighborhood east-adjacent to the project site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

B-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, construction and demolition (C&D) debris recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

B-7 MATERIALS REUSE ON-SITE

Contaminated soil, or any material in direct contact with the contaminated soil, may not be separated for reuse on-Site and will be disposed of as described in Section B-6. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site will not be reused on-Site. Any demolition material proposed for

reuse on-Site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-Site will not be performed without prior NYSDEC approval.

Soil that does not exhibit evidence of contamination during field screening and is free of debris will be stockpiled and tested at a frequency of one sample per 500 cubic yards and characterized for reuse below the Site cap. Chemical criteria for on-site reuse of material will meet the lower of the NYSDEC Part 375 protection of groundwater or the protection of public health for commercial use SCOs and can only be used as backfill beneath the site cover system for the approved use of the Site consistent with the Environmental Easement. The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Soil from representative samples that meet the SSSCOs can be reused on-Site and below the Site cap as backfill. Soil designated for reuse as part of the Site cap will be tested in accordance with the sampling protocol identified in Table 1 in Section B-10. All sampling of imported backfill will be conducted in accordance with the QAPP included in Appendix F.

B-8 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported, and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

B-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the SMP and the COC. An appropriate demarcation layer will be replaced to provide a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in the Site Management Plan. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the 'Remaining Contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

B-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the qualified environmental professional and will be in compliance with provisions in the SMP prior to receipt at the Site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d) and sampled at a frequency indicated by Table 1 in this Section.

Soil will be considered appropriate for use as on-site imported backfill below the site cap if contaminant concentrations are below the lesser of the 6 NYCRR Part 375 Restricted Residential and Groundwater Protection SCOs. Soil being used as part of the site cap will meet the 6 NYCRR Part 375 Unrestricted Use and Groundwater Protection SCOs. Soil that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Native material from a New York State Department of Transportation (NYSDOT) designated virgin quarry source will not be sampled prior to use as backfill on the Site. Non-DOT designated virgin quarry sources, or non-virgin imported material that does not have an approved NYSDEC Beneficial Use Determination will be tested at the originating facility in accordance with Section 5.4(e) 10 of NYSDEC DER 10, and at a frequency indicated by the following table:

Table 1: Soil Sampling Requirements for Import/Export

Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
	VOCs (EPA Method 8260)	SVOCs (EPA Method 8270), Inorganics (EPA Method 600/7000series & PCBs/Pesticides (EPA Methods 8082/8081)	
Soil Quantity (cubic Yards)	Discrete Samples	Composite Samples	Composite Sample Protocol
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with NYSDEC		

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

B-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

B-12 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment, and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

B-13 COMMUNITY AIR MONITORING PLAN

Work zone monitoring will be performed for the health and safety of workers during interior intrusive work (excavation, vapor barrier installation, groundwater treatment, and SSDS installation) activities in accordance with action levels and guidance outlined in the Site specific HASP. During intrusive activities, all windows and doors at street level will remain closed to prevent exposure to the public and the existing ventilation system and any additional ventilation fans will vent to the roof.

Community air monitoring will be performed at the perimeter of the Site continuously during intrusive Site activities including the loading or staging of excavated soil prior to transportation and off-site disposal. In addition, community air monitoring will be

performed periodically (at a minimum once per hour) on a roving basis with a concentration on any active exterior work area(s).

VOC and particulate monitoring equipment will consist of a photoionization detector (PID) capable of detecting the VOCs found in the excavated soil and real-time aerosol or particulate monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM₁₀). VOC monitoring equipment will be calibrated, and the particulate monitoring equipment zeroed, on a daily basis and documented in a dedicated field log book. Both VOC and particulate monitoring equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the prescribed action levels.

If VOC monitoring results in the ambient air concentration of total organic vapors in excess of 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases below 5 ppm over background, work activities can resume with measures taken to reduce vapors and continue monitoring. If total organic vapor levels persist at levels in excess of 5 ppm over background, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. If the organic vapor level is repeatedly over 25 ppm above background, activities will be shut down and the engineering controls and the Site work plan re-evaluated.

If particulate monitoring results in a 15-minute average concentration measurement that is between 100 µg/m³ and 150 µg/m³ above the background level, additional dust suppression techniques will be implemented to reduce the generation of fugitive dust and corrective action taken to protect Site personnel and reduce the potential for contaminant migration. Should dust suppression measures being utilized not lower particulates to an acceptable level (e.g., below 150 µg/m³ above the background level, and no visible dust from the work area), work will be suspended until appropriate corrective measures are implemented to remedy the situation.

Details regarding work zone and community air monitoring are outlined in the HASP and CAMP attached as Appendix D of the SMP. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

B-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include (a) through (f), as outlined below. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's QEP, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out

of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

B-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

9. Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
10. Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
11. Gravel will be used on roadways to provide a clean and dust-free road surface.
12. On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

B-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX C
SSDS MANUFACTURING SPECIFICATIONS



RadonAway Ward Hill, MA IN014 Rev E

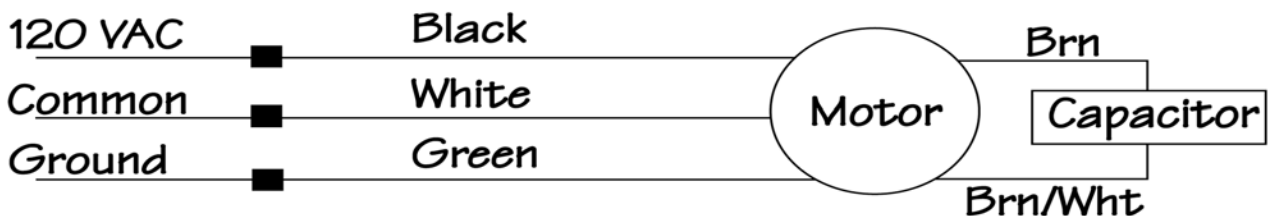
XP/GP/XR Series Fan Installation Instructions

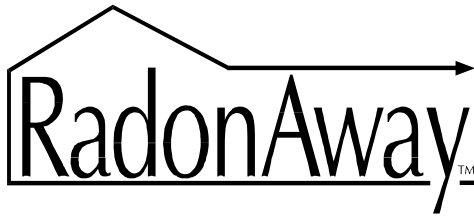
Please Read And Save These Instructions.

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

- 1. WARNING!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustibles or flammable materials.
- 2. WARNING!** Do not use fan to pump explosive or corrosive gases.
- 3. WARNING!** Check voltage at the fan to insure it corresponds with nameplate.
- 4. WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.
- 5. NOTICE!** There are no user serviceable parts located inside the fan unit.
Do NOT attempt to open. Return unit to the factory for service.
- 6.** All wiring must be in accordance with local and national electrical codes.

DynaVac GP/XP/XR/RP Series Fan Wiring Diagram





INSTALLATION INSTRUCTION IN014 Rev E

DynaVac - XP/XR Series

XP101 p/n 23008-1,-2
XP151 p/n 23010-1,-2
XP201 p/n 23011-1,-2
XR161 p/n 23018-1,-2
XR261 p/n 23019-1,-2

DynaVac - GP Series

GP201 p/n 23007-1
GP301 p/n 23006-1,-2
GP401 p/n 23009-1
GP501 p/n 23005-1,-2

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The DynaVac GP/XP/XR Series Radon Fans are intended for use by trained, professional Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of a DynaVac Fan. This instruction should be considered as a supplement to EPA standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2 ENVIRONMENTALS

The GP/XP/XR Series Fans are designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the fan should be stored in an area where the temperature is never less than 32 degrees F. or more than 100 degrees F.

1.3 ACOUSTICS

The GP/XP/XR Series Fan, when installed properly, operates with little or no noticeable noise to the building occupants. The velocity of the outgoing air should be considered in the overall system design. In some cases the "rushing" sound of the outlet air may be disturbing. In these instances, the use of a RadonAway Exhaust Muffler is recommended.

1.4 GROUND WATER

In the event that a temporary high water table results in water at or above slab level, water may be drawn into the riser pipes thus blocking air flow to the GP/XP/XR Series Fan. The lack of cooling air may result in the fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, it is recommended that the fan be turned off until the water recedes allowing for return to normal operation.

1.5 SLAB COVERAGE

The GP/XP/XR Series Fan can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the GP/XP/XR Series Fan best suited for the sub-slab material can improve the slab coverage. The GP & XP series have a wide range of models to choose from to cover a wide range of subslab material. The higher static suction fans are generally used for tighter subslab materials. The XR Series is specifically designed for high flow applications such as stone/gravel and drain tile. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size) be created below the slab at each suction hole.

1.6 CONDENSATION & DRAINAGE

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation. The GP/XP/XR Series Fan **MUST** be mounted vertically plumb and level, with the outlet pointing up for proper drainage through the fan. Avoid mounting the fan in any orientation that will allow water to accumulate inside the fan housing. The GP/XP/XR Series Fans are **NOT** suitable for underground burial.

For GP/XP/XR Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Dia.	Minimum Rise per Foot of Run*		
	@25 CFM	@50 CFM	@100 CFM
4"	1/8"	1/4"	3/8"
3"	1/4"	3/8"	1 1/2"



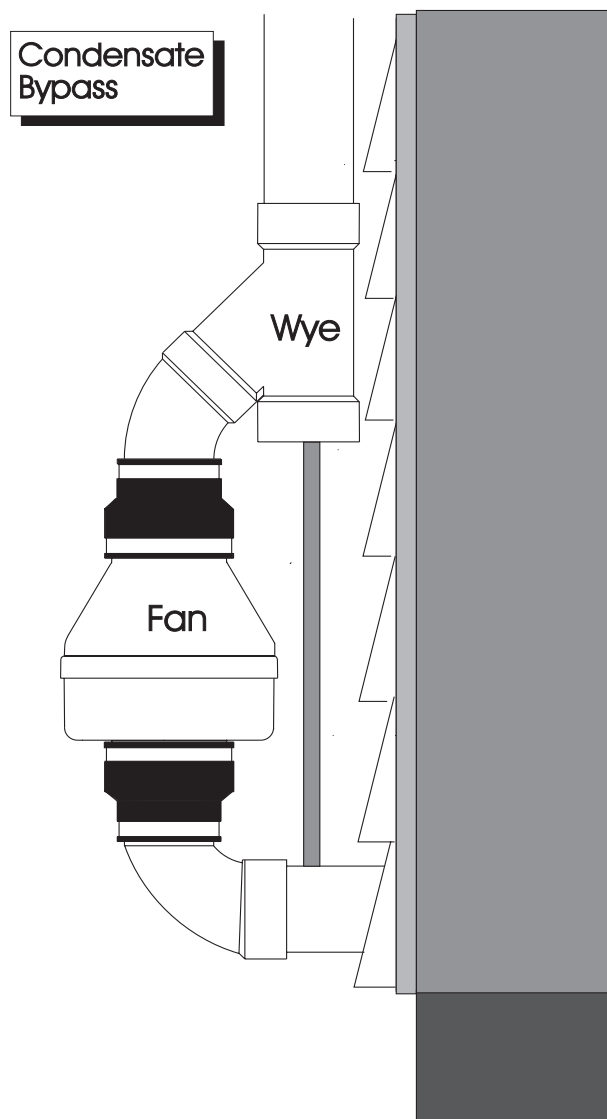
*Typical GP/XP/XR Series Fan operational flow rate is 25 - 90 CFM.
(For more precision, determine flow rate by using the chart in the addendum.)

Under some circumstances in an outdoor installation a condensate bypass should be installed in the outlet ducting as shown. This may be particularly true in cold climate installations which require long lengths of outlet ducting or where the outlet ducting is likely to produce large amounts of condensation because of high soil moisture or outlet duct material. Schedule 20 piping and other thin-walled plastic ducting and Aluminum downspout will normally produce much more condensation than Schedule 40 piping.

The bypass is constructed with a 45 degree Wye fitting at the bottom of the outlet stack. The bottom of the Wye is capped and fitted with a tube that connects to the inlet piping or other drain. The condensation produced in the outlet stack is collected in the Wye fitting and drained through the bypass tube. The bypass tubing may be insulated to prevent freezing.

1.7 "SYSTEM ON" INDICATOR

A properly designed system should incorporate a "System On" Indicator for affirmation of system operation. A manometer, such as a U-Tube, or a vacuum alarm is recommended for this purpose.



1.8 ELECTRICAL WIRING

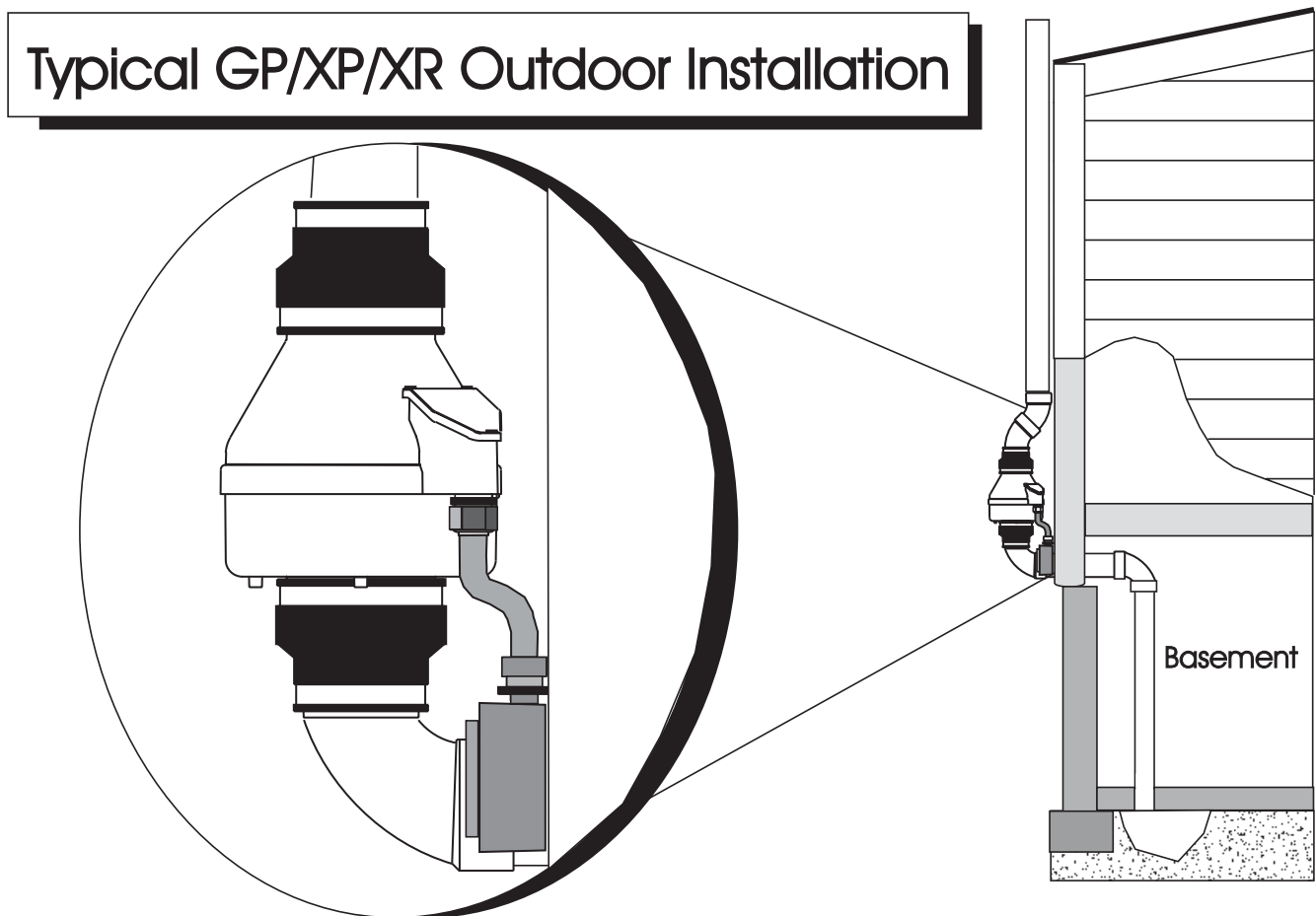
The GP/XP/XR Series Fans operate on standard 120V 60 Hz. AC. All wiring must be performed in accordance with the National Electrical Code and state and local building codes. All electrical work should be performed by a qualified electrician. Outdoor installations require the use of a U.L. listed watertight conduit.

1.9 SPEED CONTROLS

The GP/XP/XR Series Fans are rated for use with electronic speed controls ,however, they are generally not recommended.

2.0 INSTALLATION

The GP/XP/XR Series Fan can be mounted indoors or outdoors. (It is suggested that EPA recommendations be followed in choosing the fan location.) The GP/XP/XR Series Fan may be mounted directly on the system piping or fastened to a supporting structure by means of optional mounting bracket.



2.1 MOUNTING

Mount the GP/XP/XR Series Fan vertically with outlet up. Insure the unit is plumb and level. When mounting directly on the system piping assure that the fan does not contact any building surface to avoid vibration noise.

2.2 MOUNTING BRACKET (optional)

The GP/XP/XR Series fan may be optionally secured with the integral mounting bracket on the GP Series fan or with RadonAway P/N 25007-2 mounting bracket for an XP/XR Series fan. Foam or rubber grommets may also be used between the bracket and mounting surface for vibration isolation.

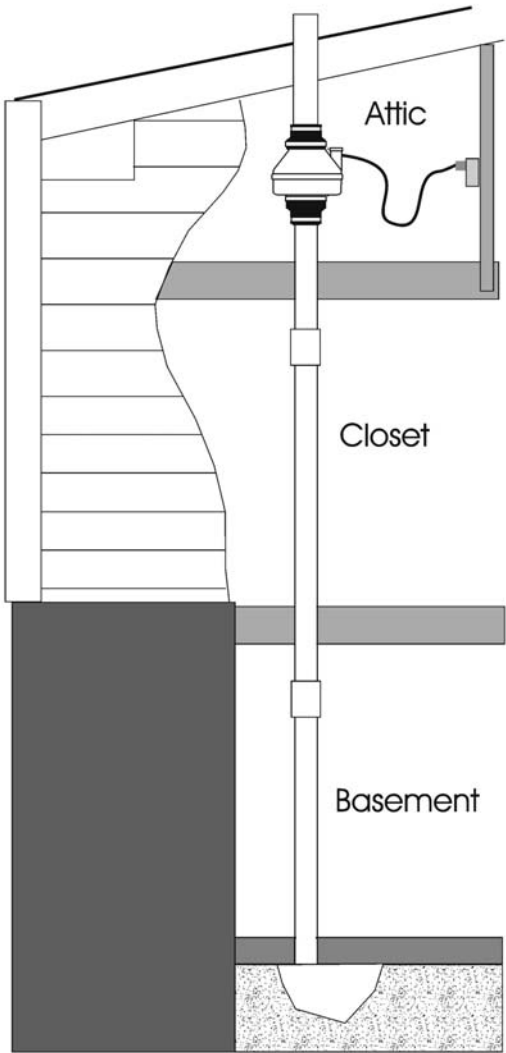
2.3 SYSTEM PIPING

Complete piping run, using flexible couplings as means of disconnect for servicing the unit and vibration isolation.

2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections:

Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common



2.5 VENT MUFLER (optional)

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed at the end of the vent pipe.

2.6 OPERATION CHECKS

- _____ **Verify** all connections are tight and **leak-free**.
- _____ **Insure** the GP/XP/XR Series Fan and all ducting is secure and vibration-free.
- _____ **Verify** system vacuum pressure with manometer. **Insure** vacuum pressure is **less than** maximum recommended operating pressure
(Based on sea-level operation, at higher altitudes reduce by about 4% per 1000 Feet.)
(Further reduce Maximum Operating Pressure by 10% for High Temperature environments)
See Product Specifications. If this is exceeded, increase the number of suction points.
- _____ **Verify Radon levels by testing to EPA protocol.**

XP/XR SERIES PRODUCT SPECIFICATIONS

The following chart shows fan performance for the XP & XR Series Fan:

	Typical CFM Vs Static Suction "WC								
	0"	.25"	.5"	.75"	1.0"	1.25"	1.5"	1.75"	2.0"
XP101	125	118	90	56	5	-	-	-	-
XP151	180	162	140	117	78	46	10	-	-
XP201	150	130	110	93	74	57	38	20	-
XR161	215	175	145	105	75	45	15	-	-
XR261	250	215	185	150	115	80	50	20	-

Maximum Recommended Operating Pressure*	
XP101	0.9" W.C. (Sea Level Operation)**
XP151	1.3" W.C. (Sea Level Operation)**
XP201	1.7" W.C. (Sea Level Operation)**
XR161	1.3" W.C. (Sea Level Operation)**
XR261	1.6" W.C. (Sea Level Operation)**

**Reduce by 10% for High Temperature Operation*

***Reduce by 4% per 1000 feet of altitude*

Power Consumption @ 120 VAC	
XP101	40 - 49 watts
XP151	45 - 60 watts
XP201	45 - 66 watts
XR161	48 - 75 watts
XR261	65 - 105 watts

XP Series Inlet/Outlet: 4.5" OD (4.0" PVC Sched 40 size compatible)

XR Series Inlet/Outlet: 5.875" OD

Mounting: Mount on the duct pipe or with optional mounting bracket.

Recommended ducting: 3" or 4" Schedule 20/40 PVC Pipe

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Size: 9.5H" x 8.5" Dia.

Weight: 6 lbs. (XR261 - 7 lbs)

Continuous Duty

Thermally protected

Class B Insulation

3000 RPM

Residential Use Only

Rated for Indoor or Outdoor use

LISTED
Electric Fan



Tested to
UL
Std. 507

77728

GP SERIES PRODUCT SPECIFICATIONS

The following chart shows fan performance for the GPx01 Series Fan:

	1.0"	Typical CFM Vs Static Suction "WC					
		1.5"	2.0"	2.5"	3.0"	3.5"	4.0"
GP501	95	87	80	70	57	30	5
GP401	93	82	60	38	12	-	-
GP301	92	77	45	10	-	-	-
GP201	82	58	5	-	-	-	-

Maximum Recommended Operating Pressure*			
GP501	3.8" W.C.	(Sea Level Operation)**	
GP401	3.0" W.C.	(Sea Level Operation)**	
GP301	2.4" W.C.	(Sea Level Operation)**	
GP201	1.8" W.C.	(Sea Level Operation)**	

**Reduce by 10% for High Temperature Operation*

***Reduce by 4% per 1000 feet of altitude*

Power Consumption @ 120 VAC	
GP501	70 - 140 watts
GP401	60 - 110 watts
GP301	55 - 90 watts
GP201	40 - 60 watts

Inlet/Outlet: 3.5" OD (3.0" PVC Sched 40 size compatible)

Mounting: Fan may be mounted on the duct pipe or with integral flanges.

Weight: 12 lbs.

Size: 13H" x 12.5" x 12.5"

Recommended ducting: 3" or 4" Schedule 20/40 PVC Pipe

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Continuous Duty

Class B Insulation

3000 RPM

Thermally protected

Rated for Indoor or Outdoor Use

GP301C / GP501C Rated for Commercial Use

LISTED
Electric Fan



77728

Tested to
UL
Std. 507

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the GPx01/XP/XR Series Fan for shipping damage within 15 days of receipt. Notify RadonAway of any damages immediately. Radonaway is not responsible for damages incurred during shipping. However, for your benefit, Radonaway does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open.** Return unit to factory for service.

Install the GPx01/XP/XR Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

WARRANTY

Subject to any applicable consumer protection legislation, RadonAway warrants that the GPX01/XP/XR/RP Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 90 days from the date of purchase (the "Warranty Term").

RadonAway will replace any Fan which fails due to defects in materials or workmanship. The Fan must be returned (at Owner's cost) to the RadonAway factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway.

5 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway will extend the Warranty Term of the fan to 5 years from date of manufacture if the Fan is installed in a professionally designed and professionally installed radon system or installed as a replacement fan in a professionally designed and professionally installed radon system. Proof of purchase and/or proof of professional installation may be required for service under this warranty. Outside the Continental United States and Canada the extended Warranty Term is limited to one (1) year from the date of manufacture.

RadonAway is not responsible for installation, removal or delivery costs associated with this Warranty.

EXCEPT AS STATED ABOVE, THE GPx01/XP/XR/RP SERIES FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping cost to and from factory.

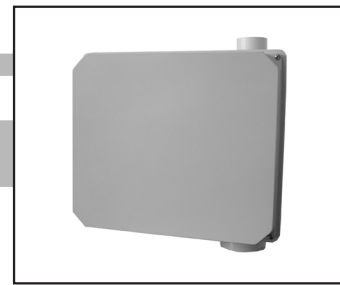
RadonAway
3 Saber Way
Ward Hill, MA 01835
TEL. (978) 521-3703
FAX (978) 521-3964

Record the following information for your records:

Serial No. _____
Purchase Date _____



The World's Leading
Radon Fan Manufacturer



HS Series

Installation & Operating Instructions

RadonAway

3 Saber Way | Ward Hill, MA 01835
www.radonaway.com



RadonAway Ward Hill, MA.

HS Series Fan Installation & Operating Instructions

Please Read and Save These Instructions.

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustible or flammable materials.
2. **WARNING!** Do not use fan to pump explosive or corrosive gases.
See Vapor Intrusion Application Note #AN001 for important information on VI applications. RadonAway.com/vapor-intrusion
3. **WARNING!** Check voltage at the fan to insure it corresponds with nameplate.
4. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.
5. **NOTICE!** There are no user serviceable parts located inside the fan unit.
Do NOT attempt to open. Return unit to the factory for service.
6. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA) "National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician.
7. **WARNING!** In the event that the fan is immersed in water, return unit to factory for service before operating.
8. **WARNING!** Do not twist or torque fan inlet or outlet piping as Leakage may result.
9. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.
10. **WARNING! TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:**
 - a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
 - b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.



INSTALLATION & OPERATING INSTRUCTIONS (Rev J)

for High Suction Series

HS2000 p/n 23004-1

HS3000 p/n 23004-2

HS5000 p/n 23004-3

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The HS Series Fan is intended for use by trained, certified/licensed, professional Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of the HS Series Fan. This instruction should be considered as a supplement to EPA/Radon Industry standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2 ENVIRONMENTALS

The HS Series Fan is designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the HS Series Fan should be stored in an area where the temperature is never less than 32 degrees F. or more than 100 degrees F. The HS Series Fan is thermally protected such that it will shut off when the internal temperature is above 104 degrees F. Thus if the HS Series Fan is idle in an area where the ambient temperature exceeds this shut off, it will not restart until the internal temperature falls below 104 degrees F.

1.3 ACOUSTICS

The HS Series Fan, when installed properly, operates with little or no noticeable noise to the building occupants. There are, however, some considerations to be taken into account in the system design and installation. When installing the HS Series Fan above sleeping areas, select a location for mounting which is as far away as possible from those areas. Avoid mounting near doors, fold-down stairs or other uninsulated structures which may transmit sound. Insure a solid mounting for the HS Series Fan to avoid structure-borne vibration or noise.

The velocity of the outgoing air must also be considered in the overall system design. With small diameter piping, the "rushing" sound of the outlet air can be disturbing. The system design should incorporate a means to slow and quiet the outlet air. The use of the RadonAway Exhaust Muffler, p/n 24002, is strongly recommended.

1.4 GROUND WATER

Under no circumstances should water be allowed to be drawn into the inlet of the HS Series Fan as this may result in damage to the unit. The HS Series Fan should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the HS Series Fan with water in installations with occasional high water tables.

In the event that a temporary high water table results in water at or above slab level, water will be drawn into the riser pipes thus blocking air flow to the HS Series Fan. The lack of cooling air will result in the HS Series Fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, it is recommended that the HS Series Fan be disconnected until the water recedes allowing for return to normal operation.

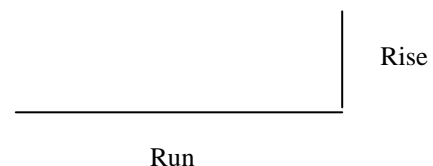
1.5 CONDENSATION & DRAINAGE

(WARNING!: Failure to provide adequate drainage for condensation can result in system failure and damage the HS Series Fan).

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation.

The use of small diameter piping in a system increases the speed at which the air moves. The speed of the air can pull water uphill and at sufficient velocity it can actually move water vertically up the side walls of the pipe. This has the potential of creating a problem in the negative pressure (inlet) side piping. For HS Series Fan inlet piping, the following table provides the minimum recommended pipe diameters as well as minimum pitch under several system conditions. Use this chart to size piping for a system.

Pipe Diam.	Minimum Rise per Foot of Run*		
	@ 25 CFM	@ 50 CFM	@ 100 CFM
4"	1/32 "	3/32 "	3/8 "
3"	1/8 "	3/8 "	1 1/2 "



*Typical operational flow rates:

HS3000, or HS5000	20 - 40 CFM
HS2000	50 - 90 CFM

All exhaust piping should be 2" PVC.

1.6 SYSTEM MONITOR AND LABEL

A properly designed system should incorporate a "System On" Indicator for affirmation of system operation. A Magnehelic pressure gauge is recommended for this purpose. The indicator should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the gauge with water in installations with occasional high water tables. A System Label (P/N 15022) with instructions for contacting the installing contractor for service and also identifying the necessity for regular radon tests to be conducted by the building occupants, must be conspicuously placed where the occupants frequent and can see the label.

1.7 SLAB COVERAGE

The HS Series Fan can provide coverage of well over 1000 sq. ft. per slab penetration. This will, of course, depend on the sub-slab aggregate in any particular installation and the diagnostic results. In general, sand and gravel are much looser aggregates than dirt and clay. Additional suction points can be added as required. It is recommended that a small pit (2 to 10 gallons in size) be created below the slab at each suction hole.

1.8 ELECTRICAL WIRING

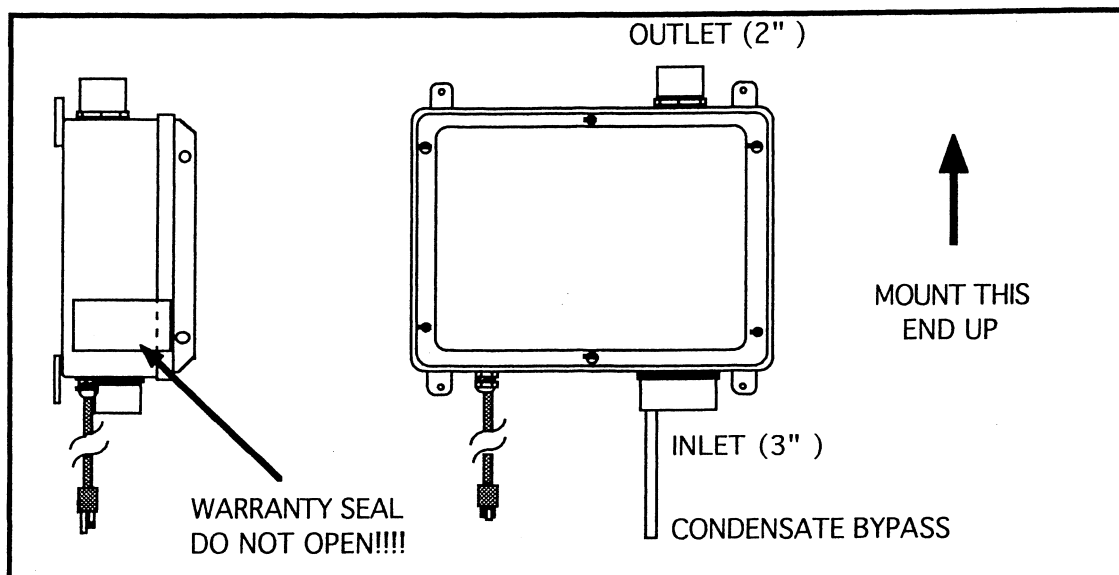
The HS Series Fan plugs into a standard 120V outlet. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA) "National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a U.L. listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly caulked to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.8a ELECTRICAL BOX (optional)

The optional Electrical Box (p/n 20003) provides a weather tight box with switch for outdoor hardwire connection. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA) "National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a U.L. listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly caulked to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.9 SPEED CONTROLS

Electronic speed controls can **NOT** be used on HS Series units.



2.0 INSTALLATION

2.1 MOUNTING

Mount the HS Series Fan to the wall studs, or similar structure, in the selected location with (4) 1/4" x 1 1/2" lag screws (not provided). Insure the HS Series Fan is both plumb and level.

2.2 DUCTING CONNECTIONS

Make final ducting connection to HS Series Fan with flexible couplings. Insure all connections are tight. Do not twist or torque inlet and outlet piping on HS Series Fan or leaks may result.

2.3 VENT MUFFLER INSTALLATION

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed above the roofline at the end of the vent pipe.

2.5 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

___ Make final operation checks by verifying all connections are tight and leak-free.

___ Insure the HS Series Fan and all ducting is secure and vibration-free.

___ Verify system vacuum pressure with Magnehelic. Insure vacuum pressure is within normal operating range and less than the maximum recommended as shown below:

HS2000	14" WC
HS3000	21" WC
HS5000	40" WC

(Above are based on sea-level operation, at higher altitudes reduce above by about 4% per 1000 Feet.)
If these are exceeded, increase number of suction points.

___ Verify Radon levels by testing to EPA protocol.

PRODUCT SPECIFICATIONS

Model	Maximum Static Suction	Typical CFM vs Static Suction WC (Recommended Operating Range)						Power* Watts @ 115 VAC
		0"	10"	15"	20"	25"	35"	
HS2000	18"	110	72	40	-	-	-	150-270
HS3000	27"	40	33	30	23	18	-	105-195
HS5000	50"	53	47	42	38	34	24	180-320

*Power consumption varies with actual load conditions

Inlet: 3.0" PVC

Outlet: 2.0" PVC

Mounting: Brackets for vertical mount

Weight: Approximately 18 lbs.

Size: Approximately 15"W x 13"H x 8"D

Minimum recommended inlet ducting (greater diameter may always be used):

HS3000, HS5000 --- 2.0" PVC Pipe

HS2000 --- Main feeder line of 3.0" or greater PVC Pipe

Branch lines (if 3 or more) may be 2.0" PVC Pipe

Outlet ducting: 2.0" PVC

Storage temperature range: 32 - 100 degrees F.

Thermally protected

Locked rotor protection

Internal Condensate Bypass

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the HS Series Fan for shipping damage within 15 days of receipt. Notify **RadonAway** of any damages **immediately**. RadonAway is not responsible for damages incurred during shipping. However, for your benefit, RadonAway does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open.** Return unit to factory for service.

Install the HS Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

WARRANTY

Subject to any applicable consumer protection legislation, RadonAway warrants that the HS Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of one (1) year from the date of manufacture (the "Warranty Term"). Outside the Continental United States and Canada the Warranty Term is one (1) year from the date of manufacture.

RadonAway will repair any fan which fails due to defects in materials or workmanship. The Fan must be returned (at owner's cost) to the RadonAway factory. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not include damage in shipment unless the damage is due to the negligence of RadonAway.

RadonAway is not responsible for installation, removal or delivery costs associated with this Warranty.

EXCEPT AS STATED ABOVE, THE HS SERIES FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping cost to and from factory.

RadonAway
3 Saber Way
Ward Hill, MA 01835
TEL. (978) 521-3703
FAX (978) 521-3964

Record the following information for your records:

Serial No. _____
Purchase Date _____

Installation and Operation Manual
Manuel d'installation et d'opération
Manual de Instalación y Mantenimiento

Item #: 401444
Rev Date: 070113

FR Series

Inline Centrifugal Fans

Ventilateurs Centrifuge en ligne

Ventiladores para Conductos Circulares



United States

10048 Industrial Blvd., Lenexa, KS, 66215
Tel.: 800.747.1762 • Fax: 800.487.9915

Canada

50 Kanalfakt Way, Bouctouche, NB, E4S 3M5
Tel.: 800.565.3548 • Fax: 877.747.8116



WARNINGS

DO NOT CONNECT POWER SUPPLY until fan is completely installed. Make sure electrical service to the fan is in the locked "OFF" position.

1. All fans are suitable for use with solid-state speed control.
2. This unit has rotating parts and safety precausting should be exercised during installation, operation and maintenance.
3. CAUTION: For General Ventilation Use Only. Do Not Use To Exhaust Hazardous Or Explosive Materials And Vapors
4. WARNING! TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS - OBSERVE THE FOLLOWING:
 - a. Use this unit in the manner intended by the manufacturer. If you have any questions, contact your manufacturer's representative or contact us directly.
 - b. CAUTION: Before installation, servicing or cleaning unit, switch power off at service panel and lock the service disconnection means to prevent power from being switched on accidentally.
 - c. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
 - d. Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Association (NFA), and the American Society for Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), and the local code authorities.
 - e. When cutting or drilling into wall and ceiling, do not damage electrical wiring and other hidden utilities.
 - f. Ducted fans must always be vented to the outdoors.
 - g. If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Circuit Interrupter) - protected branch circuit.
 - h. NEVER place a switch where it can be reached from a tub or shower.
5. WARNING! Check voltage at the fan to see if it corresponds to the motor name plate.

GUARDS MUST BE INSTALLED WHEN FANS IS WITHIN REACH OF PERSONNEL OR WITHIN SEVEN (7) FEET OF WORKING LEVEL OR WHEN DEEMED ADVISABLE FOR SAFETY.

ADVERTISSEMENTS

NE PAS BRANCHER l'électricité jusqu'à ce que le ventilateur soit complètement installé. Veillez à ce que le tableau électrique du ventilateur soit verrouillé ("OFF").

1. Tous les ventilateurs sont faits pour être utilisés avec une commande de vitesse.
2. Cette unité à des pièces d'échange et que les mesures de sécurité soient respectées pendant l'installation, le fonctionnement et l'entretien.
3. ATTENTION: Pour une ventilation générale seulement. À ne pas utiliser pour évacuer des échappements dangereux ou des matériaux et des gaz explosifs.
4. AVERTISSEMENTS POUR RÉDUIRE LES RISQUES D'INCENDIE, DE DÉCHARGE ÉLECTRIQUE OU RISQUE DE BLESSURES. SUIVEZ LES CONSEILS SUIVANTS:
 - a. Cet appareil ne doit pas être utilisé pour une autre fonction que celle prévue par son fabricant. Si vous avez des questions, contactez les représentants de vos fabricants ou contactez-nous directement.
 - b. ATTENTION: Avant l'installation, le service ou le nettoyage de l'appareil, fermer l'électricité et fermer à clé le compteur électrique afin d'éviter que l'électricité ne soit retranchée accidentellement. Si le compteur ne peut pas être fermé à clé, attachez au compteur un dispositif de sécurité comme par exemple une étiquette.
 - c. L'installation de l'électricité doit être faite par une personne qualifiée en accord avec les codes applicables et les règles pour la construction anti-feu.
 - d. La circulation de l'air est nécessaire pour une bonne combustion et pour l'aspiration des gaz dans la cheminée afin d'éviter des refoulements. Suivez le guide de chauffage du fabricant ainsi que les règles de sécurité comme celles qui sont éditées par l'Association Nationale des Sapeurs Pompiers (NFA) et l'Association américaine des Ingénieurs pour le chauffage et l'air conditionné (ASHRAE) ainsi que celles des autorités locales.
 - e. Lorsque vous coupez ou percez le mur et le plafond faites attention de ne pas endommager les câbles électriques des autres appareils utilitaires.
 - f. Le ventilateur caréné doit toujours être branché sur l'extérieur.
 - g. Si l'appareil doit être installé au-dessus d'une baignoire ou d'une douche, il doit être signalé comme tel pour son utilisation et l'installation d'une prise de terre est nécessaire.
 - h. NE JAMAIS placer près de la baignoire ou de la douche un interrupteur à portée de la main.
5. ATTENTION : Vérifier le voltage afin de voir s'il correspond à celui indiqué sur la plaque du moteur.

DES BARRIÈRES DOIVENT ÊTRE INSTALLÉES QUAND LE VENTILATEUR EST DANS LE PÉRIMÈTRE D'ATTEINTE PAR LE PERSONNEL OU À MOINS DE 2 MÈTRES DU NIVEAU DE TRAVAIL OU SELON LES RECOMMANDATIONS DE SÉCURITÉ.

ADVERTENCIAS

NO CONECTE LA ALIMENTACION hasta tanto el ventilador quede completamente instalado. Cerciñese de que el servicio eléctrico al ventilador quede asegurado en la posición "OFF" (desactivado).

1. Todos los ventiladores vienen preparados para controlarse mediante controles de estado sólido.
2. Esta unidad tiene piezas rotativas, y se deben tomar precauciones de seguridad durante la instalación, operación y mantenimiento.
3. PRECAUCION: Sólo para Ventilación General. No Usar Para Desalojar Materiales y Vapores Peligrosos o Explosivos.
2. ADVERTENCIA: PARA REDUCIR EL RIESGO DE INCENDIO, CONMOCION ELECTRICA O LESIONES A PERSONAS, OBSERVE LO SIGUIENTE:
 - a. Sólo utilice esta unidad de la manera dispuesta por el fabricante. Si tiene cualquier pregunta, diríjase al representante del fabricante, o bien a nosotros directamente.
 - b. PRECAUCION: Antes de la instalación, mantenimiento o limpieza de la unidad, desconecte la alimentación en el tablero de servicio y cierre con llave el interruptor del circuito para impedir la reactivación accidental. De no poder cerrarse el interruptor con llave, aplíquelo al tablero una etiqueta o dispositivo de advertencia bien visible.
 - c. Los trabajos de instalación y cableado eléctrico tienen que ser realizados por personal calificado conforme todos los códigos y normas del caso, incluso el código de incendio en la construcción.
 - d. La debida combustión y extracción de gases a través de la chimenea de equipos quemadores de combustibles, requiere de una cantidad adecuada de aire que impida el contratiempo. Siga las pautas y normas de seguridad del fabricante, tales como publica la National Fire Association (NFA) (Asociación Nacional de Incendios) y la American Society for Heating Refrigeration and Air-conditioning Engineers (ASHRAE), así como las de las autoridades locales del código.
 - e. Al cortar o perforar paredes y cielos rasos, tenga cuidado de no dañar el cableado eléctrico u otros servicios públicos ocultos.
 - f. Los ventiladores montados en conductos siempre deben contar con respiraderos al exterior.
 - g. Si esta unidad ha de instalarse por encima de una bañera o ducha, tiene que venir marcada como tal par dicha aplicación y conectarse a un circuito protector interruptor de circuitos de tierra falla.
 - h. JAMAS coloque un interruptor al alcance de una bañera o ducha.
3. ¡ADVERTENCIA! Revise el voltaje entrante al ventilador para constatar que corresponda al que indica la placa de fábrica.

HAY QUE INSTALAR GUARDAS DONDE QUIERA QUE EL VENTILADOR QUEDE AL ALCANCE DEL PERSONAL, A MENOS DE SIETE (7) PIES DEL NIVEL DE OPERACION, O DONCE SE ESTIME ACONSEJABLE PARA LA SEGURIDAD.

INSTALLING MOUNTING BRACKET & FAN

- When selecting fan mounting location, the following criteria should be considered: a) mounting to minimize noise generated by fan operation; b) service accessibility

a) Mounting the fan as far as possible from the intake point will minimize fan operating noise from being transmitted back through the duct work. If the fan is to be used as a booster for moving the air between two rooms, a central point along the duct may be optimal. Insulated flexible type duct work (recommended for all bathroom exhaust applications) will result in much quieter operation. Fantech recommends minimum 8' of insulated flexible duct between any exhaust grill and fan for low noise level.

b) Fan location should allow sufficient access for service this time.



Mount Bracket (NB).



Mount Fan.

pose a problem, either wrap insulation around the fan or drill a 1/4" hole in the bottom of the housing (along with an NPT insert [by others] and drain tubing) allowing condensation to drain.

- Attach fan to the mounting bracket with the sheet metal screws provided. Wiring box should be positioned for easy access. Bracket is provided with rubber vibration isolation grommets to prevent the transmission of sound through the structure. Be careful not to overtighten. Also, care should be taken not to strip the plastic housing. Screws are self tapping and do not require pilot holes. However, pilot holes (no larger than 3/32") are recommended.



Mount Bracket (MB).



Mount Fan.

- Using the wood screws provided, attach the mounting bracket (NB or MB) to a support beam at the selected location. Fan mounting can be at any point along the duct and in any angle, however, vertical mounting is recommended to reduce condensation buildup in the fan. If a horizontal installation is necessary and condensation buildup may

- Connect duct work to inlet and outlet of fan using CB clamps or duct tape. When using insulated duct, it is recommended that the inner vinyl core be clamped or taped to the inlet and outlet and that the vapor barrier surrounding the insulation be duct taped to the fan housing.

NOTE: Steps 2 & 3 may be reversed.

INSTALLING DG SUPPLY/EXHAUST GRILL

If a Vent/Light combination kit is purchased, the VLC vent/lights are supplied with a separate installation instruction replacing steps 1 through 4.

- Select the grill mounting point within the area to be ventilated. To ease installation, locations of framing beams within the walls or joists supporting the ceiling should be considered. Collar/damper is provided with a perforated hanging strap for attachment directly to a beam or joist. Allow sufficient space between the collar/damper and the beam to attach the duct work. If the location of the grill does not allow direct attachment, a cross-member mounted to the framing should be used.



Mount Collar

- Place the mounting collar/damper in the selected location and trace a circle onto the surface. From the interior side of the room, cut through the surface. Please note: In order to assure a smoother finish when mounting through a sheetrock or tile type ceiling, it is recommended that a razor knife be used to make the cut.



Side view grill and collar.

- From within the attic or crawl space, place the mounting collar into the hole until the edge of the collar is flush with the interior wall or ceiling

surface. Attach collar to the support beam with the 2" wood screws provided. Attach duct work. Secure using CB or FC clamps and/or duct tape. When installing the damper into rigid type ducting, FC clamps or duct tape should be used.

PLEASE NOTE: When attaching flex duct to the collar/damper combination and an immediate elbow is necessary, be certain that the elbow is installed with a "soft" bend to allow damper blades to operate properly.

- Snap the grill into the mounting collar/damper. Grill should be pushed tightly into place for an airtight fit. If there is a gap between the collar and the ceiling it should be caulked to avoid air leakage. For subsequent cleaning the grill can be pulled out and cleaned.

Flexible Duct Installation Hints

Flexible insulated duct is strongly recommended where allowed by local code for bathroom exhaust applications, where ducting passes through unconditioned space or where noise is a factor. Failure to use insulation could result in excessive condensation buildup within the duct, and undesirable sound levels within the room. For the quietest possible installations, Fantech recommends a minimum of 8' of insulated flexduct between any exhaust grill and fan. When using flexible type duct work, duct should be stretched as tight and straight as possible. Failure to do so could result in dramatic loss of system performance. Flexible duct should be connected to the fan with CB type clamps or duct tape. All connections should be as airtight as possible to maximize system performance.

ELECTRICAL CONNECTION

1. Remove the screws securing the terminal box cover plate located on the side of the fan. All fan motor connections are pre-wired to an electrical terminal strip. A 3/8" romex type cable restraint connector will be needed to secure the wiring through the knockout provided on the side of the terminal box.
2. Bring incoming electrical service through the romex connector and the fan terminal knockout. Be sure to place the connector nut over the wiring coming into the terminal box. There are two open ports on the terminal strip. Using a small regular screwdriver, tighten the neutral (white) wire of the incoming supply under the open terminal strip port labeled "N". Tighten the line (black) wire of the incoming supply under the open terminal strip port labeled "L". Since the fan motor is isolated within a plastic housing, grounding is not necessary.
3. Secure the romex connector. Secure the incoming supply with the romex connector. Replace the fan terminal box cover. All fan motor and capacitor connections have been pre-wired from the factory. No additional fan wiring is necessary.



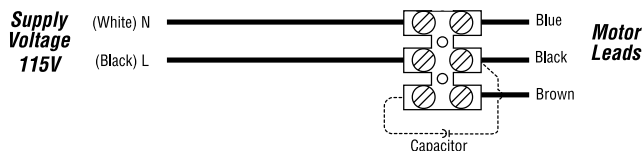
Liquid tight wiring – Top View
(For outside applications).



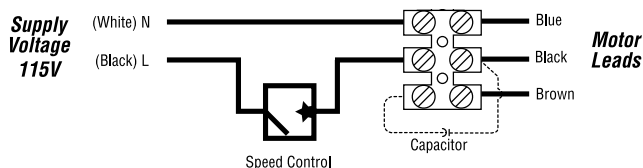
Romex wiring – Top View

WIRING DIAGRAMS

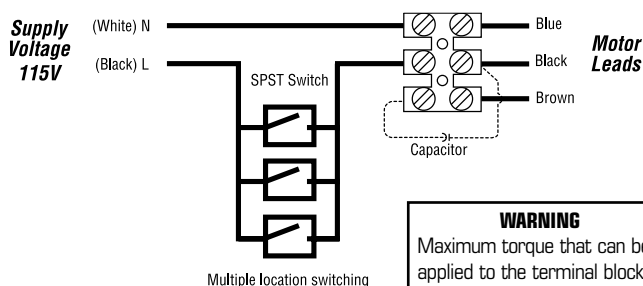
All Models Without Motor Speed Controller



With Motor Speed Controller



Multiple Location Switching Wiring Diagram



WARNING

Maximum torque that can be applied to the terminal block screws is 0.79 Nm (7 lb-in).

TROUBLESHOOTING

If fan fails to operate, please check the following:

1. Consult wiring diagrams (see below) to insure proper connection.
2. Check motor lead wiring, capacitor leads and incoming supply leads to insure definite contact.
3. If possible, use a meter to test for continuity across the fan motor leads. In order to do this, the capacitor must be disconnected (do not test the capacitor - it will not meter continuity). If motor leads show continuity, consult factory for a replacement capacitor.

MAINTENANCE INSTRUCTIONS

Since fan bearings are sealed and provided with an internal lubricating material, no addition lubrication is necessary.

INSTALLER LES ATTACHES DU SUPPORT ET DU VENTILATEUR

1. Pour choisir l'emplacement des fixations du ventilateur, les critères suivants devraient être considérés: a) fixer pour réduire au minimum le bruit produit par le fonctionnement du ventilateur; b) type d'application; et c) l'accessibilité pour le service.



Fixer le support de montage (NB)

- a) Monter le ventilateur aussi loin que possible des sources d'aération réduira au minimum le bruit de fonctionnement du ventilateur transmis par le tuyau. Si le ventilateur doit être utilisé comme régulateur pour déplacer l'air entre deux salles, un point central le long du tuyau peut être optimal. Un travail d'isolation pour les tuyaux d'aération (recommandé pour tout le système d'aération des salles de bain) permettra un fonctionnement plus silencieux. Fantech recommande le tuyau d'aération isolé de 8 pieds minimum entre n'importe quelle grille d'aération et du ventilateur pour minimiser le bruit.



Attacher le ventilateur.

- b) L'emplacement du ventilateur devrait permettre un accès suffisant pour le service.
2. Utilisez les vis en bois fournies, attachez le support (NB ou MB) à une poutre du support à l'emplacement choisi. Le support du ventilateur peut être située à un point quelconque le long du tuyau et dans n'importe quel angle, cependant, le support vertical est recommandé

pour réduire la formation de condensation dans le ventilateur. Si une installation horizontale est nécessaire, la formation de condensation peut poser un problème, enrouler alors l'isolation autour du ventilateur ou faites un trou 1/4" dans le bas de la boîte (avec une insertion de NPT [supporter par autre] et une tuyauterie de vidange) permet à la condensation de s'écouler.



Fixer le support de montage (MB).

3. Attacher le ventilateur au support avec les vis en métal fournies. La boîte de câblage devrait être placée de façon à avoir un accès facile. L'attache est équipée d'oeillets d'isolement de vibration en caoutchouc pour empêcher la transmission du bruit par la structure. Faites attention à ne pas trop serrer. En outre, prenez soin de ne pas enlever le revêtement en plastique. Les vis sont auto-collantes et n'exigent pas les trous pilotes. Cependant, les trous pilotes (pas plus grands que 3/32") sont recommandés.



Attacher le ventilateur.

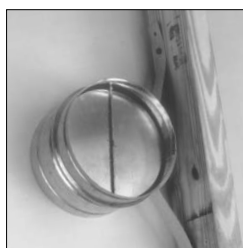
4. Connectez le tuyau à la prise et à la sortie du ventilateur à l'aide des pinces CB ou de ruban adhésif. En utilisant le tuyau isolé, il est recommandé que l'intérieur en vinyle soit maintenu ou coller avec du ruban adhésif sur la prise d'entrée et de sortie et que la barrière de vapeur entourant l'isolation soit collée au logement du ventilateur par du ruban adhésif.

NOTE: Les étapes 2 & 3 peuvent être renversées.

INSTALLER LA GRILLE D'ALIMENTATION ET D'AÉRATION DG

Si un kit de combinaison de Vent/Lumière est acheté, les VLC vent/lumière sont fournis avec une instruction d'installation séparée substituant les étapes 1 à 4.

1. Choisissez le point du support de la grille dans la zone qui doit être ventilée. Pour faciliter l'installation, les emplacements des poutres d'encadrement dans les murs ou les solives de plafond devraient être considérés. Le collier/régulateur est équipé de courroie perforée pour la connexion directe à une solive de plafond ou à une poutrelle. Permettez suffisamment d'espace entre le collier/régulateur et la poutre pour attacher la tuyauterie. Si l'emplacement de la grille ne permet pas une connexion directe, une entretoise montée sur l'encadrement devrait être utilisée.



Collet de montage.

2. Placez la fixation du collier/ régulateur dans l'emplacement choisi et tracez un cercle sur la surface. A l'intérieur de la salle, coupez à travers la surface. Veuillez noter : Afin d'assurer une finition plus lisse pour un montage sur un toit de pierres ou un toit de tuiles il est recommandé qu'un couteau rasoir soit utilisé pour couper.



Vue latérale grille et collet

3. A partir d'un grenier ou d'un vide sanitaire, placez le support du collier dans le trou jusqu'à ce que le bord du collier soit aligné avec le mur ou la surface intérieure du plafond. Attachez le collier à la poutre avec les

vis en bois de 2 pouces fournies. Attachez le tuyau. Fixez à l'aide des pinces CB ou FC et/ou avec du ruban adhésif. Pour installer le régulateur sur la tuyauterie rigide, des pinces FC ou du ruban adhésif devront être utilisés.

VEUILLEZ NOTER: Lorsque vous attachez le tuyau au collier/régulateur et qu'un coude est nécessaire, veillez à ce que le coude soit installé avec une courbe "douce" pour permettre aux lames du régulateur de fonctionner correctement.

4. Enclencher la grille sur le support du collier/régulateur. La grille devrait être pousser fermement en place pour un ajustement hermétique. S'il y a un espace entre le collier et le plafond il devra être colmaté pour éviter la fuite d'air. La grille peut être retirée et nettoyée pour le nettoyage ultérieur.

Conseils pour l'installation du tuyau

Le tuyau flexible isolé est vivement recommandé où permis par le code local pour l'installation du système d'aération dans les salles de bains où la tuyauterie passent à travers des endroits isolés et où le bruit est un facteur. Ne pas utiliser d'isolation peut entraîner la formation de condensation excessive sur le tuyau et des bruits indésirables dans la pièce. Pour des installations insonorisées au maximum, Fantech recommande un tuyau flexible isolé de 8 pieds au minimum entre toutes les grilles aération et du ventilateur. En utilisant un tuyau flexible, le tuyau devrait être étiré aussi fortement et droit que possible. Ne pas le faire peut entraîner la perte d'efficacité du fonctionnement du système. Le tuyau flexible devrait être relié au ventilateur avec des pinces de type CB ou par ruban adhésif. Toutes les connexions devraient être aussi hermétiques que possible afin de maximiser le fonctionnement du système.

CONNEXION ÉLECTRIQUE

1. Retirer les vis fixant le couvercle de la boîte de connexion située à côté du ventilateur. Toutes les connexions de moteur du ventilateur sont précablées à une bande de connexion électrique. Un connecteur encastré câble de type romex 3/8" pouces sera nécessaire pour fixer le câblage par l'éjection fournie sur le côté de la boîte de connexion.
2. Amener le courant électrique par le connecteur romex et le ventilateur d'éjection. Soyez sûr de placer l'écrou du connecteur au-dessus du câblage venant de la boîte de connexion. Il y a deux ports ouverts sur la bande de connexion. En utilisant un petit tournevis régulier, serrez le fil (blanc) neutre de l'entrée de l'alimentation sous le port de la bande de connexion étiqueté "N". Serrez le fil (noir) de la ligne d'entrée de l'alimentation sous le port de la bande de connexion étiqueté "L". Le moteur du ventilateur étant isolé dans une boîte en plastique, la prise de terre n'est pas nécessaire.
3. Fixez le connecteur romex. Fixez l'entrée de l'alimentation avec le connecteur romex. Substituez la couverture de la boîte de connexion du ventilateur. Toutes les connexions du moteur et du condensateur du ventilateur ont été précablées à l'usine. Aucun câblage supplémentaire pour le ventilateur est nécessaire.



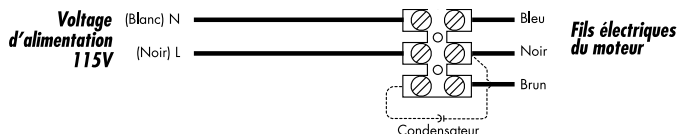
Câblage serré de liquide - vue de dessus (pour des installations extérieures)



Câblage Romex - Vue de dessus

DIAGRAMMES DE RACCORDEMENT

Tous les modèles Sans contrôle de vitesse du moteur



Avec contrôle de vitesse du moteur

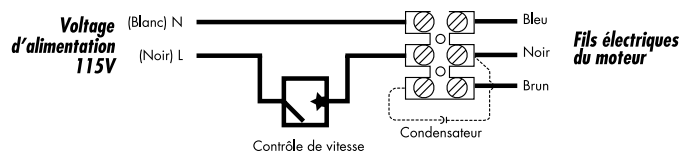
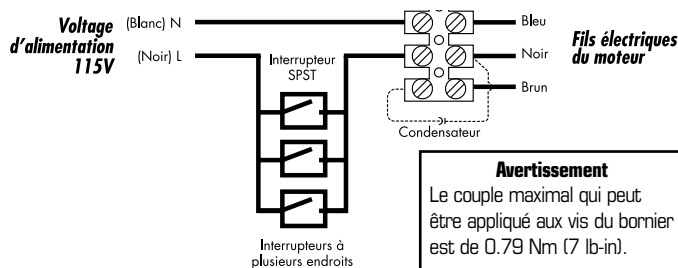


Diagramme de branchement pour plusieurs pièces



Avertissement

Le couple maximal qui peut être appliqué aux vis du bornier est de 0.79 Nm (7 lb-in).

DÉPANNAGE

Si le ventilateur ne fonctionne pas, vérifiez ce qui suit:

1. Consultez les diagrammes de câblage (voir ci-dessous) pour vous assurer que la connexion est appropriée.
2. Contrôlez le fil de sortie du moteur, les fils de sortie du condensateur et l'alimentation électrique pour vous assurer d'un bon contact.
3. Si possible, utilisez un appareil de mesure pour déterminer la continuité à travers les fils de sortie du moteur du ventilateur. Pour faire ceci, le condensateur doit être débranché (ne pas tester le condensateur - il ne montrera pas la continuité). Si les fils de sortie du moteur montrent la continuité, consultez l'usine pour un condensateur de rechange.

INSTRUCTION POUR L'ENTRETIEN

Puisque les roulements du ventilateur sont scellés et équipés d'un matériel lubrifiant interne, aucune lubrification supplémentaire n'est nécessaire.

INSTALACIÓN DEL SOPORTE DE MONTAJE Y EL VENTILADOR

1. Al ubicar el ventilador, hay que considerar las siguientes normas: a) el montaje que reduzca al mínimo el ruido que produce el ventilador en operación; b) el tipo de aplicación; y c) el acceso para facilitar el mantenimiento.

- a) El ventilador se debe montar lo más lejos posible de la salida a fin de minimizar el retroceso del ruido del ventilador a través del conducto. Si se ha de emplear el ventilador como refuerzo para mover el aire entre dos cuartos, acaso resulte óptimo montarlo en un punto céntrico a lo largo del conducto. Un conducto flexible aislado (recomendado para cualquier instalación de escape para baños) resulta mucho más silencioso. Fantech recomienda un mínimo de 8 pies de conducto flexible aislado entre cualquier rejilla de escape y el ventilador, para lograr un mínimo de ruido.

- b) El ventilador debe situarse donde haya acceso suficiente para el mantenimiento.



Monte el soporte (NB)



Monte el ventilador.

el ventilador con aislante o bien perfora un agujero de 1/2" en el fondo de la carcasa (junto con un adaptador de NPT (provido por otros) y tubería de drenaje) para desalojar el condensado.

3. Fije el ventilador al soporte de montaje mediante los tornillos de hojalata suministrados. La caja de conexiones se debe ubicar para facilitar el acceso. El soporte de montaje se ha provisto de guardaojales amortiguadores de goma que impiden la transmisión de ruidos a través de la estructura. Tenga cuidado de no sobreapretarlos. De paso, tenga cuidado de no desgarrar la carcasa de plástico. Los tornillos son autorroscantes y no requieren la perforación de pilotos. No obstante, recomendamos perforar pilotos (de no más de 3/32").



Monte el soporte (MB)



Monte el ventilador

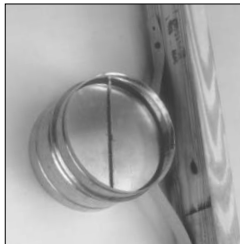
4. Conecte los conductos de entrada y salida del ventilador mediante abrazaderas CB o con cinta especial para conductos. Al usarse conductos aislados, es recomendable fijar el núcleo de vinilo con abrazaderas o con cinta a la entrada y a la salida, de manera que la película impermeable que rodea el aislante quede fijada a la carcasa del ventilador con cinta para conductos.

NOTA: Se puede invertir el orden de los pasos 2 y 3.

INSTALACIÓN DE LA REJILLA DG DE ENTRADA Y ESCAPE

Si se ha comprado el conjunto de Respiradero y Luz, éstos se suministran con instrucciones particulares de instalación que reemplazan los Pasos 1 al 4.

1. Seleccione el punto de montaje de la rejilla dentro del ambiente a ventilar. Para facilitar la instalación, se debe tomar en consideración la ubicación de las vigas enmarcadoras dentro de las paredes, o las viguetas de apoyo del techo. El Collarín/mariposa viene provisto de una cinta perforada para montaje directo en una viga o vigueta. Deje suficiente espacio entre el collarín/mariposa y la viga para fijar el conducto. Si la ubicación de la rejilla no permite el montaje directo, se debe emplear un travesaño auxiliar fijado al enmarcamiento.



Monte el collarín

2. Coloque el collarín/mariposa en el sitio deseado, y trace un círculo sobre la superficie. Desde el interior de la habitación, haga un corte a través de la superficie. Favor observar: Para poder asegurar un acabado más liso al hacer un montaje a través de un techo de cartón-piedra, recomendamos hacer el corte con una navaja.



Vista lateral de la rejilla y el collarín

3. Desde la buhardilla o el entresuelo, coloque el collarín de montaje en el agujero hasta que el borde del collarín quede al ras de la pared interior o la superficie del techo. Fije el collarín a la viga de apoyo con los tornillos tirafondo de 2" suministrados. Conecte el conducto.

Asegúrelo con abrazaderas CB o FC y/o cinta para conductos. Si se trata de instalar la mariposa dentro de un conducto de tipo rígido, se deben emplear abrazaderas de tipo FC o cinta para conductos. Veuillez noter : Afin d'assurer une finition plus lisse pour un montage sur un toit de pierres ou un toit de tuiles il est recommandé qu'un couteau rasoir soit utilisé pour couper..

FAVOR NOTAR: Al conectar un conducto flexible al conjunto de collarín/mariposa, si hace falta un codo inmediatamente a renglón seguido, tenga cuidado de instalar el codo con un doblez "suave" para permitir que las hojas de la mariposa operen debidamente.

4. Enganche la rejilla en el collarín/mariposa de montaje. La rejilla debe oprimirse para que quede bien firme y hermética. Si queda una rajadura entre el collarín y el techo, se debe calafatear para evitar fugas de aire. Para la limpieza posterior, la rejilla se puede extraer y limpiar.

Sugerencias para la Instalación del Conducto Flexible

Recomendamos encarecidamente usar conducto flexible aislado para aplicaciones de escape de baños donde quiera que el código local lo permita, donde el conducto pase a través de espacios no acondicionados o donde el ruido sea un factor de importancia. La ausencia del aislante podría causar un exceso de condensación dentro del conducto, amén del exceso de ruido dentro del cuarto. Para lograr la instalación más silenciosa posible, Fantech recomienda un mínimo de 8 pies de conducto flexible aislado entre cualquier rejilla de escape y el ventilador. Al montar un conducto de tipo flexible, el mismo se debe estirar lo más apretado y recto posible. De lo contrario, el sistema podría mucho rendimiento. El conducto flexible se debe conectar al ventilador con abrazaderas de tipo CB o con cinta para conductos. Todas las conexiones deben quedar lo más herméticas posible para lograr un máximo de rendimiento.

CONEXIÓN ELÉCTRICA

- Desenrosque los tornillos de montaje de la tapa de la caja de conexiones en el costado del ventilador. Todas las conexiones del motor del ventilador están precableadas a una regleta eléctrica. Hace falta un conector pasahilos protector 3/8" de tipo romex para sujeción del cableado a través del agujero ciego provisto en el costado de la caja de conexiones.
- Pase la alimentación eléctrica a través de conector romex y el agujero ciego del ventilador. Tenga cuidado de colocar la tuerca conectora encima del cableado entrante a la caja de conexiones. En la regleta de conexiones hay dos lumbreras abiertas. Usando un pequeño destornillador común, apriete el cable neutro (de color blanco) de la alimentación eléctrica debajo de la lumbrera marcada "N" en la regleta. Apriete el hilo de Línea (negro) de la alimentación eléctrica debajo de la lumbrera marcada "L". Debido a que el motor del ventilador está aislado por su carcasa de plástico, no hay que conectarlo a tierra.
- Asegure el conector romex. Asegure la alimentación entrante con el conector romex. Tape de nuevo la caja de conexiones del ventilador. Todas las conexiones del motor del ventilador y del capacitor vienen precableadas de fábrica. No hace falta ningún cableado adicional para el ventilador.



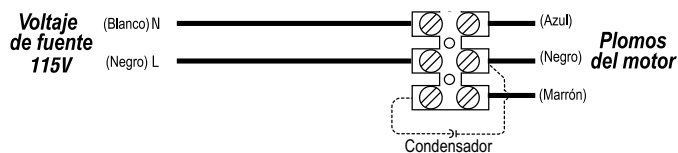
Cableado impermeable - Vista de Planta (Para aplicaciones al exterior).



Cableado en Romex - Vista de Planta

DIAGRAMAS DE ALAMBRADO

Todos los modelos Con controlador de velocidad de motor



Sin controlador de velocidad de motor

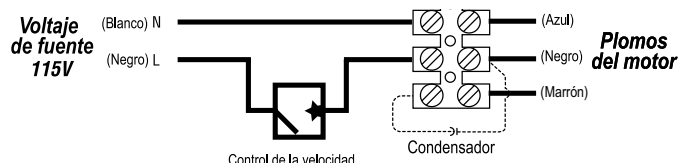
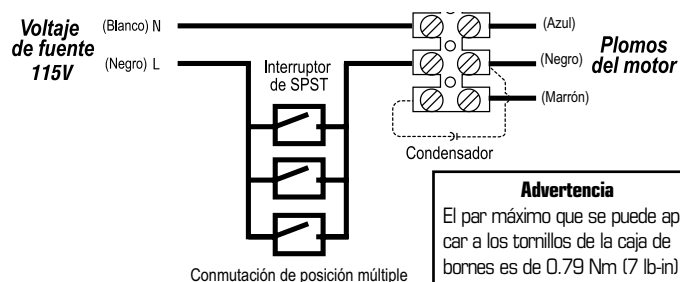


Diagrama de cableado para conmutación desde varios puntos



Advertencia

El par máximo que se puede aplicar a los tornillos de la caja de bornes es de 0.79 Nm (7 lb-in).

ANÁLISIS DE FALLAS

Si le ventilateur ne fonctionne pas, vérifiez ce qui suit:

- Consultez les diagrammes de câblage (voir ci-dessous) pour vous assurer que la connexion est appropriée.
- Contrôlez le fil de sortie du moteur, les fils de sortie du condensateur et l'alimentation électrique pour vous assurer d'un bon contact.
- Si possible, utilisez un appareil de mesure pour déterminer la continuité à travers les fils de sortie du moteur du ventilateur. Pour faire ceci, le condensateur doit être débranché (ne pas tester le condensateur - il ne montrera pas la continuité). Si les fils de sortie du moteur montrent la continuité, consultez l'usine pour un condensateur de rechange.

INSTRUCCIONES DE MANTENIMIENTO

Puisque les roulements du ventilateur sont scellés et équipés d'un matériel lubrifiant interne, aucune lubrification supplémentaire n'est nécessaire.

WARRANTY

Five (5) Year Warranty

This warranty supersedes all prior warranties

DURING ENTIRE WARRANTY PERIOD:

Fantech will repair or replace any part which has a factory defect in workmanship or material. Product may need to be returned to the Fantech factory, together with a copy of the bill of sale and identified with RMA number.

FOR FACTORY RETURN YOU MUST:

- Have a Return Materials Authorization (RMA) number. This may be obtained by calling Fantech either in the USA at 1.800.747.1762 or in CANADA at 1.800.565.3548. Please have bill of sale available.
- The RMA number must be clearly written on the outside of the carton, or the carton will be refused.
- All parts and/or product will be repaired/replaced and shipped back to buyer; no credit will be issued.

OR

The Distributor may place an order for the warranty part and/or product and is invoiced. The Distributor will receive a credit equal to the invoice only after product is returned prepaid and verified to be defective.

FANTECH WARRANTY TERMS DO NOT PROVIDE FOR REPLACEMENT WITHOUT CHARGE PRIOR TO INSPECTION FOR A DEFECT. REPLACEMENTS ISSUED IN ADVANCE OF DEFECT INSPECTION ARE INVOICED, AND CREDIT IS PENDING INSPECTION OF RETURNED MATERIAL. DEFECTIVE MATERIAL RETURNED BY END USERS SHOULD NOT BE REPLACED BY THE DISTRIBUTOR WITHOUT CHARGE TO THE

END USER, AS CREDIT TO DISTRIBUTOR'S ACCOUNT WILL BE PENDING INSPECTION AND VERIFICATION OF ACTUAL DEFECT BY FANTECH.

THE FOLLOWING WARRANTIES DO NOT APPLY:

- Damages from shipping, either concealed or visible. Claim must be filed with freight company.
- Damages resulting from improper wiring or installation.
- Damages or failure caused by acts of God, or resulting from improper consumer procedures, such as:
 1. Improper maintenance
 2. Misuse, abuse, abnormal use, or accident, and
 3. Incorrect electrical voltage or current.
- Removal or any alteration made on the Fantech label control number or date of manufacture.
- Any other warranty, expressed, implied or written, and to any consequential or incidental damages, loss or property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

WARRANTY VALIDATION

- The user must keep a copy of the bill of sale to verify purchase date.
- These warranties give you specific legal rights, and are subject to an applicable consumer protection legislation. You may have additional rights which vary from state to state.

Limitation of Warranty and Liability

This warranty does not apply to any Fantech product or part which has failed as a result of faulty installation or abuse, incorrect electrical connections or alterations made by others, or use under abnormal operating conditions or misapplication of the product or parts. We will not approve for payment any repair not made by us or our authorized agent without prior written consent. The foregoing shall constitute our sole and exclusive warranty and our sole exclusive liability, and is in lieu of any other warranties, whether written, oral, implied or statutory. There are no warranties which extend beyond the description on the page hereof. In no event, whether as a result of breach of contract, or

warranty or alleged negligence, defect incorrect advice or other causes, shall Fantech be liable for special or consequential damages, including, but not limited to, loss of profits or revenue, loss of use of equipment or any other associated equipment, cost of capital, cost of substitute equipment, facilities or services, downtime costs, or claims of customers of purchase for such damages. Fantech neither assumes or authorizes any person to assume for it any other liability in connection with the sale of product(s) or part(s). Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages so the above limitations and exclusions may not apply to you.

Warning

Fantech products are designed and manufactured to provide reliable performance, but they are not guaranteed to be 100% free from defects. Even reliable products will experience occasional failures and this possibility should be recognized by the user. If these products are

used in a life support ventilation system where failure could result in loss or injury, the user should provide adequate backup ventilation, supplementary natural ventilation, failure alarm system, or acknowledge willingness to accept the risk of such loss or injury.

GARANTIE

Garantie de 5 ans

Cette garantie remplace toutes les garanties précédentes.

DURANT TOUTE LA PÉRIODE DE GARANTIE:

Fantech s'engage à réparer ou à remplacer toute pièce présentant un défaut d'usine en matière de qualité d'exécution ou de matériau. Il sera peut être nécessaire de retourner le produit à l'usine Fantech, accompagné d'une copie du contrat de vente et du numéro d'autorisation de retour.

POUR RETOURNER UN PRODUIT À L'USINE, VOUS DEVEZ:

- Obtenir un numéro d'autorisation de retour; pour ce faire, communiquer avec Fantech aux États-Unis au numéro 1.800.747.1762, ou au Canada, au numéro 1.800.565.3548. Veuillez avoir votre contrat de vente à portée de la main.
- S'assurer que le numéro d'autorisation de retour est lisible sur l'extérieur de la boîte, sinon la boîte sera refusée.
- Toutes les pièces et/ou le produit seront réparés ou remplacés puis retournés à l'acheteur. Aucun crédit ne sera accordé.

OU

Le Distributeur peut commander une pièce ou un produit couvert par la garantie; la facture lui sera envoyée. Le distributeur ne sera crédité du montant de sa facture qu'après que le produit a été retourné port payé et qu'il a été trouvé défectueux.

LES TERMES DE LA GARANTIE DE Fantech NE PRÉVOIENT PAS DE REMPLACEMENT SANS FRAIS AVANT QUE LA PIÈCE OU LE PRODUIT DÉFECTUEUX AIT ÉTÉ INSPECTÉ. LES PRODUITS OU PIÈCES REMPLACÉS AVANT L'INSPECTION DE LA DÉFECTUOSITÉ SERONT FACTURÉS ET LE MONTANT DU CRÉDIT EST FONCTION DE L'INSPECTION DE LA PIÈCE OU DU PRODUIT RETOURNÉ. LE DISTRIBUTEUR NE DOIT PAS REMPLACER SANS FRAIS POUR

L'UTILISATEUR FINAL L'ÉQUIPEMENT DÉFECTUEUX RETOURNÉ PAR L'UTILISATEUR FINAL, CAR LE COMPTE DU DISTRIBUTEUR NE SERA CRÉDITÉ QU'APRÈS L'INSPECTION ET LA VÉRIFICATION PAR FANTECH DE LA DÉFECTUOSITÉ.

LES GARANTIES NE S'APPLIQUENT PAS DANS LES CAS SUIVANTS:

- Dommages dus au transport (dissimulés ou visibles). Les réclamations doivent être faites à la compagnie de fret.
- Dommages dus au mauvais câblage ou à l'installation inappropriée.
- Dommages ou défectuosité causés par une calamité naturelle ou résultant d'une procédure irrégulière de l'acheteur, notamment :
 1. Entretien irrégulier
 2. Mauvais usage, usage abusif, usage anormal ou accident
 3. Tension ou courant électrique incorrect
- Enlèvement ou toute modification du numéro de contrôle ou de la date de fabrication de l'étiquette Fantech
- Toute autre garantie expresse, écrite ou implicite, pour les dommages accidentels ou indirects, perte de biens, de recettes, manque à gagner ou coûts relatifs à la dépose, à l'installation ou à la réinstallation, en cas de violation de garantie.

CERTIFICATION DE LA GARANTIE:

- L'utilisateur doit conserver une copie du contrat de vente pour confirmer la date d'achat.
- Les présentes garanties vous donnent des droits spécifiques reconnus par la loi et sont régies par les lois sur la protection du consommateur appropriées. Il est possible que différents états offrent d'autres droits.

Limites de garanties et de responsabilités

Cette garantie ne s'applique à aucun produit de Fantech ou à aucune pièce détachée dont la défectuosité relève d'une erreur d'installation ou d'abus ou de mauvaise installation électrique ou dut à des modifications extérieures ou utilisées dans des conditions anormales ou encore une mauvaise installation du produit ou des pièces détachées. Nous n'approuverons aucun remboursement pour des réparations qui ne sont pas effectuées par un agent américain ou un agent autorisé sans un accord écrit. Ce dernier constituera notre seule et exclusive garantie et notre seule exclusive responsabilité et tient lieu de toute autre garantie ou bien écrite ou orale implicite ou statuaire. Aucune garantie ne s'appliquera au-delà des descriptions faites de la page ci-dessus. En aucun cas, que ce soit pour une rupture de contrat ou de garanties ou

des dommages dus à la négligence ou à des conseils incorrects ou autres causes, Fantech ne pourra être tenu pour responsable des dommages particuliers ou consécutifs, incluant mais pas limités aux pertes et profits ou bénéfices perte de matériel ou autres matériels associés. Coût du capital, coût des équipements de remplacement, matériels ou services, coût de temps d'arrêt ou les réclamations des clients pour de tels dommages. Fantech ne délègue ou autorise aucune personne d'assumer sa responsabilité sur la vente du produit ou des pièces détachées. Certaines juridictions ne permettent pas l'exclusion de la limitation des dommages accidentels ou consécutifs ainsi ces limitations ci-dessus et les exclusions ne s'appliquent pas à vous.

Avertissement

Les produits de Fantech sont conçus et fabriqués pour produire des performances fiables, mais il n'y a aucune garantie qu'ils soient 100% sans défaut. Les plus produits les plus fiables ont occasionnellement des défectuosités et cette possibilité devraient être reconnu par les usagers. Si ces produits sont utilisés comme une source de ventilation ou leur

panne risque de mettre en danger des vies humaines ou entraîner des blessures, les usagers devront avoir une source de ventilation de secours en addition à une ventilation naturelle, le défaut de système d'alarme ou la connaissance de ces conditions entraînent sa responsabilité envers de telles pertes ou blessures.

GARANTIA

Garantía por cinco (5) Años

Esta garantía de sin efecto cualquier otra garantía anterior

DURANTE EL PERÍODO INTEGRO DE LA GARANTÍA:

Fantech reparará o reemplazará toda parte que presente un defecto en el material o en la mano de obra. Es posible que el producto deba ser devuelto a la fábrica Fantech, juntamente con una copia de la constancia de compraventa e identificado con el número de RMA.

PARA DEVOLUCIÓN A FÁBRICA USTED DEBE:

- Tener un número de Autorización de Devolución de Material (RMA). Esto se puede obtener llamando a Fantech ya sea en los Estados Unidos al 1.800.747.1762
- en Canadá al 1.800.565.3548. Tenga a mano la constancia de compraventa.
- El número de RMA deberá estar claramente escrito en la parte exterior de la caja, de lo contrario la caja será rechazada.
- Todas las partes y/o el producto serán reparados/reemplazados y devueltos al comprador; no se otorgará crédito.

O BIEN

El Distribuidor puede colocar una orden por la parte y/o producto en garantía y facturarla/o. El Distribuidor recibirá un crédito igual a la factura sólo después de que se haya devuelto el producto con pago previo y con verificación de defecto.

LAS CONDICIONES DE LA GARANTÍA DE FANTECH NO CONTEMPLAN EL REEMPLAZO SIN CARGO ANTES DE REALIZAR LA INSPECCIÓN PARA DETECTAR DEFECTOS. LOS REEMPLAZOS EMITIDOS ANTES DE INSPECCIONAR POR DEFECTOS SON FACTURADOS, Y EL CRÉDITO ESTÁ A LA ESPERA DE INSPECCIÓN DEL MATERIAL DEVUELTO. EL MATERIAL DEFECTUOSO DEVUELTO POR LOS USUARIOS FINALES NO

DEBERÁ SER REEMPLAZADO POR EL DISTRIBUIDOR SIN CARGO PARA EL USUARIO FINAL, YA QUE EL CRÉDITO DE LA CUENTA DEL DISTRIBUIDOR ESTARÁ A LA ESPERA DE INSPECCIÓN Y VERIFICACIÓN DEL DEFECTO REAL POR FANTECH.

LAS SIGUIENTES GARANTÍAS NO SE APLICAN:

- Daños durante el envío, ya sean encubiertos o visibles. Se deberá presentar el reclamo a la compañía transportadora.
- Daños ocasionados por cableado o instalación indebidos.
- Daños o fallas causados por hechos fortuitos, u ocasionados por procedimientos impropios por parte del usuario, tales como:
 1. Mantenimiento indebido
 2. Uso indebido, abuso, uso anormal o accidente y
 3. Tensión o corriente eléctrica incorrecta.
- Remoción o modificación realizada al número de control del rótulo de Fantech o de la fecha de fabricación.
- Toda otra garantía, expresa, implícita o escrita, daños y perjuicios, pérdida de propiedad, de ingresos, o de beneficios, o costo de remoción, instalación o reinstalación por incumplimiento de la garantía.

VALIDACIÓN DE LA GARANTÍA

- El usuario debe conservar una copia de la constancia de compraventa para verificar la fecha de compra.
- Estas garantías le otorgan derechos legales específicos, y están sujetas a una legislación aplicable para protección del consumidor. Usted puede tener derechos adicionales que varían de estado en estado.

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negligencia, defecto, consejos incorrectos u otra causa, por daños especiales o consiguientes, incluso, pero no de manera única, pérdida de ganancias o ingresos, equipo cesante o cualquier otra pérdida relativa a equipos asociados; el costo del capital, costo de equipos, instalaciones o servicios sustitutos, tiempo ocioso o reclamos de clientes por compras incurridas por tales daños. Fantech ni asume ni autoriza a ninguna persona a que asuma a su nombre ninguna otra responsabilidad relativa a la venta de productos o piezas. Debido a que algunos distritos jurisdiccionales no permiten la exclusión o limitación por daños incidentales o consiguientes, puede que las limitaciones y limitaciones antes descritas no lo afecten a Ud.

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de ventilación vital en donde una falla pudiera dar lugar a pérdidas o lesiones, el usuario debe disponer de una ventilación adecuada de reserva, ventilación natural suplemental, sistema de alarma de fallas, o expresar su voluntad de aceptar el riesgo de tales pérdidas o lesiones.

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APPENDIX D

HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

New City Plaza
2-88 North Main Street

NEW CITY, NEW YORK

Health and Safety Plan and Community Air Monitoring Plan

AKRF Project Number: 40217
NYSDEC BCP Number: C344065

Prepared for:

Newton Associates LLC
551 Fifth Avenue
New York, New York 10176

Prepared by:



AKRF, Inc.
34 South Broadway, 3rd Floor
White Plains, New York
914-949-7336

NOVEMBER 2015

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FIGURE

Figure HASP-1 – Hospital Route Map

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1.0 INTRODUCTION

In October 2006, Newton Associates LLC (Newton) entered into a Brownfield Cleanup Agreement (BCA) with the the New York State Department of Environmental Conservation (NYSDEC) to address solvent contamination associated with a former dry cleaner operating at the New City Plaza shopping center site (the project site or site) under the Brownfield Cleanup Program (BCP). The site is located at 2-88 North Main Street, New City, New York, and consists of a portion of parking lot and commercial stores within a larger shopping center. The BCP site boundary is based on the location of a former dry cleaning facility where subsurface investigations revealed solvent contamination in soil, groundwater, and soil gas.

Previous investigations revealed a shallow source of tetrachloroethylene (PCE) soil contamination immediately behind (east) of the Dunkin' Donuts (former Robbie J. Cleaners) retail space. The investigation phase of the BCP, which was completed in March 2015, delineated the nature and extent of contamination associated with the release. Interim Remedial Measures (IRMs) were completed between November 2010 and March 2015 to address the soil and soil gas contamination associated with the release, and chemical injection was completed in September 2015 to address groundwater contamination.

The Site was remediated in accordance with BCA Index #344065. After completion of the remedial work described in the NYSDEC-approved Remedial Action Work Plan (RAWP), some residual contamination remains in the subsurface at the Site. A Site Management Plan (SMP) was prepared to manage remaining contamination at the Site until the Environmental Easement (an institutional control restricting the type of use at the property to restricted residential, commercial, and industrial use) is extinguished. This Health and Safety Plan (HASP) has been designed to provide workplace safety while completing the requirements of the SMP.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Check all that apply		
<input checked="" type="checkbox"/> Organic Chemicals	<input type="checkbox"/> Inorganic Chemicals	<input type="checkbox"/> Radiological
<input type="checkbox"/> Biological	<input checked="" type="checkbox"/> Explosive/Flammable	<input type="checkbox"/> Oxygen Deficient Atm.
<input checked="" type="checkbox"/> Heat Stress	<input checked="" type="checkbox"/> Cold Stress	<input type="checkbox"/> Carbon Monoxide
Comments: No personnel are permitted to enter permit confined spaces.		

2.1.2 Physical Characteristics

Check all that apply		
<input checked="" type="checkbox"/> Liquid	<input checked="" type="checkbox"/> Solid	<input type="checkbox"/> Sludge
<input checked="" type="checkbox"/> Vapors	<input type="checkbox"/> Unknown	<input type="checkbox"/> Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	Solids	Sludges	Solvents	Oils	Other
<input type="checkbox"/> Acids	<input type="checkbox"/> Ash	<input type="checkbox"/> Paints	<input checked="" type="checkbox"/> Halogens	<input type="checkbox"/> Transformer	<input type="checkbox"/> Lab
<input type="checkbox"/> Caustics	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Metals	<input type="checkbox"/> Petroleum	<input type="checkbox"/> Other DF	<input type="checkbox"/> Pharm
<input type="checkbox"/> Pesticides	<input type="checkbox"/> Tailings	<input type="checkbox"/> POTW	<input type="checkbox"/> Other Chlorinated	<input type="checkbox"/> Motor or Hydraulic Oil	<input type="checkbox"/> Hospital
<input type="checkbox"/> Petroleum	<input checked="" type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Organic Solvents	<input type="checkbox"/> Gasoline	<input type="checkbox"/> Rad
<input type="checkbox"/> Inks	Fill material			<input type="checkbox"/> Fuel Oil	<input type="checkbox"/> MGP
<input type="checkbox"/> PCBs					<input type="checkbox"/> Mold
<input type="checkbox"/> Metals					<input type="checkbox"/> Cyanide
()Other:					

2.1.4 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Tetrachloroethylene	REL = Lowest possible PEL = 100 ppm STEL = 100 ppm	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination, headache, drowsiness, skin erythema (skin redness), and liver damage.
Trichloroethylene	REL = 25 ppm PEL = 100 ppm	Headaches, lung irritation, dizziness, poor coordination, impaired heart function, unconsciousness, and nerve, kidney and liver damage.
1,2 Dichloroethene	REL = 200 ppm PEL = 200 ppm	Nausea, drowsy, tiredness possible heart damage.
Hydrogen Peroxide	REL = 1 ppm PEL = 1 ppm	Eye, nose, throat irritation, corneal ulcer, skin redness, bleaching hair
Sodium Persulfate	ACGIH TWA = 0.1 mg/m ³	Headache, eye and skin irritation, nausea or vomiting, abdominal cramps.
Sodium Permanganate, Potassium Permanganate	PEL = 5 mg/m ³ ACGIH TWA = 0.2 mg/m ³	Damaging to eye tissue on contact, skin, nose, and throat irritation, nausea, lung damage
Glycerol, Glycerine, Lactic Acid	REL = No NIOSH REL PEL = 15 mg/m ³	Headache, eye and skin irritation, nausea or vomiting, fertility effects.
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit ACGIH = American Conference of Governmental Industrial Hygienists		

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety; make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the site. A site safety meeting will be conducted at the start of the project. Additional meetings shall be conducted, as necessary, for new personnel working at the site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. The medical release shall consider the type of work to be performed and the required PPE. The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste site work.

2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may be changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

For locations on public streets and sidewalks, the necessary permits will be obtained from the Town of Clarkston Highway Department to close the portion of the street or sidewalk where work is being performed. Appropriate barriers will be set up to secure the area and prevent anyone from approaching within 25 feet of the work area.

Site Work Zones			
Task	Exclusion Zone	CRZ	Support Zone
Any Excavation Performed that Penetrates the Site Cap	10 ft. from Excavator	15 ft. from Excavator	As Needed
In-Situ Injection Point	10 ft from Drill Rig	25 ft from Drill Rig	As Needed

2.6 Air Monitoring

The purpose of the air monitoring program is to identify any exposure of the field personnel to potential environmental hazards in the soil and groundwater. Results of the air monitoring will be used to determine the appropriate response action, if needed.

2.6.1 Work Zone Air Monitoring

Real time air monitoring will be performed with a photoionization detector (PID) during applicable intrusive activities. Measurements will be taken prior to commencement of work and at a minimum once every half-hour during intrusive work, as outlined in the following table. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSO shall set up the equipment and confirm that it is working properly. The PID will be calibrated with 100 parts per million (ppm) isobutylene standard in accordance with the manufacturer's instructions at the start of each work day. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the following table.

Work Zone Air Monitoring Action Levels		
Instrument	Action Level	Response Action
OVM	Less than 10 ppm in breathing zone	Level D or D-Modified
	Between 10 ppm and 500 ppm	Level C
	More than 500 ppm	Stop work. Resume work when readings are less than 500 ppm.

2.6.2 Community Air Monitoring Plan

Community air monitoring will be conducted during all intrusive site activities in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds at the perimeter of the exclusion zone will be performed as described below.

VOC Monitoring

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, while opening a monitoring well cap, when bailing/purging a well, and upon leaving the location. In some instances, depending on the proximity of exposed individuals, continuous monitoring may be conducted during these activities.

Continuous monitoring for VOCs will be conducted during all ground intrusive activities (i.e., temporary injection point installation, injection during groundwater treatment, and monitoring well installation). Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a photoionization detector (PID) equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations. The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the exclusion zone perimeter, work activities will be temporarily halted

and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the exclusion zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet – is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the exclusion zone, activities will be shutdown.

More frequent intervals of monitoring will be conducted if required as determined by the SSO. All 15-minute readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Major Vapor Emission Response Plan

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work Site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or vapor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the exclusion zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

- Sustained organic vapor levels approaching 1 ppm above background for a period of more than 30 minutes, or
- Organic vapor levels greater than 5 ppm above background for any time period.

Upon activation, the following activities shall be undertaken as part of the Major Vapor Emission Response Plan:

- The NYSDEC, NYSDOH, and local police authorities will immediately be contacted by the SSO and advised of the situation;
- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer; and
- All Emergency contacts will go into effect as appropriate.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.

2.6.3 Personal Protection Equipment

The personal protection equipment required for various kinds of site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, “General Description and Discussion of the Levels of Protection and Protective Gear.”

AKRF field personnel and other site personnel shall wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in this section.

Personal Protection Equipment Requirements		
LEVEL OF PROTECTION & PPE		All Tasks
Level D (X) Steel Toe Shoes (X) Hard Hat (within 25 ft of drill rig/excavator) (X) Work Gloves	(X) Safety Glasses/Goggles, or (X) Face Shield (X) Ear Plugs (within 25 ft of drill rig/excavator) (X) Nitrile Gloves (X) Tyvek when handling chemicals for injection	Yes
Level C (in addition to Level D) (X) Half-Face Respirator OR (X) Full Face Respirator () Full-Face PAPR	() Particulate Cartridge () Organic Cartridge (X) Dual Organic/Particulate Cartridge	If PID > 10 ppm or Particulate > 5 mg/m ³ (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected).		

2.7 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to the Nyack Hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

3.1 Hospital Directions

Hospital Name:	Nyack Hospital
Phone Number:	(845) 348-2000
Address/Location:	160 North Midland Avenue, Nyack, NY 10960 The entrance to the Emergency Room is on North Midland Avenue, just north of Sickles Avenue
Directions:	<p>Head north on North Main Street - go 0.4 mile</p> <p>Turn right at Calvalry Drive West - go 0.2 mile</p> <p>Turn left at Route 304 - go 2.6 miles</p> <p>Turn right at US-9W - go 0.6 mile</p> <p>Turn left at US-9W - go 5.4 miles</p> <p>Turn left at 5th Avenue - go 0.1 mile</p> <p>Turn right at N Midland Avenue - go 0.1 mile</p> <p>Turn right into Nyack Hospital at 160 N Midland Avenue Nyack, NY 10960</p> <p>The total trip distance = 9.2 miles</p>

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Marc Godick	Project Director	914-922-2356 (office) 917-991-4030 (cell)
	Bryan Zieroff	Project Manager	914-922-2382 (office) 203-246-1566 (cell)
	Stephen Schmid	SSO	914-922-2386 (office) 914-400-9736 (cell)
Newton Associates LLC	Peter Levy	Client Project Manager	212-672-1500 (office)
Town of Clarkstown Highway Department	-	-	845-623-7500 (office)
New York State Department of Environmental Conservation	Kiera Thompson	DER Project Manager	518-402-7860 (office) 518-402-9679 (fax)
New York State Department of Health	Renata Ockerby	Public Health Specialist III	800-458-1158 – ext. 27870
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP**APPROVAL**

Signed: _____ Date: _____

AKRF Project Manager

Signed: _____ Date: _____

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

AFFIDAVIT

I, _____ (name), of _____ (company name), have read the Health and Safety Plan (HASP) for the New City Plaza site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

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Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

ATTACHMENT A
POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tět'rə-klôr' ō-ěth'ə-lēn')

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- ☐ Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- ☐ Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- ☐ In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- ☐ It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- ☐ When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- ☐ When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

ToxFAQs Internet home page via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

ene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be per-

formed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- ❑ Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- ❑ Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- ❑ Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- ❑ Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- ❑ Trichloroethylene does not build up significantly in

plants and animals.

How might I be exposed to trichloroethylene?

- ❑ Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- ❑ Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- ❑ Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- ❑ Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is “reasonably anticipated to be a human carcinogen.” The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is “probably carcinogenic to humans.”

Is there a medical test to show whether I’ve been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood

and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn’t available at most doctors’ offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

This fact sheet answers the most frequently asked health questions (FAQs) about 1,2-dichloroethene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,2-dichloroethene occurs mainly in workplaces where it is made or used. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired. *cis*-1,2-Dichloroethene has been found in at least 146 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). *trans*-1,2-Dichloroethene was found in at least 563 NPL sites. 1,2-Dichloroethene was found at 336 sites, but the isomer (*cis*- or *trans*-) was not specified.

What is 1,2-dichloroethene?

(Pronounced 1,2-dī-klôr' ô-ěth'ēn)

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. You can smell very small amounts of 1,2-dichloroethene in air (about 17 parts of 1,2-dichloroethene per million parts of air [17 ppm]).

There are two forms of 1,2-dichloroethene; one is called *cis*-1,2-dichloroethene and the other is called *trans*-1,2-dichloroethene. Sometimes both forms are present as a mixture.

What happens to 1,2-dichloroethene when it enters the environment?

- ☐ 1,2-Dichloroethene evaporates rapidly into air.
- ☐ In the air, it takes about 5-12 days for half of it to break down.
- ☐ Most 1,2-dichloroethene in the soil surface or bodies of water will evaporate into air.
- ☐ 1,2-Dichloroethene can travel through soil or dissolve in water in the soil. It is possible that it can contaminate groundwater.
- ☐ In groundwater, it takes about 13-48 weeks to break down.

- ☐ There is a slight chance that 1,2-dichloroethene will break down into vinyl chloride, a different chemical which is believed to be more toxic than 1,2-dichloroethene.

How might I be exposed to 1,2-dichloroethene?

- ☐ Breathing 1,2-dichloroethene that has leaked from hazardous waste sites and landfills.
- ☐ Drinking contaminated tap water or breathing vapors from contaminated water while cooking, bathing, or washing dishes.
- ☐ Breathing 1,2-dichloroethene, touching it, or touching contaminated materials in the workplace.

How can 1,2-dichloroethene affect my health?

Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired; breathing very high levels can kill you.

When animals breathed high levels of *trans*-1,2-dichloroethene for short or longer periods of time, their livers and lungs were damaged and the effects were more severe with longer exposure times. Animals that breathed very high

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

levels of *trans*-1,2-dichloroethene had damaged hearts.

Animals that ingested extremely high doses of *cis*- or *trans*-1,2-dichloroethene died.

Lower doses of *cis*-1,2-dichloroethene caused effects on the blood, such as decreased numbers of red blood cells, and also effects on the liver.

The long-term (365 days or longer) human health effects after exposure to low concentrations of 1,2-dichloroethene aren't known. One animal study suggested that an exposed fetus may not grow as quickly as one that hasn't been exposed.

Exposure to 1,2-dichloroethene hasn't been shown to affect fertility in people or animals.

How likely is 1,2-dichloroethene to cause cancer?

The EPA has determined that *cis*-1,2-dichloroethene is not classifiable as to its human carcinogenicity.

No EPA cancer classification is available for *trans*-1,2-dichloroethene.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethene?

Tests are available to measure concentrations of the breakdown products of 1,2-dichloroethene in blood, urine, and tissues. However, these tests aren't used routinely to determine whether a person has been exposed to this compound. This is because after you are exposed to 1,2-dichloroethene, the breakdown products in your body that are detected with these tests may be the same as those that come from exposure to other chemicals. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum allowable level of *cis*-1,2-dichloroethene in drinking water at 0.07 milligrams per liter of water (0.07 mg/L) and *trans*-1,2-dichloroethene at 0.1 mg/L.

The EPA requires that any spills or accidental release of 1,000 pounds or more of 1,2-dichloroethene must be reported to the EPA.

The Occupational Health Safety and Health Administration (OSHA) has set the maximum allowable amount of 1,2-dichloroethene in workroom air during an 8-hour workday in a 40-hour workweek at 200 parts of 1,2-dichloroethene per million parts of air (200 ppm).

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Fertility: Ability to reproduce.

Ingest: To eat or drink something.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Solvent: A chemical that can dissolve other substances.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for 1,2-Dichloroethene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



MATERIAL SAFETY DATA SHEET

CAIROX® Potassium Permanganate

Section 1 Chemical Product and Company Identification

PRODUCT NAME: CAIROX® potassium permanganate, KMnO_4
SYNONYMS: Permanganic acid potassium salt
Chameleon mineral
Condy's crystals
Permanganate of potash

MANUFACTURER'S NAME: CARUS CHEMICAL COMPANY

MANUFACTURER'S ADDRESS:

Carus Chemical Company
1500 Eighth Street
P. O. Box 1500
LaSalle, IL 61301

TRADE NAME: CAIROX® potassium permanganate

TELEPHONE NUMBER FOR INFORMATION: 815/223-1500

EMERGENCY TELEPHONE NO: 800/435-6856

AFTER HOURS NO. 815/223-1565

5:00 PM-8:00 AM Central Standard Time
Monday-Friday, Weekends and Holidays

CHEMTREC TELEPHONE NO.: 800/424-9300

Section 2 Composition/Information on Ingredients

<u>Material or component</u>	<u>CAS No.</u>	<u>%</u>	<u>Hazard Data</u>
Potassium permanganate	7722-64-7	97% min. KMnO_4	PEL-C 5 mg Mn per cubic meter of air
			TLV-TWA 0.2 mg Mn per cubic meter of air

Section 3 Hazards Identification

1. Eye Contact

Potassium permanganate is damaging to eye tissue on contact. It may cause severe burns that result in damage to the eye.

2. Skin Contact

Contact of solutions at room temperature may be irritating to the skin, leaving brown stains. Concentrated solutions at elevated temperature and crystals are damaging to the skin.

3. Inhalation

Acute inhalation toxicity data are not available. However, airborne concentrations of potassium permanganate in the form of dust or mist may cause damage to the respiratory tract.

4. Ingestion

Potassium permanganate, if swallowed, may cause severe burns to mucous membranes of the mouth, throat, esophagus, and stomach.

Section 4 First Aid Measures

1. Eyes

Immediately flush eyes with large amounts of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Do not attempt to neutralize chemically. Seek medical attention immediately. Note to physician: Soluble decomposition products are alkaline. Insoluble decomposition product is brown manganese dioxide.

2. Skin

Immediately wash contaminated areas with large amounts of water. Remove contaminated clothing and footwear. Wash clothing and decontaminate footwear before reuse. Seek medical attention immediately if irritation is severe or persistent.

3. Inhalation

Remove person from contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. Seek medical attention immediately.

4. Ingestion

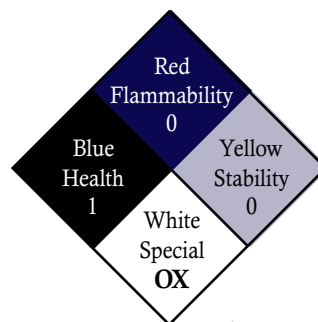
Never give anything by mouth to an unconscious or convulsing person. If person is conscious, give large quantities of water. Seek medical attention immediately.

Section 5 Fire Fighting Measures

NFPA* HAZARD SIGNAL

Health Hazard (less than 1 hour exposure)	1	=	Materials which under fire conditions would give off irritating combustion products. Materials which on the skin could cause irritation.
Flammability Hazard	0	=	Materials that will not burn.
Reactivity Hazard	0	=	Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.
Special Hazard	OX	=	Oxidizer

*National Fire Protection Association 704



FIRST RESPONDERS:

Wear protective gloves, boots, goggles, and respirator. In case of fire, wear positive pressure breathing apparatus. Approach site of incident with caution. Use Emergency Response Guide NAERG 96 (RSPA P5800.7). Guide No. 140.

FLASHPOINT

None

FLAMMABLE OR EXPLOSIVE LIMITS

Lower: Nonflammable

Upper: Nonflammable

EXTINGUISHING MEDIA

Use large quantities of water. Water will turn pink to purple if in contact with potassium permanganate. Dike to contain. Do not use dry chemicals, CO₂, Halon® or foams.

SPECIAL FIREFIGHTING PROCEDURES

If material is involved in fire, flood with water. Cool all affected containers with large quantities of water. Apply water from as far a distance as possible. Wear self-contained breathing apparatus and full protective clothing.

Section 6 Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Clean up spills immediately by sweeping or shoveling up the material. Do not return spilled material to the original container. Transfer to a clean metal drum. EPA banned the land disposal of D001 ignitable waste oxidizers. These wastes must be deactivated by reduction. To clean floors, flush with abundant quantities of water into sewer, if permitted by Federal, State, and Local regulations. If not permitted, collect water and treat chemically (Section 13).

PERSONAL PRECAUTIONS

Personnel should wear protective clothing suitable for the task. Remove all ignition sources and incompatible materials before attempting clean-up.

Section 7 Handling and Storage

WORK/HYGENIC PRACTICES

Wash hands thoroughly with soap and water after handling potassium permanganate, and before eating or smoking. Wear proper protective equipment. Remove contaminated clothing.

VENTILATION REQUIREMENTS

Provide sufficient area or local exhaust to maintain exposure below the TLV-TWA.

CONDITIONS FOR SAFE STORAGE

Store in accordance with NFPA 430 requirements for Class II oxidizers. Protect containers from physical damage. Store in a cool, dry area in closed containers. Segregate from acids, peroxides, formaldehyde, and all combustible, organic or easily oxidizable materials including anti-freeze and hydraulic fluid.

Section 8 Exposure Controls/Personal Protection

RESPIRATORY PROTECTION

In the case where overexposure may exist, the use of an approved NIOSH-MSHA dust respirator or an air supplied respirator is advised. Engineering or administrative controls should be implemented to control dust.

EYE

Faceshield, goggles, or safety glasses with side shields should be worn. Provide eye wash in working area.

GLOVES

Rubber or plastic gloves should be worn.

OTHER PROTECTIVE EQUIPMENT

Normal work clothing covering arms and legs, and rubber or plastic apron should be worn.



Section 9 Physical and Chemical Properties

APPEARANCE AND ODOR	Dark purple solid with a metallic luster, odorless
BOILING POINT, 760 mm Hg	Not applicable
VAPOR PRESSURE (mm Hg)	Not applicable
SOLUBILITY IN WATER % BY SOLUTION	6% at 20°C (68°F), and 20% at 65°C (149°F)
PERCENT VOLATILE BY VOLUME	Not volatile
EVAPORATION RATE (BUTYL ACETATE=1)	Not applicable
MELTING POINT	Starts to decompose with evolution of oxygen (O ₂) at temperatures above 150°C (302°F). Once initiated, the decomposition is exothermic and self-sustaining.
OXIDIZING PROPERTIES	Strong oxidizer
SPECIFIC GRAVITY	2.7 @ 20°C (68°F)
VAPOR DENSITY (AIR=1)	Not applicable

Section 10 Stability and Reactivity

STABILITY Under normal conditions, the material is stable.

CONDITIONS TO AVOID Contact with incompatible materials or heat (>150°C/302°F).

INCOMPATIBLE MATERIALS Acids, peroxides, formaldehyde, anti-freeze, hydraulic fluids, and all combustible organic or readily oxidizable inorganic materials including metal powders. With hydrochloric acid, toxic chlorine gas is liberated.

HAZARDOUS DECOMPOSITION PRODUCTS When involved in a fire, potassium permanganate may liberate corrosive fumes.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION Material is not known to polymerize.

Section 11 Toxicological Information

Potassium permanganate: Acute oral LD₅₀(rat) = 780 mg/kg Male (14 days); 525 mg/kg Female (14 days)
The fatal adult human dose by ingestion is estimated to be 10 grams. (Ref. Handbook of Poisoning: Prevention, Diagnosis & Treatment, Twelfth Edition)

EFFECTS OF OVEREXPOSURE

1. Acute Overexposure
Irritating to body tissue with which it comes into contact.
2. Chronic Overexposure
No known cases of chronic poisoning due to potassium permanganate have been reported. Prolonged exposure, usually over many years, to heavy concentrations of manganese oxides in the form of dust and fumes, may lead to chronic manganese poisoning, chiefly involving the central nervous system.
3. Carcinogenicity
Potassium permanganate has not been classified as a carcinogen by OSHA, NTP, IARC.
4. Medical Conditions Generally Aggravated by Exposure
Potassium permanganate will cause further irritation of tissue, open wounds, burns or mucous membranes.

Registry of Toxic Effects of Chemical Substances
RTECS #SD6476000



CARUS CHEMICAL COMPANY

Section 12 Ecological Information

Entry to the Environment

Potassium Permanganate has a low estimated lifetime in the environment, being readily converted by oxidizable materials to insoluble manganese dioxide (MnO_2).

Bioconcentration Potential

In non-reducing and non-acidic environments manganese dioxide (MnO_2) is insoluble and has a very low bioaccumulative potential.

Aquatic Toxicity

Rainbow trout, 96 hour LC_{50} : 1.8 mg/L
Bluegill sunfish, 96 hour LC_{50} : 2.3 mg/L

Section 13 Disposal Consideration

DEACTIVATION OF D001 IGNITABLE WASTE OXIDIZERS BY CHEMICAL REDUCTION

Reduce potassium permanganate in aqueous solutions with sodium thiosulfate (Hypo), or sodium bisulfite or ferrous salt solution. The thiosulfite or ferrous salt may require some dilute sulfuric acid to promote rapid reduction. If acid was used, neutralize with sodium bicarbonate to neutral pH. Decant or filter, and mix the sludge with sodium carbonate and deposit in an approved landfill. Where permitted, the sludge can be drained into sewer with large quantities of water. Use caution when reacting chemicals. Contact Carus Chemical Company for additional recommendations.

Section 14 Transport Information

U. S. DEPARTMENT OF TRANSPORTATION INFORMATION:

Proper Shipping Name: 49 CFR 172.101 Potassium Permanganate
ID Number: 49 CFR 172.101 UN 1490
Hazard Class: 49 CFR 172.101 Oxidizer
Division: 49 CFR 172.101 5.1
Packing Group: 49 CFR 172.101 II

Section 15 Regulatory Information

TSCA Listed in the TSCA Chemical Substance Inventory

CERCLA **Hazardous Substance**

Reportable Quantity: RQ - 100 lb

40 CFR 116.4; 40 CFR 302.4

RCRA Oxidizers such as potassium permanganate meet the criteria of ignitable waste. 40 CFR 261.21

SARA TITLE III Information

Section 302 Extremely hazardous substance: Not listed

Section 311/312 Hazard categories: Fire, acute and chronic toxicity

Section 313 CAIROX® potassium permanganate contains 97% Manganese Compound as part of the chemical structure (manganese compounds CAS Reg. No. N/A) and is subject to the reporting requirements of Section 313 of Title III, Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372.

Section 15 Regulatory Information (cont.)

STATE LISTS


Michigan Critical Materials Register:	Not listed
California Proposition 65:	Not listed
Massachusetts Substance List:	5 F8
Pennsylvania Hazard Substance List:	E

FOREIGN LISTS

Canadian Domestic Substances List (DSL)	Listed
Canadian Ingredient Disclosure List	Listed
European Inventory of Existing Chemical Substances (EINECS)	2317603

Section 16 Other Information

NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
OSHA	Occupational Safety and Health Administration
NTP	National Toxicology Program
IARC	International Agency for Research on Cancer
TSCA	Toxic Substances Control Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
PEL-C	OSHA Permissible Exposure Limit-OSHA Ceiling Exposure Limit
TLV-TWA	Threshold Limit Value - Time Weighted Average (American Conference of Governmental Industrial Hygienists)


Kenneth Krogulski
May 2000


CARUS



The information contained is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change; and the conditions of handling, use or misuse of the product are beyond our control. Carus Chemical Company makes no warranty, either express or implied including any warranties of merchantability and fitness for a particular purpose. Carus also disclaims all liability for reliance on the completeness or confirming accuracy of any information included herein. Users should satisfy themselves that they are aware of all current data relevant to their particular uses.

CAIROX® is registered trademark of Carus Corporation.

Responsible Care® is a service mark of the Chemical Manufacturers Association.

Rev. 5/ 00 Form # CX 1028



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name SODIUM PERMANGANATE, 40%, SOLUTION in WATER
Catalog # 5219
Version # 01
Revision date 20-Aug-2010
CAS # Mixture
CAS # 10101-50-5
Manufacturer information GFS Chemicals, Inc.
P.O. Box 245
Powell, OH 43065 US
www.gfschemicals.com
Fax 740-881-5989
Phone 740-881-5501
Toll Free 800-858-9682
Emergency Assistance Chemtrec 800-424-8300

2. Hazards Identification

Emergency overview DANGER -- OXIDIZER
Contact with combustible material may cause fire.

Harmful if inhaled. Harmful if swallowed. Harmful if absorbed through skin. Irritating to skin. Irritating to eyes. Irritating to respiratory system.

OSHA regulatory status This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

Potential health effects

Routes of exposure Inhalation. Ingestion. Skin contact. Eye contact.

Eyes Harmful in contact with eyes. Causes eye irritation. Avoid contact with eyes.

Skin Harmful in contact with skin. Irritating to skin. Avoid contact with the skin.

Inhalation Harmful if inhaled. Irritating to respiratory system. Avoid breathing dust/fume/gas/mist/vapors/spray.

Ingestion Harmful if swallowed. Do not ingest.

Potential environmental effects Ecological injuries are not known or expected under normal use.

3. Composition / Information on Ingredients

Hazardous components	CAS #	Percent
SODIUM PERMANGANATE, MONOHYDRATE	79048-36-5	40 - 60
Non-hazardous components	CAS #	Percent
WATER	7732-18-5	40 - 60

Composition comments

US OSHA Table Z-1-A: Ceiling Limit Value (mg/m³)

SODIUM PERMANGANATE, 79048-36-5 MGM3 - 5
MONOHYDRATE

4. First Aid Measures

First aid procedures

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Skin contact Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. Wash clothing separately before reuse.

Inhalation

Move to fresh air. For breathing difficulties, oxygen may be necessary. Do not use mouth-to-mouth method if victim inhaled the substance. Call a physician or poison control center immediately.

Ingestion

Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

General advice

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties

May explode from heat or contamination. Contact with combustible material may cause fire. These substances will accelerate burning when involved in a fire. Some will react explosively with hydrocarbons (fuels). Some may decompose explosively when heated or involved in a fire. Runoff may create fire or explosion hazard.

Extinguishing media**Suitable extinguishing media**

Water. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Protection of firefighters**Protective equipment and precautions for firefighters**

Do not move cargo or vehicle if cargo has been exposed to heat. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do so without risk. In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

Specific methods

In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers.

6. Accidental Release Measures

Personal precautions

Keep unnecessary personnel away. Isolate spill or leak area immediately for at least 50 to 100 meters (150 to 330 feet) in all directions. Keep upwind. Keep out of low areas. Keep people away from and upwind of spill/leak. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Ventilate closed spaces before entering them. Ensure adequate ventilation. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep combustibles away from spilled material.

Environmental precautions

Runoff from fire control or dilution water may cause pollution.

Methods for containment

Stop leak if you can do so without risk. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.

Methods for cleaning up

Dilute with plenty of water. Wipe up with absorbent material (e.g. cloth, fleece).

Never return spills in original containers for re-use.

7. Handling and Storage

Handling

DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Keep away from clothing and other combustible materials. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid contact with skin. Avoid contact with eyes. Avoid contact with clothing. Wear personal protective equipment. Do not use in areas without adequate ventilation. Wash thoroughly after handling.

Storage

Store in a well-ventilated place. Keep container tightly closed. Do not store near combustible materials. Keep out of the reach of children. Use care in handling/storage.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	CAS #	Type	Value	Form
SODIUM PERMANGANATE, MONOHYDRATE	79048-36-5	TWA	0.2 mg/m3	

U.S. - OSHA

Components	CAS #	Type	Value	Form
SODIUM PERMANGANATE, MONOHYDRATE	79048-36-5	Ceiling	5 mg/m3	

Engineering controls

Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Respiratory protection

Wear positive pressure self-contained breathing apparatus (SCBA).

Hand protection

Wear protective gloves.

Eye / face protection

Avoid contact with eyes. Chemical goggles are recommended. Face-shield.

Skin protection

Avoid contact with the skin. Wear chemical protective equipment that is specifically recommended by the manufacturer. Wear suitable protective clothing. Wear protective gloves.

General hygiene considerations

When using do not smoke. Avoid contact with eyes. Avoid contact with skin. Avoid contact with clothing. Keep away from food and drink. Handle in accordance with good industrial hygiene and safety practice.

General

Avoid contact with skin. Avoid contact with eyes. Eye wash fountains are required. Emergency showers are required.

9. Physical & Chemical Properties

Appearance	Liquid.
Color	Dark purple.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Liquid.
Form	Aqueous solution.
pH	Not available.
Melting point	< 32 °F (< 0 °C)
Freezing point	Not available.
Boiling point	> 212 °F (> 100 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	1.39
Relative density	1.39 g/cm3
Solubility (water)	Miscible.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Percent volatile	> 55 %

Molecular formula NaMnO₄

10. Chemical Stability & Reactivity Information

Chemical stability Material is stable under normal conditions. Decomposes on heating.
Incompatible materials Reducing agents.
Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Local effects Irritating to respiratory system. Irritating to eyes. Irritating to skin.
Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

12. Ecological Information

Ecotoxicity This product has no known eco-toxicological effects.
Persistence and degradability Not available.

13. Disposal Considerations

Waste codes D001: Waste Flammable material with a flash point <140 F
Disposal instructions Dispose of this material and its container to hazardous or special waste collection point. If discarded, this product is considered a RCRA ignitable waste, D001. Dispose in accordance with all applicable regulations.

14. Transport Information

DOT

Basic shipping requirements:

Proper shipping name Permanganates, inorganic, aqueous solution, n.o.s.
Hazard class 5.1
UN number UN3214
Packing group II

Additional information:

Special provisions 26, IB2, T4, TP1
Packaging exceptions 152
Packaging non bulk 202
Packaging bulk 242
ERG number 140



15. Regulatory Information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

SODIUM PERMANGANATE, 79048-36-5 1.0 % N450
MONOHYDRATE

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

SODIUM PERMANGANATE, 79048-36-5 N450 Listed.
MONOHYDRATE

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance No

Section 311 hazardous chemical Yes

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

SODIUM PERMANGANATE, 79048-36-5 500 LBS
MONOHYDRATE

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 2
Flammability: 0
Physical hazard: 2

NFPA ratings
Health: 2
Flammability: 0
Instability: 1

Disclaimer
The information in the sheet was written based on the best knowledge and experience currently available. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Issue date 20-Aug-2010

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 1 - Chemical Product and Company Identification ***

Chemical Name: Sodium Persulfate

Product Use: For Commercial Use, Not To Be Used As A Pesticide

Synonyms: Peroxydisulfuric Acid, Disodium Salt; Disodium Peroxodisulphate; Disodium Peroxodisulfate; Disodium Peroxydisulfate; Disodium Persulfate; Sodium Peroxodisulfate; Sodium Peroxydisulfate

Supplier Information

Chem One Ltd.

8017 Pinemont Drive, Suite 100

Houston, Texas 77040-6519

Phone: (713) 896-9966

Fax: (713) 896-7540

Emergency # (800) 424-9300 or (703) 527-3887

General Comments

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

*** Section 2 - Composition / Information on Ingredients ***

CAS #	Component	Percent
7775-27-1	Sodium Persulfate	90-100%

Component Information/Information on Non-Hazardous Components

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

*** Section 3 - Hazards Identification ***

Emergency Overview

Sodium Persulfate is an odorless, white solid in crystalline powder form. The primary health hazard associated with this product is the potential for irritation of the eyes, skin, nose and other tissues that come in contact with dusts or particulates of this product. Contact with this product may cause allergic reactions. This product is a powerful oxidizer and can act to initiate and sustain the combustion of combustible materials. Thermal decomposition of this product produces irritating vapors and toxic gases (e.g. sulfur oxides and sodium oxides). Emergency responders should wear proper personal protective equipment for the releases to which they are responding.

Hazard Statements

DANGER! STRONG OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES IRRITATION TO EYES, SKIN, AND RESPIRATORY TRACT. MAY CAUSE RESPIRATORY SENSITIZATION AND ALLERGIC REACTION BY INHALATION. Keep from contact with combustible materials. Avoid contact with eyes and skin. Avoid breathing dusts. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation.

Potential Health Effects: Eyes

Exposure to particulates or solution of this product may cause irritation of the eyes with symptoms such as stinging, tearing and redness. Prolonged contact may cause chemical burns.

Potential Health Effects: Skin

This product can cause irritation of the skin, with symptoms such as reddening, discomfort and itching. Prolonged skin contact may lead to severe irritation or chemical burns. Prolonged or repeated contact may cause allergic skin reactions.

Potential Health Effects: Ingestion

Ingestion of this product can cause nausea, vomiting, abdominal cramps, headache, and possible burns. Ingestion of large volumes of this product may be fatal.

Potential Health Effects: Inhalation

Breathing dusts or particulates generated by this product can lead to irritation of the nose, throat or respiratory system. Symptoms of such exposure could include coughing and sneezing. Repeated or prolonged exposure can cause an asthma-like allergic reaction. Symptoms of such reaction can include wheezing, difficulty breathing, and nasal congestion.

HMIS Ratings: Health Hazard: 2* Fire Hazard: 0 Physical Hazard: 1

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 4 - First Aid Measures ***

First Aid: Eyes

In case of contact with eyes, rinse immediately with plenty of water for at least 20 minutes. Seek immediate medical attention.

First Aid: Skin

Remove all contaminated clothing. For skin contact, wash thoroughly with soap and water for at least 20 minutes. Seek immediate medical attention if irritation develops or persists.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 4 - First Aid Measures (Continued) ***

First Aid: Ingestion

DO NOT INDUCE VOMITING. Have victim rinse mouth thoroughly with water, if conscious. Never give anything by mouth to a victim who is unconscious or having convulsions. Contact a physician or poison control center immediately.

First Aid: Inhalation

Remove source of contamination or move victim to fresh air. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Get immediate medical attention.

First Aid: Notes to Physician

Provide general supportive measures and treat symptomatically.

*** Section 5 - Fire Fighting Measures ***

Flash Point: Not flammable

Upper Flammable Limit (UEL): Not applicable

Auto Ignition: Not applicable

Rate of Burning: Not applicable

Method Used: Not applicable

Lower Flammable Limit (LEL): Not applicable

Flammability Classification: Not applicable

General Fire Hazards

Sodium Persulfate is not combustible; however, it is a strong oxidizer, which can act to initiate and sustain the combustion of flammable materials. Contact with combustible materials, flammable materials or powdered metals can cause fire or explosion. Sodium Persulfate can ignite when shocked. Damp Sodium Persulfate in contact with combustible materials may cause spontaneous combustion. When involved in a fire, this material may decompose and produce irritating vapors, acrid smoke and toxic gases (e.g. sulfur oxides and sodium oxide). Closed containers may explode when exposed to heat.

Hazardous Combustion Products

Sodium oxide and sulfur oxides.

Extinguishing Media

Use water only, do not use dry chemical, CO2 or halon. Flood fire with water from a distance.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing including self-contained breathing apparatus. Cool containers with flooding quantities of water. For large fires, use unmanned hoses or monitor nozzles; if this is not possible, withdraw from area and let fire burn. If possible control runoff from fire control or dilution water to prevent environmental contamination.

NFPA Ratings: Health: 2 Fire: 0 Reactivity: 1 Other: Oxidizer

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Stop the flow of material, if this can be done without risk. Contain the discharged material. If sweeping of a contaminated area is necessary use a dust suppressant agent, which does not react with product. Wipe down area routinely to avoid the accumulation of dusts.

Clean-Up Procedures

Keep combustible materials away from spilled material. Small releases can be cleaned-up wearing gloves, goggles and suitable body protection. In case of a large spill (in which excessive dusts can be generated), clear the affected area, protect people, and respond with trained personnel. Place all spill residues in an appropriate container and seal. Thoroughly wash the area after a spill or leak clean-up. Prevent rinsate of spill area from contamination to sewer, groundwater or soil.

Evacuation Procedures

Evacuate the area promptly and keep upwind of the spilled material. Isolate the spill area to prevent people from entering. In case of large spills, follow all facility emergency response procedures.

Special Procedures

Remove soiled clothing and laundry before reuse. Avoid all skin contact with the spilled material. Have emergency equipment readily available.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 7 - Handling and Storage ***

Handling Procedures

All personnel who handle this material, should be thoroughly trained to handle it safely. Do not breathe dust. Avoid all contact with skin and eyes. Wherever dust clouds may be generated, eliminate sparks, flames and other ignition sources. Use this product only with adequate ventilation. Wash thoroughly after handling. Care should be taken to avoid the accumulation of dusts, which can create a serious dust-explosion hazard.

Storage Procedures

Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion- and fire-resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area. Floors should be sealed to prevent absorption of this material. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers).

Empty containers may contain residual particulates; therefore, empty containers should be handled with care. Do not cut, grind, weld, or drill near this container. Never store food, feed, or drinking water in containers that held this product. Keep this material away from food, drink and animal feed. Do not store this material in open or unlabeled containers. Limit quantity of material stored.

*** Section 8 - Exposure Controls / Personal Protection ***

Exposure Guidelines

A: General Product Information

Follow the applicable exposure limits.

B: Component Exposure Limits

Sodium Persulfate (7775-27-1)

ACGIH: 0.1 mg/m³ TWA

Engineering Controls

Use mechanical ventilation such as dilution and local exhaust.

PERSONAL PROTECTIVE EQUIPMENT

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent Standards of Canada. Please reference applicable regulations and standards for relevant details.

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields or chemical goggles. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

Personal Protective Equipment: Skin

Wear impervious gloves. Neoprene, PVC, rubber or equivalent gloves are recommended. Wear long-sleeved shirt and trousers. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

Personal Protective Equipment: Respiratory

No specific guidelines are available. If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection. Special applications may necessitate the use of more stringent respiratory protection. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection.

Personal Protective Equipment: General

Have an eyewash fountain and safety shower available in the work area. Wash hands thoroughly after handling material.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 9 - Physical & Chemical Properties ***

Physical Properties: Additional Information

The data provided in this section are to be used for product safety handling purposes. Please refer to Product Data Sheets, Certificates of Conformity or Certificates of Analysis for chemical and physical data for determinations of quality and for formulation purposes.

Appearance:	White crystalline powder	Odor:	Odorless
Physical State:	Solid	pH:	6.0 (1% solution)
Vapor Pressure:	Not applicable	Vapor Density:	Not applicable
Boiling Point:	Not available	Melting Point:	Not available
Solubility (H₂O):	549 g/L @ 20 deg C	Specific Gravity:	2.4 (H ₂ O = 1)
Freezing Point:	Not applicable	Particle Size:	Not available
Softening Point:	Not applicable	Bulk Density:	Not available
Molecular Weight:	238.13	Chemical Formula:	Na ₂ S ₂ O ₈

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

Gradually decomposes; promoted by moisture and high temperatures.

Chemical Stability: Conditions to Avoid

Avoid high temperatures, exposure to air, moisture, friction, shock and incompatible materials.

Incompatibility

Sodium Persulfate is a strong oxidizing agent and presents a serious fire and explosion risk. Do not permit contact with combustible, organic or other oxidizable materials. Avoid contact with strong acids, alkalis, halides, reducing agents, organic materials, combustibles, finely powdered metals, iron, copper, zinc, sodium peroxide, aluminum + water, magnesium, alcohols, hydrazine and organic monomers.

Hazardous Decomposition

Sulfur oxides and sodium oxide.

Hazardous Polymerization

Will not occur.

*** Section 11 – Toxicological Information ***

Acute and Chronic Toxicity

A: General Product Information

May cause eye, skin, nose, throat and respiratory tract irritation. Depending on the duration of contact, over-exposures can irritate or burn the eyes, skin, mucous membranes and any other exposed tissue. If inhaled, irritation of the respiratory system can occur, with coughing and breathing difficulty. May cause allergic skin and respiratory sensitization. Harmful or fatal if swallowed. Chronic: Long term skin overexposure to this product may lead to dermatitis (red, itchy skin).

B: Component Analysis - LD₅₀/LC₅₀

Sodium Persulfate (7775-27-1):

LD₅₀ (Intraperitoneal-Mouse) 226 mg/kg

B: Component Analysis - TDLo/LDLo

LDLo (Intravenous-Rabbit, adult) 178 mg/kg Carcinogenicity

A: General Product Information

No information available.

B: Component Carcinogenicity

This compound is not listed by ACGIH, IARC, OSHA, NIOSH or NTP.

Epidemiology

No information available.

Neurotoxicity

No information available.

Mutagenicity

No information available.

Teratogenicity

No information available.

Other Toxicological Information

None.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 12 - Ecological Information ***

Ecotoxicity

A: General Product Information

No information available.

B: Ecotoxicity

Sodium Persulfate:

LC₅₀ (*Poecilia reticulata* Guppy) 48 hours = 631000 µg/L; LC₅₀ (*Cyclops strenuus* Cyclopoid copepod) 48 hours = 649,000 µg/L

Environmental Fate

No data available for this product.

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

A: General Product Information

This product may be considered an EPA Waste D001 (Ignitable-Oxidizer).

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this compound.

Disposal Instructions

All wastes must be handled in accordance with local, state and federal regulations or with regulations of Canada and its Provinces. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

*** Section 14 - Transportation Information ***

NOTE: The data in this section (Section 14) are meant as a guide to the overall classification of the product. However, transportation classifications may be subject to change with changes in package size. Consult shipper requirements under I.M.O., I.C.A.O. (I.A.T.A.) and 49 CFR to assure regulatory compliance.

US DOT Information

UN/NA #: UN 1505

Shipping Name: Sodium persulfate

Hazard Class: 5.1

Packing Group: III

Required Label(s): 5.1

Additional Shipping Information

The Limited Quantities of Division 5.1 materials exception [49 CFR 173.152 (b)] may be applicable to shipments of Sodium Persulfate if each inner packaging does not exceed 5.0 kg (11 pounds) and packaged in strong outer packages not to exceed 30 kg (66 pounds). Such shipments need not be marked with the Proper Shipping Name of the contents, but shall be marked with the UN Number (1505) of the contents, preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. For a shipment by air the class 5.1 label will be required.

International Air Transport Association (IATA):

For Shipments by Air transport: This information applies to air shipments both within the U.S. and for shipments originating in the U.S., but being shipped to a different country

UN/NA #: UN 1505

Proper Shipping Name: Sodium persulfate

Hazard Class: 5.1

Packing Group: III

Passenger & Cargo Aircraft Packing Instruction: 516

Passenger & Cargo Aircraft Maximum Net Quantity: 25 kg

Limited Quantity Packing Instruction (Passenger & Cargo Aircraft): Y516

Limited Quantity Maximum Net Quantity (Passenger & Cargo Aircraft): 10 kg

Cargo Aircraft Only Packing Instruction: 518

Cargo Aircraft Only Maximum Net Quantity: 100 kg

Special Provisions: None

ERG Code: 5L

Limited Quantity Shipments: Such shipments must be marked with the proper shipping name, UN number, and must be additionally marked with the words "LIMITED QUANTITIES" or "LTD. QTY". The total weight of each outer packaging cannot exceed 30 kg (66 pounds). For a shipment by air the class 5.1 label will be required.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 14 - Transportation Information (Continued) ***

International Maritime Organization (I.M.O.) Classification

For shipments via marine vessel transport, the following classification information applies.

UN/NA #: UN 1505

Proper Shipping Name: SODIUM PERSULPHATE

Hazard Class: class 5.1

Packing Group: III

Special Provisions: None

Limited Quantities: 5 kg

Packing Instructions: P002, LP02

IBC Instructions: IBC08

IBC Provisions: B3

EmS: F-A, S-Q

Stowage and Segregation: Category A.

Limited Quantity Shipments: Such shipments need not be marked with the Proper Shipping Name of the contents, but shall be marked with the UN Number (1505) of the contents, preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. The total weight of each outer packaging cannot exceed 30 kg (66 pounds).

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

No additional information.

B: Component Analysis

This material contains no chemical component required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

SARA 302 There are no specific Threshold Planning Quantities for Sodium Persulfate. The default Federal MSDS submission (EHS TPQ) and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

C: Sara 311/312 Tier II Hazard Ratings:

Component	CAS #	Fire Hazard	Reactivity Hazard	Pressure Hazard	Immediate Health Hazard	Chronic Health Hazard
Sodium Persulfate	7775-27-1	Yes	No	No	Yes	Yes

State Regulations

A: General Product Information

California Proposition 65

Sodium Persulfate is not on the California Proposition 65 chemical lists.

B: Component Analysis - State

Sodium Persulfate appears on one or more of the following state hazardous substance lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Sodium Persulfate	7775-27-1	No	No	No	No	Yes	No

Other Regulations

A: General Product Information

No other information available.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Sodium Persulfate	7775-27-1	Yes	Yes	Yes

C: Component Analysis - WHMIS IDL

Sodium Persulfate is not identified under the Canadian Hazardous Products Act Ingredient Disclosure List.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 15 - Regulatory Information (Continued)***

ANSI LABELING (Z129.1): **DANGER!** STRONG OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE FIRE. MAY BE FATAL IF SWALLOWED. MAY CAUSE SKIN AND EYE IRRITATION OR BURNS. HARMFUL IF INHALED. MAY CAUSE RESPIRATORY SENSITIZATION AND ALLERGIC REACTION BY INHALATION. Keep from contact with clothing and other combustible material. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing dusts and particulates. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, faceshields, suitable body protection, and NIOSH/MSHA-approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water only. Do not use dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Clean-up spilled material by dry-sweeping or vacuum, avoiding the generation of dusts. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

*** Section 16 - Other Information ***

Other Information

Chem One Ltd. ("Chem One") shall not be responsible for the use of any information, product, method, or apparatus herein presented ("Information"), and you must make your own determination as to its suitability and completeness for your own use, for the protection of the environment, and for health and safety purposes. You assume the entire risk of relying on this Information. In no event shall Chem One be responsible for damages of any nature whatsoever resulting from the use of this product or products, or reliance upon this Information. By providing this Information, Chem One neither can nor intends to control the method or manner by which you use, handle, store, or transport Chem One products. If any materials are mentioned that are not Chem One products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed. Chem One makes no representations or warranties, either express or implied of merchantability, fitness for a particular purpose or of any other nature regarding this information, and nothing herein waives any of Chem One's conditions of sale. This information could include technical inaccuracies or typographical errors. Chem One may make improvements and/or changes in the product (s) and/or the program (s) described in this information at any time. If you have any questions, please contact us at Tel. 713-896-9966 or E-mail us at Safety@chemone.com.

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration

Contact: Sue Palmer-Koleman, PhD

Contact Phone: (713) 896-9966

Revision Log

09/19/00 3:00 PM SEP Changed company name, Sect 1 and 16, from Corporation to Ltd.
08/20/01 4:30 PM CLJ Changed contact to Sue, non-800 Chemtrec Num.
03/18/21 5:26 PM HDF Checked exposure limits; overall review, add SARA 311/312 Haz Ratings.
07/31/03 5:30 pm HDF General review of entire MSDS. Up-graded Section 10 Reactivity Information. Up-Dated entire Section 14 Transportation Information to include IATA, IMO transport information.
06/22/05 1:32 PM SEP Update IATA Section 14
09/05/06 4:33 pm SEP Updated DOT and IMO Section 14

This is the end of MSDS # C1-180

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tět'rə-klôr' ō-ěth'ə-lēn')

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- ☐ Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- ☐ Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- ☐ In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- ☐ It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- ☐ When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- ☐ When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

ToxFAQs Internet home page via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

ene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be per-

formed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- ❑ Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- ❑ Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- ❑ Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- ❑ Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- ❑ Trichloroethylene does not build up significantly in

plants and animals.

How might I be exposed to trichloroethylene?

- ❑ Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- ❑ Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- ❑ Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- ❑ Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is “reasonably anticipated to be a human carcinogen.” The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is “probably carcinogenic to humans.”

Is there a medical test to show whether I’ve been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood

and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn’t available at most doctors’ offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

This fact sheet answers the most frequently asked health questions (FAQs) about 1,2-dichloroethene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,2-dichloroethene occurs mainly in workplaces where it is made or used. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired. *cis*-1,2-Dichloroethene has been found in at least 146 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). *trans*-1,2-Dichloroethene was found in at least 563 NPL sites. 1,2-Dichloroethene was found at 336 sites, but the isomer (*cis*- or *trans*-) was not specified.

What is 1,2-dichloroethene?

(Pronounced 1,2-dī-klôr' ô-ěth'ēn)

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. You can smell very small amounts of 1,2-dichloroethene in air (about 17 parts of 1,2-dichloroethene per million parts of air [17 ppm]).

There are two forms of 1,2-dichloroethene; one is called *cis*-1,2-dichloroethene and the other is called *trans*-1,2-dichloroethene. Sometimes both forms are present as a mixture.

What happens to 1,2-dichloroethene when it enters the environment?

- ☐ 1,2-Dichloroethene evaporates rapidly into air.
- ☐ In the air, it takes about 5-12 days for half of it to break down.
- ☐ Most 1,2-dichloroethene in the soil surface or bodies of water will evaporate into air.
- ☐ 1,2-Dichloroethene can travel through soil or dissolve in water in the soil. It is possible that it can contaminate groundwater.
- ☐ In groundwater, it takes about 13-48 weeks to break down.

- ☐ There is a slight chance that 1,2-dichloroethene will break down into vinyl chloride, a different chemical which is believed to be more toxic than 1,2-dichloroethene.

How might I be exposed to 1,2-dichloroethene?

- ☐ Breathing 1,2-dichloroethene that has leaked from hazardous waste sites and landfills.
- ☐ Drinking contaminated tap water or breathing vapors from contaminated water while cooking, bathing, or washing dishes.
- ☐ Breathing 1,2-dichloroethene, touching it, or touching contaminated materials in the workplace.

How can 1,2-dichloroethene affect my health?

Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired; breathing very high levels can kill you.

When animals breathed high levels of *trans*-1,2-dichloroethene for short or longer periods of time, their livers and lungs were damaged and the effects were more severe with longer exposure times. Animals that breathed very high

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levels of *trans*-1,2-dichloroethene had damaged hearts.

Animals that ingested extremely high doses of *cis*- or *trans*-1,2-dichloroethene died.

Lower doses of *cis*-1,2-dichloroethene caused effects on the blood, such as decreased numbers of red blood cells, and also effects on the liver.

The long-term (365 days or longer) human health effects after exposure to low concentrations of 1,2-dichloroethene aren't known. One animal study suggested that an exposed fetus may not grow as quickly as one that hasn't been exposed.

Exposure to 1,2-dichloroethene hasn't been shown to affect fertility in people or animals.

How likely is 1,2-dichloroethene to cause cancer?

The EPA has determined that *cis*-1,2-dichloroethene is not classifiable as to its human carcinogenicity.

No EPA cancer classification is available for *trans*-1,2-dichloroethene.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethene?

Tests are available to measure concentrations of the breakdown products of 1,2-dichloroethene in blood, urine, and tissues. However, these tests aren't used routinely to determine whether a person has been exposed to this compound. This is because after you are exposed to 1,2-dichloroethene, the breakdown products in your body that are detected with these tests may be the same as those that come from exposure to other chemicals. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum allowable level of *cis*-1,2-dichloroethene in drinking water at 0.07 milligrams per liter of water (0.07 mg/L) and *trans*-1,2-dichloroethene at 0.1 mg/L.

The EPA requires that any spills or accidental release of 1,000 pounds or more of 1,2-dichloroethene must be reported to the EPA.

The Occupational Health Safety and Health Administration (OSHA) has set the maximum allowable amount of 1,2-dichloroethene in workroom air during an 8-hour workday in a 40-hour workweek at 200 parts of 1,2-dichloroethene per million parts of air (200 ppm).

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Fertility: Ability to reproduce.

Ingest: To eat or drink something.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Solvent: A chemical that can dissolve other substances.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for 1,2-Dichloroethene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



MATERIAL SAFETY DATA SHEET

CAIROX® Potassium Permanganate

Section 1 Chemical Product and Company Identification

PRODUCT NAME: CAIROX® potassium permanganate, KMnO_4
SYNONYMS: Permanganic acid potassium salt
Chameleon mineral
Condy's crystals
Permanganate of potash

MANUFACTURER'S NAME: CARUS CHEMICAL COMPANY

MANUFACTURER'S ADDRESS:

Carus Chemical Company
1500 Eighth Street
P. O. Box 1500
LaSalle, IL 61301

TRADE NAME: CAIROX® potassium permanganate

TELEPHONE NUMBER FOR INFORMATION: 815/223-1500

EMERGENCY TELEPHONE NO: 800/435-6856

AFTER HOURS NO. 815/223-1565

5:00 PM-8:00 AM Central Standard Time
Monday-Friday, Weekends and Holidays

CHEMTREC TELEPHONE NO.: 800/424-9300

Section 2 Composition/Information on Ingredients

<u>Material or component</u>	<u>CAS No.</u>	<u>%</u>	<u>Hazard Data</u>
Potassium permanganate	7722-64-7	97% min. KMnO_4	PEL-C 5 mg Mn per cubic meter of air
			TLV-TWA 0.2 mg Mn per cubic meter of air

Section 3 Hazards Identification

1. Eye Contact

Potassium permanganate is damaging to eye tissue on contact. It may cause severe burns that result in damage to the eye.

2. Skin Contact

Contact of solutions at room temperature may be irritating to the skin, leaving brown stains. Concentrated solutions at elevated temperature and crystals are damaging to the skin.

3. Inhalation

Acute inhalation toxicity data are not available. However, airborne concentrations of potassium permanganate in the form of dust or mist may cause damage to the respiratory tract.

4. Ingestion

Potassium permanganate, if swallowed, may cause severe burns to mucous membranes of the mouth, throat, esophagus, and stomach.

Section 4 First Aid Measures

1. Eyes

Immediately flush eyes with large amounts of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Do not attempt to neutralize chemically. Seek medical attention immediately. Note to physician: Soluble decomposition products are alkaline. Insoluble decomposition product is brown manganese dioxide.

2. Skin

Immediately wash contaminated areas with large amounts of water. Remove contaminated clothing and footwear. Wash clothing and decontaminate footwear before reuse. Seek medical attention immediately if irritation is severe or persistent.

3. Inhalation

Remove person from contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. Seek medical attention immediately.

4. Ingestion

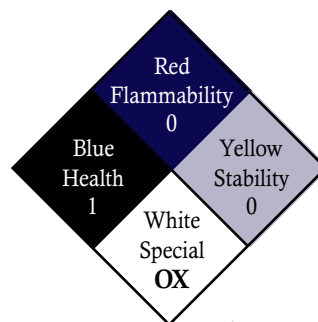
Never give anything by mouth to an unconscious or convulsing person. If person is conscious, give large quantities of water. Seek medical attention immediately.

Section 5 Fire Fighting Measures

NFPA* HAZARD SIGNAL

Health Hazard (less than 1 hour exposure)	1	=	Materials which under fire conditions would give off irritating combustion products. Materials which on the skin could cause irritation.
Flammability Hazard	0	=	Materials that will not burn.
Reactivity Hazard	0	=	Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.
Special Hazard	OX	=	Oxidizer

*National Fire Protection Association 704



FIRST RESPONDERS:

Wear protective gloves, boots, goggles, and respirator. In case of fire, wear positive pressure breathing apparatus. Approach site of incident with caution. Use Emergency Response Guide NAERG 96 (RSPA P5800.7). Guide No. 140.

FLASHPOINT

None

FLAMMABLE OR EXPLOSIVE LIMITS

Lower: Nonflammable

Upper: Nonflammable

EXTINGUISHING MEDIA

Use large quantities of water. Water will turn pink to purple if in contact with potassium permanganate. Dike to contain. Do not use dry chemicals, CO₂, Halon® or foams.

SPECIAL FIREFIGHTING PROCEDURES

If material is involved in fire, flood with water. Cool all affected containers with large quantities of water. Apply water from as far a distance as possible. Wear self-contained breathing apparatus and full protective clothing.

Section 6 Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Clean up spills immediately by sweeping or shoveling up the material. Do not return spilled material to the original container. Transfer to a clean metal drum. EPA banned the land disposal of D001 ignitable waste oxidizers. These wastes must be deactivated by reduction. To clean floors, flush with abundant quantities of water into sewer, if permitted by Federal, State, and Local regulations. If not permitted, collect water and treat chemically (Section 13).

PERSONAL PRECAUTIONS

Personnel should wear protective clothing suitable for the task. Remove all ignition sources and incompatible materials before attempting clean-up.

Section 7 Handling and Storage

WORK/HYGENIC PRACTICES

Wash hands thoroughly with soap and water after handling potassium permanganate, and before eating or smoking. Wear proper protective equipment. Remove contaminated clothing.

VENTILATION REQUIREMENTS

Provide sufficient area or local exhaust to maintain exposure below the TLV-TWA.

CONDITIONS FOR SAFE STORAGE

Store in accordance with NFPA 430 requirements for Class II oxidizers. Protect containers from physical damage. Store in a cool, dry area in closed containers. Segregate from acids, peroxides, formaldehyde, and all combustible, organic or easily oxidizable materials including anti-freeze and hydraulic fluid.

Section 8 Exposure Controls/Personal Protection

RESPIRATORY PROTECTION

In the case where overexposure may exist, the use of an approved NIOSH-MSHA dust respirator or an air supplied respirator is advised. Engineering or administrative controls should be implemented to control dust.

EYE

Faceshield, goggles, or safety glasses with side shields should be worn. Provide eye wash in working area.

GLOVES

Rubber or plastic gloves should be worn.

OTHER PROTECTIVE EQUIPMENT

Normal work clothing covering arms and legs, and rubber or plastic apron should be worn.



CARUS CHEMICAL COMPANY

Section 9 Physical and Chemical Properties

APPEARANCE AND ODOR	Dark purple solid with a metallic luster, odorless
BOILING POINT, 760 mm Hg	Not applicable
VAPOR PRESSURE (mm Hg)	Not applicable
SOLUBILITY IN WATER % BY SOLUTION	6% at 20°C (68°F), and 20% at 65°C (149°F)
PERCENT VOLATILE BY VOLUME	Not volatile
EVAPORATION RATE (BUTYL ACETATE=1)	Not applicable
MELTING POINT	Starts to decompose with evolution of oxygen (O ₂) at temperatures above 150°C (302°F). Once initiated, the decomposition is exothermic and self-sustaining.
OXIDIZING PROPERTIES	Strong oxidizer
SPECIFIC GRAVITY	2.7 @ 20°C (68°F)
VAPOR DENSITY (AIR=1)	Not applicable

Section 10 Stability and Reactivity

STABILITY Under normal conditions, the material is stable.

CONDITIONS TO AVOID Contact with incompatible materials or heat (>150°C/302°F).

INCOMPATIBLE MATERIALS Acids, peroxides, formaldehyde, anti-freeze, hydraulic fluids, and all combustible organic or readily oxidizable inorganic materials including metal powders. With hydrochloric acid, toxic chlorine gas is liberated.

HAZARDOUS DECOMPOSITION PRODUCTS When involved in a fire, potassium permanganate may liberate corrosive fumes.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION Material is not known to polymerize.

Section 11 Toxicological Information

Potassium permanganate: Acute oral LD₅₀(rat) = 780 mg/kg Male (14 days); 525 mg/kg Female (14 days)
The fatal adult human dose by ingestion is estimated to be 10 grams. (Ref. Handbook of Poisoning: Prevention, Diagnosis & Treatment, Twelfth Edition)

EFFECTS OF OVEREXPOSURE

1. Acute Overexposure
Irritating to body tissue with which it comes into contact.
2. Chronic Overexposure
No known cases of chronic poisoning due to potassium permanganate have been reported. Prolonged exposure, usually over many years, to heavy concentrations of manganese oxides in the form of dust and fumes, may lead to chronic manganese poisoning, chiefly involving the central nervous system.
3. Carcinogenicity
Potassium permanganate has not been classified as a carcinogen by OSHA, NTP, IARC.
4. Medical Conditions Generally Aggravated by Exposure
Potassium permanganate will cause further irritation of tissue, open wounds, burns or mucous membranes.

Registry of Toxic Effects of Chemical Substances
RTECS #SD6476000



CARUS CHEMICAL COMPANY

Section 12 Ecological Information

Entry to the Environment

Potassium Permanganate has a low estimated lifetime in the environment, being readily converted by oxidizable materials to insoluble manganese dioxide (MnO_2).

Bioconcentration Potential

In non-reducing and non-acidic environments manganese dioxide (MnO_2) is insoluble and has a very low bioaccumulative potential.

Aquatic Toxicity

Rainbow trout, 96 hour LC_{50} : 1.8 mg/L
Bluegill sunfish, 96 hour LC_{50} : 2.3 mg/L

Section 13 Disposal Consideration

DEACTIVATION OF D001 IGNITABLE WASTE OXIDIZERS BY CHEMICAL REDUCTION

Reduce potassium permanganate in aqueous solutions with sodium thiosulfate (Hypo), or sodium bisulfite or ferrous salt solution. The thiosulfite or ferrous salt may require some dilute sulfuric acid to promote rapid reduction. If acid was used, neutralize with sodium bicarbonate to neutral pH. Decant or filter, and mix the sludge with sodium carbonate and deposit in an approved landfill. Where permitted, the sludge can be drained into sewer with large quantities of water. Use caution when reacting chemicals. Contact Carus Chemical Company for additional recommendations.

Section 14 Transport Information

U. S. DEPARTMENT OF TRANSPORTATION INFORMATION:

Proper Shipping Name: 49 CFR 172.101 Potassium Permanganate
ID Number: 49 CFR 172.101 UN 1490
Hazard Class: 49 CFR 172.101 Oxidizer
Division: 49 CFR 172.101 5.1
Packing Group: 49 CFR 172.101 II

Section 15 Regulatory Information

TSCA Listed in the TSCA Chemical Substance Inventory

CERCLA **Hazardous Substance**

Reportable Quantity: RQ - 100 lb

40 CFR 116.4; 40 CFR 302.4

RCRA Oxidizers such as potassium permanganate meet the criteria of ignitable waste. 40 CFR 261.21

SARA TITLE III Information

Section 302 Extremely hazardous substance: Not listed

Section 311/312 Hazard categories: Fire, acute and chronic toxicity

Section 313 CAIROX® potassium permanganate contains 97% Manganese Compound as part of the chemical structure (manganese compounds CAS Reg. No. N/A) and is subject to the reporting requirements of Section 313 of Title III, Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372.

Section 15 Regulatory Information (cont.)

STATE LISTS

Michigan Critical Materials Register:	Not listed
California Proposition 65:	Not listed
Massachusetts Substance List:	5 F8
Pennsylvania Hazard Substance List:	E

FOREIGN LISTS

Canadian Domestic Substances List (DSL)	Listed
Canadian Ingredient Disclosure List	Listed
European Inventory of Existing Chemical Substances (EINECS)	2317603

Section 16 Other Information

NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
OSHA	Occupational Safety and Health Administration
NTP	National Toxicology Program
IARC	International Agency for Research on Cancer
TSCA	Toxic Substances Control Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
PEL-C	OSHA Permissible Exposure Limit-OSHA Ceiling Exposure Limit
TLV-TWA	Threshold Limit Value - Time Weighted Average (American Conference of Governmental Industrial Hygienists)


Kenneth Krogulski
May 2000


CARUS



The information contained is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change; and the conditions of handling, use or misuse of the product are beyond our control. Carus Chemical Company makes no warranty, either express or implied including any warranties of merchantability and fitness for a particular purpose. Carus also disclaims all liability for reliance on the completeness or confirming accuracy of any information included herein. Users should satisfy themselves that they are aware of all current data relevant to their particular uses.

CAIROX® is registered trademark of Carus Corporation.

Responsible Care® is a service mark of the Chemical Manufacturers Association.

Rev. 5/ 00 Form # CX 1028



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name SODIUM PERMANGANATE, 40%, SOLUTION in WATER
Catalog # 5219
Version # 01
Revision date 20-Aug-2010
CAS # Mixture
CAS # 10101-50-5
Manufacturer information GFS Chemicals, Inc.
P.O. Box 245
Powell, OH 43065 US
www.gfschemicals.com
Fax 740-881-5989
Phone 740-881-5501
Toll Free 800-858-9682
Emergency Assistance Chemtrec 800-424-8300

2. Hazards Identification

Emergency overview DANGER -- OXIDIZER
Contact with combustible material may cause fire.

Harmful if inhaled. Harmful if swallowed. Harmful if absorbed through skin. Irritating to skin. Irritating to eyes. Irritating to respiratory system.

OSHA regulatory status This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

Potential health effects

Routes of exposure Inhalation. Ingestion. Skin contact. Eye contact.

Eyes Harmful in contact with eyes. Causes eye irritation. Avoid contact with eyes.

Skin Harmful in contact with skin. Irritating to skin. Avoid contact with the skin.

Inhalation Harmful if inhaled. Irritating to respiratory system. Avoid breathing dust/fume/gas/mist/vapors/spray.

Ingestion Harmful if swallowed. Do not ingest.

Potential environmental effects Ecological injuries are not known or expected under normal use.

3. Composition / Information on Ingredients

Hazardous components	CAS #	Percent
SODIUM PERMANGANATE, MONOHYDRATE	79048-36-5	40 - 60
Non-hazardous components	CAS #	Percent
WATER	7732-18-5	40 - 60

Composition comments

US OSHA Table Z-1-A: Ceiling Limit Value (mg/m³)

SODIUM PERMANGANATE, 79048-36-5 MGM3 - 5
MONOHYDRATE

4. First Aid Measures

First aid procedures

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Skin contact Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. Wash clothing separately before reuse.

Inhalation

Move to fresh air. For breathing difficulties, oxygen may be necessary. Do not use mouth-to-mouth method if victim inhaled the substance. Call a physician or poison control center immediately.

Ingestion

Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

General advice

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties

May explode from heat or contamination. Contact with combustible material may cause fire. These substances will accelerate burning when involved in a fire. Some will react explosively with hydrocarbons (fuels). Some may decompose explosively when heated or involved in a fire. Runoff may create fire or explosion hazard.

Extinguishing media**Suitable extinguishing media**

Water. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Protection of firefighters**Protective equipment and precautions for firefighters**

Do not move cargo or vehicle if cargo has been exposed to heat. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do so without risk. In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

Specific methods

In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers.

6. Accidental Release Measures

Personal precautions

Keep unnecessary personnel away. Isolate spill or leak area immediately for at least 50 to 100 meters (150 to 330 feet) in all directions. Keep upwind. Keep out of low areas. Keep people away from and upwind of spill/leak. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Ventilate closed spaces before entering them. Ensure adequate ventilation. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep combustibles away from spilled material.

Environmental precautions

Runoff from fire control or dilution water may cause pollution.

Methods for containment

Stop leak if you can do so without risk. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.

Methods for cleaning up

Dilute with plenty of water. Wipe up with absorbent material (e.g. cloth, fleece).

Never return spills in original containers for re-use.

7. Handling and Storage

Handling

DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Keep away from clothing and other combustible materials. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid contact with skin. Avoid contact with eyes. Avoid contact with clothing. Wear personal protective equipment. Do not use in areas without adequate ventilation. Wash thoroughly after handling.

Storage

Store in a well-ventilated place. Keep container tightly closed. Do not store near combustible materials. Keep out of the reach of children. Use care in handling/storage.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	CAS #	Type	Value	Form
SODIUM PERMANGANATE, MONOHYDRATE	79048-36-5	TWA	0.2 mg/m3	

U.S. - OSHA

Components	CAS #	Type	Value	Form
SODIUM PERMANGANATE, MONOHYDRATE	79048-36-5	Ceiling	5 mg/m3	

Engineering controls

Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Respiratory protection

Wear positive pressure self-contained breathing apparatus (SCBA).

Hand protection

Wear protective gloves.

Eye / face protection

Avoid contact with eyes. Chemical goggles are recommended. Face-shield.

Skin protection

Avoid contact with the skin. Wear chemical protective equipment that is specifically recommended by the manufacturer. Wear suitable protective clothing. Wear protective gloves.

General hygiene considerations

When using do not smoke. Avoid contact with eyes. Avoid contact with skin. Avoid contact with clothing. Keep away from food and drink. Handle in accordance with good industrial hygiene and safety practice.

General

Avoid contact with skin. Avoid contact with eyes. Eye wash fountains are required. Emergency showers are required.

9. Physical & Chemical Properties

Appearance	Liquid.
Color	Dark purple.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Liquid.
Form	Aqueous solution.
pH	Not available.
Melting point	< 32 °F (< 0 °C)
Freezing point	Not available.
Boiling point	> 212 °F (> 100 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	1.39
Relative density	1.39 g/cm3
Solubility (water)	Miscible.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Percent volatile	> 55 %

Molecular formula NaMnO₄

10. Chemical Stability & Reactivity Information

Chemical stability Material is stable under normal conditions. Decomposes on heating.
Incompatible materials Reducing agents.
Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Local effects Irritating to respiratory system. Irritating to eyes. Irritating to skin.
Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

12. Ecological Information

Ecotoxicity This product has no known eco-toxicological effects.
Persistence and degradability Not available.

13. Disposal Considerations

Waste codes D001: Waste Flammable material with a flash point <140 F
Disposal instructions Dispose of this material and its container to hazardous or special waste collection point. If discarded, this product is considered a RCRA ignitable waste, D001. Dispose in accordance with all applicable regulations.

14. Transport Information

DOT

Basic shipping requirements:

Proper shipping name Permanganates, inorganic, aqueous solution, n.o.s.
Hazard class 5.1
UN number UN3214
Packing group II

Additional information:

Special provisions 26, IB2, T4, TP1
Packaging exceptions 152
Packaging non bulk 202
Packaging bulk 242
ERG number 140



15. Regulatory Information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

SODIUM PERMANGANATE, 79048-36-5 1.0 % N450
MONOHYDRATE

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

SODIUM PERMANGANATE, 79048-36-5 N450 Listed.
MONOHYDRATE

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance No

Section 311 hazardous chemical Yes

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

SODIUM PERMANGANATE, 79048-36-5 500 LBS
MONOHYDRATE

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 2
Flammability: 0
Physical hazard: 2

NFPA ratings
Health: 2
Flammability: 0
Instability: 1

Disclaimer
The information in the sheet was written based on the best knowledge and experience currently available. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Issue date 20-Aug-2010

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 1 - Chemical Product and Company Identification ***

Chemical Name: Sodium Persulfate

Product Use: For Commercial Use, Not To Be Used As A Pesticide

Synonyms: Peroxydisulfuric Acid, Disodium Salt; Disodium Peroxodisulphate; Disodium Peroxodisulfate; Disodium Peroxydisulfate; Disodium Persulfate; Sodium Peroxodisulfate; Sodium Peroxydisulfate

Supplier Information

Chem One Ltd.

8017 Pinemont Drive, Suite 100

Houston, Texas 77040-6519

Phone: (713) 896-9966

Fax: (713) 896-7540

Emergency # (800) 424-9300 or (703) 527-3887

General Comments

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

*** Section 2 - Composition / Information on Ingredients ***

CAS #	Component	Percent
7775-27-1	Sodium Persulfate	90-100%

Component Information/Information on Non-Hazardous Components

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

*** Section 3 - Hazards Identification ***

Emergency Overview

Sodium Persulfate is an odorless, white solid in crystalline powder form. The primary health hazard associated with this product is the potential for irritation of the eyes, skin, nose and other tissues that come in contact with dusts or particulates of this product. Contact with this product may cause allergic reactions. This product is a powerful oxidizer and can act to initiate and sustain the combustion of combustible materials. Thermal decomposition of this product produces irritating vapors and toxic gases (e.g. sulfur oxides and sodium oxides). Emergency responders should wear proper personal protective equipment for the releases to which they are responding.

Hazard Statements

DANGER! STRONG OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES IRRITATION TO EYES, SKIN, AND RESPIRATORY TRACT. MAY CAUSE RESPIRATORY SENSITIZATION AND ALLERGIC REACTION BY INHALATION. Keep from contact with combustible materials. Avoid contact with eyes and skin. Avoid breathing dusts. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation.

Potential Health Effects: Eyes

Exposure to particulates or solution of this product may cause irritation of the eyes with symptoms such as stinging, tearing and redness. Prolonged contact may cause chemical burns.

Potential Health Effects: Skin

This product can cause irritation of the skin, with symptoms such as reddening, discomfort and itching. Prolonged skin contact may lead to severe irritation or chemical burns. Prolonged or repeated contact may cause allergic skin reactions.

Potential Health Effects: Ingestion

Ingestion of this product can cause nausea, vomiting, abdominal cramps, headache, and possible burns. Ingestion of large volumes of this product may be fatal.

Potential Health Effects: Inhalation

Breathing dusts or particulates generated by this product can lead to irritation of the nose, throat or respiratory system. Symptoms of such exposure could include coughing and sneezing. Repeated or prolonged exposure can cause an asthma-like allergic reaction. Symptoms of such reaction can include wheezing, difficulty breathing, and nasal congestion.

HMIS Ratings: Health Hazard: 2* Fire Hazard: 0 Physical Hazard: 1

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 4 - First Aid Measures ***

First Aid: Eyes

In case of contact with eyes, rinse immediately with plenty of water for at least 20 minutes. Seek immediate medical attention.

First Aid: Skin

Remove all contaminated clothing. For skin contact, wash thoroughly with soap and water for at least 20 minutes. Seek immediate medical attention if irritation develops or persists.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 4 - First Aid Measures (Continued) ***

First Aid: Ingestion

DO NOT INDUCE VOMITING. Have victim rinse mouth thoroughly with water, if conscious. Never give anything by mouth to a victim who is unconscious or having convulsions. Contact a physician or poison control center immediately.

First Aid: Inhalation

Remove source of contamination or move victim to fresh air. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Get immediate medical attention.

First Aid: Notes to Physician

Provide general supportive measures and treat symptomatically.

*** Section 5 - Fire Fighting Measures ***

Flash Point: Not flammable

Upper Flammable Limit (UEL): Not applicable

Auto Ignition: Not applicable

Rate of Burning: Not applicable

Method Used: Not applicable

Lower Flammable Limit (LEL): Not applicable

Flammability Classification: Not applicable

General Fire Hazards

Sodium Persulfate is not combustible; however, it is a strong oxidizer, which can act to initiate and sustain the combustion of flammable materials. Contact with combustible materials, flammable materials or powdered metals can cause fire or explosion. Sodium Persulfate can ignite when shocked. Damp Sodium Persulfate in contact with combustible materials may cause spontaneous combustion. When involved in a fire, this material may decompose and produce irritating vapors, acrid smoke and toxic gases (e.g. sulfur oxides and sodium oxide). Closed containers may explode when exposed to heat.

Hazardous Combustion Products

Sodium oxide and sulfur oxides.

Extinguishing Media

Use water only, do not use dry chemical, CO2 or halon. Flood fire with water from a distance.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing including self-contained breathing apparatus. Cool containers with flooding quantities of water. For large fires, use unmanned hoses or monitor nozzles; if this is not possible, withdraw from area and let fire burn. If possible control runoff from fire control or dilution water to prevent environmental contamination.

NFPA Ratings: Health: 2 Fire: 0 Reactivity: 1 Other: Oxidizer

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Stop the flow of material, if this can be done without risk. Contain the discharged material. If sweeping of a contaminated area is necessary use a dust suppressant agent, which does not react with product. Wipe down area routinely to avoid the accumulation of dusts.

Clean-Up Procedures

Keep combustible materials away from spilled material. Small releases can be cleaned-up wearing gloves, goggles and suitable body protection. In case of a large spill (in which excessive dusts can be generated), clear the affected area, protect people, and respond with trained personnel. Place all spill residues in an appropriate container and seal. Thoroughly wash the area after a spill or leak clean-up. Prevent rinsate of spill area from contamination to sewer, groundwater or soil.

Evacuation Procedures

Evacuate the area promptly and keep upwind of the spilled material. Isolate the spill area to prevent people from entering. In case of large spills, follow all facility emergency response procedures.

Special Procedures

Remove soiled clothing and laundry before reuse. Avoid all skin contact with the spilled material. Have emergency equipment readily available.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 7 - Handling and Storage ***

Handling Procedures

All personnel who handle this material, should be thoroughly trained to handle it safely. Do not breathe dust. Avoid all contact with skin and eyes. Wherever dust clouds may be generated, eliminate sparks, flames and other ignition sources. Use this product only with adequate ventilation. Wash thoroughly after handling. Care should be taken to avoid the accumulation of dusts, which can create a serious dust-explosion hazard.

Storage Procedures

Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion- and fire-resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area. Floors should be sealed to prevent absorption of this material. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers).

Empty containers may contain residual particulates; therefore, empty containers should be handled with care. Do not cut, grind, weld, or drill near this container. Never store food, feed, or drinking water in containers that held this product. Keep this material away from food, drink and animal feed. Do not store this material in open or unlabeled containers. Limit quantity of material stored.

*** Section 8 - Exposure Controls / Personal Protection ***

Exposure Guidelines

A: General Product Information

Follow the applicable exposure limits.

B: Component Exposure Limits

Sodium Persulfate (7775-27-1)

ACGIH: 0.1 mg/m³ TWA

Engineering Controls

Use mechanical ventilation such as dilution and local exhaust.

PERSONAL PROTECTIVE EQUIPMENT

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent Standards of Canada. Please reference applicable regulations and standards for relevant details.

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields or chemical goggles. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

Personal Protective Equipment: Skin

Wear impervious gloves. Neoprene, PVC, rubber or equivalent gloves are recommended. Wear long-sleeved shirt and trousers. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

Personal Protective Equipment: Respiratory

No specific guidelines are available. If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection. Special applications may necessitate the use of more stringent respiratory protection. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection.

Personal Protective Equipment: General

Have an eyewash fountain and safety shower available in the work area. Wash hands thoroughly after handling material.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 9 - Physical & Chemical Properties ***

Physical Properties: Additional Information

The data provided in this section are to be used for product safety handling purposes. Please refer to Product Data Sheets, Certificates of Conformity or Certificates of Analysis for chemical and physical data for determinations of quality and for formulation purposes.

Appearance:	White crystalline powder	Odor:	Odorless
Physical State:	Solid	pH:	6.0 (1% solution)
Vapor Pressure:	Not applicable	Vapor Density:	Not applicable
Boiling Point:	Not available	Melting Point:	Not available
Solubility (H₂O):	549 g/L @ 20 deg C	Specific Gravity:	2.4 (H ₂ O = 1)
Freezing Point:	Not applicable	Particle Size:	Not available
Softening Point:	Not applicable	Bulk Density:	Not available
Molecular Weight:	238.13	Chemical Formula:	Na ₂ S ₂ O ₈

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

Gradually decomposes; promoted by moisture and high temperatures.

Chemical Stability: Conditions to Avoid

Avoid high temperatures, exposure to air, moisture, friction, shock and incompatible materials.

Incompatibility

Sodium Persulfate is a strong oxidizing agent and presents a serious fire and explosion risk. Do not permit contact with combustible, organic or other oxidizable materials. Avoid contact with strong acids, alkalis, halides, reducing agents, organic materials, combustibles, finely powdered metals, iron, copper, zinc, sodium peroxide, aluminum + water, magnesium, alcohols, hydrazine and organic monomers.

Hazardous Decomposition

Sulfur oxides and sodium oxide.

Hazardous Polymerization

Will not occur.

*** Section 11 – Toxicological Information ***

Acute and Chronic Toxicity

A: General Product Information

May cause eye, skin, nose, throat and respiratory tract irritation. Depending on the duration of contact, over-exposures can irritate or burn the eyes, skin, mucous membranes and any other exposed tissue. If inhaled, irritation of the respiratory system can occur, with coughing and breathing difficulty. May cause allergic skin and respiratory sensitization. Harmful or fatal if swallowed. Chronic: Long term skin overexposure to this product may lead to dermatitis (red, itchy skin).

B: Component Analysis - LD₅₀/LC₅₀

Sodium Persulfate (7775-27-1):

LD₅₀ (Intraperitoneal-Mouse) 226 mg/kg

B: Component Analysis - TDLo/LDLo

LDLo (Intravenous-Rabbit, adult) 178 mg/kg Carcinogenicity

A: General Product Information

No information available.

B: Component Carcinogenicity

This compound is not listed by ACGIH, IARC, OSHA, NIOSH or NTP.

Epidemiology

No information available.

Neurotoxicity

No information available.

Mutagenicity

No information available.

Teratogenicity

No information available.

Other Toxicological Information

None.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 12 - Ecological Information ***

Ecotoxicity

A: General Product Information

No information available.

B: Ecotoxicity

Sodium Persulfate:

LC₅₀ (*Poecilia reticulata* Guppy) 48 hours = 631000 µg/L; LC₅₀ (*Cyclops strenuus* Cyclopoid copepod) 48 hours = 649,000 µg/L

Environmental Fate

No data available for this product.

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

A: General Product Information

This product may be considered an EPA Waste D001 (Ignitable-Oxidizer).

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this compound.

Disposal Instructions

All wastes must be handled in accordance with local, state and federal regulations or with regulations of Canada and its Provinces. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

*** Section 14 - Transportation Information ***

NOTE: The data in this section (Section 14) are meant as a guide to the overall classification of the product. However, transportation classifications may be subject to change with changes in package size. Consult shipper requirements under I.M.O., I.C.A.O. (I.A.T.A.) and 49 CFR to assure regulatory compliance.

US DOT Information

UN/NA #: UN 1505

Shipping Name: Sodium persulfate

Hazard Class: 5.1

Packing Group: III

Required Label(s): 5.1

Additional Shipping Information

The Limited Quantities of Division 5.1 materials exception [49 CFR 173.152 (b)] may be applicable to shipments of Sodium Persulfate if each inner packaging does not exceed 5.0 kg (11 pounds) and packaged in strong outer packages not to exceed 30 kg (66 pounds). Such shipments need not be marked with the Proper Shipping Name of the contents, but shall be marked with the UN Number (1505) of the contents, preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. For a shipment by air the class 5.1 label will be required.

International Air Transport Association (IATA):

For Shipments by Air transport: This information applies to air shipments both within the U.S. and for shipments originating in the U.S., but being shipped to a different country

UN/NA #: UN 1505

Proper Shipping Name: Sodium persulfate

Hazard Class: 5.1

Packing Group: III

Passenger & Cargo Aircraft Packing Instruction: 516

Passenger & Cargo Aircraft Maximum Net Quantity: 25 kg

Limited Quantity Packing Instruction (Passenger & Cargo Aircraft): Y516

Limited Quantity Maximum Net Quantity (Passenger & Cargo Aircraft): 10 kg

Cargo Aircraft Only Packing Instruction: 518

Cargo Aircraft Only Maximum Net Quantity: 100 kg

Special Provisions: None

ERG Code: 5L

Limited Quantity Shipments: Such shipments must be marked with the proper shipping name, UN number, and must be additionally marked with the words "LIMITED QUANTITIES" or "LTD. QTY". The total weight of each outer packaging cannot exceed 30 kg (66 pounds). For a shipment by air the class 5.1 label will be required.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 14 - Transportation Information (Continued) ***

International Maritime Organization (I.M.O.) Classification

For shipments via marine vessel transport, the following classification information applies.

UN/NA #: UN 1505

Proper Shipping Name: SODIUM PERSULPHATE

Hazard Class: class 5.1

Packing Group: III

Special Provisions: None

Limited Quantities: 5 kg

Packing Instructions: P002, LP02

IBC Instructions: IBC08

IBC Provisions: B3

EmS: F-A, S-Q

Stowage and Segregation: Category A.

Limited Quantity Shipments: Such shipments need not be marked with the Proper Shipping Name of the contents, but shall be marked with the UN Number (1505) of the contents, preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. The total weight of each outer packaging cannot exceed 30 kg (66 pounds).

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

No additional information.

B: Component Analysis

This material contains no chemical component required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

SARA 302 There are no specific Threshold Planning Quantities for Sodium Persulfate. The default Federal MSDS submission (EHS TPQ) and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

C: Sara 311/312 Tier II Hazard Ratings:

Component	CAS #	Fire Hazard	Reactivity Hazard	Pressure Hazard	Immediate Health Hazard	Chronic Health Hazard
Sodium Persulfate	7775-27-1	Yes	No	No	Yes	Yes

State Regulations

A: General Product Information

California Proposition 65

Sodium Persulfate is not on the California Proposition 65 chemical lists.

B: Component Analysis - State

Sodium Persulfate appears on one or more of the following state hazardous substance lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Sodium Persulfate	7775-27-1	No	No	No	No	Yes	No

Other Regulations

A: General Product Information

No other information available.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Sodium Persulfate	7775-27-1	Yes	Yes	Yes

C: Component Analysis - WHMIS IDL

Sodium Persulfate is not identified under the Canadian Hazardous Products Act Ingredient Disclosure List.

Material Safety Data Sheet

Material Name: Sodium Persulfate

ID: C1-180

*** Section 15 - Regulatory Information (Continued)***

ANSI LABELING (Z129.1): **DANGER!** STRONG OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE FIRE. MAY BE FATAL IF SWALLOWED. MAY CAUSE SKIN AND EYE IRRITATION OR BURNS. HARMFUL IF INHALED. MAY CAUSE RESPIRATORY SENSITIZATION AND ALLERGIC REACTION BY INHALATION. Keep from contact with clothing and other combustible material. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing dusts and particulates. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, faceshields, suitable body protection, and NIOSH/MSHA-approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water only. Do not use dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Clean-up spilled material by dry-sweeping or vacuum, avoiding the generation of dusts. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

*** Section 16 - Other Information ***

Other Information

Chem One Ltd. ("Chem One") shall not be responsible for the use of any information, product, method, or apparatus herein presented ("Information"), and you must make your own determination as to its suitability and completeness for your own use, for the protection of the environment, and for health and safety purposes. You assume the entire risk of relying on this Information. In no event shall Chem One be responsible for damages of any nature whatsoever resulting from the use of this product or products, or reliance upon this Information. By providing this Information, Chem One neither can nor intends to control the method or manner by which you use, handle, store, or transport Chem One products. If any materials are mentioned that are not Chem One products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed. Chem One makes no representations or warranties, either express or implied of merchantability, fitness for a particular purpose or of any other nature regarding this information, and nothing herein waives any of Chem One's conditions of sale. This information could include technical inaccuracies or typographical errors. Chem One may make improvements and/or changes in the product (s) and/or the program (s) described in this information at any time. If you have any questions, please contact us at Tel. 713-896-9966 or E-mail us at Safety@chemone.com.

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration

Contact: Sue Palmer-Koleman, PhD

Contact Phone: (713) 896-9966

Revision Log

09/19/00 3:00 PM SEP Changed company name, Sect 1 and 16, from Corporation to Ltd.
08/20/01 4:30 PM CLJ Changed contact to Sue, non-800 Chemtrec Num.
03/18/21 5:26 PM HDF Checked exposure limits; overall review, add SARA 311/312 Haz Ratings.
07/31/03 5:30 pm HDF General review of entire MSDS. Up-graded Section 10 Reactivity Information. Up-Dated entire Section 14 Transportation Information to include IATA, IMO transport information.
06/22/05 1:32 PM SEP Update IATA Section 14
09/05/06 4:33 pm SEP Updated DOT and IMO Section 14

This is the end of MSDS # C1-180

Material Safety Data Sheet

Hydrogen Peroxide Solution

(Hydrogen Peroxide, 30%)

Print Date: August 2004

SECTION 1 – Chemical Product and Company Identification

MSDS Name: Hydrogen Peroxide Solution

MSDS Preparation Date: 08-2004

Synonyms: Dihydrogen dioxide Hydrogen dioxide Hydroperoxide Hydrogen peroxide

Chemical Name French: Peroxyde d'hydrogène, **Chemical Name Spanish:** Peróxido de hidrógeno

Product numbers: BA-17-0500

Canadian TDG Classification: 5.1, 8 PKG Gr II

Formula: H₂O₂

PIN (UN# / NA#): UN2014

Molecular Wt: 34.01

WHMIS Classification: Class C (Oxidizing material), Class E (Corrosive material).

Supplier: Seastar Chemicals Inc, PO Box 2219, 2045 Mills Road West, Sidney, BC, Canada

V8L 3S8

Tel: (250) 655-5880, **Fax:** (250) 655-5888

CANUTEC (CAN): (613)-996-6666

SECTION 2 – Composition/Information on Ingredients

CAS #	Chemical Name	Percent	EINECS/ELINCS	TLV
7722-84-1	Hydrogen Peroxide	30-32%	231-765-0	(TLV-TWA): 1 ppm - Carcinogenicity Designation A3 (PEL-TWA): 1 ppm (1.4 mg/m3)
7732-18-5	Water	Balance	231-791-2	None

SECTION 3 – Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Danger! Strong oxidizer. Contact with other material may cause a fire. Eye contact may result in permanent eye damage. May cause central nervous system effects. Causes eye and skin irritation and possible burns. Corrosive. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Light sensitive. May be harmful if swallowed. May cause blood abnormalities.

Target Organs: Blood, central nervous system.

Potential Health Effects

Eye: Contact with liquid is corrosive to the eyes and causes severe burns. Contact with the eyes may cause corneal damage.

Skin: Causes severe skin irritation and possible burns. May cause discoloration, erythema (redness), swelling, and the formation of papules and vesicles (blisters).

Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause damage to the red blood cells. May cause difficulty in swallowing, stomach distension, possible cerebral swelling and death. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation.

Inhalation: Causes chemical burns to the respiratory tract. May cause ulceration of nasal tissue, insomnia, nervous tremors with numb extremities, chemical pneumonia, unconsciousness, and death. At high concentrations, respiratory effects may include acute lung damage and delayed pulmonary edema.

Chronic: Prolonged or repeated skin contact may cause dermatitis. Laboratory experiments have resulted in mutagenic effects. Repeated contact may cause corneal damage.

SECTION 4 – First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Treat symptomatically and supportively. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. In the event of severe distension of the stomach or esophagus due to gas formation, insertion of a gastric tube may be required. To treat corneal damage, careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.

SECTION 5 – Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Some oxidizers may react explosively with hydrocarbons(fuel). May decompose explosively when heated or involved in a fire. May accelerate burning if involved in a fire.

Extinguishing Media: Use water only! Do NOT use carbon dioxide. Do NOT use dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. For large fires, flood fire area with large quantities of water, while knocking down vapors with water fog.

Flash Point: Noncombustible

Autoignition Temperature: Noncombustible

Explosion Limits: Lower:40 vol %, Upper: 100 vol %

NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 1; Special Hazard: OX

SECTION 6 – Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g., dry sand or earth), then place into a chemical waste container. Do not use combustible materials such as saw dust. Flush spill area with water. Do not get water inside containers. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

Steps to be taken in case material is released or spilled: Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Add lime. Mix carefully with water to form a slurry place in a suitable container and send for disposal. Ventilate area and wash spill site after material pick-up is complete.

Waste disposal method: According to all applicable regulations. Avoid run-off.

SECTION 7 – Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Store protected from light. Discard contaminated shoes. Unused chemicals should not be returned to the container. Rinse empty drums and containers thoroughly with water before discarding.

Storage: Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light. Keep away from alkalis, oxidizable materials, finely divided metals, alcohols, and permanganates. Store below 35°C. Store only in light-resistant containers fitted with a safety vent.

SECTION 8 – Exposure Control/Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits:

Chemical Name	ACGH	NIOSH	OSHA
Hydrogen Peroxide	1 ppm TWA	1 ppm TWA; 1.4 mg/m ³ TWA 75 ppm IDLH	1 ppm TWA; 1.4 mg/m ³ TWA
Water	None listed.	None listed.	None listed.

OSHA Vacated PELs: Hydrogen Peroxide: 1 ppm TWA; 1.4 mg/m³ TWA Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Ventilation: Use only in an explosion proof fume hood. Adequate ventilation to maintain vapour below TLV.

Other Protective Equipment: Make eye bath and emergency shower available.

SECTION 9 – Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless

Odor: slight acid odor

pH: 3.3 (30% solution)

Vapor Pressure: 23 mm Hg @ 30C

Vapor Density: 1.10

Evaporation Rate:>1.0 (Butyl acetate=1)

Viscosity: 1.25 cP

Boiling Point: 108 deg C @ 760 mmHg

Freezing/Melting Point: -33 deg C

Decomposition Temperature: Not available.

Solubility: Miscible in water.

Specific Gravity/Density:1.1-1.2 (30-50%)

Molecular Formula:H₂O₂

Molecular Weight:34.0128

SECTION 10 – Stability and Reactivity

Chemical Stability: Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.

Conditions to Avoid: Mechanical shock, incompatible materials, light, ignition sources, dust generation, excess heat, combustible materials, reducing agents, alkaline materials, strong oxidants, rust, dust, pH > 4.0.

Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, acetic acid, acetic anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, manganese dioxide, mercurous chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.

Hazardous Decomposition Products: Oxygen, hydrogen gas, water, heat, steam.

Hazardous Polymerization: Will not occur.

SECTION 11 – Toxicological Information

RTECS: CAS# 7722-84-1; MX0887000; MX0888000; MX0890000; MX0899000; MX0899500; MX0900000. CAS# 7732-18-5; ZC0110000

LD50/LC50: CAS# 7722-84-1: Draize test, rabbit, eye: 1 mg Severe; Inhalation, rat: LC50 = 2 gm/m³/4H; Inhalation, rat: LC50 = 2000 mg/m³; Oral, mouse: LD50 = 2000 mg/kg; Oral, rabbit: LD50 = 820 mg/kg; Oral, rat: LD50 = 1518 mg/kg; Oral, rat: LD50 = 910 mg/kg; Oral, rat: LD50 = 376 mg/kg; Oral, rat: LD50 = 4050 mg/kg; Skin, rat: LD50 = 3 gm/kg; Skin, rat: LD50 = 4060 mg/kg;<BR.

CAS# 7732-18-5:

Oral, rat: LD50 = >90 mL/kg;<BR.

Carcinogenicity: CAS# 7722-84-1: ACGIH: A3 - Animal Carcinogen

IARC: IARC Group 3 - not classifiable CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: No information available.

Teratogenicity: No information available.

Reproductive Effects: No information available.

Neurotoxicity: No information available.

Mutagenicity: CAS#: 7722-84-1 Mutation in Microorganisms: Salmonella typhimurium = 100 ug/plate.; Hyman, embryo = 50 umol/L.; Cytogenetic Analysis: Human, embryo = 20 umol/L. Mutation in Mammalian Somatic Cells: Hamster, lung = 1mmol/L.

Other Studies: No data available.

SECTION 12 – Ecological Information

Ecotoxicity: Fish: Carp: LC50 = 42 mg/L; 48 Hr; Unspecified Fathead Minnow: LC50 = 16.4 mg/L; 96 Hr; Fresh water Fathead Minnow: NOEC = 5 mg/L; 96 Hr; Fresh water flea Daphnia: EC50 = 2.4 mg/L; 48 Hr; Fresh water Channel catfish: LC50 = 37.4 mg/L; 96 Hr; Fresh water No data available.

Environmental: Rain washout is expected due to condensation of hydrogen peroxide on contact with water droplets. In the atmosphere, indirect photooxidation is predicted with a half-life of 10 to 20 hours. Non-significant evaporation and adsorption from water surfaces and soil/sediments is expected. Rapid and considerable aerobic biodegradation was determined with a half-life < 1 minute (biological treatment sludge) and 0.3 to 2 days (fresh water). Hydrogen peroxide is non-bioaccumulable.

Physical: No information available. **Other:** No information available.

SECTION 13 – Disposal Considerations

Dispose of in a manner consistent with federal, provincial/state/territorial, and local regulations.

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

SECTION 14 – Transport Information

CANADIAN TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION

Proper Shipping Name: HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20 per cent but not more than 60 per cent hydrogen peroxide (stabilized as necessary)

Hazard Class: 5.1, 8

UN Number: UN2014

Packing Group/Risk Group: II

Special Provisions: ---

Passenger Carrying Road/Rail Limit: 1 kg or L

Marine Pollutant: ---

NOTE: This information incorporates the Transportation of Dangerous Goods Regulations SOR/2001-286, effective October 2003

US DEPARTMENT OF TRANSPORT (DOT) HAZARDOUS MATERIALS SHIPPING INFORMATION (49 CFR)

Shipping Name and Description: HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS with not less than 20 percent but not more than 40 percent hydrogen peroxide (stabilized as necessary)

Hazard Class or Division: 5.1

Identification Number: UN2014

Packing Group: II

NOTE: This information was taken from the US Code of Federal Regulations Title 49 - Transportation and is effective October 2003.

SECTION 15 – Regulatory Information

US Federal

TSCA CAS# 7722-84-1 is listed on the TSCA inventory.

CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List: None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules: None of the chemicals in this product are under a Chemical Test Rule.

Section 12b: None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule: None of the chemicals in this material have a SNUR under TSCA.

SARA: CERCLA Hazardous Substances and corresponding RQs: None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

CAS# 7722-84-1: 1,000 lb TPQ (concentration > 52%)

SARA Codes: CAS # 7722-84-1: acute, flammable.

Section 313: No chemicals are reportable under Section 313.

Clean Air Act: This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act: None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA: None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7722-84-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: O C

Risk Phrases: R 34 Causes burns. R 8 Contact with combustible material may cause fire.

Safety Phrases: S 28 After contact with skin, wash immediately with...S 3 Keep in a cool place. S 36/39 Wear suitable protective clothing and eye/face protection. S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection) CAS# 7722-84-1: 0 CAS# 7732-18-5: No information available.

Canada - DSL/NDL: CAS# 7722-84-1 is listed on Canada's DSL List. CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of C, E.

Canadian Ingredient Disclosure List

CAS# 7722-84-1 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits: CAS# 7722-84-1

OEL-AUSTRALIA:TWA 1 ppm (1.5 mg/m³)

OEL-BELGIUM:TWA 1 ppm (1.4 mg/m³)

OEL-DENMARK:TWA 1 ppm (1.4 mg/m³)

OEL-FINLAND:TWA 1 ppm (1.4 mg/m³); STEL 3 ppm (4.2 mg/m³)

OEL-FRANCE:TWA 1 ppm (1.5 mg/m³)

OEL-GERMANY:TWA 1 ppm (1.4 mg/m³)

OEL-THE NETHERLANDS:TWA 1 ppm (1.4 mg/m³)

OEL-THE PHILIPPINES:TWA 1 ppm (1.4 mg/m³)

OEL-SWITZERLAND:TWA 1 ppm (1.4 mg/m³); STEL 2 ppm (2.8 mg/m³)

OEL-TURKEY:TWA 1 ppm (1.4 mg/m³)

OEL-UNITED KINGDOM:TWA 1 ppm (1.5 mg/m³); STEL 2 ppm (3 mg/m³)

SECTION 16 – Other Information

The statements contained herein are offered for informational purposes only and are based upon technical data. Seastar Chemicals Inc believes them to be accurate but does not purport to be all-inclusive. The above-stated product is intended for use only by persons having the necessary technical skills and facilities for handling the product at their discretion and risk. Since conditions and manner of use are outside our control, we (Seastar Chemicals Inc) make no warranty of merchantability or any such warranty, express or implied with respect to information and we assume no liability resulting from the above product or its use. Users should make their own investigations to determine suitability of information and product for their particular purposes.

**Hydrogen Release Compound (HRC[®])
MATERIAL SAFETY DATA SHEET (MSDS)**

Last Revised: **March 23, 2012**

Section 1 - Material Identification

Supplier:



REGENESIS

1011 Calle Sombra

San Clemente, CA 92673

Phone: 949.366.8000

Fax: 949.366.8090

E-mail: info@regenesiS.com

Chemical Name: **Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester**

Chemical Family: **Organic Chemical**

Trade Name: **Hydrogen Release Compound[®] (HRC[®])
Glycerol tripoly lactate and Glycerol**

Product Use: **Used to remediate contaminated soil and groundwater
(environmental applications)**

Section 2 – Chemical Identification

<u>CAS#</u>	<u>Chemical</u>
201167-72-8	Glycerol Tripoly lactate
56-81-5	Glycerol
50-21-5	Lactic Acid

Section 3 - Physical Data

Melting Point: **Not Available (NA)**

Boiling Point: **Not Determined (ND)**

Flash Point: **ND**

Density: **1.3 g/cc**

Section 3 – Physical Data (cont)

Solubility:	Acetone and DMSO
Appearance:	Viscous amber gel/liquid
Odor:	Not detectable
Vapor Pressure:	None

Section 4 - Fire and Explosion Hazard Data

Extinguishing Media: Use Water Spray, Carbon Dioxide, Dry Chemical Powder or Appropriate Foam.

Water may be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 - Toxicological Information

Acute Effects: May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the glycerol tripolylactate have not been investigated. Listed below are the toxicological information for glycerol and lactic acid.

RTECS#: MA8050000
Glycerol

Irritation data:	SKN-RBT 500 MG/24H MLD	BIOFX* 9-4/1970
	85JCAE-,207,1986	85JCAE-,207,1986
	EYE-RBT 126 MG MLD	85JCAE -,656,86
	EYE-RBT 500 MG/24H MLD	AJOPAA 29,1363,46
	SKN-RBT 5MG/24H SEV	
	EYE-RBT 750 UG SEV	

Section 5 – Toxicological Information (cont)

Toxicity data:	ORL-MUS LD50:4090 MG/KG	NIIRDN 6,215,1982
	FRZKAP (6),56,1977	FEPRA7 4,142,1945
	SCU-RBT LD50:100 MG/KG	RCOCB8 56,125,1987
	ORL-RAT LD50:12600 MG/KG	ARZNAD 26,1581,1976
	IHL-	ARZNAD 26,1579,1978
	RATLC50:>570MG/M3/1HBIO	NIIRDN 6,215,1982
	FX*9-4/1970 IPR-RAT LD50:	JAPMA8 39,583,1950
	4420 MG/KG	DMDJAP 31,276,1959
	IVN-RAT LD50: 5566 MG/KG	BIOFX* 9-4/1970
	IPR-MUS LD50: 8700 MG/KG	NIIRDN 6,215,1982
	SCU-MUS LD50: 91 MG/KG	FMCHA2-,C252,91
	IVN-MUS LD50: 4250 MG/KG	FMCHA2-,C252,91
	ORL-RBT LD50: 27 GM/KG	FAONAU 40,144,67
	SKN-RBT LD50:>10GM/KG	JIHTAB 23,259,41
	IVN-RBT LD50: 53 GM/KG	FMCHA2-,C252,91
	ORL-GPG LD50: 7750 MG/KG	JIHTAB 23,259,1941
	ORL-RAT LD50:3543 MG/KG	
	SKN-RBT LD50:>2 GM/KG	
	ORL-MUS LD50: 4875 MG/KG	
	ORL-GPG LD50: 1810 MG/KG	
	ORL-QAL LD50: >2250	
	MG/KG	
Target Organ data:	Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).	
RTECS#:	OD2800000	
	Lactic acid	

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Section 6 - Health Hazard Data

Handling: Avoid continued contact with skin. Avoid contact with eyes.

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation: Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.

Ingestion: No effects expected. Do not give anything to an unconscious person. Call a physician immediately.

Skin Contact: Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.

Eye contact: Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.

Section 7 - Reactivity Data

Conditions to Avoid: Strong oxidizing agents, bases and acids

Hazardous Polymerization: None known

Further Information: Hydrolyses in water to form Lactic Acid and Glycerol.

Section 8 - Spill, Leak or Accident Procedures

After Spillage or Leakage: Neutralization is not required. This material may be burned in a chemical incinerator equipped with an afterburner and scrubber.

Disposal: Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material, may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 - Special Protection or Handling

Should be stored in plastic lined, steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves: Vinyl or Rubber

Eyes: Splash Goggles or Full Face Shield
Area should have approved means of washing eyes.

Ventilation: General exhaust.

Storage: Store in cool, dry, ventilated area. Protect from incompatible materials.

Section 10 - Other Information

This material will degrade in the environment by hydrolysis to lactic acid and glycerol. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

Hydrogen Release Compound (HRC®)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: **March 23, 2012**

Section 1 - Material Identification

Supplier:



REGENESIS

1011 Calle Sombra

San Clemente, CA 92673

Phone: 949.366.8000

Fax: 949.366.8090

E-mail: info@regenesiS.com

Chemical Name: **Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester**

Chemical Family: **Organic Chemical**

Trade Name: **Hydrogen Release Compound® (HRC®)**
Glycerol tripoly lactate and Glycerol

Product Use: **Used to remediate contaminated soil and groundwater (environmental applications)**

Section 2 – Chemical Identification

<u>CAS#</u>	<u>Chemical</u>
201167-72-8	Glycerol Tripoly lactate
56-81-5	Glycerol
50-21-5	Lactic Acid

Section 3 - Physical Data

Melting Point: **Not Available (NA)**

Boiling Point: **Not Determined (ND)**

Flash Point: **ND**

Density: **1.3 g/cc**

Section 3 – Physical Data (cont)

Solubility:	Acetone and DMSO
Appearance:	Viscous amber gel/liquid
Odor:	Not detectable
Vapor Pressure:	None

Section 4 - Fire and Explosion Hazard Data

Extinguishing Media: Use Water Spray, Carbon Dioxide, Dry Chemical Powder or Appropriate Foam.

Water may be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 - Toxicological Information

Acute Effects: May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the glycerol tripolylactate have not been investigated. Listed below are the toxicological information for glycerol and lactic acid.

RTECS#: MA8050000
Glycerol

Irritation data:	SKN-RBT 500 MG/24H MLD	BIOFX* 9-4/1970
	85JCAE-,207,1986	85JCAE-,207,1986
	EYE-RBT 126 MG MLD	85JCAE -,656,86
	EYE-RBT 500 MG/24H MLD	AJOPAA 29,1363,46
	SKN-RBT 5MG/24H SEV	
	EYE-RBT 750 UG SEV	

Section 5 – Toxicological Information (cont)

Toxicity data:	ORL-MUS LD50:4090 MG/KG	NIIRDN 6,215,1982
	FRZKAP (6),56,1977	FEPRA7 4,142,1945
	SCU-RBT LD50:100 MG/KG	RCOCB8 56,125,1987
	ORL-RAT LD50:12600 MG/KG	ARZNAD 26,1581,1976
	IHL-	ARZNAD 26,1579,1978
	RATLC50:>570MG/M3/1HBIO	NIIRDN 6,215,1982
	FX*9-4/1970 IPR-RAT LD50:	JAPMA8 39,583,1950
	4420 MG/KG	DMDJAP 31,276,1959
	IVN-RAT LD50: 5566 MG/KG	BIOFX* 9-4/1970
	IPR-MUS LD50: 8700 MG/KG	NIIRDN 6,215,1982
	SCU-MUS LD50: 91 MG/KG	FMCHA2-,C252,91
	IVN-MUS LD50: 4250 MG/KG	FMCHA2-,C252,91
	ORL-RBT LD50: 27 GM/KG	FAONAU 40,144,67
	SKN-RBT LD50:>10GM/KG	JIHTAB 23,259,41
	IVN-RBT LD50: 53 GM/KG	FMCHA2-,C252,91
	ORL-GPG LD50: 7750 MG/KG	JIHTAB 23,259,1941
	ORL-RAT LD50:3543 MG/KG	
	SKN-RBT LD50:>2 GM/KG	
	ORL-MUS LD50: 4875 MG/KG	
	ORL-GPG LD50: 1810 MG/KG	
	ORL-QAL LD50: >2250	
	MG/KG	
Target Organ data:	Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).	
RTECS#:	OD2800000	
	Lactic acid	

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Section 6 - Health Hazard Data

Handling: Avoid continued contact with skin. Avoid contact with eyes.

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation: Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.

Ingestion: No effects expected. Do not give anything to an unconscious person. Call a physician immediately.

Skin Contact: Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.

Eye contact: Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.

Section 7 - Reactivity Data

Conditions to Avoid: Strong oxidizing agents, bases and acids

Hazardous Polymerization: None known

Further Information: Hydrolyses in water to form Lactic Acid and Glycerol.

Section 8 - Spill, Leak or Accident Procedures

After Spillage or Leakage: Neutralization is not required. This material may be burned in a chemical incinerator equipped with an afterburner and scrubber.

Disposal: Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material, may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 - Special Protection or Handling

Should be stored in plastic lined, steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves: Vinyl or Rubber

Eyes: Splash Goggles or Full Face Shield
Area should have approved means of washing eyes.

Ventilation: General exhaust.

Storage: Store in cool, dry, ventilated area. Protect from incompatible materials.

Section 10 - Other Information

This material will degrade in the environment by hydrolysis to lactic acid and glycerol. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

Material Safety Data Sheet

Hydrogen Peroxide Solution

(Hydrogen Peroxide, 30%)

Print Date: August 2004

SECTION 1 – Chemical Product and Company Identification

MSDS Name: Hydrogen Peroxide Solution

MSDS Preparation Date: 08-2004

Synonyms: Dihydrogen dioxide Hydrogen dioxide Hydroperoxide Hydrogen peroxide

Chemical Name French: Peroxyde d'hydrogène, **Chemical Name Spanish:** Peróxido de hidrógeno

Product numbers: BA-17-0500

Canadian TDG Classification: 5.1, 8 PKG Gr II

Formula: H₂O₂

PIN (UN# / NA#): UN2014

Molecular Wt: 34.01

WHMIS Classification: Class C (Oxidizing material), Class E (Corrosive material).

Supplier: Seastar Chemicals Inc, PO Box 2219, 2045 Mills Road West, Sidney, BC, Canada

V8L 3S8

Tel: (250) 655-5880, **Fax:** (250) 655-5888

CANUTEC (CAN): (613)-996-6666

SECTION 2 – Composition/Information on Ingredients

CAS #	Chemical Name	Percent	EINECS/ELINCS	TLV
7722-84-1	Hydrogen Peroxide	30-32%	231-765-0	(TLV-TWA): 1 ppm - Carcinogenicity Designation A3 (PEL-TWA): 1 ppm (1.4 mg/m3)
7732-18-5	Water	Balance	231-791-2	None

SECTION 3 – Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Danger! Strong oxidizer. Contact with other material may cause a fire. Eye contact may result in permanent eye damage. May cause central nervous system effects. Causes eye and skin irritation and possible burns. Corrosive. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Light sensitive. May be harmful if swallowed. May cause blood abnormalities.

Target Organs: Blood, central nervous system.

Potential Health Effects

Eye: Contact with liquid is corrosive to the eyes and causes severe burns. Contact with the eyes may cause corneal damage.

Skin: Causes severe skin irritation and possible burns. May cause discoloration, erythema (redness), swelling, and the formation of papules and vesicles (blisters).

Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause damage to the red blood cells. May cause difficulty in swallowing, stomach distension, possible cerebral swelling and death. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation.

Inhalation: Causes chemical burns to the respiratory tract. May cause ulceration of nasal tissue, insomnia, nervous tremors with numb extremities, chemical pneumonia, unconsciousness, and death. At high concentrations, respiratory effects may include acute lung damage and delayed pulmonary edema.

Chronic: Prolonged or repeated skin contact may cause dermatitis. Laboratory experiments have resulted in mutagenic effects. Repeated contact may cause corneal damage.

SECTION 4 – First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Treat symptomatically and supportively. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. In the event of severe distension of the stomach or esophagus due to gas formation, insertion of a gastric tube may be required. To treat corneal damage, careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.

SECTION 5 – Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Some oxidizers may react explosively with hydrocarbons(fuel). May decompose explosively when heated or involved in a fire. May accelerate burning if involved in a fire.

Extinguishing Media: Use water only! Do NOT use carbon dioxide. Do NOT use dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. For large fires, flood fire area with large quantities of water, while knocking down vapors with water fog.

Flash Point: Noncombustible

Autoignition Temperature: Noncombustible

Explosion Limits: Lower:40 vol %, Upper: 100 vol %

NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 1; Special Hazard: OX

SECTION 6 – Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g., dry sand or earth), then place into a chemical waste container. Do not use combustible materials such as saw dust. Flush spill area with water. Do not get water inside containers. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

Steps to be taken in case material is released or spilled: Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Add lime. Mix carefully with water to form a slurry place in a suitable container and send for disposal. Ventilate area and wash spill site after material pick-up is complete.

Waste disposal method: According to all applicable regulations. Avoid run-off.

SECTION 7 – Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Store protected from light. Discard contaminated shoes. Unused chemicals should not be returned to the container. Rinse empty drums and containers thoroughly with water before discarding.

Storage: Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light. Keep away from alkalis, oxidizable materials, finely divided metals, alcohols, and permanganates. Store below 35°C. Store only in light-resistant containers fitted with a safety vent.

SECTION 8 – Exposure Control/Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits:

Chemical Name	ACGH	NIOSH	OSHA
Hydrogen Peroxide	1 ppm TWA	1 ppm TWA; 1.4 mg/m3 TWA 75 ppm IDLH	1 ppm TWA; 1.4 mg/m3 TWA
Water	None listed.	None listed.	None listed.

OSHA Vacated PELs: Hydrogen Peroxide: 1 ppm TWA; 1.4 mg/m³ TWA Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Ventilation: Use only in an explosion proof fume hood. Adequate ventilation to maintain vapour below TLV.

Other Protective Equipment: Make eye bath and emergency shower available.

SECTION 9 – Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless

Odor: slight acid odor

pH: 3.3 (30% solution)

Vapor Pressure: 23 mm Hg @ 30C

Vapor Density: 1.10

Evaporation Rate:>1.0 (Butyl acetate=1)

Viscosity: 1.25 cP

Boiling Point: 108 deg C @ 760 mmHg

Freezing/Melting Point: -33 deg C

Decomposition Temperature: Not available.

Solubility: Miscible in water.

Specific Gravity/Density:1.1-1.2 (30-50%)

Molecular Formula:H₂O₂

Molecular Weight:34.0128

SECTION 10 – Stability and Reactivity

Chemical Stability: Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.

Conditions to Avoid: Mechanical shock, incompatible materials, light, ignition sources, dust generation, excess heat, combustible materials, reducing agents, alkaline materials, strong oxidants, rust, dust, pH > 4.0.

Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, acetic acid, acetic anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, manganese dioxide, mercurous chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.

Hazardous Decomposition Products: Oxygen, hydrogen gas, water, heat, steam.

Hazardous Polymerization: Will not occur.

SECTION 11 – Toxicological Information

RTECS: CAS# 7722-84-1; MX0887000; MX0888000; MX0890000; MX0899000; MX0899500; MX0900000. CAS# 7732-18-5; ZC0110000

LD50/LC50: CAS# 7722-84-1: Draize test, rabbit, eye: 1 mg Severe; Inhalation, rat: LC50 = 2 gm/m³/4H; Inhalation, rat: LC50 = 2000 mg/m³; Oral, mouse: LD50 = 2000 mg/kg; Oral, rabbit: LD50 = 820 mg/kg; Oral, rat: LD50 = 1518 mg/kg; Oral, rat: LD50 = 910 mg/kg; Oral, rat: LD50 = 376 mg/kg; Oral, rat: LD50 = 4050 mg/kg; Skin, rat: LD50 = 3 gm/kg; Skin, rat: LD50 = 4060 mg/kg;<BR.

CAS# 7732-18-5:

Oral, rat: LD50 = >90 mL/kg;<BR.

Carcinogenicity: CAS# 7722-84-1: ACGIH: A3 - Animal Carcinogen

IARC: IARC Group 3 - not classifiable CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: No information available.

Teratogenicity: No information available.

Reproductive Effects: No information available.

Neurotoxicity: No information available.

Mutagenicity: CAS#: 7722-84-1 Mutation in Microorganisms: Salmonella typhimurium = 100 ug/plate.; Hyman, embryo = 50 umol/L.; Cytogenetic Analysis: Human, embryo = 20 umol/L. Mutation in Mammalian Somatic Cells: Hamster, lung = 1mmol/L.

Other Studies: No data available.

SECTION 12 – Ecological Information

Ecotoxicity: Fish: Carp: LC50 = 42 mg/L; 48 Hr; Unspecified Fathead Minnow: LC50 = 16.4 mg/L; 96 Hr; Fresh water Fathead Minnow: NOEC = 5 mg/L; 96 Hr; Fresh water flea Daphnia: EC50 = 2.4 mg/L; 48 Hr; Fresh water Channel catfish: LC50 = 37.4 mg/L; 96 Hr; Fresh water No data available.

Environmental: Rain washout is expected due to condensation of hydrogen peroxide on contact with water droplets. In the atmosphere, indirect photooxidation is predicted with a half-life of 10 to 20 hours. Non-significant evaporation and adsorption from water surfaces and soil/sediments is expected. Rapid and considerable aerobic biodegradation was determined with a half-life < 1 minute (biological treatment sludge) and 0.3 to 2 days (fresh water). Hydrogen peroxide is non-bioaccumulable.

Physical: No information available. **Other:** No information available.

SECTION 13 – Disposal Considerations

Dispose of in a manner consistent with federal, provincial/state/territorial, and local regulations.

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

SECTION 14 – Transport Information

CANADIAN TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION

Proper Shipping Name: HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20 per cent but not more than 60 per cent hydrogen peroxide (stabilized as necessary)

Hazard Class: 5.1, 8

UN Number: UN2014

Packing Group/Risk Group: II

Special Provisions: ---

Passenger Carrying Road/Rail Limit: 1 kg or L

Marine Pollutant: ---

NOTE: This information incorporates the Transportation of Dangerous Goods Regulations SOR/2001-286, effective October 2003

US DEPARTMENT OF TRANSPORT (DOT) HAZARDOUS MATERIALS SHIPPING INFORMATION (49 CFR)

Shipping Name and Description: HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS with not less than 20 percent but not more than 40 percent hydrogen peroxide (stabilized as necessary)

Hazard Class or Division: 5.1

Identification Number: UN2014

Packing Group: II

NOTE: This information was taken from the US Code of Federal Regulations Title 49 - Transportation and is effective October 2003.

SECTION 15 – Regulatory Information

US Federal

TSCA CAS# 7722-84-1 is listed on the TSCA inventory.

CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List: None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules: None of the chemicals in this product are under a Chemical Test Rule.

Section 12b: None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule: None of the chemicals in this material have a SNUR under TSCA.

SARA: CERCLA Hazardous Substances and corresponding RQs: None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

CAS# 7722-84-1: 1,000 lb TPQ (concentration > 52%)

SARA Codes: CAS # 7722-84-1: acute, flammable.

Section 313: No chemicals are reportable under Section 313.

Clean Air Act: This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depleters. This material does not contain any Class 2 Ozone depleters.

Clean Water Act: None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA: None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7722-84-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: O C

Risk Phrases: R 34 Causes burns. R 8 Contact with combustible material may cause fire.

Safety Phrases: S 28 After contact with skin, wash immediately with...S 3 Keep in a cool place. S 36/39 Wear suitable protective clothing and eye/face protection. S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection) CAS# 7722-84-1: 0 CAS# 7732-18-5: No information available.

Canada - DSL/NDL: CAS# 7722-84-1 is listed on Canada's DSL List. CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of C, E.

Canadian Ingredient Disclosure List

CAS# 7722-84-1 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits: CAS# 7722-84-1

OEL-AUSTRALIA:TWA 1 ppm (1.5 mg/m³)

OEL-BELGIUM:TWA 1 ppm (1.4 mg/m³)

OEL-DENMARK:TWA 1 ppm (1.4 mg/m³)

OEL-FINLAND:TWA 1 ppm (1.4 mg/m³); STEL 3 ppm (4.2 mg/m³)

OEL-FRANCE:TWA 1 ppm (1.5 mg/m³)

OEL-GERMANY:TWA 1 ppm (1.4 mg/m³)

OEL-THE NETHERLANDS:TWA 1 ppm (1.4 mg/m³)

OEL-THE PHILIPPINES:TWA 1 ppm (1.4 mg/m³)

OEL-SWITZERLAND:TWA 1 ppm (1.4 mg/m³); STEL 2 ppm (2.8 mg/m³)

OEL-TURKEY:TWA 1 ppm (1.4 mg/m³)

OEL-UNITED KINGDOM:TWA 1 ppm (1.5 mg/m³); STEL 2 ppm (3 mg/m³)

SECTION 16 – Other Information

The statements contained herein are offered for informational purposes only and are based upon technical data. Seastar Chemicals Inc believes them to be accurate but does not purport to be all-inclusive. The above-stated product is intended for use only by persons having the necessary technical skills and facilities for handling the product at their discretion and risk. Since conditions and manner of use are outside our control, we (Seastar Chemicals Inc) make no warranty of merchantability or any such warranty, express or implied with respect to information and we assume no liability resulting from the above product or its use. Users should make their own investigations to determine suitability of information and product for their particular purposes.

ATTACHMENT B
WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

The following section is based upon information provided by the CDC Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis encephalitis is to avoid mosquito bites. To reduce the chance of mosquito contact:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for use, as printed on the product.

ATTACHMENT C
REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: _____ Project Name/Number: _____

Report Date: _____ Project Manager Name: _____

Summary of any violations of procedures occurring that week:

Summary of any job related injuries, illnesses, or near misses that week:

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

Comments:

Name: _____ Company: _____

Signature: _____ Title: _____

INCIDENT REPORT FORM

Date of Report: _____

Injured: _____

Employer: _____

Site: _____ Site Location: _____

Report Prepared By: _____
Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

<input type="checkbox"/> Injury	<input type="checkbox"/> Illness	<input type="checkbox"/> Near Miss
<input type="checkbox"/> Property Damage	<input type="checkbox"/> Fire	<input type="checkbox"/> Chemical Exposure
<input type="checkbox"/> On-site Equipment	<input type="checkbox"/> Motor Vehicle	<input type="checkbox"/> Electrical
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Spill	<input type="checkbox"/> Other

DATE AND TIME OF ACCIDENT/INCIDENT: Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

WITNESS TO ACCIDENT/INCIDENT:

Name: _____	Company: _____
Address: _____	Address: _____
Phone No.: _____	Phone No.: _____
Name: _____	Company: _____
Address: _____	Address: _____
Phone No.: _____	Phone No.: _____

INJURED - ILL:

Name: _____ SSN: _____

Address: _____ Age: _____

Length of Service: _____ Time on Present Job: _____

Time/Classification: _____

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ____ Non-disabling ____ Fatality

____ Medical Treatment ____ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: _____**NATURE OF INJURY OR ILLNESS:** _____

CLASSIFICATION OF INJURY:

__ Abrasions	_____ Dislocations	_____ Punctures
__ Bites	_____ Faint/Dizziness	_____ Radiation Burns
__ Blisters	_____ Fractures	_____ Respiratory Allergy
__ Bruises	_____ Frostbite	_____ Sprains
__ Chemical Burns	_____ Heat Burns	_____ Toxic Resp. Exposure
__ Cold Exposure	_____ Heat Exhaustion	_____ Toxic Ingestion
__ Concussion	_____ Heat Stroke	_____ Dermal Allergy
__ Lacerations		

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care was Received: _____

Where Medical Care was Received: _____

Address (if off-site): _____

(If two or more injuries, record on separate sheets)

PROPERTY DAMAGE:

Description of Damage: _____

Cost of Damage: \$ _____

ACCIDENT/INCIDENT LOCATION: _____

ACCIDENT/INCIDENT ANALYSIS: Causative agent most directly related to accident/incident
(Object, substance, material, machinery, equipment, conditions)

Was weather a factor?: _____

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

Modifications:

Was injured using required equipment?:

If not, how did actual equipment use differ from plan?:

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?)

ACCIDENT/INCIDENT REPORT REVIEWED BY:

SSO Name Printed

SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature

Title

Signature

Title

Signature

Title

ACCIDENT/INCIDENT FOLLOW-UP: Date: _____

Outcome of accident/incident: _____

Physician's recommendations: _____

Date injured returned to work: _____
Follow-up performed by: _____

Signature

Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT D
EMERGENCY HAND SIGNALS

EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATHE!



Hand gripping throat

**LEAVE AREA IMMEDIATELY,
NO DEBATE!**

(No Picture) Grip partner's wrist or place
both hands around waist

NEED ASSISTANCE!



Hands on top of head

**OKAY! – I'M ALL RIGHT!
- I UNDERSTAND!**



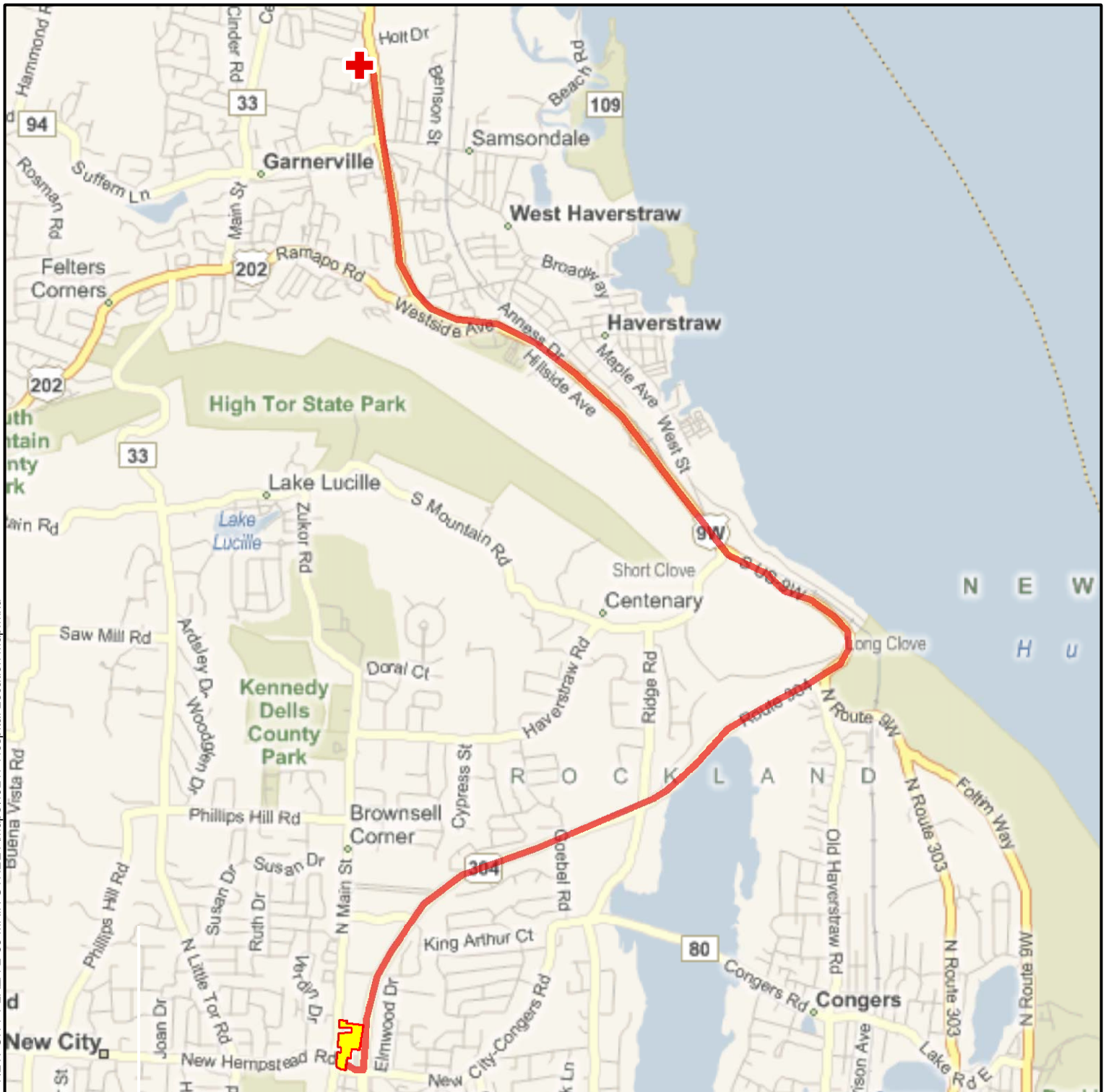
Thumbs up

NO! - NEGATIVE!



Thumbs down

FIGURES



Legend

- + Hospital_Location
- Route to Hospital
- Project Site Location

Source: LiveMaps Circa 2008

0 0.75 Miles



Helen Hayes Hospital
51-55 N Route 9W,
West Haverstraw, NY 10993
(845) 786-4000

NEW CITY PLAZA
NEW CITY, NEW YORK

HOSPITAL LOCATION MAP



Environmental Consultants
34 South Broadway, White Plains, N.Y. 10601

DATE
2.17.10

PROJECT No.
40217

FIGURE
HASP-1

APPENDIX E
MONITORING WELL BORING AND CONSTRUCTION LOGS

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-7		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2" Split Spoon		Start Finish		
				Driller : Paragon		Time: 16:45 Time: 19:30		
				Weather: Sunny, 80F		Date: 5/22/2007 Date: 5/22/2007		
				Sampler: AKRF/Art Rastelli				
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	11"	8	SILT/ SAND	0-4": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		7		4-11": Loose Reddish brown SAND and SILT, some fine Gravel.				
3	22"	6	SILT/ SAND	0-22": Loose Reddish brown SAND and SILT. Some Gravel	ND	No odor	Dry	
4		5						
5	17"	5	TILL	0-17": Medium Dense red/brown fine SAND, some Silt., trace Clay.	ND	No odor	Dry	
6		10						
7	18"	14	TILL	0-18": Medium dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Dry	
8		19		Water Approx 7.8'				
9	8"	21	TILL	0-8": Very Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Dry	
10		22						
11	8"	25	TILL	0-8": Very dense red/brown fine SAND, some Silt.	ND	No odor	Moist	
12								
13	8"		TILL	0-8": Very dense red/brown fine SAND, some Silt.	ND	No odor	Wet	
14								
15	12"		TILL	0-12": Very dense red/brown fine SAND, trace Silt.	ND	No odor	Wet	
16								
17	12"		TILL	0-12": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	
18								
19	12"		TILL	0-12": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	
20								
21	8"		TILL	0-8": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	
22								
23	8"		TILL	0-8": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No Odor	Wet	SB/MW-7 (22.7')
				22.7 below grade. End of Boring.				
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-7 (22.7') sent to the lab to be analyzed for VOCs (8260B)								

<h1 style="margin: 0;">AKRF, Inc.</h1>				288 North Main Street New City, New York AKRF Project Number : 40217		Boring No. SB/MW-8		
Environmental Consultants 34 South Broadway, White Plains, New York				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Mark Bowen		Sheet 1 of 1 Drilling		
						Start Finish Time: 7:30 Time: 11:30 Date: 5/25/2007 Date: 5/25/2007		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	13"	8	SILT/ SAND	0-4": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		9		4-13": Loose Reddish brown SAND and SILT, some fine Gravel and Clay				
3	24"	5	SILT/ SAND	0-24": Medium Dense Reddish brown SAND and SILT. Some Gravel	ND	No odor	Dry	
4		8						
5	19"	10	TILL	0-19": Medium Dense red/brown fine SAND, some Silt, Some Gravel	ND	No odor	Wet	
6		7						
7	9"	33	TILL	0-9": Medium dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
8		16		Water Approx 7.8'				
9	9"	50/0.3"	TILL	0-9": Very Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
10		16						
11	9"	50/0.3"	TILL	0-9": Very dense red/brown fine SAND, some Silt, Gravel	ND	No odor	Wet	
12		5						
13	9"	50/0.3"	TILL	0-9": Very dense red/brown fine SAND, some Silt, Gravel	ND	No odor	Wet	
14								
15	9"	50/0.3"	TILL	0-9": Very dense red/brown fine SAND, trace Silt, Gravel	ND	No odor	Wet	SB/MW-8 (16')
16								
				16' below grade. End of Boring.				
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-8 (16') sent to the lab to be analyzed for VOCs (8260B)								

<h1 style="margin: 0;">AKRF, Inc.</h1>				288 North Main Street New City, New York AKRF Project Number : 40217		Boring No. SB/MW-9		
Environmental Consultants 34 South Broadway, White Plains, New York				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Sheet 1 of 1 Drilling		
						Start Finish Time: 11:00 Time: 15:00 Date: 5/24/2007 Date: 5/24/2007		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	12"	9	SILT/ SAND	0-3": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		18		3-12": Medium dense Reddish brown SAND and SILT, some fine Gravel.				
3	2"	23	SILT/ SAND	0-2": Dense Reddish brown SILT and fine SAND. Some Gravel	ND	No odor	Dry	
4		50/0.4'						
5	24"	16	TILL	0-24": Medium dense red/brown fine SAND, some Silt., trace Clay.	ND	No odor	Dry	
6		17						
7	16"	16	TILL	0-16": Medium dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Moist	
8		17						
9	18"	7	TILL	0-18": Loose red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
10		3						
11	24"	11	TILL	0-24": Medium dense red/brown fine SAND, some Silt.	ND	No odor	Wet	
12		18						
13	24"	21	TILL	0-24": Medium dense red/brown fine SAND, some Silt.	ND	No odor	Wet	
14		17						
15	12"	15	TILL	0-12": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	
16		50						
17	6"	50/0.3"	TILL	0-6": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	SB/MW-9 (16'-18')
18								
				18' below grade. End of Boring.				
Notes:				PID - Photoionization detector ND - Not Detected				
Soil sample SB/MW-9 (16'-18") sent to the lab to be analyzed for VOCs (8260B)								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-10		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2" Split Spoon		Start Finish		
				Driller : Paragon		Time: 14:00 Time: 16:45		
				Weather: Sunny, 80F		Date: 5/24/2007 Date: 5/24/2007		
				Sampler: AKRF/Art Rastelli				
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Grass	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	16"	9	SILT/ SAND	0-16": Loose Reddish brown SAND and SILT, some fine Clay	ND	No odor	Dry	
2		9						
3	24"	6	SILT/ SAND	0-24": Medium Dense Reddish brown SAND and SILT. Some Clay	ND	No odor	Dry	
4		12						
5	16"	10	TILL	0-16": Medium Dense red/brown fine SAND, some Silty Clay	ND	No odor	Dry	
6		7						
7	16"	18	TILL	0-16": Medium dense red/brown fine SAND, some Silt, trace Clay. Water Approx 7.8'	ND	No odor	Wet	
8		16						
9	16"	18	TILL	0-16": Medium Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
10		24						
11	12"	18	TILL	0-12": Medium dense red/brown fine SAND, some Silty Clay	ND	No odor	Wet	
12		18						
13	12"	26	TILL	0-12": Very dense red/brown fine SAND, some Silty Clay	ND	No odor	Wet	
14		28						
15	12"	50/0.3"	TILL	0-12": Very dense red/brown fine SAND, trace Silty Clay	ND	No odor	Wet	
16		32						
17	12"	50/0.3"	TILL	0-12": Very dense red/brown fine SAND, trace Silty Clay	ND	No odor	Wet	SB/MW-10 (18')
18		33						
				End of Boring				
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-10 (18') sent to the lab to be analyzed for VOCs (8260B).								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-11		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny 70 degrees Sampler: AKRF/Art Rastelli		Drilling Start: _____ Finish: _____ Time: 12:45PM Time: 4:30PM Date: 5/29/2007 Date: 5/29/2007		
Depth (feet)	Recovery (Inches)	Blows	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	8"	6	TILL	0'-8": Loose brown SILT, and fine SAND, trace Clay, trace fine Gravel	ND	No odor	Dry	
2		12		0'-1" asphalt				
3	18"	6	TILL	0'-18": Medium Dense brown SILT, and fine SAND, trace Clay.	ND	No odor	Dry	
4		10						
5	24"	24	TILL	0-24": Medium Dense red/brown SAND, some SILT.	ND	No odor	Moist	
6		10		Moist at 5-6'				
7	6"	10	TILL	0-6": Medium Dense red/brown SAND, some sandy SILT.	ND	No odor	Wet	
8		11		Water Approx 6'				
9	24"	8	TILL	0-24": Medium Dense red/brown SAND, some sandy SILT.	ND	No odor	Wet	
10		11						
11	12"	13	TILL	0-12": Medium Dense red/brown SAND, some sandy SILT.	ND	No odor	Wet	
12		15						
13	12"	39	TILL	0-12": Very Dense red/brown SAND, some sandy SILT.	ND	No odor	Wet	
14		50/.3"						
15				Advanced auger to 17'				
16								
17	24"	50/0.3"	TILL	0-24": Very Dense red/brown SAND, some sandy SILT.	ND	No odor	Wet	SB/MW-11 (17-19')
18								
19				Final Depth at 19' below grade. End of Boring.				
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-11 (17-19') sent to the lab to be analyzed for VOCs (8260B).								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-12		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Drilling Start Finish Time: 9:15 Time: 12:00 Date: 5/29/2007 Date: 5/29/2007		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	8"	10	SILT/ SAND	0-4": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		12		4-8": Medium Dense Reddish brown SAND and SILT, some fine Gravel and Clay				
3	16"	7	SILT/ SAND	0-16": Medium Dense Reddish brown SAND and SILT. Some Gravel	ND	No odor	Dry	
4		11						
5	16"	6	TILL	0-16": Loose red/brown fine SAND, some Silt.	ND	No odor	Moist	
6		7						
7	24"	5	TILL	0-24": Loose red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
8		6		Water Approx 7.3'				
9	24"	5	TILL	0-24": Loose red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
10		6						
11	18"	5	TILL	0-18": Loose red/brown fine SAND, some Silt.	ND	No odor	Wet	
12		9						
13				Advanced auger to 15'.				
14								
15	6"	3	TILL	0-6": Medium dense red/brown fine SAND, some Silt	ND	No Odor	Wet	
16		6						
17	18"	14	TILL	0-18": Very dense red/brown fine SAND, trace Silt	ND	No Odor	Wet	SB/MW-11 (17-19')
18		17						
19		43		0-12": Very dense red/brown fine SAND, trace Silt				
20		50/0.2"		19' below grade. End of Boring.				
21								
22								
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-12 (17-19') sent to the lab to be analyzed for VOCs (8260B)								

<h1>AKRF, Inc.</h1>				288 North Main Street New City, New York AKRF Project Number : 40217		Boring No. SB/MW-13 Sheet 1 of 1		
Environmental Consultants 34 South Broadway, White Plains, New York				Sampling Method: 2' Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Drilling Start _____ Finish _____ Time: 10:15 Time: 16:45 Date: 5/23/2007 Date: 5/23/2007		
Depth (feet)	Recovery (Inches)	Blows/Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	8"	9	SILT/ SAND	0-4": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		8		4-8": Loose Reddish brown SAND and SILT, some fine Gravel.				
3	12"	10	SILT/ SAND	0-12": Medium Dense Reddish brown SAND and SILT. Some Gravel	ND	No odor	Dry	
4		10						
5	18"	8	TILL	0-18": Loose red/brown fine SAND, some Silt,, trace Clay.	ND	No odor	Dry	
6		7						
7	18"	10	TILL	0-18": Medium dense red/brown fine SAND, some Silt, trace Clay. Water Approx 7.8'	ND	No odor	Moist	
8		9						
9	18"	18	TILL	0-18": Medium Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
10		21						
11	18"	26	TILL	0-18": Medium dense red/brown fine SAND, some Silt.	0.5	No odor	Wet	SB/MW-13 (10-12')
12		25						
13	18"	26	TILL	0-18": Medium dense red/brown fine SAND, some Silt.	ND	No odor	Wet	
14		24						
15	18"	15	TILL	0-18": Medium to Very dense red/brown fine SAND, trace Silt.	ND	No odor	Wet	
16		14						
17	20"	50/0.3"	TILL	0-20": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	
18								
19	2"	50/0.1"	TILL	0-2": Very dense red/brown fine SAND and some Clay, trace Silt.	ND	No odor	Wet	
20								
21				no data advanced auger				
22								
23				no data advanced auger				
24								
25				no data advanced auger				
26								
27				no data advanced auger				
28								
29				Cored from 28.5 ft to 33 ft - 2" recovery - Till				
30								
31								
32								
33			TILL	33' below grade. End of Boring.	ND	No Odor	Wet	
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-13 (10'-12') sent to the lab to be analyzed for VOCs (8260B)								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-13#2		
Environmental Consultants				AKRF Project Number : 40217		Sheet 1 of 2		
34 South Broadway, White Plains, New York				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Drilling Start: 10:30 Finish: 17:00 Time: 10:30 Time: 17:00 Date: 5/30/2007 Date: 5/30/2007		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1				Advanced auger.				
2								
3				Advanced auger.				
4								
5	1"	13	SILT/ SAND	0-4": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
6		18		4-5": Medium Dense Reddish brown SAND and SILT, some fine Gravel.				
15		19						
7				Advanced auger.				
8								
9				Advanced auger.				
10								
11	12"	10	SILT/ SAND	0-12": Medium Dense Reddish brown SAND and SILT. Some Gravel	ND	No odor	Wet	
12		15						
18		20						
13				Advanced auger.				
14								
15	12"	50/.4"	TILL	0-12": Very Dense red/brown fine SAND, some Silt., trace Clay.	ND	No odor	Wet	
16								
17				Advanced auger.				
18								
19				Advanced auger.				
20								
21	16"	50/.2"	TILL	0-16": Very dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
22				Water Approx 7.8'				
23				Advanced auger.				
24								
25	12"	50/.4"	TILL	0-12": Very Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	
26								
27				Advanced auger.				
28								
29				Advanced auger.				
30								
31	12"	50/.2"	TILL	0-12": Very dense red/brown fine SAND, some Silt.	ND	No odor	Wet	
32								
Notes: PID - Photoionization detector ND - Not Detected								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-13#2		
Environmental Consultants				AKRF Project Number : 40217		Sheet 2 of 2		
34 South Broadway, White Plains, New York				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Drilling Start: _____ Finish: _____ Time: 10:30 Time: 17:00 Date: 5/30/2007 Date: 5/30/2007		
Depth (feet)	Recovery (inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
33				Advanced auger.				
34								
35				Advanced auger.				
36								
37				Advanced auger.				
38								
39				Advanced auger.				
40								
41		50/2"		0-12": Very dense red/brown fine SAND, some Silt.				
42	12"		TILL		ND	No odor	Wet	
43				Advanced auger.				
44								
45				Advanced auger.				
46								
47				Advanced auger.				
48								
49				Advanced auger.				
50								
51		50/0"		0-12": Very dense red/brown fine SAND, trace Silt.				
52	12"		TILL		ND	No odor	Wet	
53				Advanced auger.				
54								
55				Advanced auger.				
56								
57				Advanced auger.				
58								
59				0-6": Very dense red/brown fine SAND and some Clay, trace Silt.		No odor	Wet	
60	6"							
62		50/0.2"	TILL	60.2 below grade. End of Boring.	ND			SB/MW-13 (60'-60.2')
64								

Notes: PID - Photoionization detector ND - Not Detected

Soil sample SB/MW-13 (60'-60.2') sent to the lab to be analyzed for VOCs (8260B)

<h1 style="text-align: center;">AKRF, Inc.</h1>				288 North Main Street New City, New York AKRF Project Number : 40217		Boring No. SB/MW-14		
Environmental Consultants 34 South Broadway, White Plains, New York				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Sheet 1 of 1		
						Drilling		
						Start		Finish
						Time: 7:55		Time: 9:25
						Date: 5/22/2007		Date: 5/22/2007
Depth (feet)	Recovery (Inches)	Blows/ FL	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	11"	8	SILT/ SAND	0-4": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		7		4-11": Loose Reddish brown SAND and SILT, some fine Gravel and Clay				
3	22"	6	SILT/ SAND	0-22": Loose Reddish brown SAND and SILT. Some Gravel	ND	No odor	Dry	
4		5						
5	17"	10	TILL	0-17": Medium Dense red/brown fine SAND, some Silt.	ND	No odor	Dry	
6		14						
7	18"	19	TILL	0-18": Medium Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Dry	
8		21						
9	8"	50/.4"	TILL	0-8": Very Dense red/brown fine SAND, some Silt, trace Clay. Some Gravel	ND	No odor	Dry	
10		22						
11	8"	50/.4"	TILL	0-8": Very Dense red/brown fine SAND, some Silt.	ND	No odor	Moist	
12		23						
13	8"	50/.3"	TILL	0-8": Very dense red/brown fine SAND, some Silt	ND	No odor	Wet	
14		24						
15	12"	50/0.1"	TILL	0-12": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
16		25						
17	12"	50/.3"	TILL	0-12": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
18		26						
19	12"	50/.3"	TILL	0-12": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
20		27						
21	8"	50/.3"	TILL	0-8": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
22		28						
23	12"	50/0.3"	TILL	0-12": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
24		29						
25	20"	50/0.2"	TILL	0-20": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
26		30						
27	20"	50/0.1"	TILL	0-20": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
28		31						
29	20"	50/0.1"	TILL	0-20": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	
30		32						
31								
32								
33				advanced auger. No data				
34								
35								
36								
37								
38								
39	20"		Till	0-20": Very dense red/brown fine SAND, trace Silt	ND	No odor	Wet	SB/MW-14 40'
40		50/0.0"						
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB/MW-14 (40') sent to the lab to be analyzed for VOCs (8260B)								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB-15		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny 70 degrees Sampler: AKRF/Art Rastelli		Drilling Start: _____ Finish: _____ Time: 7:20 Time: 8:50 Date: 5/23/07 Date: 5/23/07		
Depth (feet)	Recovery (inches)	Blows	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1 2	12"	9 8 12	TILL	0"-12": Loose brown SILT, some sandy Clay.	ND	No odor	Dry	
3 4	16"	14 12 7 10	TILL	0-16": Medium Dense red/brown SILT, some sandy Clay, trace fine Gravel.	ND	No odor	Dry	
5 6	12"	7 6 7 14	TILL	0-12": Medium Dense red/brown SILT, some sandy Clay, trace fine Gravel.	ND	No odor	Dry	
7 8	20"	13 16 18 22	TILL	0-20": Medium Dense red/brown SILT, some sandy Clay. 18-20" moist	ND	No odor	Moist	
9 10	24"	20 19 16 15	TILL	0-24": Red/brown SANDY SILT and fine GRAVEL (well-sorted till).	ND	No odor	Moist	
11 12	12"	10 8 14 15	TILL	0-12": Medium Dense red/brown fine SAND, some Silt, trace fine Gravel, trace Clay. Water Approx. 11.4'	ND	No odor	Wet	
13 14				Advanced auger.				
15 16				Advanced auger.				
17 19	12"	50/0.1*	TILL	0-12": Very Dense red/brown fine SAND, some Silt, trace Clay. Advanced Auger to 17' with no contamination present	ND	No odor	Wet	
20 21	12"	50/0.1*	TILL	0-12": Very Dense red/brown fine SAND, some Silt, trace Clay.	ND	No odor	Wet	SB-15 (20.7')
				Final Depth at 20.7' below grade. End of Boring.				
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB-15 (20.7') sent to the lab to be analyzed for VOCs (8260B).								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB-16		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
				Sampling Method: 2" Split Spoon Driller : Paragon Weather: Sunny, 80F Sampler: AKRF/Art Rastelli		Drilling Start Finish Time: 7:55 Time: 9:25 Date: 5/24/2007 Date: 5/24/2007		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	10"	13	SILT/ SAND	0-6": ASPHALT, some brown fine SAND.	ND	No odor	Dry	
2		13		6-10": Medium Dense Reddish brown SAND and SILT, some fine Gravel and Clay				
3	12"	13	SILT/ SAND	0-12": Medium Dense Reddish brown SAND and SILT. Some Gravel	ND	No odor	Dry	
4		14		23				
5	18"	28	TILL	0-18": Medium Dense red/brown fine SAND, some Silt. Some Gravel	ND	No odor	Dry	
6		17		20				
7	14"	25	TILL	0-14": Very Dense red/brown fine SAND, some Silt, trace Clay. Some Gravel	ND	No odor	Dry	
8		28		50/.4"				
9	24"	10	TILL	0-24": Medium Dense red/brown fine SAND, some Silt, trace Clay. Some Gravel	ND	No odor	Moist	
10		14		26				
11	24"	10	TILL	0-24": Medium Dense red/brown fine SAND, some Silt.	ND	No odor	Wet	
12		15		13				
13				advanced auger to 15'				
14								
15	8"	50/.3"	TILL	0-8": Very dense red/brown fine SAND, some Silt	ND	No odor	Wet	
16								
17				advanced auger to 18'				
18								
19	20"	50/0.1'	TILL	0-20": Very dense red/brown fine SAND, trace Silt.	ND	No odor	Wet	SB-16 (20-20.1')
20.1								
				20.1 below grade. End of Boring.				
Notes: PID - Photoionization detector ND - Not Detected Soil sample SB-16 (20-20.1') sent to the lab to be analyzed for VOCs (8260B).								

AKRF, Inc.				288 North Main Street New City, New York AKRF Project Number : 40217		Boring No. SB/MW-17		
Environmental Consultants 34 South Broadway, White Plains, New York				Sampling Method: Roller-bit Driller : Paragon Weather: Sunny, 90F Sampler: AKRF/Eric Rubin		Sheet 1 of 2 Drilling		
						Start Finish Time: 10:55 Time: 15:30 Date: 7/22/2008 Date: 7/26/2008		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
2			Loose Till	Dark brown medium SILT, some fine Sand, some Wood, trace Gravel		None		
4								
6			Loose Till	Brown Medium SILT, trace fine Sand and Gravel		None		
8								
10			Loose Till	Brown Medium fine Sand, some Silt, trace coarse Gravel		None		
12								
14			Loose Till	Brown medium SAND, some twigs, trace coarse Gravel		None		
18								
20			Dense Till	Medium brown medium-coarse SAND		None		
22								
24			Dense Till	Red brown CLAY, some Sand and Gravel		None		
26								
28			Dense Till	Red brown medium-coarse SAND, some Clay		None		
30								
32			Dense Till	Red brown medium-coarse SAND		None		
34								
36			Dense Till	Red brown medium-coarse SAND		None		
38								
40			Dense Till	Red brown medium-coarse SAND		None		
42								
44			Dense Till	Red brown medium-coarse SAND		None		
48								
50			Dense Till	Red brown medium-coarse SAND		None		
52								
54			Dense Till	Red brown medium-coarse SAND		None		
56								
58			Dense Till	Red brown medium-coarse SAND		None		
60								
62			Dense Till	Red brown medium-coarse SAND		None		
64								
66			Dense Till	Red brown medium-coarse SAND		None		
68								
70			Dense Till	Red brown medium-coarse SAND		None		
72								
74			Dense Till	Red brown medium-coarse SAND		None		
76								
Notes: PID - Photoionization detector ND - Not Detected								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-17		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 2 of 2		
				Sampling Method: Paragon Driller : Sunny, 90F Weather: AKRF/Eric Rubin Sampler:		Drilling Start Finish Time: 10:55 Time: 15:30 Date: 7/22/2008 Date: 7/26/2008		
Depth (feet)	Recovery (Inches)	Blows/ F.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
78 80			Dense Till	Red brown medium-coarse SAND		None		
82 84			Dense Till	Red brown medium-coarse SAND		None		
86 88			Dense Till	Red brown medium-coarse SAND		None		
90 92			Dense Till	Red brown medium-coarse SAND		None		
94 96			Dense Till	Red brown medium-coarse SAND		None		
98 100			Dense Till	Red brown medium-coarse SAND, trace Red Clay		None		
102 104			Dense Till	Red brown medium-coarse SAND, trace Red Clay		None		
106 108			Dense Till	Red brown medium-coarse SAND, trace Red Clay		None		
110 112			Dense Till	Red brown medium-coarse SAND, trace Red Clay		None		
114 116			Dense Till	Red brown medium-coarse SAND, trace Red Clay		None		
118 120			Dense Till	Red brown medium-coarse SAND, trace Red Clay		None		
122 124			Dense Till	Red brown coarse SAND, trace Schist flakes		None		
126 128			Dense Till	Red brown coarse SAND, trace Schist flakes		None		
130 132			Dense Till	Red brown coarse SAND		None		
134 136			Dense Till	Red brown coarse SAND		None		
138 140			Dense Till	Red brown coarse SAND		None		
142 144			Dense Till	Red brown coarse SAND		None		
146 148			Dense Till	Red brown coarse SAND		None		
150			Dense Till	Red brown coarse SAND; End of boring at 150 feet below grade		None		
Notes: PID - Photoionization detector ND - Not Detected								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-18		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2' Split Spoon		Start		
				Driller : Paragon		Time: 11:20		
				Weather: Sunny, 90F		Date: 7/29/2008		
				Sampler: AKRF/Eric Rubin		Date: 7/29/2008		
Depth (feet)	Recovery (Inches)	Blows/Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	13"	9	Loose Till	Medium-dark brown SILT, some fine Sand, some Wood, trace Gravel	0	None	Dry	
2		16						
3	12"	7	Loose Till	Medium brown SILT, trace fine Sand and Gravel	0	None	Dry	
4		10						
5	14"	2	Loose Till	Medium brown fine Sand, some Silt, trace coarse Gravel	0	None	Dry	
6		1						
7	10"	4	Loose Till	Brown medium SAND, some twigs, trace coarse Gravel	0	None	Wet	
8		7						
9	5"	9	Dense Till	Medium brown medium-coarse SAND	0	None	Saturated	
10		14						
11	13"	9	Dense Till	3" Brown coarse SAND and GRAVEL 10" Red brown CLAY, some fine Sand	0	None	Saturated	
12		12						
13	24"	15	Dense Till	5" Brown coarse SAND and GRAVEL 4" Red brown fine SAND, some CLAY 15" Red brown medium-coarse SAND	0	None	Moist	NC-SB-18 (13-14)
14		21						
15				End of boring at 14 feet bgs				
16								
Notes: PID - Photoionization detector ND - Not Detected Soil sample NC-SB-18(13-14) sent to the lab to be analyzed for VOCs (8260B)								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-19		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2' Split Spoon		Start		
				Driller : Paragon		Finish		
				Weather: Sunny, 90F		Time: 11:00 13:00		
				Sampler: AKRF/Eric Rubin		Date: 7/30/2008 7/30/2008		
Depth (feet)	Recovery (Inches)	Blows/Ft.	Soil Type	Surface Condition: Asphalt	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	14"	7	Loose Till	Red brown fine-medium SAND, some Silt, trace Gravel	0	None	Dry	
2		10						
3	12"	5	Loose Till	Red brown fine-medium SAND, some Silt, trace Gravel	0	None	Dry	
4		7						
5	13"	4	Loose Till	Red brown fine-medium SAND, some medium Gravel, trace Silt	0	None	Dry	
6		8						
7	13"	9	Dense Till	Red brown medium SAND, some medium-coarse Gravel	0	None	Moist	
8		12						
9	4"	50/2	Dense Till	Red brown coarse SAND and GRAVEL	0	None	Wet	
10		20						
11	8"	50/2	Dense Till	Red brown coarse SAND and GRAVEL	0	None	Saturated	
12								
13	7"	19	Dense Till	Red brown coarse SAND and GRAVEL	0	None	Saturated	NC-SB-19 (13-14)
14		50/3						
15				End of boring at 14 feet bgs				
16								
Notes: PID - Photoionization detector ND - Not Detected Soil sample NC-SB-19(13-14) sent to the lab to be analyzed for VOCs (8260B) Soil sample NC-SB-19B(13-14) collected as a blind duplicate and sent to the lab to be analyzed for VOCs (8260B)								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-20		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2' Split Spoon		Start		
				Driller : Paragon		Time: 11:55		
				Weather: Sunny, 90F		Time: 12:45		
				Sampler: AKRF/Eric Rubin		Date: 7/31/2008		
						Date: 7/31/2008		
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Grass	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	20"	15	Loose Till	2" TOPSOIL	0	None	Dry	
2		21		10" Dark brown SILT, some Gravel, trace fine Sand				
3	13"	24	Loose Till	12" Light brown SILT and SAND, some Gravel	0	None	Dry	
4		27		2" Orange brown SILT, some very fine Sand				
5	10"	18	Loose Till	11" Grey SILT and SAND, trace Gravel	0	None	Wet	
6		20		1" Grey SILT and SAND, trace Gravel				
7	12"	9	Loose Till	9" Red brown fine-medium SAND, some Cobble and Gravel	0	None	Saturated	
8		10		Red brown fine-medium SAND, some Gravel				
9	0	7	Loose Till	NO RECOVERY: Water	0	None	Saturated	
10		8						
11	24"	50//4	Dense Till	Red brown fine-medium SAND, some Gravel and Cobble	0	None	Saturated	
12								
13	6"	50//4	Dense Till	Red brown fine-medium SAND, some Gravel and Cobble	0	None	Saturated	NC-SB-20 (13-14)
14								
15				End of boring at 14 feet bgs				
16								
Notes: PID - Photoionization detector ND - Not Detected Soil sample NC-SB-20(13-14) sent to the lab to be analyzed for VOCs (8260B)								

AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-21		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2" Split Spoon		Start		
				Driller : Paragon		Finish		
				Weather: Sunny, 90F		Time: 7:50		Time: 10:00
				Sampler: AKRF/Eric Rubin		Date: 8/1/2008		Date: 8/1/2008
Depth (feet)	Recovery (Inches)	Blows/ Ft.	Soil Type	Surface Condition: Grass	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	19"	7	Loose Till	3" Tan brown fine SAND and GRAVEL	0	None	Dry	
2		12		6" Dark brown fine SAND and GRAVEL, trace Silt				
3		15		10" Red brown SAND				
4	21"	10	Loose Till	Red brown SILT, some fine Sand, trace Clay	0	None	Dry	NC-SB-21 (3-4)
5		11						
6		15						
7	3"	8	Loose Till	Red brown SILT, some fine Sand, trace Clay	0	None	Moist	
8		9						
9		12						
10	10"	15	Dense Till	Red brown SILT, some fine Sand, trace Clay	0	None	Moist	
11		22						
12		29						
13	15"	14	Dense Till	Red brown SILT, some fine Sand, trace Clay	0	None	Saturated	
14		17						
15		19						
16	11"	5	Dense Till	3" Brown SILT and medium SAND	0	None	Saturated	
17		8		8" Brown SILT, trace Clay				
18		7						
19	16"	10	Dense Till	Brown SILT, trace Clay, trace fine Sand	0	None	Saturated	
20		10						
21		10						
22				End of boring at 13 feet bgs				
23								
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Notes: PID - Photoionization detector ND - Not Detected


Soil sample NC-SB-20(3-4) sent to the lab to be analyzed for VOCs (8260B)


Soil sample NC-SB-MS collected as Matrix Spike and sent to the lab to be analyzed for VOCs (8260B)


Soil sample NC-SB-MSD collected as Matrix Spike Duplicate and sent to the lab to be analyzed for VOCs (8260B)

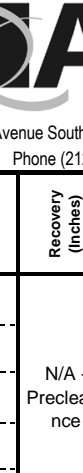
AKRF, Inc.				288 North Main Street New City, New York		Boring No. SB/MW-22		
Environmental Consultants 34 South Broadway, White Plains, New York				AKRF Project Number : 40217		Sheet 1 of 1		
						Drilling		
				Sampling Method: 2' Split Spoon		Start		
				Driller : Paragon		Time: 15:20		
				Weather: Sunny, 90F		Time: 16:45		
				Sampler: AKRF/Eric Rubin		Date: 7/31/2008		
						Date: 7/31/2008		
Depth (feet)	Recovery (Inches)	Blows/Ft.	Soil Type	Surface Condition: Grass	PID Reading (ppm)	Odor	Moisture	Samples Collected for Lab Analysis
1	15"	6	Loose Till	Medium-dark brown medium SAND, some Gravel, trace Silt	0	None	Dry	
2		8						
3	15"	11	Loose Till	6" Red brown SILT and GRAVEL, trace medium Sand	0	None	Dry	
4		12						
5	10"	12	Loose Till	Brown medium SAND, trace Gravel	0	None	Slightly Moist	
6		1						
7	13"	1	Dense Till	Red brown fine SAND, some Cobble and Gravel	0	None	Saturated	
8		1						
9	24"	32	Dense Till	Red and yellowish brown fine-medium SAND, some Gravel	0	None	Wet	
10		26						
11	20"	15	Dense Till	Brown SILT, some Clay, trace Sand	0	None	Wet	NC-SB-22 (11-12)
12		18						
13		14		End of boring at 12 feet bgs				
14		19						
15		16						
16		19						
Notes: PID - Photoionization detector ND - Not Detected Soil sample NC-SB-22(11-12) sent to the lab to be analyzed for VOCs (8260B)								


SOIL BORING LOG			Project Name AKRF Project Number: 40217-0001		Boring No. Sheet 1 of 1		MW-23			
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Hollow-Stem Auger		Drilling					
			Sampling Method: 2' Split-spoon		Start 10:45		Finish 12:00			
			Driller : NYEG		Time		Time			
			Sampler: Erik Nimlos		Date 11/18/2013		Weather: Partly Cloudy, 60° s			
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT			Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1	N/A - Preclearance	N/A	0-3": ASPHALT			ND	Dry	ND	ND	
2			3-60": Red SAND, little Gravel, trace Silt			ND	Dry	ND	ND	
3						ND	Moist	ND	ND	
4						ND	Wet	ND	ND	
5						ND	Wet	ND	ND	
6	15	N/A	0-15": Red SAND, little Gravel, trace Silt			ND	Wet	ND	ND	
7						ND	Wet	ND	ND	
8	18	N/A	0-9": SLOUGH			ND	Wet	ND	ND	
9			9-18": Red SAND, little Gravel, trace Silt			ND	Wet	ND	ND	
10	18	N/A	0-10": SLOUGH			ND	Wet	ND	ND	
11			10-18": Red SAND, little Gravel, trace Silt			ND	Wet	ND	ND	
12	7	N/A	0-1": SLOUGH			ND	Wet	ND	ND	
13			1-7": Red SAND, little Gravel, trace Silt			ND	Wet	ND	ND	
14			END OF BORING AT 12'							
15										
16										
17										
18										
19										
20										
21										
22										
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24										
25										
Notes: Groundwater encountered at 4' below grade.										
PID = photoionization detector ppm = parts per million ND = Not Detected										


SOIL BORING LOG				Project Name AKRF Project Number: 22141-0001		Boring No. Sheet 1 of 1		SB/MW-24	
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942				Drilling Method: Hollow-Stem Auger Sampling Method: Macro Core Driller : Longshore Environmental Sampler: Erik Nimlos		Drilling			
						Start 8:40 Finish 9:05 Time Time			
						Date 12/28/2012			
						Weather: Partly Cloudy, 40° s			
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis	
1	N/A (pre-clearance)	N/A	0-2": ASPHALT	ND	Dry	ND	ND		
2			2-60": Light-brown SAND, trace fine Gravel, Fines (FILL).	ND	Dry	ND	ND		
3				ND	Dry	ND	ND		
4				ND	Dry	ND	ND		
5				ND	Moist	ND	ND		
6	60	N/A	0-24": Brown FINE TO MEDIUM SAND, trace Fines (FILL).	ND	Moist	ND	ND		
7			24-52": Brown SILTY-SAND	ND	Wet	ND	ND		
8			52-60": Brown FINE SAND	ND	Saturated	ND	ND		
9				ND	Saturated	ND	ND		
10				ND	Saturated	ND	ND		
11	3"	N/A	0-3": Brown SAND, trace fine Gravel	ND	Saturated	ND	ND		
12				ND	Saturated	ND	ND		
13				ND	Saturated	ND	ND		
14				ND	Saturated	ND	ND		
15				ND	Saturated	ND	ND		
16			END OF BORING AT 15'						
17									
18									
19									
20									
Notes: Groundwater encountered at 6' below grade. PID = photoionization detector ppm = parts per million NA= Not applicable ND = Not Detected									


SOIL BORING LOG			Project Name AKRF Project Number: 40217-0001		Boring No. Sheet 1 of 1		SB/MW-25	
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Hollow-Stem Auger		Drilling			
			Sampling Method: 2' Split-spoon		Start Time 10:30		Finish Time 11:25	
			Driller : Longshore Environmental		Date 12/7/2012			
			Sampler: Erik Nimlos		Weather: Light rain, 40° s			
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1	N/A - Preclearance	N/A	0-3": ASPHALT	ND	Dry	1.1	ND	
2			3-60": Brown SAND, some to little Fines, trace F Gravel (FILL). Gravel becomes little below 2'	ND	Dry	1.9	ND	
3				ND	Dry	1.2	ND	
4				ND	Dry	1.7	ND	
5				ND	Dry	4	ND	
6	12	6	0-8": SLOUGH	ND	Wet	ND	ND	
7		7	8-12": Red-brown SILT	ND	Moist	ND	ND	
8	14	3	0-4": SLOUGH	ND	Moist	ND	ND	
9		4	4-14": Red-brown SILT, little Gravel, trace fine Sand	ND	Moist	ND	ND	
10	16	1	0-1": SLOUGH	ND	Moist	ND	ND	
11		3	1-10": Red-brown SILT, little Gravel, trace fine Sand	ND	Moist	ND	ND	
12	15	32	0-10": SAME AS ABOVE	ND	Moist	ND	ND	
13		8	10-15": Red-brown SAND, little Gravel and Fines (TILL?)	ND	Moist	ND	ND	
14	18	12	0-7": SLOUGH	ND	Moist	ND	ND	
15		6	7-18": Red-brown SAND, little Gravel and Fines	ND	Moist	ND	ND	
16	24	6	0-8": SLOUGH	ND	Wet	ND	ND	
17		5	8-24": Red-brown SAND, little Gravel and Fines	ND	Wet	ND	ND	
18	19	8	0-19": SAME AS ABOVE	ND	Wet	ND	ND	
19		9		ND	Wet	ND	ND	
20			END OF BORING AT 19'					
21								
22								
23								
24								
25								
Notes: R = Auger refusal Groundwater encountered at 11.5' below grade. PID = photoionization detector ppm = parts per million NA= Not applicable ND = Not Detected								


SOIL BORING LOG			Project Name AKRF Project Number: 40217-0001		Boring No. Sheet 1 of 1		SB/MW-26		
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Hollow-Stem Auger		Drilling				
			Sampling Method: 2' Split-spoon		Start Time 10:30		Finish Time 11:25		
			Driller : Longshore Environmental		Date 12/7/2012				
			Sampler: Erik Nimlos		Weather: Light rain, 40° s				
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT		Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1	N/A pre-clearance	N/A	0-3": ASPHALT		ND	Dry	0.9	ND	
2			3-60": Brown SAND, some fine to coarse Gravel, little Fines (FILL). Rock and brick cobbles encountered at 2'.		ND-slight	Dry	2	ND	
3					Petroleum	Moist	10.7	ND	
4					Petroleum	Moist	15.5	ND	
5					Slight	Moist-Wet	28	ND	
6	3	1	0-1": SLOUGH		Slight	Moist	2.1	ND	
7		0	1-3": Gray SAND, some Fines, trace Gravel (FILL)		ND	Moist			
8	9	2	0-4": SLOUGH		ND	Moist-Wet	10.4	ND	
9		4	4-9": Gray-brown SAND, little Gravel and Fines (FILL)		ND	Moist-Wet			
10	24	6	0-7": SLOUGH		ND	Saturated	2.9	Slight sheen	
11		8	7-24": Red-brown SAND, some Fines, trace Gravel (TILL)		ND	Moist			
12	18	10	0-8": SLOUGH		ND	Saturated	1.2	Slight sheen	
13		65	8-18": Red-brown SAND, little Gravel and Fines (TILL)		ND	Moist			
14			END OF BORING AT 13'						
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
Notes: R = Auger refusal Groundwater encountered at 5' below grade. PID = photoionization detector ppm = parts per million NA= Not applicable ND = Not Detected									


SOIL BORING LOG			Project Name AKRF Project Number: 40217-0001		Boring No. Sheet 1 of 1		MW-27		
 <p>440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942</p>			Drilling Method: Hollow-Stem Auger		Drilling				
			Sampling Method: 2' Split-spoon						
			Driller : NYEG		Start 15:15		Finish 16:50		
			Sampler: Erik Nimlos		Time		Time		
			Date 11/18/2013						
			Weather: Partly Cloudy, 60° s						
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT		Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1	N/A - Preclearance	N/A	0-3": ASPHALT		ND	Dry	ND	ND	
2			3-60": Brown SAND AND SILT, little Gravel (FILL)		ND	Dry	ND	ND	
3					ND	Dry	ND	ND	
4					ND	Dry	ND	ND	
5					ND	Dry	ND	ND	
6	20	N/A	0-20": Red-brown SAND, some Silt, little Gravel		ND	Moist	ND	ND	
7					ND	Moist	ND	ND	
8	14	N/A	0-2": SLOUGH		ND	Moist	ND	ND	
9			2-14": Red-brown SAND, some Silt, little Gravel		ND	Moist	ND	ND	
10	24	N/A	0-5": SLOUGH		ND	Moist	ND	ND	
11			5-24": Red-brown SAND, some Silt, little Gravel		ND	Moist	ND	ND	
12	18	N/A	0-2": SLOUGH		ND	Moist	ND	ND	
13			2-18": Red-brown SAND, some Silt, little Gravel		ND	Wet	ND	ND	
14	12		0-2": SLOUGH		ND	Wet	ND	ND	
15			2-12": Red-brown SAND, some Silt, little Weathered Bedrock		ND	Wet	ND	ND	
16	24		0-24": Red-brown SAND, some Silt, little Weathered Bedrock		ND	Wet	ND	ND	
17					ND	Wet	ND	ND	
18	24		0-24": Red-brown SAND, some Silt, little Weathered Bedrock		ND	Wet	ND	ND	
19					ND	Wet	ND	ND	
20			END OF BORING AT 20'						
21									
22									
23									
24									
25									
Notes: Groundwater encountered at 13' below grade.									
PID = photoionization detector ppm = parts per million NA= Not applicable ND = Not Detected									


SOIL BORING LOG			Project Name AKRF Project Number: 40217-0001		Boring No. Sheet 1 of 1		SB/MW-28	
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Hollow-Stem Auger		Drilling			
			Sampling Method: 2' Split-spoon		Start Time 9:20		Finish Time 11:30	
			Driller : Longshore Environmental		Date 12/6/2012			
			Sampler: Erik Nimlos		Weather: Mostly Clear, 50° s			
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1	N/A pre-clearance	N/A	0-2": ASPHALT	ND	Saturated	ND	ND	
2			2-60": Brown SAND, some fine to coarse Gravel, little Fines (FILL). Rock and brick cobbles encountered	ND	Saturated	ND	ND	
3				ND	Saturated	ND	ND	
4				ND	Saturated	ND	ND	
5				ND	Saturated	ND	ND	
6	6	2	0-6": Dark-brown SAND AND GRAVEL, trace fines, wood fragments (FILL)	ND	Wet	ND	ND	
7	3							
8	6	4	0-6": SAME AS ABOVE	ND	Wet	ND	ND	
9		5						
10	14	11	0-10": Dark-brown SAND, little Gravel and Fines (FILL)	ND	Moist	ND	ND	
11		15	10-14": Light-brown GRAVEL, some Sand, little Fines (FILL)					
12	12	4	0-4": SLOUGH	ND	Wet	ND	ND	
13		9	4-12": Gray-green SAND, some fine Gravel, trace Fines (FILL)					
14	21	10	0-2": SLOUGH	ND	Saturated	ND	ND	
15		11	2-21": Red-brown SAND, little fine Gravel, trace Fines (TILL)					
16	18	31	0-3": SLOUGH	ND	Saturated	ND	ND	
17		48	3-18": Red-brown SAND, little Gravel, trace Fines (TILL)					
18			END OF BORING AT 17.5'					
19								
20								
Notes: Groundwater encountered at 5' below grade. PID = photoionization detector ppm = parts per million NA= Not applicable ND = Not Detected								


SOIL BORING LOG			Project Name AKRF Project Number: 40217-0001		Boring No. Sheet 1 of 1		MW-29	
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Hollow-Stem Auger		Drilling			
			Sampling Method: 2' Split-spoon		Start Time 7:50		Finish Time 9:30	
			Driller : NYEG		Date 11/19/2013			
			Sampler: Erik Nimlos		Weather: Partly Cloudy, 40° s			
Depth (feet)	Recovery (Inches)	Blows	Surface Condition: ASPHALT	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1	N/A - Preclearance	N/A	0-9": ASPHALT	ND	Dry	ND	ND	
2			9-60": Brown SAND, some Gravel, little Garbage (FILL)	ND	Dry	ND	ND	
3				ND	Dry	ND	ND	
4				ND	Dry	ND	ND	
5				ND	Dry	ND	ND	
6	6	N/A	0-6": Brown SAND, some Gravel, little Garbage (FILL)	ND	Dry	ND	ND	
7			ND	Dry	ND	ND		
8	5	N/A	0-5": Brown SAND, some Gravel, little Garbage (FILL)	ND	Moist	ND	ND	
9			ND	Wet	ND	ND		
10	12	N/A	0-2": SLOUGH	ND	Wet	ND	ND	
11			2-12": Red-brown SAND AND SILT, trace Gravel	ND	Wet	ND	ND	
12	24	N/A	0-2": SLOUGH	ND	Wet	ND	ND	
13			2-24": Red-brown SAND AND SILT, trace Gravel	ND	Wet	ND	ND	
14	5	N/A	0-2": SLOUGH	ND	Wet	ND	ND	
15			2-5": Red-brown SAND AND SILT, trace Gravel, Weathered Bedrock	ND	Wet	ND	ND	
16			END OF BORING AT 16'					
17								
18								
19								
20								
21								
22								
23								
24								
25								
Notes: Groundwater encountered at 9' below grade. PID = photoionization detector ppm = parts per million NA= Not applicable ND = Not Detected								


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-1 Sheet 1 of 1			
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling Start Time 8:32 Finish Time 8:55 Date 05.20.10 Weather: Approx. 70; sunny			
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis
1	24"	Silt	0-12": ASPHALT and fine GRAVEL, some brown Silt.	ND	Dry	ND	ND	CB-1 (5')
2			12-24": Brown-red SILT, some brown fine Sand, trace fine Gravel.	Slight solvent-like odor	Dry	max: 34.1	ND	
3								
4								
5								
6	14"	Silt	0-3": ASPHALT SLOUGH.	ND	Dry	ND	ND	CB-1 (10')
7			3-14": Brown-red SILT.	Slight solvent-like odor	Dry	16.2	ND	
8								
9								
10								
11	60"	Silt	0-52": Brown-red SILT.	ND	Wet	max: 4.0	ND	
12			52-60": Brown-red SILT, trace fine Gravel.	ND	Dry	ND	ND	
13								
14								
15								
16	60	Silt	Brown-red SILT, trace fine Gravel (with a layer of light brown-yellow medium to coarse Sand at 43-44").	ND	Wet:	max: 0.6	ND	
17					0-18"			
18					Moist:			
19					18-36"			
20					Dry:			
Notes: Groundwater encountered at approx. 11' below grade. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected								


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-2 Sheet 1 of 1																
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: See below. Driller: Moran Environmental Sampler: E. Baird		Drilling <table border="1"> <tr> <td>Start Time</td> <td>13:10</td> <td>Finish Time</td> <td>13:43</td> </tr> <tr> <td>Date</td> <td colspan="3">05.20.10</td> </tr> <tr> <td colspan="4">Weather: approx. 80; sunny</td> </tr> </table>					Start Time	13:10	Finish Time	13:43	Date	05.20.10			Weather: approx. 80; sunny			
Start Time	13:10	Finish Time	13:43																		
Date	05.20.10																				
Weather: approx. 80; sunny																					
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis													
1	36	Silt and Sand	*Boring advanced by hand auger due to boring's proximity to water utility line.	ND	Moist	ND	ND	CB-2 (2.5')													
2																					
3																					
4																					
5																					
6	42"	Sand and Silt	*Boring advanced with direct push macrocore.	ND	Dry: 0-14" Moist: 14-42"	max: 2.0	ND	CB-2 (7.5')													
7																					
8																					
9																					
10																					
11	56"	Silt and Sand	0-12: Brown-red SILT and SAND, some fine Gravel.	ND	Dry	ND	ND														
12																					
13																					
14																					
15																					
			12-23": Brown-red SILT and SAND, some fine Gravel.	ND	Saturated	ND	ND														
			23-56": Brown-red SILT and SAND, some fine Gravel.	ND	Moist	ND	ND														
Notes: Groundwater encountered at approx. 12' below grade. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected																					


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-3 Sheet 1 of 1															
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling <table border="1"> <tr> <td>Start Time</td> <td>10:45</td> <td>Finish Time</td> <td>11:15</td> </tr> <tr> <td>Date</td> <td colspan="3">05.20.10</td> </tr> <tr> <td colspan="4">Weather: approx. 75; sunny</td> </tr> </table>				Start Time	10:45	Finish Time	11:15	Date	05.20.10			Weather: approx. 75; sunny			
Start Time	10:45	Finish Time	11:15																	
Date	05.20.10																			
Weather: approx. 75; sunny																				
Depth (feet)	Recovery (inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis												
1	42"	Silt	0-12": ASPHALT and fine GRAVEL.	ND	Dry	ND	ND	CB-3 (2.5')												
2			12-18": Brown SILT, trace fine Gravel.	ND	Dry	ND	ND													
3			18-20": Fine Gravel.	ND	Dry	ND	ND													
4			20-42": Brown-red SILT, some fine Gravel, trace yellow fine to medium Sand.	ND	Dry	ND	ND	CB-3 (5')												
5																				
6	48"	Silt	0-4": SLOUGH.	ND	Moist	ND	ND	CB-3 (7.5')												
7			4-48": Brown-red SILT, some fine Gravel.	ND	Moist	ND	ND	CB--3 (10')												
8																				
9																				
10																				
11	60"	Silt	0-52": Brown-red SILT, little fine Gravel.	ND	Moist	ND	ND													
12			52-60": Brown-red SILT, little fine Gravel.	ND	Dry	ND	ND													
13																				
14																				
15																				
Notes: Groundwater encountered at approx. 11' below grade. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected																				


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-4 Sheet 1 of 1																
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: See below. Driller: Moran Environmental Sampler: E. Baird		Drilling <table border="1"> <tr> <td>Start Time</td> <td>10:10</td> <td>Finish Time</td> <td>11:45</td> </tr> <tr> <td colspan="4">Date 05.20.10</td> </tr> <tr> <td colspan="4">Weather: approx. 75; sunny</td> </tr> </table>					Start Time	10:10	Finish Time	11:45	Date 05.20.10				Weather: approx. 75; sunny			
Start Time	10:10	Finish Time	11:45																		
Date 05.20.10																					
Weather: approx. 75; sunny																					
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis													
1	60	Silt	*Hand auger due to proximity to utility line.	ND	Dry	ND	ND	CB-4 (2.5')													
2			0-30": Brown-red SILT, some fine Gravel.																		
3			*Hollow stem auger to continue boring to 5' below grade.																		
4			30-60": Brown-red SILT, some fine Gravel.																		
5																					
6	45"	Silt and Sand	*Macrocore to continue boring to 13.5' below grade.	ND	Moist	ND	ND	CB-4 (7.5') CB-4 (10')													
7			Brown-red SILT and brown-red SAND, trace fine Gravel (layer of light brown Silt mottling at 36-38").																		
8																					
9																					
10																					
11	42		0-38": Brown-red SILT, little fine Gravel.	ND	Moist	ND	ND														
12			38-42": Brown-red SILT, little fine Gravel.	ND	Moist	ND	ND														
13			Refusal at approximately 13.5' below grade.																		
14																					
15																					
Notes: Groundwater not encountered. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected																					


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-5 Sheet 1 of 1																
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling <table border="1"> <tr> <td>Start Time</td> <td>8:58</td> <td>Finish Time</td> <td>9:28</td> </tr> <tr> <td>Date</td> <td colspan="3">05.20.10</td> </tr> <tr> <td colspan="4">Weather: approx. 70; sunny</td> </tr> </table>					Start Time	8:58	Finish Time	9:28	Date	05.20.10			Weather: approx. 70; sunny			
Start Time	8:58	Finish Time	9:28																		
Date	05.20.10																				
Weather: approx. 70; sunny																					
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis													
1	34"	Silt	0-3": ASPHALT and GRAVEL.	ND	Dry	ND	ND	CB-5 (2.5')													
2			3-29": Light to medium brown SILT, little fine Gravel, trace yellow fine Sand.																		
3			29-34": Brown-red Silt, trace fine Gravel.																		
4																					
5																					
6	46"	Silt	0-4": SLOUGH.	ND	Dry	ND	ND	CB-5 (10')													
7			4-12": Brown-red SILT, trace fine Gravel.	ND	Moist	Max: 9.7 at 8'	ND														
8			12-13": ASPHALT MILLINGS.	ND	Moist		ND														
9			13-46": Brown-red SILT, trace fine Gravel.	ND	Moist		ND														
10																					
11	48"	Silt	Brown-red SILT, trace fine Gravel.	Slight solvent-like odor	Saturated at approx. 12'	Max: 6.1 at approx. 12'	ND														
12																					
13																					
14																					
15																					
Notes: Groundwater encountered at approx. 12' below grade. All samples submitted to Test America Labs for TCL 8260. Sample CB-5 (2.5) submitted for TCLP 8260 analysis. ND = Not Detected																					

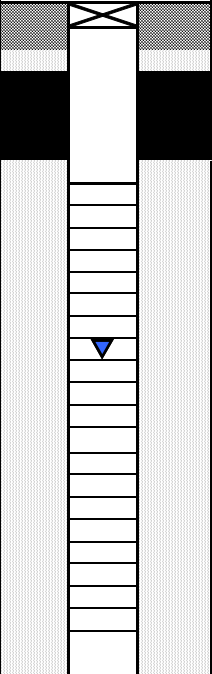
SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-6 Sheet 1 of 1																
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling <table border="1"> <tr> <td>Start Time</td> <td>10:20</td> <td>Finish Time</td> <td>10:40</td> </tr> <tr> <td>Date</td> <td colspan="3">05.20.10</td> </tr> <tr> <td colspan="4">Weather: approx. 70; sunny</td> </tr> </table>					Start Time	10:20	Finish Time	10:40	Date	05.20.10			Weather: approx. 70; sunny			
Start Time	10:20	Finish Time	10:40																		
Date	05.20.10																				
Weather: approx. 70; sunny																					
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis													
1	40"	Silt	0-14": ASPHALT, some fine Gravel.	ND	Dry	ND	ND	CB-6 (2.5')													
2			14-23": Brown SILT, some fine Gravel, trace yellow-white Sand.	ND	Dry	ND	ND	CB-6 (5')													
3			23-40": Brown-red SILT, trace fine Gravel.	ND	Dry	ND	ND														
4																					
5																					
6	46"	Silt	0-3": SLOUGH.	ND	Dry	ND	ND	CB-6 (7.5')													
7			3-46": Brown-red SILT, trace yellow-white fine to medium Sand.	ND	Saturated	ND	ND	CB-6 (10')													
8																					
9																					
10																					
11	48"	Silt	Brown-red SILT, trace fine Gravel.	ND	Moist to Saturated	ND	ND														
12																					
13																					
14																					
15																					
Notes: Groundwater encountered at approx. 12' below grade. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected																					


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-7 Sheet 1 of 1				
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling				
					Start Time 12:50			Finish Time 13:10	
					Date 05.20.10				
					Weather: approx. 80; sunny				
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis	
1	40"	Silt	0-13": ASPHALT and fine GRAVEL.	ND	Dry	0.1	ND	CB-7 (2.5')	
2			13-27": Brown-yellow-red SILT, little fine Gravel (dark brown mottling at 26-27").	ND	Dry	ND	ND	CB-7 (5')	
3			27-40": Brown-red SILT, little fine Gravel, white Sand.	ND	Dry	ND	ND		
4									
5									
6	43"	Silt	0-7": Red-yellow SILT, little red-yellow Sand, trace fine Gravel.	ND	Dry	ND	ND	CB-7 (7.5')	
7			7-43": Brown-red SILT, some fine Gravel, trace red-brown Sand.	ND	Moist	ND	ND	CB-7 (10')	
8									
9									
10									
11	41"	Silt	Brown-red SILT, some fine Gravel.	ND	Moist to Saturated at 11'	ND	ND		
12									
13									
14									
15									
Notes: Groundwater encountered at approx. 11' below grade. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected									


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-8 Sheet 1 of 1			
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling			
					Start Time 9:30		Finish Time 9:49	
					Date 05.20.10			
					Weather: approx. 70; sunny			
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis
1	32"	Silt	0-4": ASPHALT.	ND	Dry	ND	ND	CB-8 (5')
2			4-24": Light to medium brown SILT, trace fine Gravel.	ND	Moist	0.6	ND	
3			24-32": Brown-red SILT, trace fine Gravel.	ND	Dry	ND	ND	
4								
5								
6	44"	Silt	0-5": Light to medum brown SILT.	ND	Dry	ND	ND	CB-8 (10')
7			5-7": Brown-red SILT.	ND	Dry	ND	ND	
8			7-9": ASPHALT MILLINGS.	ND	Dry	ND	ND	
9			9-44": Brown-red SILT, trace fine Gravel.	ND	Moist	0.2	ND	
10								
11	33"	Silt	0-30": Brown-red SILT, trace fine Gravel.	ND	Moist	ND	ND	
12			30-33": Brown-red SILT, trace fine Gravel.	ND	Moist	ND	ND	
13			Refusal at approximately 12' below grade.					
14								
15								
Notes: Groundwater not encountered. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected								


SOIL BORING LOG			New City Plaza AKRF Project Number: 40217		Boring No. CB-9 Sheet 1 of 1																
 440 Park Avenue South, New York, NY 10016 Phone (212) 696-0670 Fax (212) 726-0942			Drilling Method: Geoprobe Sampling Method: Macrocore Driller: Moran Environmental Sampler: E. Baird		Drilling <table border="1"> <tr> <td>Start Time</td> <td>13:50</td> <td>Finish Time</td> <td>14:25</td> </tr> <tr> <td>Date</td> <td colspan="3">05.20.10</td> </tr> <tr> <td colspan="4">Weather: approx. 80; sunny</td> </tr> </table>					Start Time	13:50	Finish Time	14:25	Date	05.20.10			Weather: approx. 80; sunny			
Start Time	13:50	Finish Time	14:25																		
Date	05.20.10																				
Weather: approx. 80; sunny																					
Depth (feet)	Recovery (Inches)	Soil Type	Surface Condition: Asphalt	Odor	Moisture	PID (ppm)	NAPL	Samples Collected for Lab Analysis													
1	30"	Silt	0-4": ASPHALT and fine GRAVEL.	ND	Dry	ND	ND	CB-9 (2.5')													
2			4-30": Brown SILT, little fine Gravel, trace yellow-white fine Sand.	ND	Moist at 15"	ND	ND	CB-9 (5')													
3																					
4																					
5																					
6	44"	Silt	0-11": Brown medium SAND and SILT, little fine Gravel.	ND	Moist	ND	ND	CB-9 (7.5')													
7			11-44": Brown SILT and SAND, little fine Gravel.	ND	Saturated at approx. 10'	0.1	ND	CB-9 (10')													
8																					
9																					
10																					
11	60"	Silt	0-42": Brown-red SILT and SAND, little fine Gravel.	ND	Moist	ND	ND														
12			42-60": Brown-red SILT and SAND, little fine Gravel.	ND	Dry	0.1	ND														
13																					
14																					
15																					
Notes: Groundwater encountered at approx. 10' below grade. All samples submitted to Test America Labs for TCL 8260. ND = Not Detected																					


AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-7	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2' Split Spoon	Start	Finish
		Driller :	Paragon	Time: 16:45	Time: 19:30
		Weather:	80F Sunny	Date: 5/22/07	Date: 5/22/07
		Field Supervisor:	AKRF/Art Rastelli		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
2		Bentonite Seal 0.5' to 3'			
3		PVC well riser from 0 to 7'			
4					
5					
6					
7					
8		10-Slot PVC well screen 7' to 17'			
9					
10					
11		Sand pack filter 3' to 18'			
12					
13					
14					
15		1' Sump 17'-18'			
16					
17					
18					
Notes:	Groundwater was encountered at approximately 7.8 feet below grade during drilling on 5/22/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/7/07. Stabilized groundwater level measurement of 10.38 feet below grade taken prior to sampling on 6/7/07.  Groundwater level indicator.				

AKRF, Inc.		288 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-8	
				Sheet 1	of 1
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Split Spoon	Start	Finish
		Driller :	Paragon	Time: 7:30	Time: 11:30
		Weather:	80F Sunny	Date: 5/25/2007	5/25/2007
		Field Supervisor:	AKRF/Mark Bowen		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap 0 to 0.5' below grade. Concrete Seal 0 to 1' below grade Sand pack filter 1' to 1.5' Bentonite Seal 1.5' to 3.5'			
2		PVC well riser from 0 to 4'			
3					
4					
5					
6					
7					
8		10-Slot PVC well screen 4' to 14'			
9					
10					
11		Sand pack filter 3.5' to 15'			
12					
13					
14					
15		1' Sump 14'-15'			
Notes:	Groundwater was encountered at approximately 7.8 feet below grade during drilling on 5/25/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/7/07. Stabilized groundwater level measurement of 5.95 feet below grade taken prior to sampling on 6/7/07. ▼ Groundwater level indicator.				


AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-9 Sheet 1 of 1	
		Drilling Method: Sampling Method: Driller : Weather: Field Supervisor:	4-1/4" Hollow Stem Auger 2" Split Spoon Paragon 80F Sunny AKRF/Art Rastelli	Drilling Start Time: 11:00 Date: 5/24/07	
Depth (feet)	Well Construction	Surface Condition: Asphalt			
		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
1		Sand pack filter 0.5' to 1'			
2		Bentonite Seal 1' to 3'			
3		PVC well riser from 0 to 5'			
4					
5					
6					
7		10-Slot PVC well screen 5' to 15'			
8					
9					
10					
11					
12		Sand pack filter 3' to 16'			
13					
14					
15					
16		1' sump 15'-16'			
Notes:		Groundwater was encountered at approximately 7.4 feet below grade during drilling on 5/24/07. No free-phase product detected with the oil/water interface probe prior to sampling on 6/7/07. Stabilized groundwater level measurement of 7.92 feet below grade taken prior to sampling on 6/7/07.  Groundwater level indicator.			

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-10	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Split Spoon	Start	Finish
		Driller :	Paragon	Time: 14:00	Time: 16:45
		Weather:	80F Sunny	Date: 5/24/07	Date: 5/24/07
		Field Supervisor:	AKRF/Art Rastelli		
Depth (feet)	Well Construction	Surface Condition: Grass			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
2		Bentonite Seal 0.5' to 3'			
3		PVC well riser from 0 to 4'			
4					
5					
6					
7					
8		10-Slot PVC well screen 4' to 15'			
9					
10					
11		Sand pack filter 3' to 16'			
12					
13					
14					
15		1' Sump 15'-16'			
16					
Notes:	Groundwater was encountered at approximately 7.8 feet below grade during drilling on 5/24/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/7/07. Stabilized groundwater level measurement of 10.04 feet below grade taken prior to sampling on 6/7/07.  Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-11	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Split Spoon	Start	Finish
		Driller :	Paragon	Time: 12:45	Time: 16:30
		Weather:	80F Sunny	Date: 5/29/07	Date: 5/29/07
		Field Supervisor:	AKRF/Art Rastelli		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
2		Bentonite Seal 0.5' to 3'			
3		PVC well riser from 0 to 4'			
4					
5					
6					
7					
8		10-Slot PVC well screen 4' to 14'			
9					
10					
11		Sand pack filter 3' to 15'			
12					
13					
14					
15		1' Sump 14'-15'			
Notes:	Groundwater was encountered at approximately 6 feet below grade during drilling on 5/29/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/8/07. Stabilized groundwater level measurement of 4.6 feet below grade taken prior to sampling on 6/8/07.  Groundwater level indicator.				


AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-12 Sheet 1 of 1	
		Drilling Method: 4-1/4" Hollow Stem Auger Sampling Method: 2" Split Spoon Driller : Paragon Weather: 80F Sunny Field Supervisor: AKRF/Art Rastelli	Drilling Start Time: 9:15 Date: 5/29/07	Finish Time: 12:00 Date: 5/29/07	
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
2		Bentonite Seal 0.5' to 3'			
3		PVC well riser from 0 to 5'			
4					
5					
6					
7					
8		10-Slot PVC well screen 5' to 15'			
9					
10					
11		Sand pack filter 3' to 16'			
12					
13					
14					
15		1' Sump 15'-16'			
16					
Notes:	Groundwater was encountered at approximately 7.3 feet below grade during drilling on 5/29/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/8/07. Stabilized groundwater level measurement of 5.02 feet below grade taken prior to sampling on 6/8/07.  Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-13	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Sheet 1 of 1	
		Sampling Method:	2" Split Spoon	Drilling	
		Driller :	Paragon	Start	Finish
		Weather:	80F Sunny	Time: 10:30	Time: 17:00
		Field Supervisor:	AKRF/Art Rastelli	Date: 5/30/07	Date: 5/30/07
Depth (feet)	Well Construction	Surface Condition: Asphalt			
2		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
4		Sand pack filter 0.5' to 1'			
6		Bentonite Seal 1' to 3'			
8					
10					
12		PVC well riser from 3' to 49.5'			
14					
16					
18					
20					
22					
24					
26		10-Slot PVC well screen 49.5' to 59.5'			
28					
30					
32					
34					
36					
38					
40					
42					
44		Sand pack filter 3' to 60.2'			
46					
48					
50					
52					
54					
56					
58		Sump 59.5' to 60.2'			
60					
60.2					
Notes:	Groundwater was encountered at approximately 7.8 feet below grade during drilling on 5/30/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/7/07. Stabilized groundwater level measurement of 11.78 feet below grade taken prior to sampling on 6/7/07. ▼ Groundwater level indicator.				


AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. SB/MW-14	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Sheet 1 of 1	
		Sampling Method:	2" Split Spoon	Drilling	
		Driller :	Paragon	Start	Finish
		Weather:	80F Sunny	Time: 7:55	Time: 9:25
		Field Supervisor:	AKRF/Art Rastelli	Date: 5/22/07	Date: 5/22/07
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
2		Bentonite Seal 0.5' to 3'			
3		PVC well riser from 0 to 4'			
4					
5					
6					
7					
8		10-Slot PVC well screen 4' to 17'			
9					
10					
11		Sand pack filter 3' to 18'			
12					
13					
14					
15		1' Sump 17'-18'			
16					
17					
18					
Notes:	Groundwater was encountered at approximately 11.5 feet below grade during drilling on 5/22/07. No free-phase product was detected with the oil/water interface probe prior to sampling on 6/8/07. Stabilized groundwater level measurement of 7.95 feet below grade taken prior to sampling on 6/8/07 .  Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-17	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger and Rollerbit	Sheet 1 of 1	
		Sampling Method:		Drilling	
		Driller :	Paragon	Start	Finish
		Weather:	90F Sunny	Time: 1055	Time: 1530
		Field Supervisor:	AKRF/Eric Rubin	Date: 7/22/08	Date: 7/26/08
Depth (feet)	Well Construction	Surface Condition: Asphalt			
4		Flush-mounted well cover, locking cap and concrete seal 0 to 1.0' below grade.			
8	▼				
12					
16		8-inch steel casing from 0 to 18'			
20					
24					
28					
32					
36					
40		PVC well riser from 0 to 138.5'			
44					
48					
52					
56		Portland grout seal 1.5' to 136'			
60					
64					
68					
72					
76					
80					
84					
88					
92					
96					
100					
104					
108					
112					
116					
120					
124					
128					
132					
136		Bentonite seal 134' to 136'			
140					
144		Sand pack filter 136' to 149'			
146		10-Slot PVC well screen 138' to 148'			
149.5		1' Sump 148'-149'			
Notes:		Groundwater was encountered at approximately 8 feet below grade during drilling on 7/22/08. No free-phase product was detected with the oil/water interface probe prior to sampling on 8/8/08. Stabilized groundwater level measurement of 7.50 feet below grade taken prior to sampling on 8/8/08 . ▼ Groundwater level indicator.			

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-18	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Split Spoon	Start	Finish
		Driller :	Paragon	Time: 1055	Time: 1520
		Weather:	90F Sunny	Date: 7/29/08	Date: 7/29/08
		Field Supervisor:	AKRF/Eric Rubin		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1.0' below grade.			
2		Bentonite Seal 1.0' to 1.5'			
3		PVC well riser from 0 to 3'			
4					
5					
6					
7					
8		10-Slot PVC well screen 3' to 13'			
9					
10					
11		Sand pack filter 1.5' to 14'			
12					
13					
14		1' Sump 13'-14'			
Notes:	Groundwater was encountered at approximately 5.5 feet below grade during drilling on 7/29/08. No free-phase product was detected with the oil/water interface probe prior to sampling on 8/5/08. Stabilized groundwater level measurement of 4.85 feet below grade taken prior to sampling on 8/5/08 . Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-19	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Sheet 1 of 1	
		Sampling Method:	2" Split Spoon	Drilling	
		Driller :	Paragon	Start	Finish
		Weather:	90F Sunny	Time: 1050	Time: 1530
		Field Supervisor:	AKRF/Eric Rubin	Date: 7/30/08	Date: 7/30/08
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1.0' below grade.			
2		Bentonite Seal 1.0' to 1.5'			
3		PVC well riser from 0 to 3'			
4					
5					
6					
7					
8		10-Slot PVC well screen 3' to 13'			
9					
10					
11		Sand pack filter 1.5' to 14'			
12					
13					
14		1' Sump 13'-14'			
Notes:	Groundwater was encountered at approximately 6.0 feet below grade during drilling on 7/30/08. No free-phase product was detected with the oil/water interface probe prior to sampling on 8/4/08. Stabilized groundwater level measurement of 7.76 feet below grade taken prior to sampling on 8/4/08 .  Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-20	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Sheet 1 of 1	
		Sampling Method:	2" Split Spoon	Drilling	
		Driller :	Paragon	Start	Finish
		Weather:	90F Sunny	Time: 1150	Time: 1350
		Field Supervisor:	AKRF/Eric Rubin	Date: 7/31/08	Date: 7/31/08
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1.0' below grade.			
2		Bentonite Seal 1.0' to 1.5'			
3		PVC well riser from 0 to 3'			
4					
5					
6					
7					
8		10-Slot PVC well screen 3' to 13'			
9					
10					
11		Sand pack filter 1.5' to 14'			
12					
13					
14		1' Sump 13'-14'			
Notes:	Groundwater was encountered at approximately 5.5 feet below grade during drilling on 7/31/08. No free-phase product was detected with the oil/water interface probe prior to sampling on 8/7/08. Stabilized groundwater level measurement of 5.50 feet below grade taken prior to sampling on 8/7/08 . Groundwater level indicator.				


AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-21	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Sheet 1 of 1	
		Sampling Method:	2" Split Spoon	Drilling	
		Driller :	Paragon	Start	Finish
		Weather:	90F Sunny	Time: 0750	Time: 1120
		Field Supervisor:	AKRF/Eric Rubin	Date: 8/1/08	Date: 8/1/08
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1.0' below grade. Bentonite Seal 1.0' to 2.0'			
2		PVC well riser from 0 to 2'			
3					
4					
5					
6					
7					
8		10-Slot PVC well screen 2' to 12'			
9					
10					
11		Sand pack filter 1.0' to 13'			
12					
13		1' Sump 12'-13'			
Notes:	Groundwater was encountered at approximately 5.0 feet below grade during drilling on 8/1/08. No free-phase product was detected with the oil/water interface probe prior to sampling on 8/7/08. Stabilized groundwater level measurement of 1.62 feet below grade taken prior to sampling on 8/7/08 .  Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-22	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Split Spoon	Start	Finish
		Driller :	Paragon	Time: 1500	Time: 1900
		Weather:	90F Sunny	Date: 7/31/08	Date: 7/31/08
		Field Supervisor:	AKRF/Eric Rubin		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 0.5' below grade.			
2		PVC well riser from 0 to 1'			
3					
4	▼				
5					
6					
7					
8		10-Slot PVC well screen 2' to 12'			
9		Sand pack filter 1.0' to 12'			
10					
11		1' Sump 11'-12'			
12					
Notes:	Groundwater was encountered at approximately 4.0 feet below grade during drilling on 7/31/08. No free-phase product was detected with the oil/water interface probe prior to sampling on 8/7/08. Stabilized groundwater level measurement of 3.85 feet below grade taken prior to sampling on 8/7/08 . ▼ Groundwater level indicator.				


AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-23 Sheet 1 of 1	
		Drilling Method: 4-1/4" Hollow Stem Auger Sampling Method: 2" Split Spoon Driller : Longshore Environmental Weather: 40F P. Cloudy Field Supervisor: AKRF/Eric Nimlos	Drilling Start Time: 09:10 Date: 11/18/13	Finish Time: 13:00 Date: 11/18/13	
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1.0' below grade.			
2		PVC well riser from 0 to 2'			
3					
4	▼				
5					
6		Sand pack filter 1' to 12'			
7					
8		10-Slot PVC well screen 2' to 12'			
9					
10					
11					
12					
Notes:	Groundwater was encountered at approximately 4 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis ▼ Groundwater level indicator.				

AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-24 Sheet 1 of 1	
		Drilling Method: 4-1/4" Hollow Stem Auger Sampling Method: 2" Macrocore Driller : Longshore Environmental Weather: 40°F P. Cloudy Field Supervisor: AKRF/Eric Nimlos	Drilling Start Time: 08:40 Date: 12/28/12		Finish Time: 09:05 Date: 12/28/12
Depth (feet)	Well Construction	Surface Condition: Asphalt Flush-mounted well cover, locking cap and concrete seal 0' to 1.0' below grade. Bentonite Seal from 1' to 1.5' PVC well riser from 0' to 2.5' 10-Slot PVC well screen 2.5' to 13' Sand pack filter 1' to 12' 0.5' Sump 12.5'-13'			
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
Notes:	Groundwater was encountered at approximately 6 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis ▼ Groundwater level indicator.				

AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-25 Sheet 1 of 1	
		Drilling Method: 4-1/4" Hollow Stem Auger Sampling Method: 2" Macrocore Driller : Longshore Environmental Weather: 40°F Light Rain Field Supervisor: AKRF/Eric Nimlos	Drilling Start Time: 10:30 Date: 12/07/12	Finish Time: 11:25 Date: 12/07/12	
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1' below grade.			
2		PVC well riser from 0 to 9'			
3		Grout Seal 1' to 7'			
4					
5					
6					
7					
8		Bentonite Seal from 7' to 8'			
9					
10					
11		Sand pack filter 7' to 19.5'			
12					
13					
14					
15					
16		10-Slot PVC well screen 9' to 19'			
17					
18					
19					
20		0.5' Sump 19-19.5'			
Notes:	Groundwater was encountered at approximately 11.5 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis Groundwater level indicator.				

AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-26 Sheet 1 of 1	
		Drilling Method: 4-1/4" Hollow Stem Auger Sampling Method: 2" Macrocore Driller : Longshore Environmental Weather: 40°F Light Rain Field Supervisor: AKRF/Eric Nimlos	Drilling Start Time: 10:30 Date: 12/07/12		Finish Time: 11:25 Date: 12/07/12
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0' to 1.0' below grade.			
2		Bentonite Seal from 1' to 1.5'			
3		PVC well riser from 0' to 2.5'			
4					
5					
6					
7					
8		10-Slot PVC well screen 2.5' to 13'			
9					
10					
11		Sand pack filter 1.5' to 12'			
12					
13		0.5' Sump 12.5'-13'			
Notes:	Groundwater was encountered at approximately 5 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis  Groundwater level indicator.				

AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-27	
		Sheet 1 of 1			
		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Macrocore	Start	Finish
		Driller :	Longshore Environmental	Time: 15:15	Time: 16:50
		Weather:	60°F Partly Cloudy	Date: 11/18/13	Date: 11/18/13
		Field Supervisor:	AKRF/Eric Nimlos		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0 to 1' below grade.			
2		PVC well riser from 0 to 9'			
3		Grout Seal 1' to 7'			
4					
5					
6					
7					
8		Bentonite Seal from 7' to 8'			
9					
10					
11		Sand pack filter 7' to 19'			
12					
13					
14					
15					
16		10-Slot PVC well screen 9' to 19'			
17					
18					
19					
Notes:	Groundwater was encountered at approximately 13 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis Groundwater level indicator.				

AKRF, Inc. Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		2-88 North Main Street, New City, NY AKRF Project Number : 40217-0001		Well No. MW-28 Sheet 1 of 1	
		Drilling Method: 4-1/4" Hollow Stem Auger Sampling Method: 2" Macrocore Driller : Longshore Environmental Weather: 40°F Light Rain Field Supervisor: AKRF/Eric Nimlos	Drilling Start Finish Time: 9:20 Time: 11:00 Date: 12/06/12 Date: 12/06/12		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0' to 1.0' below grade.			
2		Bentonite Seal from 1.0' to 2.5'			
3					
4		PVC well riser from 0' to 4.5'			
5					
6					
7					
8		10-Slot PVC well screen 4.5' to 14.5'			
9					
10					
11		Sand pack filter 2.5' to 15'			
12					
13					
14					
15		0.5' Sump 14.5'-15'			
Notes:	Groundwater was encountered at approximately 5 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis  Groundwater level indicator.				

AKRF, Inc.		2-88 North Main Street, New City, NY		Well No. MW-29	
		AKRF Project Number : 40217-0001		Sheet 1 of 1	
Environmental Consultants 440 Park Avenue South, 7th Floor New York, NY 10016		Drilling Method:	4-1/4" Hollow Stem Auger	Drilling	
		Sampling Method:	2" Macrocore	Start	Finish
		Driller :	Longshore Environmental	Time: 7:50	Time: 9:30
		Weather:	40°F Partly Cloudy	Date: 11/19/12	Date: 11/19/12
		Field Supervisor:	AKRF/Eric Nimlos		
Depth (feet)	Well Construction	Surface Condition: Asphalt			
1		Flush-mounted well cover, locking cap and concrete seal 0' to 1.0' below grade.			
2		Bentonite Seal from 1' to 4'			
3					
4		PVC well riser from 0' to 6'			
5					
6					
7					
8		10-Slot PVC well screen 6' to 16'			
9	▼				
10					
11		Sand pack filter 4' to 16'			
12					
13					
14					
15					
16		3			
Notes:	Groundwater was encountered at approximately 9 feet below grade No free-phase product was detected with the oil/water interface probe Soil samples were not designated for laboratory analysis ▼ Groundwater level indicator.				

APPENDIX F
GROUNDWATER MONITORING WELL SAMPLING LOG FORM

Appendix B

Indoor air quality questionnaire and building inventory

As discussed in Section 2.11, products in buildings should be inventoried every time indoor air is sampled to provide an accurate assessment of the potential contribution of volatile chemicals. In addition, the type of structure, floor layout and physical conditions of the building being studied should be noted to identify (and minimize) conditions that may interfere with the proposed testing.

Toward this end, a blank copy of the NYSDOH Center for Environmental Health's Indoor Air Quality Questionnaire and Building Inventory is provided in this appendix. Also provided is an example that demonstrates how the form should be completed properly.

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**NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH**

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No. _____

Purpose of Investigation _____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ____)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential
Industrial

School
Church

Commercial/Multi-use
Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors _____ Building age _____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

Airflow near source

Outdoor air infiltration

Infiltration into air ducts

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

- a. Above grade construction: wood frame concrete stone brick
- b. Basement type: full crawlspace slab other _____
- c. Basement floor: concrete dirt stone other _____
- d. Basement floor: uncovered covered covered with _____
- e. Concrete floor: unsealed sealed sealed with _____
- f. Foundation walls: poured block stone other _____
- g. Foundation walls: unsealed sealed sealed with _____
- h. The basement is: wet damp dry moldy
- i. The basement is: finished unfinished partially finished
- j. Sump present? Y / N
- k. Water in sump? Y / N / not applicable

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in: Basement Outdoors Main Floor Other _____

Air conditioning: Central Air Window units Open Windows None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level **General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**

Basement	<hr/>
1 st Floor	<hr/>
2 nd Floor	<hr/>
3 rd Floor	<hr/>
4 th Floor	<hr/>

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

- a. Is there an attached garage? Y / N
- b. Does the garage have a separate heating unit? Y / N / NA
- c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify _____
- d. Has the building ever had a fire? Y / N When? _____
- e. Is a kerosene or unvented gas space heater present? Y / N Where? _____
- f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____
- g. Is there smoking in the building? Y / N How frequently? _____
- h. Have cleaning products been used recently? Y / N When & Type? _____
- i. Have cosmetic products been used recently? Y / N When & Type? _____

- j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____
- k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____
- l. Have air fresheners been used recently? Y / N When & Type? _____
- m. Is there a kitchen exhaust fan? Y / N If yes, where vented? _____
- n. Is there a bathroom exhaust fan? Y / N If yes, where vented? _____
- o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N
- p. Has there been a pesticide application? Y / N When & Type? _____

Are there odors in the building?

Y / N

If yes, please describe: _____

Do any of the building occupants use solvents at work?

Y / N

(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist)

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work?

Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)

No

Yes, use dry-cleaning infrequently (monthly or less)

Unknown

Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____

Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: Public Water Drilled Well Driven Well Dug Well Other: _____

Sewage Disposal: Public Sewer Septic Tank Leach Field Dry Well Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

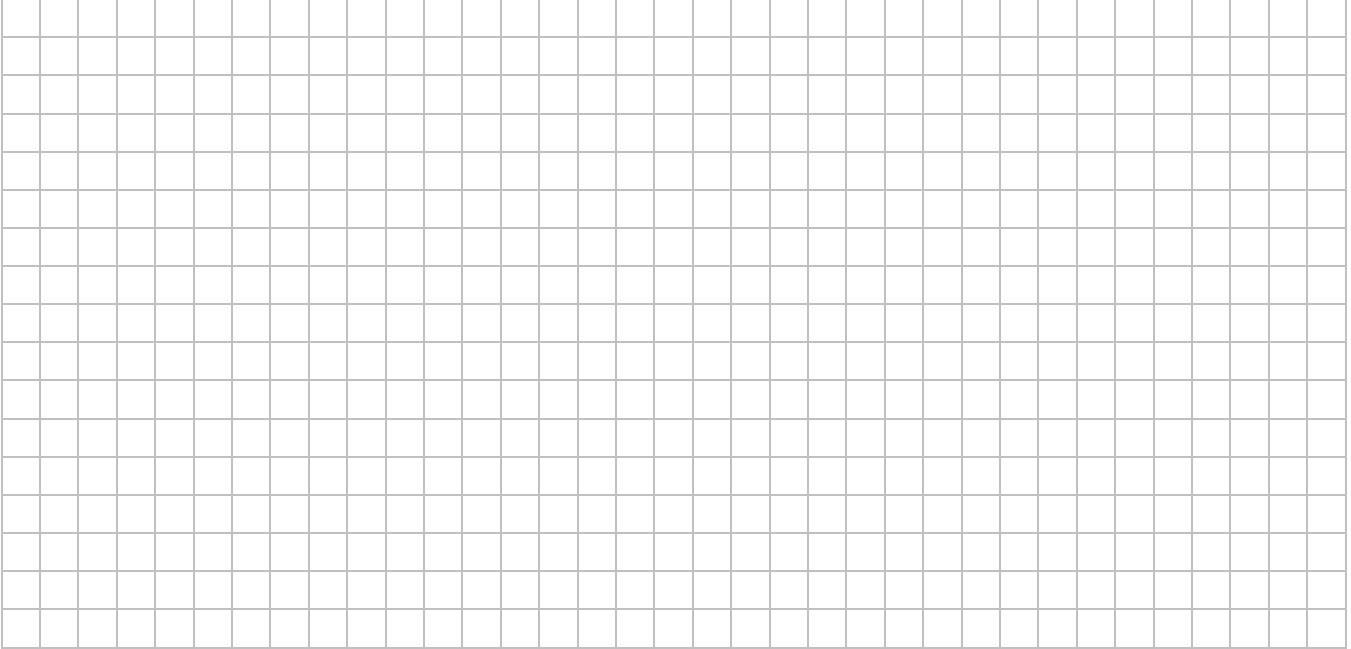
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

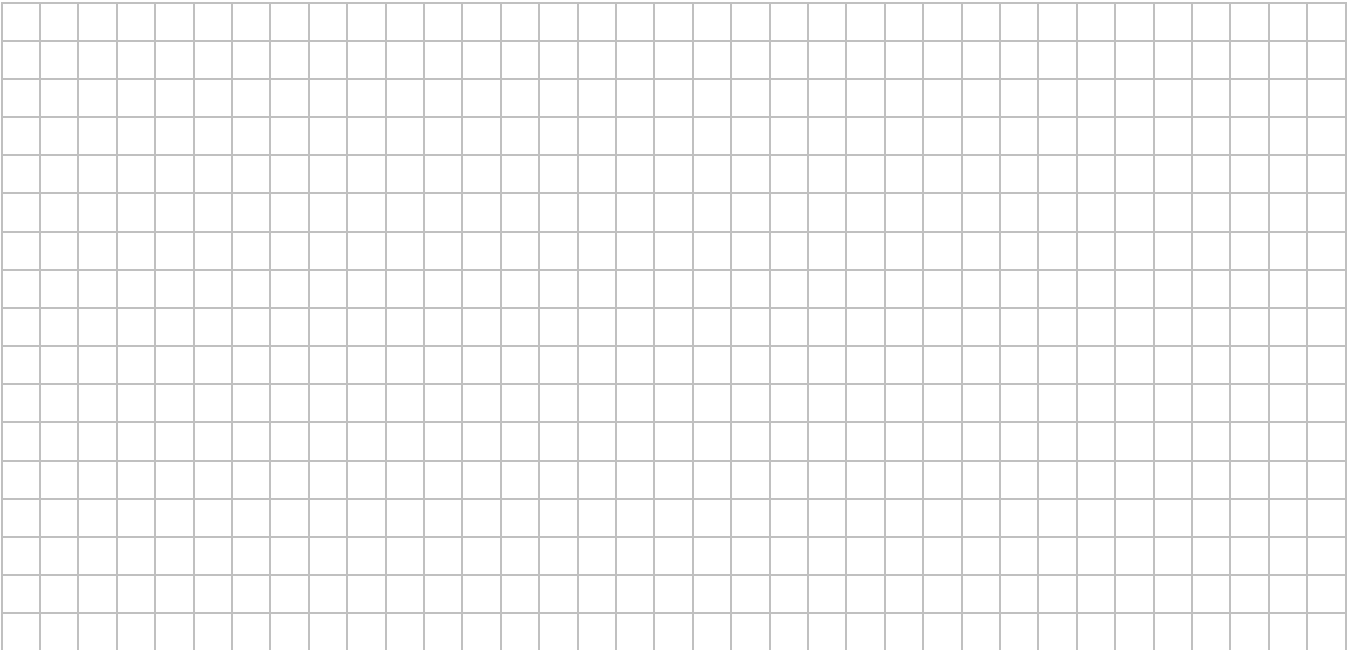
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



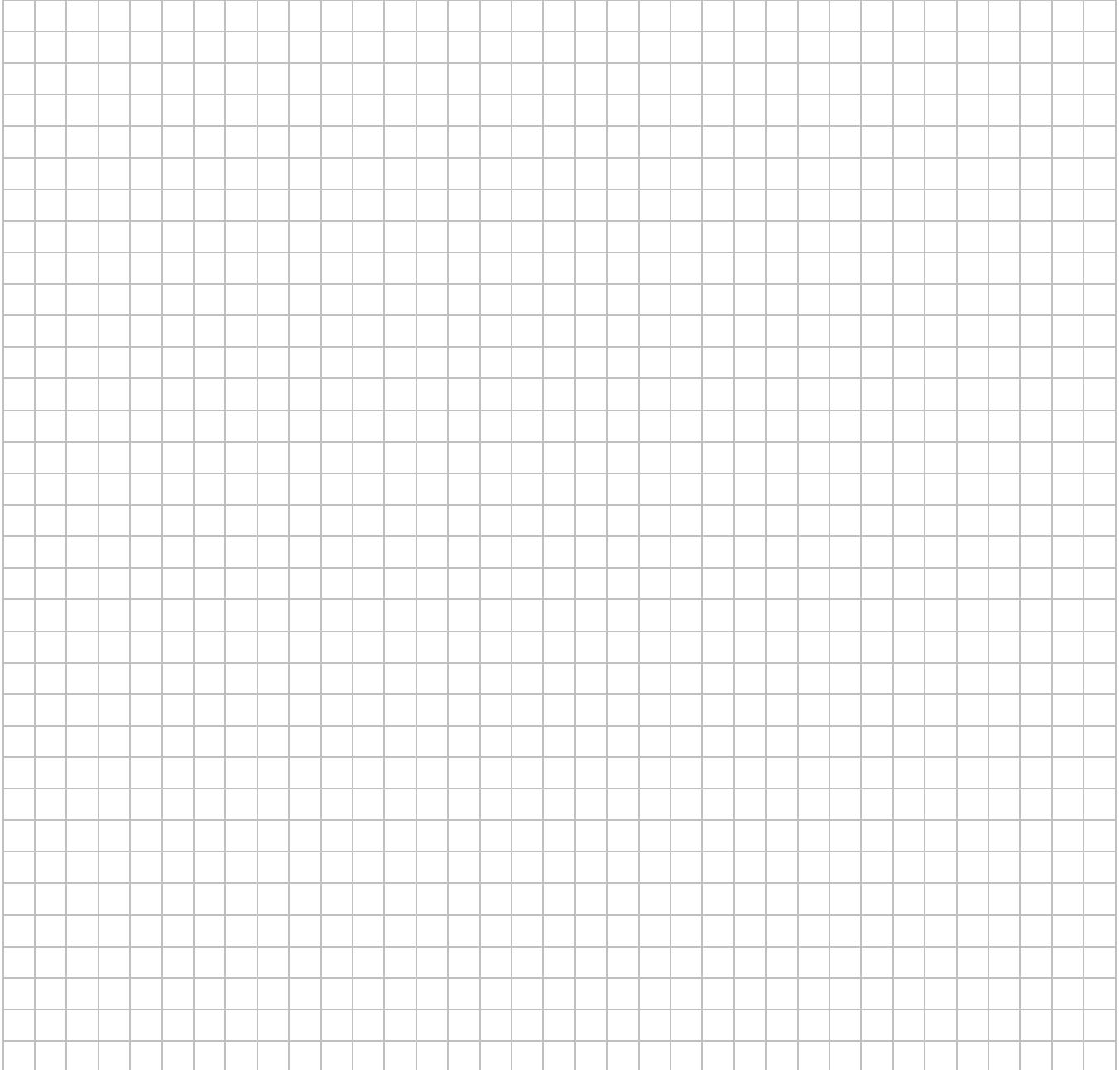
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition *	Chemical Ingredients	Field Instrument Reading (units)	Photo ** <u>Y / N</u>

* Describe the condition of the product containers as **Unopened (UO)**, **Used (U)**, or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.



Well Sampling Log

Job No: 40217						Client: Kamber		Well No: MW-4	
Project Location: New City Plaza						Sampled By:			
Date:						Sampling Time:			
PID at surface:									
Total Depth: ft. below top of casing						Water Column (0.00 feet		*= 0.163 * WC for 2" wells	
Depth to Water: ft. below top of casing						Well Volume*: 0.00 gallons		*= 0.653 * WC for 4" wells	
Depth to Product: ft. below top of casing						Volume Purged: gallons		*= 1.469 * WC for 6" wells	
Depth to top of screen: ft. below top of casing						Well Diam.: 2 inches		Target maximum flow rate is 100 ml/min	
Depth to bottom of screen: ft. below top of casing						Purging Device (pump type):			
Approx. Pump Intake: ft. below top of casing						QED Sample Pro 1.75			
Time	Depth to Water (Ft.)	Purge Rate (ml/min)	Temp (°C)	Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Comments (problems, odor, sheen)
Sampling									
Stabilization Criteria:				+/- 3 mS/cm	+/- 0.3 mg/L	+/- 0.1 pH units	+/- 10 mV	<50 NTU	If water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, discontinue purging and collect sample.
Groundwater samples analyzed for:									

Job No: _____ **Client:** _____
Project Location: _____ **Sampled By:** _____
Date: _____

Sample ID: _____
Canister ID: _____
Flow Controller ID: _____

Laboratory Sample (Summa Canister)

Time Started: _____ **Vacuum:** _____ inHg
Time Stopped: _____ **Vacuum:** _____ inHg

Field Sample

PID Calibration: _____
Time Started: _____
Time Stopped: _____
PID Reading: _____ ppm

APPENDIX G
QUALITY ASSURANCE PROJECT PLAN

New City Plaza
2-88 North Main Street
NEW CITY, NEW YORK

Quality Assurance Project Plan

AKRF Project Number: 40217
NYSDEC BCP Number: C344065

Prepared for:

Newton Associates LLC
551 Fifth Avenue
New York, New York 10176

Prepared by:



AKRF, Inc.
34 South Broadway, 3rd Floor
White Plains, New York
914-949-7336

NOVEMBER 2015

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ATTACHMENTS

Attachment A - Resumes for Project QA/QC Officer, Project Director and Project Manager

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Site Management Plan (SMP) at the New City Plaza shopping center site. The New City Plaza shopping center site consists of a portion of parking lot and commercial stores within a larger shopping center located at 2-88 North Main Street in New City, New York. The objective of the QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental investigative, sampling and remedial activities conducted under the SMP. Adherence to the QAPP will ensure that defensible data will be obtained during the remediation.

2.0 PROJECT TEAM

The project team will be drawn from AKRF professional and technical personnel and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

2.1 PROJECT DIRECTOR

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team, the New York State Department of Environmental Conservation (NYSDEC), and to ensure a smooth flow of information between involved parties. Marc Godick will serve as the project director for the SMP. Mr. Godick's resume is included in Attachment A.

2.2 PROJECT MANAGER

The project manager will be responsible for directing and coordinating all elements of the SMP. He will prepare reports and participate in meetings with Newton Associates LLC and/or the NYSDEC. Bryan Zieroff will serve as the project manager for the SMP. Mr. Zieroff's resume is included in Attachment A.

2.3 FIELD TEAM LEADER

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and HASP. He will report to the Project Manager on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified, responsible person, able to act professionally and promptly during soil disturbing activities. Stephen Schmid will be the field team leader for the SMP.

2.4 PROJECT QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the QAPP. He will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic site visits to assess implementation of the procedures. The QA/QC officer will also be responsible for reviewing a Data Usability Summary Report (DUSR) for soil, soil gas and groundwater analytical results, as described in Section 5.0 of this QAPP. Marc Godick will serve as the QA/QC officer for the SMP.

2.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. He/she will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued. He/she will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be determined upon selection of a contract laboratory(s) for the SMP.

3.0 STANDARD OPERATING PROCEDURES

The following sections describe the standard operating procedures (SOPs) for the monitoring activities included in the SMP. During these operations, safety monitoring will be performed as described in the Site specific Health and Safety Plan (HASP) and all field personnel will wear appropriate personal protective equipment. SMP implementation will include quarterly groundwater monitoring and sampling, operation and maintenance of the sub-slab depressurization system (SSDS), and a contingency for additional groundwater remediation. The SMP also includes provisions and appropriate actions to be taken in the event that future renovation or redevelopment of the Site requires the breaching of the composite cover system and excavation/removal of underlying soil.

3.1 WATER TABLE READINGS

Water table readings will be taken in the groundwater monitoring wells using an oil/water interface probe. The gate boxes will be unlocked and opened at each well location. The oil/water interface probe will be turned on and sound tested. The probe of the meter will be inserted into the PVC casing. The probe will be lowered down the casing until the meter alarm indicates the probe is at the water table. A reading of the depth from the top of the top of the PVC casing to the groundwater table will be recorded in the field notebook.

3.2 MONITORING WELL SAMPLING

Groundwater samples are collected on a quarterly basis for a minimum of two years after the Certificate of Completion (COC) as part of the groundwater monitoring program. Low flow sampling techniques will be used, as described in U.S. EPA's Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers [EPA 542-S-02-001, May 2002]. Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Slowly remove the locking cap and immediately measure the vapor concentrations in the well with a PID calibrated to the manufacturer's specifications.
- Measure the depth to water and total well depth, and check for the presence of NAPL using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and well log. Collect a sample of NAPL using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a well where the total depth is 15 feet, screened interval is 5 to 15 feet, and depth to water is 7 feet, the mid-point of the water column within the screened interval would be 11 feet.

- Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Horiba multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be approximately 0.5 liters and will be no greater than 3.8 liters/minute.
- Transfer discharged water from the 5-gallon buckets to 55-gallon drums designated for well-purge water.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Table 1
Stabilization Criteria

Parameter	Stabilization Criteria
PH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter
mV = millivolts
NTU = nephtholometric turbidity units
mg/l = milligrams per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 3.7 of this QAPP. Label the containers as described in Section 3.9 of this QAPP and place in a chilled cooler. Samples should be collected for volatile organic compounds (VOCs).
- Collect one final field sample and analyze for turbidity and water quality parameters (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity).

- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter in a 55-gallon drum designated for disposable sampling materials and PPE. The purge water will be managed as described in Section 3.6 of this QAPP.
- Decontaminate the pump, oil/water interface probe, and flow-through cell, as described in Section 3.5 of this QAPP.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume), and observations in the project logbook and field data sheet, if applicable.

3.3 EXCAVATION AND REMOVAL OF SOIL/FILL

Any planned disturbance to the composite cover system will comprise the following activities:

1. The location of groundwater monitor wells, SSDS monitoring points, and engineering controls (ECs) located within or beneath the concrete floor slab including SSDS pits, and SSDS piping.
2. The existing concrete floor and/or asphalt parking area will be marked out and saw cut, at a minimum, around the perimeter of the designated removal area.
3. Excavated fill material will be removed using an excavator or hand tools. Fill material excavated from beneath the site cap that exhibits no evidence of contamination may be characterized for potential reuse as backfill material on-site or handled and disposed of as non-hazardous waste. All soil will be handled in accordance with the Excavation Work Plan (EWP) included as Appendix B of the SMP.
4. All excavated material requiring staging for overnight or longer will follow the procedures in Section 3.3.2.

Damaged floors, walls, sub-slab venting system piping, additional utilities, or other building elements outside the removal area, will be repaired prior to demobilization from the Site.

3.3.1 Soil Screening

During any excavation work below the site cap, the excavated material will be inspected by qualified field personnel for evidence of contamination (i.e., separate phase liquid, staining, sheening and/or odors) and field-screened using a photoionization detector (PID) calibrated at the start of each day in accordance with the manufacturer's instructions.

3.3.2 Stockpiling/Staging Area

Prior to excavation and removal of contaminated material, the stockpiling/staging area will be selected and prepared prior to the commencement of excavation activities to protect building occupants. Staging area(s) will be prepared for staging any contaminated material overnight or longer using the procedures described below:

The material staging area(s) will be prepared by placing 6-mil plastic on the ground and covered with additional 6-mil plastic sheeting. Sealable containers with tight-fitting covers may also be utilized for the staging of VOC-contaminated material overnight or longer, to prevent the migration of VOCs into the site building.

3.3.3 Backfill/Reuse Sampling

In addition to any proposed soil excavation, some shallow soil throughout the Site, such as the material removed from a maximum depth of five feet below the concrete slab in the soil excavation area, or as part of SSDS component repairs may be excavated. Prior to reuse as backfill, the excavated soil will be evaluated using the criteria below:

1. Concrete or demolition debris that does not exhibit signs of contamination will be sampled for asbestos prior to reuse on-Site.
2. Material proposed for reuse will be sampled at a frequency and for the required parameters as outlined in NYSDEC's DER-10, Table 5.4.
3. Samples will be collected into laboratory-supplied containers.
4. Samples will be kept in an ice-filled cooler or refrigerator (not asbestos samples) until receipt by the laboratory.
5. Decontaminate all sampling equipment between sampling locations as described in Sections 3.5 of this QAPP.

3.3.4 Excavation Backfill Import

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated properties will not be imported to the Site. All imported soil will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Approval will also be based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria. Soil will be considered appropriate for use as on-site imported backfill if contaminant concentrations are below the lesser of the 6 NYCRR Part 375 Restricted Residential and Groundwater Protection SCOs. Soil that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Native material from a virgin quarry source will not be sampled prior to use as backfill on the site. Non-DOT designated virgin quarry sources, or non-virgin imported material that does not have an approved NYSDEC Beneficial Use Determination will be tested at the originating facility in accordance with Section 5.4(e) 10 of NYSDEC DER 10, included in Section B-10 of the EWP.

3.3.5 MATERIALS REUSE ON-SITE

Contaminated soil, or any material in direct contact with the contaminated soil, may not be separated for reuse on-site and will be disposed of as described in Section B-6 of the EWP. Organic matter (wood, roots, stumps, etc.) or other solid is prohibited for reuse on-site. All demolished material from the existing vacant buildings, including the concrete slabs, and the existing asphalt, will be disposed of in accordance with all prevailing Federal, State, and local regulations. Soil that does not exhibit evidence of contamination during field screening, as described in Section 3.1.1 and is free of debris will be stockpiled and tested at a frequency of one sample per 500 cubic yards and characterized for reuse.

Each sample will be tested for laboratory parameters listed in Section 4.3. Samples will be shipped to the laboratory with appropriate chain of custody documentation. The samples will be analyzed in a laboratory following New York State Department of Health

(NYSDOH) Analytical Services Protocol (ASP) Category B deliverables. Soil from representative samples that meet the SSSCOs can be reused onsite as backfill.

3.3.6 CONTINGENCY ENDPOINT SOIL SAMPLING

In the event contamination is observed and removed from the site, post-excavation endpoint samples will be collected from each excavation for closure purposes. One sample will be collected from each sidewall and the bottom of the excavation. The sidewall samples will be collected from just above the bottom of the excavation. Each sample will be tested for laboratory parameters listed in Section 4.3.

3.4 GROUNDWATER REMEDIATION CONTINGENCY

The SMP includes a contingency in the event that post remediation groundwater monitoring indicates that additional groundwater remediation is necessary. Although the SMP requires that a review of all available technologies would be considered, and the approach would be based on an NYSDEC-approved work plan, a scope of work is included for an additional round of chemical injections. A pre-determined number of soil borings, based on the size of the injection area, would be drilled for installation of temporary injection points. Soil borings drilled for installation of temporary injection points would not include soil sampling, as injection tooling advanced by the direct push drilling rig is used in lieu of the macrocore soil sampler. The soil borings would be advanced to dense till layer, which was documented to be approximately 15 to 18 feet below grade in the potential groundwater treatment area. The actual number and location of borings/injection points would be outlined in the work plan, and this QAPP would be updated accordingly and attached as an appendix to the work plan.

The injection process at each proposed injection point would be completed using fabricated injection tooling specifically designed to be implemented by a direct push drilling rig. The injection tooling would consist of a pressure activated injection probe that is capable of top-down or bottom-up injection methods, which allows for injection of remediation materials throughout the entire target interval at each injection point. The injection probe would be advanced into the ground to the target interval, and prepared remediation fluids are pumped from a holding tank, through tubing that is connected to the injection probe through the drilling rods. Groundwater in the treatment area is expected to be encountered at approximately 6 feet below grade, and dense till was encountered at approximately 15 to 18 feet below grade.

The injection process at each injection point would be based on the following procedures:

- Measure the depth to water in the adjacent monitoring wells to establish the water table elevation.
- Advance the injection tooling to a designated target depth, either the water table for top down injection, or the dense till layer (approximately 15 to 18 feet below grade in the release area) to begin the injection of remediation fluids.
- For a top down injection, remediation fluids would be injected into the subsurface from the water table interface down to the dense till layer. For a bottom up injection, remediation fluids would be injected into the formation at designated intervals up to the water table interface.
- The type of injection (top down vs bottom up) and the injection interval (number of injections per boring) would be determined after completing the bench test and would be specified in the ISDD, which would be submitted to NYSDEC for review and approval.

- Backfill the remaining annular space using a bentonite-cement grout.
- Decontaminate the probe and drilling rods prior to and following installation of each injection well as described in Section 3.5 of this QAPP.

Document injection well installation data (location, depth, construction details, water level measurements) in the field logbook or on field data sheets.

3.5 DECONTAMINATION OF SAMPLING EQUIPMENT

All drilling and sampling equipment (injection tooling, drilling rods, probe rods and pumps, etc.) will be either dedicated or decontaminated between boring/well/sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/ Simple Green® and bristle brush.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground.

3.6 MANAGEMENT OF INVESTIGATION DERIVED WASTE

All investigation-derived waste (IDW) will be containerized in DOT-approved 55-gallon drums. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, development water or purge water) and the name of an AKRF point-of-contact. Soil samples collected from soil boring activities will be used for waste characterization of soils, since such data would be biased towards areas which are expected to be most contaminated. Groundwater sampling data would be used for waste characterization of groundwater, since the results would directly correlate to the range of solvent contamination in each drum. Notwithstanding, additional waste characterization soil samples will be collected, if warranted. All IDW will be disposed of or treated according to applicable local, state and federal regulations.

3.7 COVER SYSTEM AND SSDS MONITORING

The location and details of the Site cover system and passive SSDS are shown on Figures 8 and 9 of the SMP, respectively. Monitoring will consist of visual inspection, which shall evaluate the structural integrity of the concrete floor slab of the first floor, support columns into the floor and the wall joints. The exterior inspection will be conducted by traversing the site on foot in a grid pattern with approximately 15 foot centers. Interior inspections will be completed by inspecting each main room on the first floor, including any closet or interior spaces containing sub-grade penetrations and/or exposed support columns. If any cracks or openings are identified, they shall be screened for organic vapors with a PID and any readings shall be noted.

SSDS Monitoring will consist of visual inspection of the SSDS piping for structural integrity and/or damage that would prohibit proper functioning of the SSDS. Inspection will include the entire length of accessible piping from the suction pit in the floor slab up through the roof blower and exhaust pipe. The inspector will look for any cracks or perforations in the piping system, and

confirm that the manifold valves are in their proper setting. Results of the inspection will be recorded into the Site Cover System and SSDS Inspection Form that is included in Appendix H of the SMP.

3.7.1 System Vacuum Monitoring

The sub-slab vacuum monitoring points (SG-5 through SG-8, and SG-12) are shown on Figure 8 of the SMP. Vacuum will be monitored at these locations at the intervals designated in the SMP. The procedures for instantaneously screening the vacuum monitoring points are as follows:

- Slowly remove the access manhole.
- Attach the analog vacuum gauge, digital manometer, or magnehelic gauge to the barged fitting on the vacuum monitoring point with polyethylene tubing.
- Document the vacuum reading.
- Detach the polyethylene tubing from the barbed fitting on the monitoring point.
- Replace the access manhole and twist to tighten seal.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 SOIL SAMPLING

Soil sampling will be conducted according to the following procedures:

- Field screening for evidence of contamination (e.g., odors, staining, elevated PID measurements). Using a hand auger or sampling spoon, remove a small amount of soil from the bottom or sidewall of the excavation. A grab sample can also be collected from the excavator bucket after targeted soil removal from the excavation. Place the soil in a zip-lock bag and insert the PID through the sealed bag to obtain an organic vapor concentration measurement.
- After selecting which samples will be analyzed in the laboratory, fill the required laboratory-supplied sample jars with the soil from the selected sampling location or labeled sealable plastic bags. Seal and label the sample jars as described in Section 4.3 of this QAPP and place in an ice-filled cooler.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.5 of this QAPP.
- Record sample number, sample depth and sample observations (evidence of contamination, PID readings, soil classification) in field log book and boring log data sheet, if applicable.

4.2 INDOOR AIR SAMPLING

Indoor air sampling was completed during the IRM to confirm that the SSDS was effective in mitigating the potential for vapor intrusion. The SMP indicates that one additional round of indoor air samples will be collected during the 2015/2016 heating season in accordance with the following details:

- The indoor air sampling is to be conducted following the completion of a pre-sampling inspection and chemical inventory of the Site building.

- Place a labeled 6-liter Summa canister at the breathing zone level (3 to 4 feet above ground surface).
- Record the vacuum reading from the vacuum gauge on the canister at the beginning of the 8-hour sampling period.
- Open the valve of the canister and record the time in the field book. At the end of the 8-hour sampling period, close valve, remove flow-rate controllers and vacuum gauges, install caps on canisters, and record time.
- Place canisters in shipping containers for transportation to laboratory.

Repeat procedure for all of the sampling locations.

4.3 LABORATORY METHODS

Table 1 summarizes the laboratory methods that will be used to analyze field samples for soil reuse (Section 3.3) and/or endpoint sampling (Section 3.4), as well as the sample container type, preservation, and applicable holding times. An ELAP Certified laboratory will be used for all chemical analyses in accordance with DER-10 2.1(b) and 2.1(f), including Category B Deliverables.

Table 1
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil	TCL VOCs	8260	Encore sampler (3) or Terracore Sampler (1)	4 °C 0°C within 24 hrs	48 hours to extract 14 days to analyze
	TCL SVOCs	8270	Glass 8 oz. Jar	4 °C	14 days to extract 40 days to analyze
	TAL Metals	6000/7000	Glass 8 oz. Jar	4 °C	6 months (28 days for Hg)
	Pesticides	8081	Glass 8 oz. Jar	4 °C	14 days to extract 40 days to analyze
	PCBs	8082	Glass 8 oz. Jar	4 °C	14 days to extract 40 days to analyze
Groundwater	VOCs	EPA 8260	40 mL glass vial, septa top	4°C, HCL	14 days
	Performance Monitoring Parameters	TBD	TBD	TBD	TBD
	Process Monitoring Parameters	TBD	TBD	TBD	TBD
Air	TCL VOCs	TO-15	6-liter summa	none	30 days

Notes:

TBD – to be determined – will be added after approval of the work plan for additional groundwater remediation, if needed

4.4 QUALITY CONTROL SAMPLING

In addition to the laboratory analysis of the investigative soil samples and characterization soil samples for reuse and off-site disposal, additional analysis will be included for quality control measures, as required by the Category B sampling techniques. These samples will include field blanks, trip blanks, matrix spike/matrix spike duplicates (MS/MSD), and duplicate/blind duplicate samples at a frequency of one sample per 20 field samples collected. Table 2 provides a summary of the field samples and QA/QC samples to be analyzed by the laboratory.

TABLE 2
FIELD SAMPLE AND QC SAMPLE QUANTITIES

Sample Type	Parameters	Analytical Method ¹	Field Samples	QC Samples			
				Field Blank ²	Trip Blank ²	MS/MSD ²	Duplicate ²
Soil	VOCs	EPA 8260	20	1	1	1	1
	TCL SVOCs	EPA 8270	20	--	--	1	1
	TAL Metals	EPA 6000/7000	20	--	--	1	1
	Pesticides	EPA 8081	20	--	--	1	1
	PCBs	EPA 8082	20	--	--	1	1
Groundwater	EPA 8260	20	1	1	1	1	1
	TBD	4	1	1	1	1	TBD
	TBD	4	1	1	1	1	TBD
Indoor Air	VOCs	TO-15	2	NA	1 Ambient Air	NA	1

Notes:

MS/MSD - matrix spike/matrix spike duplicate

¹ - NYSDEC Category B deliverables

² - One QC sample per twenty field samples or sample shipment

³ - Does not apply to performance and/or process parameters being monitored in the field

TBD - to be determined - will be added after approval of the work plan for additional groundwater remediation, if needed

4.5 SAMPLE HANDLING

4.5.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric code. Endpoint sidewall and bottom samples will be identified by the excavation number, collection interval number, followed by the sample depth interval (in parenthesis). Characterization samples collected from soil stockpiles will be designated "ST" and by the designated stockpile number.

The field duplicate sample will be labeled with a dummy sample location to ensure that it is submitted as blind samples to the laboratory. The dummy identification will consist of the sample type followed by a letter. For duplicate soil boring samples, the sample depth will be the actual sample depth interval. Trip blanks and field blanks will be identified with “TB” and “FB”, respectively.

Table 3 provides examples of the sampling identification scheme:

Table 3
Examples of Sample Names

Sample Description	Sample Designation
Endpoint soil sample collected from the sidewall of excavation #1	EX1-SW1(3-4)
Endpoint soil sample collected from the bottom of the excavation #2	EX2-B1(5-6)
Matrix spike soil sample from a sidewall of excavation #1	EX-1-SW2(3-4) MS
Duplicate soil sample from a sidewall of excavation #2	EX2-SWB (3-4)
Characterization soil sample from soil stockpile #3	ST3-1
Indoor Air sample collected from the Dunkin Donuts tenant space at location SG-5	IA-5

4.5.2 Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler’s initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. All samples will be shipped to the laboratory at least twice per week. At the start and end of each workday, field personnel will add ice to the coolers as needed.

The samples will be prepared for shipment by placing each sample in a sealable plastic bag, then wrapping each container in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody (COC) form. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the coolers remain sealed during delivery.

4.5.3 Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals

involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

4.6 FIELD INSTRUMENTATION

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

ATTACHMENT A

RESUME OF PROJECT QA/QC OFFICER, PROJECT DIRECTOR, AND PROJECT MANAGER

MARC S. GODICK, LEP

SR. VICE PRESIDENT

Marc S. Godick, a Senior Vice President of the firm, has over 20 years of experience in the environmental consulting industry. Mr. Godick will serve as Principal-in-Charge for this effort and has broad-based environmental experience includes expertise in brownfield redevelopment, site assessment, remedial investigation, design and implementation of remedial measures, compliance assessment, litigation support, and storage tank management.

Education

M.E., Engineering Science/Environmental Engineering, Pennsylvania State University, 1998

B.S., Chemical Engineering, Carnegie Mellon University, 1989

Licenses/Certifications

Licensed Environmental Professional (License # 396) – State of Connecticut – 2003 - Present

40 Hour HAZWOPER and Annual Refresher Training, 1990 - Present

Supervisors of Hazardous Waste Operations (8 Hour), 1990

Professional Memberships

Chairman, Village of Larchmont/Town of Mamaroneck Coastal Zone Management Commission, 1997 - Present

Chairman/Member, Westchester County Soil and Water Conservation District, 2005 - 2010

Board of Directors, Sheldrake Environmental Center, Larchmont, New York, 2006 - 2008

Member, NYSDEC Risk-Based Corrective Action (RBCA) Advisory Group for Petroleum-Impacted Sites, 1997

Community Leadership Alliance, Pace University School of Law, 2001

Years of Experience

Year started in company: 2002

Year started in industry: 1990

RELEVANT EXPERIENCE

Queens West Development Project, Avalon Bay Communities, Queens, NY

For over 20 years, AKRF has played a key role in advancing the Queens West development, which promises to transform an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF has prepared an Environmental Impact Statement (EIS) that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. Mr. Godick managed one of the largest remediation projects completed to date under the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP) that was contaminated by coal tar and petroleum. The remedy included the installation of a hydraulic barrier (sheet pile cut off wall), excavation of contaminated soil under a temporary structure to control odors during remediation, a vapor mitigation system below the buildings, and implementation of institution controls. The investigation, remediation design, and remedy implementation, and final sign-off (issuance of Certificate of Completion) were completed in two years. Total remediation costs were in excess of \$13 million.

On-Call Environmental Consulting (Various Locations), New York City School Construction Authority

Mr. Godick is managing a \$4 million, 2 year on-call contract with the SCA for environmental assessment, remedial design, and plumbing disinfection. For new school sites, initial due diligence involves conducting Phase I



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environmental site assessments (ESAs) and multi-media sampling of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school and remediation requirements and associated costs. Once design for a school is underway, AKRF would prepare remediation plans and construction specifications and oversee the construction activities. For existing school sites, the work can involve conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills. AKRF also oversees plumbing disinfection work, which is required prior to new plumbing being placed into service. The assignments involve reviewing and commenting on disinfection plans, supervision of the disinfection and confirmation testing, and preparation of a report documenting the work was conducted in accordance with the specifications and applicable requirements. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours.

Brownfield Opportunity Area (BOA) Grant Program Services for the Town of Babylon, Wyandanch, NY

AKRF was retained by the Town of Babylon to prepare a blight study, market study, NYS BOA Step 2 Nomination, an Urban Renewal Plan, and a Generic Environmental Impact Statement (GEIS) as part of a revitalization and redevelopment effort for downtown Wyandanch. Mr. Godick was responsible for overseeing the environmental data collection effort for the 226 brownfields identified in the 105-acre project area, and for identifying strategic sites for which site assessment funding should be sought. He also prepared the Hazardous Materials section of the Wyandanch Downtown Revitalization Plan (which incorporates the Nomination, Urban Renewal Plan, and GEIS), involving a summary of available environmental reports, a review of regulatory records, and limited street-level site inspections.

Alexander Street Urban Renewal Plan, Master Plan, Brownfield Opportunity Area Plan, Yonkers, NY

AKRF was retained by the City of Yonkers to prepare an Urban Renewal Plan, Master Plan, Brownfield Opportunity Area Plan, and a Generic Environmental Impact Statement (GEIS) for a 153 acre industrial area along Alexander Street on the Yonkers Waterfront. Mr. Godick is coordinating the preparation of BOA documents and was responsible for the Hazardous Materials sections of the GEIS and Urban Renewal Plan. Mr. Godick managed the environmental data collection effort for the entire study area which involved review and summary of existing environmental reports, a review of regulatory records, and field inspections. The collected information was used to prioritize individual parcels for funding and remediation. The Master Plan for the area calls for the development of a mixed-use neighborhood consisting of residential, neighborhood retail, and office space uses with substantial public open space, access to the Hudson River, and marina facilities.

Williamsburg Waterfront Redevelopment, RD Management/L&M Equities/Toll Brothers, Brooklyn, NY

The project is one of the largest development projects in the Greenpoint/Williamsburg Rezoning Area, which includes the construction of nearly 1 million square feet of residential and retail space along the Williamsburg waterfront. The site had a variety of industrial uses, including a railyard, junk yard, and waste transfer station. As part of the City's rezoning, the site was assigned an E-designation for hazardous materials. Mr. Godick managed the preparation of the Phase I and II environmental site assessments, remedial action plan (RAP), and construction health and safety plan (CHASP). Mr. Godick obtained NYSDEC closure of an open spill associated with former underground storage tanks at the site. The NYCDEP-approved RAP and CHASP included provisions for reuse of the existing fill material, with the excess being disposed off-site, installation of a vapor barrier below the new buildings, installation of a site cap, and environmental monitoring during the construction activities. Mr. Godick managed the environmental monitoring work. A Notice of Satisfaction has been issued by NYCDEP and NYCOER for the first two phases of the development.

West 37th Street Redevelopment, Rockrose, New York, NY

The project is a redevelopment in the Hudson Yards Rezoning Area, which includes the construction of a 250,000 square foot residential/retail building in Manhattan. The site had several motor vehicle service operations, which resulted in a petroleum release to the underlying soil, bedrock, and groundwater. As part of the City's rezoning,



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the site was assigned an E-designation for hazardous materials. Mr. Godick managed the preparation of the Phase I and II environmental site assessments, remedial action plan (RAP), and construction health and safety plan (CHASP). Mr. Godick obtained approval for the RAP and CHASP by both the NYSDEC and NYCDEP. The RAP and CHASP included provisions for excavation of contaminated soil and bedrock, installation of waterproofing that will also serve as a vapor barrier for the new building, environmental monitoring during the construction activities, and post-development groundwater monitoring. Construction of the building was completed in 2009, and a Notice of Satisfaction was issued by NYCOER.

Underground Storage Tank Closure and Site Remediation–Program Management, Con Edison, New York, NY

Mr. Godick provided technical assistance to Con Edison in developing technical submittals and budgets associated with tank closures at over 50 facilities. Technical summaries were prepared for submittal of contractor-prepared closure reports to the NYSDEC. The summaries included a review of historic pre-closure assessments, tank closure data, and provided recommendations for additional assessment, remediation or closure. Subsequently, a three-year program budget was developed for implementation of the UST investigation/remedial program, which Con Edison utilized for internal budgeting purposes.

Site Investigation–Over 20 Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations associated with petroleum, dielectric fluid, and PCB releases at over 20 Con Edison facilities including service centers, substations, generating stations, and underground transmission and distribution systems. Site investigations have included due diligence site reviews, soil boring installation, monitoring well installation, hydrogeologic testing, and water quality sampling. Risk-based closures were proposed for several sites.

Site Investigation–7 World Trade Center Substation, Con Edison, New York, NY

Mr. Godick managed the site investigation at the former 7 World Trade Center Substation in an effort to delineate and recover approximately 140,000 gallons of transformer and feeder oil following the collapse of the building. The project involved coordination with several crews, Con Edison, and other site personnel.

Landfill Closure & Compost Facility Application, White Plains, NY

Mr. Godick is currently managing the closure of a formal ash landfill, which is currently being utilized as a leaf and yard waste compost facility by the City of White Plains. The landfill closure required additional assessment to define the extent of methane and solvent contamination. The closure will involve remediation of a chlorinated solvent plume, placement of landfill cap, and methane recovery. Mr. Godick also managed the preparation of the compost facility permit application, which required modification to the facility's operations necessary to close the landfill and address other regulatory requirements.

Landfill Redevelopment – RD Management, Orangeburg, NY

Mr. Godick is managing the remediation of the former Orangeburg Pipe site under the Voluntary Cleanup Program. The site contains widespread fill material, which has fragments of Orangeburg pipe that is impregnated with asbestos and coal tar. The site is currently being redeveloped for retail use. The closure plan for the site provides for reuse of all fill material on-site. The fill management activities will include dust and sediment control measures and air monitoring to prevent airborne dust in accordance with a closure plan, stormwater pollution prevention plan (SWPPP), and construction health and safety plan (CHASP). In pervious areas, the site cap will consist of 2 feet of clean fill and a liner in larger areas. The site will be redeveloped for retail use.

National Grid – Halesite Manufactured Gas Plant Site, Town of Huntington, NY

Mr. Godick managed the remedial design and engineering work associated with remediation of National Grid's former manufactured gas plant (MGP) located in the Town of Huntington. The site is situated in a sensitive



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location along the waterfront, surrounded by commercial and residential properties, and half the property where the remediation was conducted was a steep slope. The remedy consisted of soil removal, oxygen injection, and non-aqueous phase liquid recovery. Mr. Godick was responsible for the development of the remedial work plans, design/construction documents, landscape architecture, confirmatory sampling, air monitoring, supervision, and preparation of close-out documentation in accordance with NYSDEC requirements.

Site Investigation–Former Manufactured Gas Plant (MGP) Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations at four former MGP facilities. The investigations at three of the four sites were completed at a Con Edison substation, flush pit facility, and service center, respectively. The details associated with the fourth site are confidential. Site characterizations at the substation and flush pit facility were conducted in preparation of expansion at these locations. The findings from these characterizations were used by Con Edison to make appropriate changes to the design specifications and to plan for appropriate handling of impacted materials and health and safety protocols during future construction activities.

Storage Tank Management, Citibank, N.A., New York, NY

Mr. Godick managed a storage tank replacement project for a facility located on Wall Street in New York City. The existing underground storage tank was closed in place and replaced with a field-constructed AST system within the building. The project required zero tolerance for service interruptions, disruptions to building operations, or disturbance to occupants of the office space neighboring the new tank location. Responsibilities included the management of design, preparation of specifications, contractor bidding, construction inspections, site assessment for closed-in-place UST, SPCC plan preparation, and responsibility for project budget and documentation.

Storage Tank Management, Verizon, Various Locations, NY, PA, DE, and MA

Mr. Godick managed the removal and replacement of underground and aboveground storage tank systems for Verizon in New York, Pennsylvania, Delaware, and Massachusetts. Responsibilities included the management of design, preparation of specifications, contractor bidding, construction oversight, project budget, and documentation. For selected AST sites, managed the development of Spill Control, Contingency and Countermeasures (SPCC) plans.

Multimedia Compliance and Remediation, Greenburgh Central School District No. 7, Hartsdale, NY

Mr. Godick implemented a multimedia program to address regulatory compliance and remediation at the transportation yard and other facilities. The compliance program included development of an environmental management system including periodic auditing, standard operating procedures, release reporting, and training. Designed and implemented engineering controls and monitoring to satisfy stormwater requirements. Remediation was conducted to address petroleum and solvent contamination from former underground storage tanks and dry wells, which included source removal and natural attenuation of groundwater. Provided support in connection with litigation from the adjoining property owner.

Litigation Support & Remediation, Former Service Station, Brooklyn, New York

Mr. Godick took over management of remediation of an inactive service station (formerly conducted by another firm). His approach outlined additional characterization and remediation efforts which resulted in successful closure of the spill by NYSDEC within two years. Mr. Godick testified as an expert witness at a hearing in the New York State Supreme Court of Kings County to determine the adequacy of the remediation efforts.

Litigation Support & Remediation, Residential Heating Oil Spill, Cranford, New Jersey

Mr. Godick took over management of remediation of a heating oil spill in the basement of a single family residence on behalf of the insurance company. Up until Mr. Godick taking over the remediation, several hundred thousand dollars had been spent on remediation with no resolution of the spill with the NJDEP and homeowners. His



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approach outlined additional characterization and remediation efforts to expeditiously and cost-effectively resolve the spill.

Litigation Support, Cost Recovery Action, Town of Carmel, New York

Mr. Godick served as an expert witness representing the owner of a property in a landlord-tenant dispute, which was used as a gasoline station and oil change facility. Mr. Godick prepared exhibits, testified, and participated in meetings with NYSDEC to support the landlord's claim that the oil change tenant's practices were poor and were adversely affecting the environment and the overall facility systems at the site.

Litigation Support, Cost Recovery Action, New York State Superfund Site

Mr. Godick provided technical support for the former owner of a New York State Superfund site in upstate New York. Current owner of the property brought a cost recovery action against client as a potential responsibility party. Completed technical review of draft Remedial Investigation/Feasibility Study prepared by opposing party's consultant to develop more cost effective remedial strategy and to better position the client for liability allocation as part of future settlement negotiations. Developed cost allocation paper and model for settlement negotiations. Participated in mediation process.

Litigation Support, Cost Recovery Action, New York State Petroleum Spill Site, New York, NY

Mr. Godick provided technical support for the former owner of a New York City multi-unit residential apartment building. The State of New York brought a cost recovery action against our client as a result of a previous spill from a former underground storage tank. Reviewed invoices and project documentation to dispute work performed by the NYSDEC, which provided the basis for settlement at a fraction of the initial claim.

Cost Analysis, Environmental Insurance Claims, Various Locations

Mr. Godick provided technical support for cost analyses completed for a large national insurance company related to several former MGP and other industrial sites. Responsibilities included evaluation and development of cost-effective remedial strategies, as well as compilation of detailed costs for remedial action implementation and closure.

Litigation Support, Class Action Lawsuit, Confidential Client, NJ

Mr. Godick provided technical support for a class action suit involving a petroleum-impacted community water supply in southern New Jersey. The technical assistance included analysis of expert testimony and coordination with legal counsel in preparing for cross-examination of the opposing party's lead expert witness.

BRYAN ZIEROFF

TECHNICAL DIRECTOR

Bryan Zieroff has 16 years of experience in the environmental consulting industry. Mr. Zieroff's experience includes the conceptual design, implementation and reporting of detailed field investigations including assessments of ground-water supplies for residential, municipal and industrial users, and evaluation, monitoring and remediation of soil and ground-water contamination for sites regulated by CERCLA, RCRA, Connecticut's Remediation Standard Regulations, and the New York State Department of Environmental Conservation cleanup Programs. These studies include investigations at sites impacted by petroleum products, chlorinated solvents, metals and landfill leachate. The scopes of study include characterization of the extent of contamination in soil, ground water, and soil vapor, evaluation of compliance with the established regulatory criteria, and operation and maintenance of remediation systems. His management skills are enhanced by comprehensive hands of familiarity with all forms of field investigation techniques.

Prior to his employment with AKRF, Mr. Zieroff was a Senior Hydrogeologist with Leggette, Brashears and Graham, Inc. in Shelton, Connecticut, where his responsibilities included overseeing fieldwork, preparing and reviewing technical reports, computer modeling, and conceptual design/implementation of investigation programs to characterize contamination release areas.

BACKGROUND

Education

B.S., Geological Sciences, The Ohio State University, 1994

Licenses/Certifications

Certified Professional Geologist-American Institute of Professional Geologists, License # CPG-11197

Connecticut Licensed Environmental Professional, License #532

40 Hour HAZWOPER and Annual Refresher Training

Supervisors of Hazardous Waste Operations (8 Hour)

Professional Memberships

American Institute of Professional Geologists

Association of Ground-Water Scientists and Engineers (National Ground Water Association)

Environmental Professionals' Organization of Connecticut (EPOC)

Years of Experience

Year started in company: 2006

Year started in industry: 1995

RELEVANT EXPERIENCE

Gedney Way Leaf and Yard Waste Composting Facility, White Plains, NY

Mr. Zieroff is Project Manager for a remediation and landfill closure project at an existing composting facility. The project included documenting the complete disposal history and completion of a site-wide investigation to confirm the extent of a solvent release and to provide data necessary to complete landfill closure. The investigation was



BRYAN ZIEROFF

TECHNICAL DIRECTOR

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completed satisfy the requirements in NYSDEC DER-10 and 6NYCRR Part 360. After receiving State approval of the Site Investigation Report the project has moved into the remediation and landfill closure design phase. The remedial design includes the testing and implementation of a chemical oxidation injection program, and landfill closure includes design, State approval, and construction of a landfill cap.

New City Plaza, New City, NY

Mr. Zieroff is Project Manager for an investigation and remediation project at a former dry cleaning facility. Investigation and remediation at the site is currently being conducted under review of the NYSDEC Brownfield's Cleanup Program. Tasks have included preparation and state approval of a Site Investigation Work Plan Site, Quality Assurance Project Plan, Health and Safety Plan, a Community Participation Plan, and completion of the investigation phase of the Brownfield's program. Interim Remedial activities include contamination source removal from soil and installation of a sub-slab depressurization system to address soil vapor. A feasibility study is currently being completed to determine the optimal remedial approach for site-wide remediation.

Orangeburg Pipe Site, Orangeburg, NY

Mr. Zieroff completed a subsurface investigation to determine the extent of soil and groundwater contamination at the former Orangeburg Pipe facility. The investigation results were used to develop a Remedial Action Plan to address solid waste, petroleum contamination, worker safety during site development, and capping requirements to satisfy the NYSDEC Voluntary Remediation Program.. The Remedial Action Plan included a Health and Safety Plan, Community Air Monitoring Plan, and specifications for soil management, a vapor mitigation system and dewatering procedures during the construction of multiple commercial buildings.

Magna Metals Facility, Cortlandt, NY

Mr. Zieroff managed a soil-gas investigation project at an existing commercial warehouse and office building. The project included installation of permanent soil gas sampling points and completion of a sampling program that met the requirements of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Site activities included a pre-sampling investigation with the NYSDOH to document materials storage, air flow specifications, historical uses, site uses and areas of concern for sub-slab and ambient air sampling. The investigation work was being conducted to satisfy an NYSDEC consent order.

Zerega – Federal Jeans Site, Bronx, NY

Mr. Zieroff was the project completed a Construction Health and Safety Plan and a Soil Management Plan for a former materials storage facility associated with Manhattan College. The plans were completed to provide worker safety and soil handling guidelines during the construction of a large retail facility and parking garage. Development activities at the site are being conducted under oversight of the NYCDEP.

Paragon Paint Company Facility, Long Island City, NY

Mr. Zieroff was Project Manager for an investigation and remediation project at a former paint manufacturing facility. The project has included a multiple subsurface investigations to determine the extent of solvent and petroleum contamination at the site. All phases of remediation at the site are being completed under review of the NYSDEC Brownfield's Cleanup Program. Tasks include completion and state approval of a Site Investigation Work Plan, Quality Assurance Project Plan, Health and Safety Plan, Community Participation Plan, Remedial Action Plan, and Final Remediation Report.

Pathmark Stores Site, Bronx, NY

Mr. Zieroff completed a Remedial Action Plan, Construction Health and Safety Plan and a Soil Management Plan for a former materials storage facility associated with Manhattan College. The plans were completed to provide worker safety and soil handling guidelines during the construction of a large retail facility and parking garage.



BRYAN ZIEROFF

TECHNICAL DIRECTOR

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Development activities at the site were conducted under oversight of the NYCDEP. A Notice of Satisfaction was received after project completion.

Yale and Towne Site, Stamford, CT

Mr. Zieroff provided oversight services for a remediation project at a former industrial site. The site included over 35 buildings and 87 areas of environmental concern that required investigation and remediation. Tasks included providing technical support in understanding the Connecticut regulatory requirements, investigation and remediation costs, and confirmation of appropriate schedules to address the environmental issues during redevelopment of the project site.

Aluminum Company of America (ALCOA) Facility, Guilford, CT

Mr. Zieroff managed a ground-water remediation project at an existing aluminum manufacturing facility. The project included soil, vapor and ground-water sampling to confirm the extent of a solvent release, determination of ground water and aquifer characteristics, operation and maintenance of a ground-water pump-and-treat system and compliance sampling in association with a CTDEP consent order.

Coats North America Facility, Watertown, CT

Mr. Zieroff was the Project Manager for site compliance work at an existing synthetic treads facility. The project included an evaluation of activities, chemical uses and waste handling practices to determine areas of environmental concern. Investigations to determine the status of these areas included installation of monitoring wells, soil and ground-water sampling, soil-vapor sampling, liquid storage tank removal and RCRA closure of waste storage areas. The project activities were completed in compliance with the CTDEP property transfer program.

United Parcel Service, Storm Water Management, 9 Connecticut Facilities

Mr. Zieroff managed the design and implementation of a storm water pollution prevention project at 9 United Parcel Service facilities. The project included analysis of drainage areas, determination of sheet flow characteristics and the collection of storm-water discharge samples and SMR reporting in accordance with the CTDEP General Permit for the Discharge of Storm Water.

Elite Development Investigation, Norwalk, CT

Mr. Zieroff managed an investigation and remediation project related to a release of gasoline from an underground storage tank system. The project included a multi-phase Subsurface (Phase III) Investigation to determine the nature and extent of gasoline in the soil and ground water and a feasibility study to determine the appropriate remedial action plan. The project was being conducted to satisfy a Stipulation of Judgment issued by the Attorney General for the State of Connecticut.

Applera Corporation, Wilton, CT

Mr. Zieroff oversaw the site compliance program associated with the ownership transfer of five adjacent commercial office properties. The project included monitor well installation, design and execution of a remedial action plan to address a petroleum release area, a bus maintenance garage, multiple underground storage tank areas, a lead and mercury release area and ground-water compliance monitoring.

Chubb Group of Insurance Companies, Remediation Oversight, 7 Connecticut Properties

Mr. Zieroff was the Project Manager for the oversight of emergency response and remediation of heating-oil releases from residential underground storage tank systems. The projects included investigations to determine the nature and extent of the release areas and design and implementation of a remedial action plan. The oversight activities were performed as a representative of the insurance carrier to confirm all aspects of project were being conducted in compliance with all applicable Connecticut regulations.



BRYAN ZIEROFF

TECHNICAL DIRECTOR

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Bank of New York, Southport, CT

Mr. Zieroff managed a ground-water remediation project at a former gasoline station. An investigation and remediation project related to a release of gasoline from an underground storage tank system. The project included a multi-phase Subsurface (Phase III) Investigation to determine the nature and extent of gasoline in the soil and ground water and a feasibility study to determine the appropriate remedial action plan. The project was being conducted to satisfy a Stipulation of Judgment issued by the Attorney General for the State of Connecticut.

Meriden Enterprise Center, Meriden, CT

Mr. Zieroff developed and directed a subsurface investigation to determine the nature and extent of contamination related to releases from multiple underground storage tank farms, silverware plating, machining and furniture stripping operations. Activities included ground-penetrating radar, drilling of test borings, installation of monitoring wells, developing a conceptual site model for the established releases and preparation of a report detailing remedial alternatives for the property and owner requirements under the Connecticut Department of Environmental Protection Property Transfer Act.

Harris Brothers Industrial Complex, New Britain, CT

Mr. Zieroff developed and directed a subsurface investigation to determine the status of recognized areas of environmental concern related to business operations. Activities included drilling of test borings, installation of monitoring wells, collection of soil and ground-water samples, developing a conceptual site model and preparation of a report detailing remedial alternatives for the property and owner requirements under the Connecticut Department of Environmental Protection Property Transfer Act.

Development properties in Kent, Ridgefield, and Greenwich, CT and Mahopac and Brewster, NY

Mr. Zieroff directed an evaluation and testing program of bedrock water-supply wells to determine long-term yield, impact on local users, and water quality results. The project included compilation of data, construction of hydrographs, determination of aquifer characteristics and reporting.

Bettsville Quarry, Bettsville, OH

Mr. Zieroff directed a pumping test of dewatering wells to determine yield requirements for dewatering a carbonate rock quarry. The dewatering program included a determination of offsite impacts to local ground-water users. Mr. Zieroff developed an offsite monitoring program to document and protect local users during the quarry dewatering process.

Mahopac Country Club, Town of Lewisborough, NY

Mr. Zieroff managed an in-situ percolation test in large test pit trenches to determine ground-water recharge rates. The project was conducted to support the proposed upgrade to the facility septic system. Data compilation and reporting included a ground-water recharge model to determine the area mounding potential.

Burning Tree Country Club, Greenwich, CT

Mr. Zieroff directed an in-situ percolation test to determine recharge rates for a proposed upgrade to the facility septic system. The project included compilation of slug test data and software analysis to determine K values.



APPENDIX H
SSDS & SITE COVER INSPECTION FORMS

**NEW CITY PLAZA
SITE INSPECTION FORM
2-88 NORTH MAIN STREET, NEW CITY, NEW YORK**

Inspector Name:			Date:	
Reviewed By:			Date:	
Site Cap - Soil Cover	Condition Observed			Comments
	Good	Maintenance Required ^{1/}	Contingency Action Required ^{2/}	
Subsidence/Settling				
Erosion/ Soil Deposition				
Vegetative cover				
Seeps				
Ponding				
Site Cap - Asphalt/Sidewalk Cover	Condition Observed			Comments
	Good	Maintenance Required ^{1/}	Contingency Action Required ^{2/}	
Surface Cracks				
Depressions				
Ponding				
Heaving				
Pot Holes				
Asphalt Deterioration				
Site Cap - Building Cover	Condition Observed			Comments
	Good	Maintenance Required ^{1/}	Contingency Action Required ^{2/}	
Surface Cracks				
Unusual Damage				
Sealed Penetrations				
^{1/} - Contact Kamber to coordinate maintenance activities. Document completed maintenance activities on this form. ^{2/} - Immediately contact Kamber and AKRF Project Manager for contingency requirements. Notify NYSDEC within 24 hours and refer to Site Management Plan for contingency requirements.				

Emergency Contact Information		
Name	Title	Contact Numbers
Marc Godick	AKRF Project Director	914-922-2356
Bryan Zieroff	AKRF Project Manager	914-922-2382
Michael Miller	New City Plaza Maintenance	845-598-1227
Peter Levy	Newton Associates LLC	212-672-1500

SYSTEM MONITORING INSPECTION FORM
NEW CITY PLAZA
2-88 NORTH MAIN STREET, NEW CITY, NEW YORK

Inspector Name:		Date:	
BLOWER OPERATION		Manometer Reading (Inches of Water)	Consistent with Baseline Data*
BOSTON MARKET	<input type="checkbox"/> YES <input type="checkbox"/> NO		YES <input type="checkbox"/> NO <input type="checkbox"/>
DUNKING DONUTS	<input type="checkbox"/> YES <input type="checkbox"/> NO		YES <input type="checkbox"/> NO <input type="checkbox"/>
POTATO REPUBLIC	<input type="checkbox"/> YES <input type="checkbox"/> NO		YES <input type="checkbox"/> NO <input type="checkbox"/>
7-ELEVEN	<input type="checkbox"/> YES <input type="checkbox"/> NO		YES <input type="checkbox"/> NO <input type="checkbox"/>
VERIZON	<input type="checkbox"/> YES <input type="checkbox"/> NO		YES <input type="checkbox"/> NO <input type="checkbox"/>
JUST A DOLLAR	<input type="checkbox"/> YES <input type="checkbox"/> NO		YES <input type="checkbox"/> NO <input type="checkbox"/>
VACUUM POINT SCREENING		Differential Pressure Reading (Inches of Water)	Consistent with Baseline Data*
Boston Market	SG-7		YES <input type="checkbox"/> NO <input type="checkbox"/>
Dunkin Donuts	SG-6		YES <input type="checkbox"/> NO <input type="checkbox"/>
	SG-5		YES <input type="checkbox"/> NO <input type="checkbox"/>
Potato Republic	SG-8		YES <input type="checkbox"/> NO <input type="checkbox"/>
7-Eleven	SG-9 (covered)		
	SG-11 (covered)		
Verizon Wireless	SG-12		YES <input type="checkbox"/> NO <input type="checkbox"/>
Just A Dollar	SG-13		YES <input type="checkbox"/> NO <input type="checkbox"/>
Comments:			
* A variation from baseline data indicates loss of SSDS performance. If corrective measures are unable to be made, immediately inform emergency contacts below.			
Emergency Contact Information			
Name	Title	Contact Numbers	
Marc Godick	AKRF Project Director	914-922-2356	
Bryan Zieroff	AKRF Project Manager	914-922-2382	
Michael Miller	New City Plaza Maintenance	845-598-1227	
Peter Levy	Newton Associates LLC	212-672-1500	