34-11 BEACH CHANNEL DRIVE SITE
BCP No. C241141

34-11 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK
Block 15950 Lots 14 and 24

REMEDIAL ACTION WORK PLAN

MARCH 2015
Revised JUNE 2015

Prepared for:
ALPROF REALTY LLC
VFP REALTY LLC
85 Forestdale Road
Rockville Centre, New York 11570

AMC Engineering
99 Jericho Turnpike, Suite 300J
Jericho, NY 11753
Phone: (516) 417-8588

CERTIFICATIONS

I Ariel Czemerinski certify that I am currently a NYS registered professional engineer and that this Remedial Action Work 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).

076508 — NYS Professional Engineer #

6/5/2015 — Date

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.

TABLE OF CONTENTS
REMEDIAL ACTION WORK PLAN
34-11 BEACH CHANNEL DRIVE SITE

TABLE OF CONTENTS
REMEDIAL ACTION WORK PLAN
34-11 BEACH CHANNEL DRIVE SITE

TABLE OF CONTENTS
REMEDIAL ACTION WORK PLAN
34-11 BEACH CHANNEL DRIVE SITE

TABLE OF CONTENTS
REMEDIAL ACTION WORK PLAN
34-11 BEACH CHANNEL DRIVE SITE

TABLE OF CONTENTS
REMEDIAL ACTION WORK PLAN
34-11 BEACH CHANNEL DRIVE SITE

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

LIST OF ACRONYMS

Acronym	Definition
AMC	AMC Engineering
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CQMP	Construction Quality Management Plan
DUSR	Data Usability Statement Report
EBC	Environmental Business Consultants
FER	Final Engineering Report
HDPE	High Density Polyethylene
IRM	Interim Remedial Measure
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PS	Public School
PVC	Polyvinyl Chloride
RAO	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RSCOs	Recommended Site Cleanup Objectives
SCG	Standards, Criteria, and Guidelines
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SSDS	Sub-slab Depressurization System
SWPPP	Stormwater Pollution Prevention Plan
SVOCs	Semi-Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

This Remedial Action Work Plan has been prepared on behalf of Alprof Realty LLC and VFP Realty LLC to remediate a 0.85-acre property located at 34-11 Beach Channel Boulevard, in Far Rockaway, Queens County, New York (**Figure 1**). The Site was formally accepted into the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP) through a Brownfield Cleanup Agreement (BCA) executed in December, 2012. The applicants, Alprof Realty LLC and VFP Realty LLLC were accepted as Volunteers in the BCP.

The Site is located in Queens County, New York City, New York and is identified as Block 15950 Lots 14 and 24 on the New York City Tax Map. The Site consists of two tax parcels totaling 36,657 sf (0.84-acre) and is bounded by Far Rockaway Boulevard to the north and northwest, Beach Channel Drive to the northwest, Rockaway Expressway and the Manhattan Transit Authority A-Line to the south, and a vacant lot (Lot 29) to the east. There are no structures present on either lot, and both lots are currently being used by a waste transporting company, PCI Contracting, for the storage of roll-off containers.

Summary of the Remedial Investigation

A Remedial Investigation was completed at the Site by FPM Group (FPM) from July 2013 through November 2014. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- Sampling for non-petroleum contaminants such as pesticides, PCBs and metals in soil and groundwater including the analysis of soil and groundwater samples;
- Soil sampling and analysis for petroleum compounds in soil samples from soil boring locations;

- The installation of groundwater monitoring wells;
- The collection and analysis of groundwater samples for petroleum compounds;
- The collection of analysis of soil gas and indoor air samples for VOCs from soil gas sampling locations.

The field work portion of the RI was initially performed by FPM in July and November 2013 with a secondary mobilization in November 2014. The results of sampling performed during the RI identified fill materials containing elevated levels of metals throughout the Site at a depth which ranged 1 to 5 feet below grade.

In addition CVOCs were documented in soils at depth along a 110 ft strip near the Lot 24 eastern property line and extending up to 45 feet onto the Site. The contamination was reported in clay and sand units from 21 to 28 feet below grade extending to a deeper clay unit at 39 feet at one location closest to the east property line. The RI Report concluded that "The adjoining upgradient Church property (Lot 29) is documented as the source of CVOC contamination that impacts the Site, and that "Petroleum contamination from the Church property has also impacted the Site".

Based on the groundwater flow direction and distribution, a VOC groundwater plume is also migrating onto the Site from the adjacent Lot 29. In addition, CVOCs are either off-gassing from affected groundwater beneath the site, or migrating onto the Site in vapor form.

Qualitative Human Health Exposure Assessment

The qualitative exposure assessment identified potential completed routes of exposure to construction workers and remediation workers through inhalation, ingestion and dermal contact during excavation activities. The Health and Safety Plan prepared for the site identifies such exposures and provides instructions for on-site workers to minimize potential exposure. Occupants in the proposed on-site residential buildings may be exposed to CVOCs originating from an off-site source through the vapor intrusion pathway if preventive measures are not incorporated into the design of the new building.

The RI (FPM 1/15) concluded that there are no ecological resources present on or in the immediate vicinity of the Site,

Summary of the Remedy

The remedy recommended for the Site consists of capping the Site with the building slabs, asphalt and concrete parking areas and walkways, the removal / replacement of the top 2 feet of soil with parameters above restricted residential SCOs in exposed areas (landscaped), and installation of subslab depressurization systems beneath all occupied areas of the planned buildings. The remedy will include the following items:

1. Removal of underground storage tanks (USTs) from Lot 14, and the removal remediation of any grossly contaminated soil and groundwater resulting from leakage of the UST, if present;
2. Excavation of soil/fill as needed for the construction of the new buildings foundation to a minimum depth of 2 feet below grade. ;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 4 Restricted Residential Use SCOs;
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
6. Import of materials to be used for backfill and cover in compliance with Restricted Residential SCOs as provided in Appendix 5 of DER-10: (1) chemical limits and other specifications included in **Table 1A**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. Perform in-situ chemical oxidation (ISCO) to treat chlorinated volatile organic compounds (CVOCs) in soil and groundwater at the eastern property line;
8. All future on-site buildings constructed at the Site will have a subslab depressurization systems (SSDS), or similar engineered system to prevent the migration of vapors into the buildings from soil and / or groundwater.
9. A site cover will be constructed to allow for restricted residential use of the Site. The cover will consist either of the structures such as buildings, pavement, sidewalks

comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable SCOs. Where the soil cover is required, it will be a minimum of two feet of soil meeting the SCOs in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer;

10. Implementation of a Site Management Plan (SMP) for long term maintenance of the Institutional and Engineering Controls;
11. An Environmental Easement will be filed against the Site to ensure implementation of the SMP.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

Alprof Realty LLC and VFP Realty LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on December 14, 2012, to remediate a 0.85-acre property located at 34-11 Beach Channel Drive in Far Rockaway, Queens County, New York. Alprof Realty LLC and VFP Realty LLC are Volunteers in the Brownfield Cleanup Program (BCP). A restricted residential use is proposed for the property. When completed, the Site will be redeveloped with a new six to seven story mixed-use (residential, commercial-retail) building.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between July 2013 and November 2013. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in Queens County, New York City, New York and is identified as Block 15950 Lots 14 and 24 on the New York City Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (**Figure 1**) shows the Site location. The Site consists of a two tax parcels totaling 36,657 sf (0.84-acre) and is bounded by Far Rockaway Boulevard to the north and northwest, Beach Channel Drive to the northwest, Rockaway Expressway and the

Manhattan Transit Authority A-Line to the south, and a vacant lot (Lot 29) to the east (see **Figure 2**).

According to the RI Report, Lot 14 of the Site was initially developed with a garage prior to 1933; uses noted since this time have included automobile repair and a retail gasoline station with associated USTs. The garage structure was reportedly removed circa 2004. A construction contractor most recently utilized Lot 14 for temporary offices and storage of construction-related equipment; a temporary trailer-type building was present during this use but was removed from the Site in late 2012. No structures have been reported on Lot 24, except for a small shed noted in 1933. Lot 24 appears to have been vacant since this time.

There are currently no structures present on either lot and both lots are currently being used by a waste transporting company, PCI Contracting, for the storage of roll-off containers.

A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 0.84-acre property is fully described in **Attachment A – Metes and Bounds.**

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. The Remedial Action contemplated under this RAWP will be implemented as part of the proposed redevelopment plan.

The Site is to be redeveloped through the new construction of a single six to seven story apartment building with 4,500 sf of retail space, 4,500 sf of community space and 16,120 sf of residential facility / service space on the first floor and 148,368 sf of residential space (154 apartments) on floors 2 through 7.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The surrounding land use (**Figure 3**) in the immediate vicinity of the Site includes residential apartment buildings (southwest), an elevated rail line (NYCMTA A-Line) and vacant lots to the south, duplex style residential homes to the west, a shopping center and athletic fields to the north, and a vacant and residential town house homes to the east.

The adjacent vacant lot to the east (Lot 29) has an open petroleum spill file (No. 02-07599) which was first reported to the NYSDEC on October 22, 2002. The property was also accepted into the NYS BCP in 2014 (Site No. C241158) to investigate and remediate chlorinated solvent and petroleum releases which have historically occurred on the property.

The property is zoned R6 residential with a C2-2 commercial overlay. The proposed project is compatible with the surrounding land use, and will be in compliance with the current zoning.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The field work portion of the Remedial Investigation was conducted by FPM Group (FPM) from July through November 2014. The investigation is summarized in the sections below. Further details are provided in the Remedial Investigation Report (FPM January 2015).

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

2.1.1 Borings

A total of twelve borings, including six on-site soil borings (RIB1-RIB6) and three off-site borings (RIB7-RIB9) were advanced during the initial site mobilization by FPM in July 2013 - November 2013. Three additional borings (RIB10-RIB12) were advanced during a secondary mobilization in November 2014. All soil borings were advanced by Geoprobe direct push equipment.

As reported by FPM (RI Report 1/2015):
The soil borings were each performed to a depth of between 40 to 45 feet below grade and into the top of the deep clay. Samples were obtained continuously, screened by an environmental professional with a calibrated PID, and classified using the Unified Soil Classification System (USCS).

Soil samples were retained for analysis from the onsite soil borings to characterize the onsite historic fill, the shallow sand unit, and the shallow clay, where present. Samples of the deep clay were also retained from two onsite borings closest to the VOC source area on the Lot 29 property. Soil samples were retained from the offsite soil borings to characterize the shallow sand and shallow clay.

After examination by the environmental professional, the soil samples were containerized in laboratory provided clean sample containers with appropriate preservatives as required by the analytical methods. The sample containers were sealed and labeled with the sample location, depth, date and time of sampling, and the analysis to be performed. The labeled sample containers were stored onsite in a cooler with ice sufficient to depress the sample temperature

and a chain-of-custody was initiated to document the sequence of sample possession. The samples were transported under chain-of-custody to the analytical laboratory for testing. The location of the soil borings are shown on **Figure 4**.

2.1.2 Cone Penetrometer Testing

Cone penetrometer tests (CPT) were performed during the November 2014 mobilization by FPM.

As reported by FPM (RI Report 1/2015):
CPTs were performed at six onsite locations (CPT-1 through CPT-6) utilizing a CPT rig operated by a professional CPT operator. Each CPT was performed to a depth at or near 40 feet below grade, as feasible, CPT-2 and CPT-4 were terminated at approximately 26 and 29 feet below grade, respectively, due to refusal. Each CPT included continuous measurement of cone resistance (ge), sleeve friction (fs) and pore pressure behind the cone (u2). Pore pressure dissipation tests were performed periodically during each CPT to obtain information about the rate of pore pressure dissipation over time' this information was used by the CPT operator to facilitate interpretation of the CPT results.

2.1.3 Monitoring Wells

A total of nine two-depth well clusters were installed during the July mobilization by FPM including six shallow wells (MW1S-MW9s) and six intermediate wells (MW1I-MW9I). Well clusters MW1-MW6 were installed on the Site while well clusters MW7-MW9 were installed off-site.

As reported by FPM (RI Report 1/2015):
The wells were each constructed using two-inch diameter PVC casing and 0.02-inch machine-slotted PVC screen. The shallow sand wells were installed across the water table with between 5 and 15 of well screen, depending on the location of the underlying clay. The intermediate sand wells were completed with five feet of screen and were installed just above the deep clay. The well annuli were backfilled with Morie #1 well gravel, or equivalent, from approximately one foot below to approximately one foot above each well screen. The sand pack above each screen

was sealed with a two-foot bentonite seal, and the balance of each annulus in the vadose zone was backfilled with sand to near grade. The top of each well was capped with an expansion-fit locking well cap and completed with a traffic-rated boltdown flush-mounted manhole cover or standpipe set in concrete. Following installation the wells were developed by pumping/bailing to remove suspended sediment until a clear discharge was obtained. The top of each well casing was surveyed to the nearest 0.01 foot relative to a common datum. Water level measurements were then obtained and integrated with the top of casing relative elevations to develop groundwater relative elevation maps for the shallow and intermediate sands. The resulting data were used to further evaluate the Site-specific groundwater flow direction.

Monitoring well locations are shown in **Figure 4**.

2.1.4 Samples Collected

2.1.4.1 Soil Samples

A total of 38 soil samples were collected from 12 soil borings for laboratory analysis of VOCs (EPA Method 8260). In addition, the shallow interval from six of the on-site borings was submitted for analysis of SVOCs (EPA Method 8270), TAL metals and PCBs (EPA Method 8082).

2.1.4.2 Groundwater Samples

Groundwater samples were collected from all of the wells in October 2013 (MW1-MW9) and on a subset of the wells in November 2014.

As reported by FPM (1/2015:

At each well the depth to the static water level and depth of the well were measured with an interface probe. The potential presence of non-aqueous-phase liquid (NAPL) was also assessed. Then a decontaminated submersible pump was used to purge the well until the turbidity of the produced water is less than 50 NTU or until five well volumes of water have been purged. Following the removal of each well volume, field parameters, including pH, turbidity, specific conductivity, and temperature, were monitored. When all stability parameters varied by less than

10 percent between the removal of successive well volumes, the well was sampled. Samples were obtained using dedicated disposable polyethylene bailers suspended from dedicated lines. The retrieved samples were decanted into laboratory-supplied sample containers.

The groundwater samples were containerized in laboratory-provided clean sample containers with appropriate preservatives as required by the analytical methods. The sample containers were sealed and labeled with the sample location, depth, date and time of sampling, and the analysis to be performed. The labeled sample containers were stored onsite in a cooler with ice sufficient to depress the sample temperature and a chain-of-custody was initiated to document the sequence of sample possession. The samples were transported under chain-of-custody to the analytical laboratory for testing. During the October 2013 sampling event the samples were tested for Target Compound List (TCL) VOCs. During the November 2014 sampling event the samples were tested for TCL VOCs and select samples were also tested for Target Analvte List (TAL metals (total and dissolved).

2.1.4.3 Soil Gas Samples

To assess the presence of VOCs in soil gas both beneath the Site and off the site, soil gas samples were collected from three off-site locations (RISV1-RISV3) in October 2013 and at ten on site locations (SV4-SV-13) in November 2014.

As reported by FPM (1/2015):

Each soil vapor point for the offsite locations was installed to a depth of approximately three feet below grade due to shallow water table conditions in the offsite areas. For consistency, the soil vapor points for the onsite locations were also installed to a depth of approximately three feet below grade. Each soil vapor point consisted of a six-inch stainless steel implant with inert tubing to grade in accordance with NYSDOH guidance (NYSDOH, October 2006). Each implant was purged prior to sampling using an air pump set at less than 0.2 liters per minute and helium gas was used as a tracer to evaluate the potential for ambient air bypassing. The results of the tracer tests indicated that no bypassing was occurring.

The soil vapor samples were collected into laboratory-provided Summa canisters equipped with flow controllers in accordance with NYSDOH guidance. The flow controllers were set for an approximately one-hour period and were filled at less than 0.2 liters per minute. The filled canisters were managed under chain-of-custody procedures, transmitted to a NYSDOH-certified lab, and analyzed for VOCs using the TO-15 Method.

2.1.5 Chemical Analytical Work Performed

All soil boring samples were analyzed VOCs (EPA Method 8260). In addition shallow samples of the fill from six onsite borings were analyzed for SVOCs (EPA Method 8270), TAL metals and PCBs (EPA Method 8081/8082). All groundwater samples were analyzed for VOCs with select locations tested for (TAL) metals (total, dissolved) during the second sampling event in November 2014. Soil gas samples analyzed for VOCs by EPA method TO-15.

2.1.6 Documentation

Maps showing the locations of the soil borings, monitoring wells, and soil gas sample collection points are provided in **Figure 4**. The results of soil, groundwater and soil gas samples collected during the RI are summarized in **Tables 2** through **7**. Below is a summary of RI findings.

The results of sampling performed during the RI, identified CVOCs and petroleum constituents in soils at depth along a 110 ft strip near the Lot 24 eastern property line and extending up to 45 feet onto the Site. The contamination was reported in clay and sand units from 21 to 28 feet below grade extending to a deeper clay unit at 39 feet at one location closest to the east property line. This contamination migrated onto the Site from a source on Lot 29, the adjacent property to the east (upgradient).

Shallow fill materials across both lots had elevated levels of metals including copper, chromium, lead and zinc above unrestricted or restricted residential soil cleanup objectives (SCOs).

Groundwater samples obtained from the on-site wells indicate that chlorinated and petroleum compounds are present in groundwater beneath the Site. Based on the groundwater flow direction (see **Figures 5A, 5B**) and distribution of VOCs across the Site, a VOC plume is

migrating onto the property from the east (upgradient) from the source on the adjacent Lot 29 property. VOCs are either off-gassing from affected groundwater beneath the site, or migrating onto the site in vapor form from the Lot 29 source area.

2.2 SIGNIFICANT THREAT

The NYSDEC and NYSDOH have determined that this Site does not present a significant threat to human health and the environment.

2.3 SITE HISTORY

2.3.1 Past Uses and Ownership

Previous owners of the property are shown in the tables below.

Previous Owners Lot 14

Dates	Name	Comments	Contact Information
From 10/26/53 to 8/3/1970	Leon Steinberg et al, d/b/a Steinberg & Co.	Deed	1 Bay Blvd. Lawrence, NY 11559
From 8/3/1970 to 4/15/1985	Sidney Fortin	Deed	815 N.E. 27th Ave. Hallendale Beach, FL 33009
From 4/15/85 to 1/15/1986	Didactic Development Corp.	Deed	26 Court Street Brooklyn, NY 1120
From 1/15/86 to 11/20/2001	Ali Kas	Deed	1414 Bay Blvd. Atlantic Beach, NY 11509
From 11/20/2001 to 7/12/02	Far Rockaway Mini Mall LLC	Deed	248-44 Far Rockaway Blvd. Rosedale, NY 11422
From 7/12/02 to Present	VFP Realty LLC	Deed	248-44 Far Rockaway Blvd. Rosedale, NY 11422

Previous Owners Lot 24

Dates	Name	Comments	Contact Information
Prior to 12/20/1979 to 8/3/2000	City of New York	Deed	City Hall, Manhattan, NY
From 8/30/2000 to 10/27/2003	Abraham Talassazan	Deed	530 Seventh Ave., 3d Floor New York, NY 10018
From 10/27/2003 to 10/27/2003	Rockaway TADD LLC	Deed	530 Seventh Ave., 3d Floor New York, NY 10018
From 10/27/2003 to Present	VFP Realty LLC	City Directory	248-44 Far Rockaway Blvd. Rosedale, NY 11422

The following resources were employed in obtaining historical information with respect to ownership:

- NYC ACRIS Database
- Interviews with current owners
- Title Search

2.3.2 Summary of Previous Reports

Environmental investigations performed at the Site include the following:

- Phase I and Phase II Report - Advanced Cleanup Technologies, April 4, 2002.
- Off-Site Investigation Report - Anson Environmental, Ltd., March 7, 2007.
- Off-Site Investigation Report (Block 15950 Lot 24) - TRC, December 16, 2008.
- Soil Testing - H2M, April 2, 2009
- Laboratory Results of Soil, Groundwater & Soil Vapor - FPM Group August 2012.

These reports were summarized by FPM (RIR 1/2015) as follows:

Phase I and Phase II Report - (ACT, 4/4/2002)
The Site was initially investigated in 2002; this investigation identified an historic gasoline service station, auto repair activities, and a suspected UST on the northwest portion of Lot 14 as Recognized Environmental Conditions (RECs). Lot 24 was identified as vacant and overgrown with vegetation. Solid waste debris was the only REC identified for Lot 24. The Site was not identified on any of the state or federal databases searched during this investigation.

The identified RECs on the Site were investigated by performing a geophysical survey, conducting soil borings and groundwater sampling, conducting in-house chromatographic screening, and submitting select samples to an analytical laboratory for testing of VOCs, semi-volatile organic compounds (SVOCs), and metals.

The geophysical survey identified one anomaly consistent with a UST near the northwestern corner of Lot 14 of the Site. There is no report of a UST having been removed. No other anomalies were identified on the Site.

No visual or olfactory evidence of chemical or petroleum impact was observed in any of the below-grade soil samples. No VOCs or metals were detected in soil in excess of the NYSDEC

TAGM 4046 Recommended Soil Cleanup Objectives (Objectives), which were the applicable Standards, Criteria, and Guidance (SCGs) at that time. One SVOC (chrysene) was detected in a shallow soil sample (0 to 2 feet below grade) at a concentration that slightly exceeded the NYSDEC Objective. This sample was obtained from an area of surficial staining on the northwest side of Lot 14. This detection is consistent with surficial soil contamination by SVOCs typical of auto repair facilities and is also consistent with the historic fill present beneath Lot 14.

Low levels of petroleum-related VOCs, including methyl tert-butyl ether (MTBE), sec-butylbenzene, isopropylbenzene, and/or n-propylbenzene, were detected at two groundwater sampling locations on Lot 14. The levels of three VOCs slightly exceeded their respective NYSDEC Standards. No petroleum-related VOCs were identified in the groundwater sample collected from Lot 24.

Arsenic, chromium, barium, and/or lead were detected in two groundwater samples from Lot 14 at concentrations that exceeded the NYSDEC Standards. These samples were collected from wells that had not been properly developed and the samples were not filtered; it is likely that these detections resulted from suspended particulate material in the samples.

In-house screening of the soil and groundwater samples was also performed using a gas chromatograph. This screening identified large early peaks in the chromatograms of all of the groundwater samples; these peaks were noted as “solvent” on the chromatograms. However, since solvent VOCs were not identified as chemicals of concern at the Site, no further analysis was performed to identify or quantify the in-house screening results, and the results were not discussed in the report.

Off-Site Investigation Report (Anson, 3/7/2007)

Following the identification of contamination on the adjoining Lot 29 property, sampling of shallow groundwater was performed at seven locations on the Site to determine if contamination extended offsite from the Lot 29 property. The four groundwater samples located most closely downgradient of the area of contamination identified on the Lot 29 property (B-54, B-55, B-56, and B-57) exhibited concentrations of the chemicals of concern in excess of the NYSDEC

Standards. VC was detected at the highest levels, ranging from 650 to 2,800 micrograms per liter (ug/l); trans-1,2-DCE was detected at up to 1,200 ug/l, and 1,1-DCE was detected at up to 280 ug/l. TCE was detected in one sample at 48 ug/l. Petroleum compounds were also detected, including benzene up to 35 ug/l. It was concluded that contamination from the adjoining Lot 29 property had migrated onto the Site.

Off-Site Investigation Report (TRC, 12/16/2008)

To further evaluate contamination migrating from the adjoining property (Lot 29), additional investigation was performed in a small area of Lot 24 near the east corner of the Site in the downgradient vicinity of a contaminated area previously identified on the Lot 29 property.

Fill was identified to five feet below grade and was underlain by the "shallow sand" to a depth of 16 feet below grade; groundwater was present within the shallow sand. An organic clay ("shallow clay") was identified beneath the shallow sand to a depth of 22 feet; this clay was determined to have a high total organic carbon content (4.45%). Another sand layer ("intermediate sand") containing groundwater was present beneath the shallow clay to a depth of approximately 35 feet. A clay layer ("deep clay") was present beneath the intermediate sand. Soil sampling was conducted for the deep clay only; none of the chemicals of concern were identified in the deep clay. No analysis for VOCs was conducted for the shallow clay. Groundwater samples were collected from both the shallow and intermediate sands.

Chlorinated VOCs were detected in all of the groundwater samples, including primarily cis-1,2-DCE with lower concentrations of VC, TCE, trans-1,2-DCE, and 1,1-DCE. Vertical profiling was performed at one location (MZ-4) to assess the distribution of VOCs in the shallow and intermediate sands. Chlorinated VOC concentrations were reported to increase downward within the shallow sand from 416.5 ug/l near the top of the shallow sand to 9,572.9 ug/l at the bottom of the shallow sand just above the shallow clay. In the intermediate sand, chlorinated VOC concentrations decreased downward from 17,508.4 ug/l in the intermediate sand immediately below the shallow clay, to 718.9 ug/l in the middle of the intermediate sand, to 6.16 ug/l near the bottom of the intermediate sand. This distribution of chlorinated VOCs in the groundwater was not consistent with a potential source of chlorinated VOCs on the Site. Monitoring wells MW-5S

and MW-5I were installed and sampled in the shallow sand and intermediate sand, respectively, and 1,1-DCE, cis- and trans-1,2-DCE, TCE, and/or vinyl chloride were found in both sands, with the concentrations of these CVOCs being highest in the intermediate sand.

In 2009 further investigation was performed on the east portion of Lot 24 in the downgradient vicinity of a contaminated area previously identified on the Lot 29 property and where extensive excavation of TCE-impacted soil had been conducted in 2004 and additional excavation was conducted in 2009. Petroleum-contaminated soil, petroleum mixed with groundwater, and TCE-impacted soil were removed from an excavation area on the Lot 29 property (Lot 29) between June and November 2004. Additional impacted soil and petroleum and groundwater were removed from this area of the Lot 29 property in March and April 2009. A sample of the TCE-impacted soil was tested and found to contain 13,804 mg/kg of TCE. Petroleum product samples from wells MW-4S and MW-4I, in the shallow sand and intermediate sand, respectively, located on the Lot 29 property in the former excavation area were tested in May 2009 and found to contain 123,000 ug/l and 23,500,000 ug/l of TCE, respectively.

Soil Testing (H2M, April 2, 2009)

The remediation process in 2004 on Lot 29 had included use of the surface of Lot 24 for access purposes, and included surface storage of contaminated soil on the adjacent area of the Lot 29 property for up to five months. As a result, the surface of Lot 24 may have been contaminated by impacted soil from the Lot 29 property. In 2009, H2M collected six shallow soil samples (SB-1 through SB-6) on Lot 24 from a depth of approximately 2.5 feet below grade and laboratory analysis for CVOCs. One soil sample (SB-2) contained TCE at a concentration (11 ppm) above the 6 NYCRR Part 375 Soil Cleanup Objective (Objective) for unrestricted use (Objective), but below the NYSDEC Objective for restricted-residential use (21 ppm). None of the other soil samples contained any CVOCs in excess of the NYSDEC Objectives.

Laboratory Results of Soil, Groundwater & Soil Vapor (FPM 8/2012)

To further evaluate impacts originating from the adjoining Lot 29 property, an environmental investigation was conducted by FPM on Lots 14 and 24 in August 2012. This investigation included soil, groundwater, and soil vapor sampling and the area investigated included the

portions of Lots 14 and 24 located downgradient (generally west) of the area of contamination identified on the Lot 29 property.

Soil borings were conducted at three locations (SB-1 through SB-3) on Lot 24 to between 25 and 30 feet below grade. The SB-3 boring was performed at the approximate location of the SB-2 boring conducted in 2009. Fill was identified between 2.5 and five feet below grade. The shallow sand was identified below the fill and extended to between approximately 12 and 18 feet below grade. Groundwater was encountered generally between 7 and 9 feet below grade in the shallow sand. The shallow clay was identified below the shallow sand and extended to depths ranging between approximately 24 and 28 feet. The intermediate sand was identified below the shallow clay in two borings but was not fully penetrated.

Soil sampling was conducted in each of the borings; samples were selected to characterize the shallow sand and the shallow clay and the samples were analyzed for Target Compound List (TCL) VOCs. No exceedances of the NYSDEC Objectives were noted in any of the shallow sand samples. Exceedances of the NYSDEC Objectives for chemicals of concern, including cis-1,2-DCE and/or VC, were noted in all of the shallow clay samples. The highest concentrations were detected at the 2012 SB-2 location, which is the closest sample location to the area of contamination identified on the adjoining Lot 29 property. These results suggested that no source material was present in the shallow sand onsite, but breakdown products from TCE were present at depth in the shallow clay and that most likely migrated from the Lot 29 property. TCE, which is the primary contaminant at the Lot 29 property, was not detected in any of the soil samples from the Site.

Groundwater sampling was conducted at six locations on Lot 24 (GW-1, GW-2 and GW-4 through GW-7) and one location on Lot 14 (GW-3). At each location one groundwater sample was collected from the lower portion of the shallow sand and one groundwater sample was collected from the upper portion of the intermediate sand. Chlorinated VOCs that are chemicals of concern were detected in nearly all of the groundwater samples; the highest concentrations at each location were detected in the groundwater in the shallow sand. The highest concentrations of chlorinated VOCs were noted in the shallow sand at GW-2, which is the location in closest

downgradient proximity to the area of contamination identified on the Lot 29 property; cis-1,2-DCE was detected at 310,000 ug/l and VC was detected at 21,000 ug/l in GW-2. The highest concentrations of chlorinated VOCs in the intermediate sand (5,100 ug/l of cis-1,2-DCE and 86 ug/l of VC) were detected at GW-1, which is also in close proximity to the area of contamination identified on the Lot 29 property. Chlorinated VOCs extended downgradient (west) at least as far as the GW-3 location on Lot 14, where 320 ug/l of cis-1,2-DCE and 470 ug/l of VC were identified in the shallow sand. Petroleum compounds were also detected in many groundwater samples, including benzene up to 15 ug/l in GW-6, and toluene up to 23 ug/l in GW-7. These results indicated that VOCs in groundwater consisting primarily of breakdown products from TCE, as well as petroleum constituents, were migrating onto the Site from the area of contamination identified on the Lot 29 property. This contamination migrating onto the Site extended downgradient at least as far as GW-3 on Lot 14.

Soil vapor sampling was conducted at five locations (SV-A through SV-E) on Lot 24; at each location one soil vapor sample was collected from approximately five feet below grade in accordance with NYSDOH procedures. Chlorinated VOCs that are chemicals of concern and petroleum compounds were detected in all of the samples. The highest concentrations of chlorinated VOCs were noted at SV-D and SV-E, which were the locations in closest downgradient proximity to the area of contamination identified on the Lot 29 property. The chlorinated VOCs detected at the highest concentrations at these two locations were cis-1,2-DCE and VC, both of which are breakdown products of TCE. These locations are closest to the area of the Lot 29 property that was thermally treated, as discussed below. At the SV-A through SV-C locations, which are more distant from the contaminated area on the Lot 29 property that was thermally treated, TCE was the chlorinated VOC detected at the highest concentration. In accordance with NYSDOH soil vapor intrusion guidance, mitigation for soil vapor intrusion would be required at each location if a building were present.

2.4 GEOLOGICAL CONDITIONS

Geologic and hydrogeologic conditions beneath the site were reported by FPM (RIR, 1/2015) as follows:

This area underwent a lengthy period of filling and channel dredging in the late 1800s and into the 1900s, during which time much of the Rockaway Peninsula was filled. Fill appears to have been placed over the entire Site and vicinity. Fill in the Site vicinity appears to consist largely of native sand, presumably excavated during the enlargement of the nearby Norton Bay and creation of the Reynolds Channel. Other materials, such as solid waste, coal ash, wood ash, incinerator ash, construction and demolition debris, railroad ballast, refuse, or land-clearing debris, which may be components of historic fill, have not been noted in the borings performed onsite.

A dredged channel that connects to Norton Basin is located approximately 500 feet to the northwest of the Site and the Atlantic Ocean is located approximately one-quarter mile south of the Site. The Edgemere Landfill is situated approximately one-half mile northwest of the Site. Beneath the historic fill, the Site is underlain by Upper Glacial Formation sand, silt, and clay outwash plain deposits (USGS, 1966). The Gardeners Clay, consisting of clay with interbedded silt and sand, is present below the Upper Glacial Formation.

Historic fill is present at the Site to about five feet below grade followed by a medium sand to a depth of 16 feet. A discontinuous clay zone is present beneath the sand to a depth of 22 feet. Another sand layer is present beneath the shallower clay zone to a depth of approximately 35 feet followed by a second clay layer.

The depth to groundwater beneath the Site is approximately five to ten feet and is consistent with information obtained during previous investigations performed at the Site. The groundwater flow direction was determined to be generally to the west-northwest during previous investigation work conducted on the Site and the adjoining Lot 29 (**Figures 5A, 5B**). The groundwater flow velocity in the shallowest groundwater has been estimated at 0.2 feet per day, while the flow velocity decreases downward to an estimated 0.005 feet per day in the deeper portion of the Upper Glacial Aquifer, as documented in a report concerning the adjoining Lot 29.

2.5 CONTAMINATION CONDITIONS

2.5.1 Conceptual Model of Site Contamination

The primary contaminants of concern at the Site are CVOCs including TCE and associated breakdown products, in soil, groundwater and soil vapor at the Site. The impacts to soil and groundwater are mainly located along the eastern portion of Lot 24 near the property boundary with adjacent Lot 29, though impacted groundwater and soil vapor have also migrated across Lot 24 to Lot 14. It has been established that both CVOC and petroleum contamination in soils are present on Lot 29 and that this contamination migrated onto Lot 24, which is located downgradient of Lot 29. Since shallow VOC contamination was not identified during the RI investigation, on Lot 24 and has only been reported in clay zones at depths of 22 and 37 feet below the surface, it is likely that TCE released on Lot 29 migrated vertically downward (as a DNAPL) in the source area through the shallow sand zone until it encountered the clay. It then migrated horizontally along the clay surface to Lot 24 and became entrained there. Some portion of the DNAPL in the source area on Lot 29 may have migrated further downward to the second clay zone where it then traveled horizontally to Lot 24, where it also became entrained. However vertical migration from the upper clay zone to the lower clay zone may also have occurred on Lot 24 in areas where the upper clay was absent. In either case the source was a DNAPL released on Lot 29. Similarly constituents of petroleum discharged on Lot 29 likely followed the same pathways onto Lot 24. CVOCs in soil in the clay zones on Lot 24 contain significant levels of TCE degradation compounds indicating that dechlorinization has proceeded to some degree from TCE to cis/trans-1.2-DCE to vinyl chloride in the residuals. Although petroleum was also released at the Lot 29 property and may be associated with the dechlorinization of the CVOCs, it does not account for this occurring in residual soil contamination at depth. Previous reports have noted a high organic carbon content in the clay and it may be that this is the carbon source allowing the dechlorinization to proceed.

Residual CVOC contamination is dissolving into the groundwater and then migrating west in the direction of groundwater flow. This dissolution is most likely occurring on Lot 29 and on the portion of Lot 24 with residual contamination and migrating west with groundwater flow beneath Lot 14. CVOCs in shallow groundwater are off-gassing into the vapor phase and then dispersing

across both Lot 14 and Lot 24. It is also possible that CVOC vapors are either migrating onto the Site from shallow impacted soil remaining on Lot 29 or from remedial operations on Lot 29.

Elevated levels of metals reported in the shallow fill throughout the Site are likely inherent in the sub-standard fill historically placed on the property.

2.5.2 Description of Areas of Concern

Elevated levels of metals were reported in soil samples throughout the site to a depth of five feet. In addition CVOCs entrained in two clay layers were reported in the southeast corner of Lot 24.

No other source areas were identified or indicated during the RI.

2.5.3 Soil/Fill Contamination

Fill materials containing elevated levels of metals were documented throughout the site at a depth which ranged 1 to 4 feet below grade. Elevated levels (above unrestricted SCOs) of metals including one or more of the following: copper, chromium, lead, mercury, nickel and zinc were reported above unrestricted use SCOs in one or more shallow soil samples on both lots. In addition chromium and copper were reported above Restricted Residential Use SCOs at location RIB6 on lot 14 and RIB3 on Lot 24. Nickel was also reported above Restricted Residential Use SCOs at the RIB3 location.

CVOCs were documented in soils at depth along a 110 ft strip from RIB10 to RIB11 near the Lot 24 eastern property line and extending up to 45 feet onto the Site, in the vicinity of RIB12. The contamination was reported in clay and sand units from 21 to 28 feet below grade extending to a deeper clay unit at 39 feet at one location (RIB2) closest to the east property line.

CVOCs including TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride were reported above unrestricted or restricted residential use in four borings (RIB2, RIB10-RIB12). TCE was reported in two of the borings and ranged from 3,400 ug/kg in RIB2 to 1,300,000 ug/kg in RIB10. Cis-1,2-DCE was reported in three of the borings ranging from 880 ug/kg in RIB11 to 320,000 ug/kg in RIB2. Trans-1,2-DCE was reported in two locations at concentrations of 630 ug/kg and

2,100 ug/kg in borings RIB2 and RIB 10 respectively. Vinyl chloride was reported in four borings at concentrations which ranged from 950 ug/kg in RIB12 to 14,000 ug/kg in RIB2.

2.5.3.1 Summary of Soil/Fill Data

Soil sample results from the RI are summarized in **Tables 2-3**. Further information on soil sample collection, handling and analysis can be found in the RI Report (FPM 1/15).

2.5.3.2 Comparison of Soil/Fill with SCGs

Table 4 shows sample results above Track 1 Unrestricted SCOs for all overburden soil at the Site. **Figure 6** is a spider map which show soil boring locations and summarize sample results above Track 1 Unrestricted SCOs for all overburden soil.

2.5.4 On-Site and Off-Site Groundwater Contamination

Petroleum VOC impacts to groundwater above water quality standards included low levels (<2 ug/L) of benzene in the shallow wells located closest to the east property line. Higher levels of benzene (3.7 to 15 ug/L) and toluene (7.3 to 7.7 ug/L) were reported in the intermediate groundwater zone extending onto Lot 14 and beyond the west property line. MTBE (11 ug/L) was also detected on Lot 14.

CVOC impacts including TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride were reported above standards in the shallow groundwater zone in MW2S, MW3S and MW4s. CVOC impacts were highest in the upgradient wells with total CVOC concentrations ranging from 6.5 ug/L in MW5S to 306 ug/L in MW2S.

CVOC impacts in the intermediate groundwater zone were much greater and extended beyond the western property line of Lot 14. Total CVOC concentrations in the intermediate zone were also highest near the eastern property line (upgradient) of Lot 24, with concentrations ranging from 5,440 ug/L at MW2I to 5.4 ug/L at MW4I in the central area of the Site. However, CVOCs extended further west than MW4I with concentrations of 56 ug/L in MW5I located near the north central property line on Lot 14. In addition, CVOCs of 193 ug/L were reported in an off-site well (MW9I) located 35 ft west of the west Lot 14 property line.

Overall VOCs in the intermediate zone are an order of magnitude greater than that in the shallow zone with greater migration occurring in the deeper groundwater. The distribution of CVOCs in groundwater in both the shallow and deep zones indicates that migration of the plume(s) has occurred from the adjacent Lot 29 source and proceeded in a westerly direction beneath the Site.

2.5.4.1 Summary of Groundwater Data

The results of groundwater samples collected during the RI are summarized in **Table 5**. Further information on groundwater sample collection, handling and analysis can be found in the RI Report (FPM 1/15).

2.5.4.2 Comparison of Groundwater with SCGs

Sample results above GA groundwater standards in monitor wells prior to the remedy are shown in **Table 6**. Spider maps which show groundwater sampling locations and summarize results above GA groundwater standards prior to the remedy are shown in **Figures 7A** and **7B**.

2.5.5 On-Site and Off-Site Soil Vapor Contamination

CVOCs were detected in all of the soil vapor samples collected during the RI. PCE was the most common CVOC detected as it was found in all ten of the on-site samples. PCE concentrations ranged from 25 ug/m^3 in SV7 in the southeast corner of Lot 24 to 150 ug/m^3 in SV9 located in the northwest area of Lot14. TCE was identified in seven of the on-site samples ranged from 3.5 ug/m^3 in SV4 in the north central area of Lot 14 to 1,700 ug/m^3 in the southwest corner of Lot 24. PCE was not reported in soil or groundwater at the Site. There also does not appear to be any direct correlation between the distribution of TCE in soil gas and that in the groundwater or soil since most of this contamination was present in deeper zones near the east property line. **Figure 8** shows posted soil gas results from the RI.

2.5.5.1 Summary of Soil Vapor Data

A table of soil vapor data collected prior to the remedy is shown in **Table 7**. Further information on soil gas sample collection, handling and analysis can be found in the RI Report (FPM 1/15).

2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.6.1 Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment under the BCP is to identify potential receptors to the contaminants of concern (COC) that are present at, or migrating from, the site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur. An exposure pathway has five elements; a contaminant source, release and transport mechanisms, point of exposure, route of exposure and a receptor population.

The potential exposure pathways identified below, represent both current and future exposure scenarios.

Contaminant Source

Elevated levels of metals are present throughout the site to a depth of four feet below grade. VOCs in soil, soil vapor and groundwater beneath the site are related to a known off-site source on the adjacent property east of the Site.

Contaminant Release and Transport Mechanism

Metals present throughout the site are related to the fill materials emplaced at the Site sometime in the past.

VOCs present in groundwater may be volatilizing to air to some degree, though CVOCs in soil vapor may also be related to off-gassing from impacted media on Lot 29 to the east. Since the origin of VOC contamination in soil, groundwater and vapors originated from an off-site source, it was caused by the migration of contaminated media onto the Site.

Point of Exposure, Route of Exposure and Potentially Exposed Populations

Potential On-Site Exposures: Remediation workers and construction workers engaged in the excavation of impacted and non-impacted soil at the site may be exposed to metals and VOCs through several routes.

Workers excavating impacted soil may be exposed to heavy metals through inhalation, ingestion and dermal contact. Workers excavating non-impacted soil may also be exposed to VOCs in soil vapor through inhalation. A site specific Health and Safety Plan has been developed to identify and minimize the potential hazards to on-site workers.

Under a future scenario, residents within the proposed buildings may be exposed to soil vapor intrusion via inhalation if remediation of the source area is not completed, and also if preventive measures are not incorporated into the new building design to protect against contaminated soil vapor intrusion. This potential route of exposure is not likely to be reduced in response to on-site remedial activity since it is related to an off-site source. However, on-going remediation of the off-site source would be expected to improve the potential for on-site vapor intrusion with time as the remediation progresses.

Potential Off-Site Exposures: The entire area is serviced by the New York City Water System which distributes water from the Croton Reservoir system. Since there are no public or private potable supply wells in the area, exposure from contact with contaminated groundwater is not a concern. Off-site exposure is therefore limited to vapor intrusion from VOCs migrating beneath the site. Potential off-site exposure related to VOC vapor intrusion was evaluated during the RI. Based on the low concentrations of VOCs reported in soil gas at a location downgradient of the Site, off-site vapor intrusion related to off-gassing from impacted water migrating off-site is not a concern.

2.6.2 Fish & Wildlife Remedial Impact Analysis

Since CVOCs in shallow groundwater may be leaving the Site in a west-northwest direction, the groundwater to surface water discharge pathway was evaluated. The RI (FPM 1/15) concluded

that there are no ecological resources present on or in the immediate vicinity of the Site, which is an unimproved parcel in an urban area surrounded by developed commercial and residential uses.

2.7 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.7.1 Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.7.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.7.3 Soil Vapor

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

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community acceptance; and
- Land use.

The first two criteria are threshold criteria and must be satisfied in order for an alternative to be considered for selection. The remaining seven criteria are balancing criteria which are used to compare the positive and negative aspects of each of the remedial alternatives, provided the alternative satisfies the threshold criteria.

3.2 STANDARDS, CRITERIA AND GUIDANCE (SCG)

A criterion for remedy selection is evaluation for conformance with SCGs that are applicable, relevant and appropriate. Principal SCGs that are applicable, relevant and appropriate for evaluating the alternatives for remediation of this Site include the following:

- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response

- 10 NYCRR Part 67 – Lead
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Part 375 - 6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1, 375-3 and 375-6 (December 2006)
- 6 NYCRR Part 376 - Land Disposal Restrictions
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - May 2010
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)

Additional regulations and guidance are applicable, relevant, and appropriate to the remedial alternatives and will be complied in connection with implementation of the remedial program; however, the list above is intended to represent the principal SCGs which should be considered in evaluating the remedial alternatives for the BCP site.

Conformance with the appropriate standards for remediation of contaminated soil is an important criterion in evaluating the remedial alternatives for the BCP site. Presently, in New York State, 6 NYCRR Part 375 establishes the primary SCGs associated with remediation of contaminated soil at sites which are in the BCP. If proposing remediation pursuant to a Track other than Track 1 (Unrestricted Use), 6 NYCRR Part 375 requires evaluation of at least one remedial alternative pursuant to Track 1 (Unrestricted Use) and one other alternative developed by the applicant for the proposed use of the BCP site. The remedial alternatives presented in Section 3.3 of this work plan have been prepared in conformance with this requirement.

3.3 ALTERNATIVES ANALYSIS

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. This analysis was prepared in accordance with 6 NYCRR Part 375-1.8(f) and Part 375-3.8(f) and Section 4.3(c) of NYSDEC DER-10. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

- Alternative 1 - Track 1, remediation of all soils above bedrock to unrestricted use criteria. This Alternative includes the removal of an underground storage tank(s) believed to be present in the northwestern portion of Lot 14. Excavation would be to a minimum depth of 5 ft across the Site. Also included would be the excavation or treatment of CVOC impacted soils in the eastern portion of the Site to a depth of 39 feet. Groundwater would be treated through chemical oxidation injections completed near the upgradient (east) property line. This alternative does not allow the use of long-term institutional /engineering controls to address impacted media or prevent exposures which may be required beneath the new building.

- Alternative 2 - Track 4, remediation of all soils to site-specific criteria as needed to prevent direct exposure. This alternative would require a lesser degree of excavation than Alternative 1, requiring all exposed soils to meet restricted residential SCOs in the top 2 feet and the placement of an engineered cap over all soils which do not meet restricted residential SCOs. This Alternative also includes the removal of an underground storage tank(s) believed to be present in the northwestern portion of Lot 14 along with any grossly impacted or petroleum contaminated soil if encountered. Groundwater would be treated through chemical oxidation injections completed near the upgradient (east) property line. Alternative 2 includes the installation of a vapor barrier and sub-slab depressurization (SSD) system beneath any occupied portion of the new building. This alternative does not allow the use of long-term institutional /engineering controls to meet soil cleanup objectives. Long-term institutional /engineering controls are allowed to address or prevent exposures from other impacted media.

3.4 REMEDIAL ALTERNATIVE 1

The following sections provide an evaluation of Alternative 1 based on the nine evaluation criteria as previously discussed.

3.4.1 Overall Protection of Human Health and the Environment

Alternative 1 will be protective of human health and the environment by eliminating constituents in soil related to historic fill. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of all historic fill soils and hot spot areas with parameters in excess of unrestricted criteria, disposing of excavated materials off-site and backfilling as needed with certified clean fill, virgin mined materials or recycled concrete materials from a NYSDEC permitted recycling facility. Additional excavation would be performed to meet unrestricted soil cleanup objectives in all soils at the Site.

Potential post-remediation exposures to on-site residents from soil vapors are not expected to require the long term (>5 yrs) operation of SSD systems. However, if remedial efforts on adjacent Lot 29 are incomplete or unsuccessful, long term operation of the SSD systems, if required, would eliminate attainment of this cleanup Track. Groundwater use will also be

restricted at the Site until groundwater quality recovers even though such a restriction is likely to be unnecessary due to brackish conditions and NYC prohibitions on groundwater usage.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors will be minimized through the use of engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

3.4.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 1 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to Track 1 unrestricted cleanup levels. Groundwater quality will be improved, but SCGs for groundwater may not be achieved permanently, as impacted groundwater is migrating onto the Site from the adjacent property (Lot 29). Compliance with SCGs for soil vapor is expected following completion of the remedial action.

3.4.3 Long-Term Effectiveness and Permanence

Alternative 1 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants or historic fill materials. Under this Alternative, risk from soil impacts is eliminated though risk from groundwater will be reduced but remain unless the off-site source is effectively and permanently remedied. Alternative 1 will continue to meet RAOs for soil in the future, providing a permanent long-term solution for the Site.

3.4.4 Reduction in Toxicity, Mobility or Volume Through Treatment

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting unrestricted objectives.

3.4.5 Short-Term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 1 is minimal.

Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan has also been prepared to minimize disturbance to the local roads and community.

3.4.6 Implementability

The techniques, materials and equipment to implement Alternative 1 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

However, excavation to a depth of 40 ft or more represents considerable technical challenges which in this case limit its feasibility. Sloping and shoring requirements for a 40 ft deep excavation would present significant construction challenges and would impede and interfere with the construction of the new building. Areal expansion of the excavation would likely be impossible in the event that contaminants above unrestricted criteria were identified in end-point verification samples. Documented contaminants significantly below the water table would add further difficulty in employing excavation alone as a means to remediate soil requiring high volume dewatering operations. Oxidant injections to attain unrestricted objectives in deep soils would require massive volumes of oxidant and may not fully achieve goals within the 5-year

limit under Track 1 since the majority of the contaminant mass appears to be entrained in clay zones.

3.4.7 Cost

Costs associated with Alternative 1 are estimated at approximately $5,028,817. This cost estimate includes the following elements and assumptions:

- Removal of suspect underground storage tank(s) on Lot 14;
- Excavate a minimum of 5 feet across entire Site. Over-excavate as necessary to remediate hot-spot areas and remove all historic fill at the Site;
- Excavate CVOC impacted soil to depth of 40 ft in 4,000 sf area;
- Shoring to allow excavation to 40 ft depth;
- Dewatering to allow excavation to 40 ft depth;
- Disposal of approximately 4,443 tons of hazardous soil from the CVOC impacted soil area in the southeast area of the Site;
- Perform Chemical oxidant injections near the upgradient property line;
- Disposal of approximately 10,182 tons of historic fill soil as non-hazardous;
- Backfilling as needed for the redevelopment plan with 1,830 cy of soil / fill meeting unrestricted SCOs;
- Installation and maintenance of a permeable reactive wall to treat impacted groundwater migrating onto the Site;
- Installation and temporary operation (<5 yrs) of a Sub Slab Depressurization System (SSDS) beneath all occupied areas of the new building;
- HASP and CAMP monitoring for the duration of the remedial activities.

3.4.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current R6 / C2-2 residential / commercial zoning. Following remediation, the Site will meet unrestricted use objectives which will exceed the objectives for its planned multi-tenant residential and commercial / retail use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.4.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP will be subject to a 45-day public comment period to determine if the community had comments on the presented remedial alternatives and selected remedy. If no comments were received regarding Alternative 1, it is considered to be acceptable to the community.

3.5 REMEDIAL ALTERNATIVE 2

The following sections provide an evaluation of Alternative 2 based on the nine evaluation criteria as previously discussed.

3.5.1 Overall Protection of Human Health and the Environment

Alternative 2 will be protective of human health and the environment by excavating 2-4 ft of soil as necessary for the new building construction, capping the Site with the concrete building slab, asphalt parking areas and two feet of clean in exposed soil (landscaped) areas, and installing a subslab depressurization system beneath the occupied areas of the new building.

The potential for human and environmental exposure to metals and SVOCs in fill materials on-site will be eliminated by excavation of all soils with parameters in excess of restricted residential criteria to a depth of 2 feet, disposing of excavated materials off-site and backfilling as needed with certified clean fill, virgin mined materials or recycled concrete materials from a NYSDEC permitted recycling facility.

Potential post-remediation exposures to on-site residents from soil vapors would be addressed through the use of a vapor barrier and an SSD system beneath the building slab. Groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity, workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

3.5.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 2 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to restricted residential cleanup levels for the top 2 feet. SCGs for groundwater will not be achieved by this Alternative as impacted groundwater is migrating onto the Site from an off-Site source.. Compliance with SCGs for soil vapor is expected following completion of the remedial action and installation of the SSD Systems.

3.5.3 Long-term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants above restricted residential objectives to a depth of 2 feet. Under this Alternative risk from soil impacts is eliminated for on-site residents. Alternative 2 will continue to meet RAOs for soil in the future, providing a permanent long-term solution for the Site.

3.5.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting restricted residential objectives in the upper two feet of soil.

3.5.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination

procedures of equipment, including trucks transporting soil to off-site disposal facilities will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.5.6 Implementability

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

3.5.7 Cost

Costs associated with Alternative 2 are estimated at $876,285. This cost estimate includes the following elements and assumptions:

- Removal of suspect underground storage tank(s) on Lot 14;
- Excavate the entire Site to a depth of 2 ft below grade;
- Excavate remainder of the Site an additional 2 ft as per the foundation plans for the new buildings.
- Disposal of approximately 6,709 tons of historic fill soil as non-hazardous;
- Backfilling 875 cy of certified clean fill in the parking area and landscaped areas of the Site;
- Capping the Site with the concrete building slab, asphalt parking areas and two feet of clean fill in exposed soil areas;
- Perform Chemical oxidant injections near the upgradient property line;
- Installation and operation of a Sub Slab Depressurization System (SSDS) beneath all occupied areas of the new buildings;
- HASP and CAMP monitoring for the duration of the remedial activities.

3.5.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current C6-3D residential / commercial zoning Following remediation the Site will meet restricted residential use objectives

which is appropriate for its planned multi-tenant residential use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.5.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP will be subject to a 45-day public comment period to determine if the community had any comments on the presented remedial alternatives and selected remedy. If no comments are received, it is considered to be acceptable to the community.

3.6 SELECTION OF THE PREFERRED REMEDY

The remedy recommended for the site is a Track 4 alternative (Alternative 2) which consists of chemical oxidation to treat contaminated groundwater, the removal of 2 feet of soil from the entire Site with an additional 2 feet beneath the building areas, backfilling the parking area and landscaped area with certified clean fill and installation and operation of SSD systems beneath the occupied portions of the planned buildings.

Any backfill materials used at the site will either consist of clean native soil excavated from other areas of the site, virgin mined materials, recycled materials or certified fill which meets restricted residential SCOs.

3.6.1 Preferred Remedy Land Use Factor Evaluation

As required by Article 27, Title 14 of the Environmental Conservation Law 27-1415, the following land use factor evaluation examines whether the preferred alternative is acceptable based on the 14 criteria presented in the following subsections.

Zoning

The proposed redevelopment project, which includes the construction of 6-7 story mixed use residential / commercial-retail building is in compliance with the R6 / C2-2 residential / commercial zoning. Therefore the project will be constructed as-of-right regardless of the remedy implemented. The preferred remedy will comply with current zoning.

Applicable Comprehensive Community Master Plans or Land Use Plans

The proposed redevelopment project and selected remedy are consistent with comprehensive master and land use plans, specifically the Rockaway Neighborhoods rezoning action (CEQR No. 08DCP065Q). This area-wide comprehensive re-zoning was completed by the New York City Department of City Planning and adopted by the City Council in August 2008. The preferred remedy will be in full compliance with this applicable land use plan.

Surrounding Property Uses

The land use in the immediate vicinity of the Site includes residential apartment buildings (southwest), an elevated rail line (NYCMTA A-Line) and vacant blocks to the south, duplex style residential homes to the west, a shopping center and athletic fields to the north, and residential town house homes to the east.

The proposed remedy will not interfere with surrounding property uses and considers the short term affects to neighboring residences.

Citizen Participation

Citizen participation for implementation of the preferred alternative will be performed in accordance with DER 23 and NYCRR Part 375-1.10 and Part 375-3.10. A Citizen Participation Plan has been prepared and is available for public review at the identified document repositories (NYSDEC Region 2 Office, Far Rockaway Branch of the Queens Public Library).

Environmental Justice Concerns

The Site is located within a potential environmental justice area. The NYSDEC defines a potential environmental justice area as a "minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies".

Environmental justice means the fair treatment and meaningful involvement of all people regardless of race, color, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group

of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Since the goal of the remedy will remove contaminated materials from the community and be protective of public health, the remedy poses no environmental justice concerns.

Land use designations

The proposed remedy is consistent with land-use designations.

Population growth patterns

Population growth patterns support the proposed use for the Site. The preferred remedy will not negatively affect population growth patterns.

Accessibility to existing infrastructure

The Site is accessible to existing infrastructure. The close proximity of the Site to Seagirt Boulevard and the Nassau Expressway will assist soil transportation and contractor access to the Site. The Site is also accessible to mass transit and is within walking distance to the A line which has a subway stop on Rockaway Freeway and Beach 36th Street approximately two blocks to the west. The preferred remedy will not alter accessibility to existing infrastructure.

Proximity to cultural resources

The proposed remedy will not negatively impact cultural resources.

Proximity to natural resources

The proposed remedy will improve the local environment and will not negatively impact affect natural resources.

Off-Site groundwater impacts

The proposed remedy will not affect groundwater and will not affect natural resources.

Proximity to floodplains

The entire Site is located within a moderate risk flood zone. A portion of Lot 24 is also located within a high risk flood.

Geography and geology of the Site

The selected remedy will excavate soil from the Site to a depth of 2 feet. Redevelopment will also remove an additional 2 feet of soil for the foundations of the new building. The selected alternative and development of the site have considered the geography and geology of the Site.

Current Institutional Controls

There are no institutional controls which currently apply to the Site. The proposed remedy will require an institutional control in the form of an environmental easement to restrict the future use of the site to Restricted Residential use.

3.7 SUMMARY OF SELECTED REMEDIAL ACTIONS

The remedy recommended for the site is a Track 4 alternative (Alternative 2) which consists of the removal of the top 2 feet of soil from the Site with the excavation of an additional 2 feet of soil beneath the planned building areas, removal of any hazardous lead-impacted and grossly contaminated soil and installation of a site cap and installation of SSD systems beneath the occupied portions of the new building. All fill material excavated will be removed from the Site and properly disposed of at an off-site facility. The remedy will include the following items:

1. Removal of underground storage tanks (USTs) from Lot 14, and the remediation of any grossly contaminated soil and groundwater resulting from leakage of the UST,;
2. Excavation of soil/fill as needed for the construction of the new buildings foundation to a minimum depth of 2 feet below grade. ;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 4 Restricted Residential Use SCOs;

5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
6. Import of materials to be used for backfill and cover in compliance with Appendix 5 of DER-10: (1) chemical limits and other specifications included in **Table 1A**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. Perform in-situ chemical oxidation (ISCO) to treat CVOCs in soil and groundwater at the eastern property line;
8. All future on-site buildings constructed at the Site will have a subslab depressurization systems (SSDS), or similar engineered system to prevent the migration of vapors into the buildings.
9. A site cover will be constructed to allow for restricted residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable SCOs. Where the soil cover is required, it will be a minimum of two feet of soil meeting the SCOs in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer;
10. Implementation of a Site Management Plan (SMP) for long term maintenance of the Institutional and Engineering Controls.
11. An Environmental Easement will be filed against the Site to ensure implementation of the SMP.

All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. All deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the FER.

4.0 REMEDIAL ACTION PROGRAM

The objective of this section of the Remedial Action Work Plan, is to present a scope of work which will be approved by NYSDEC and when completely implemented will ready the BCP site for development under the Contemplated Use consistent with the requirements of the Brownfield Cleanup Program.

4.1 GOVERNING DOCUMENTS

Governing documents and procedures included in the Remedial Work Plan include a Site-specific Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP), a Citizen Participation Plan, a Site Management Plan (SMP), a Quality Assurance Project Plan (QAPP), fluid management procedures, and contractors' site operations and quality control procedures. Highlights of these documents and procedures are provided in the following sections.

4.1.1 Health & Safety Plan (HASP)

Contractors and subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, the Remedial Engineer will insure that it meets the minimum requirements as detailed in the site-specific HASP prepared for the Site.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. Modifications to the HASP may be made with the approval of the Remedial Engineer (RE), Site Safety Manager (SSM) and/or Project Manager (PM).

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an

appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Coordinator will be Ms. Chawinie Miller. Her resume is provided in **Attachment F**. Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses. A copy of the Site Specific Health and Safety Plan is provided in **Attachment B.**

4.1.2 Quality Assurance Project Plan (QAPP)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or a cold-pak(s) to maintain a temperature of 4^{o}C.

Dedicated disposable sampling materials will be used for both soil and groundwater samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by poring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory. Laboratory reports will be upgradeable to ASP category B deliverables for use in the preparation of a data usability report (DUSR). The QAPP for the Site is provided in **Attachment C**.

4.1.3 Construction Quality Assurance Plan (CQAP)

All construction work related to the remedy (i.e. soil excavation) will be monitored by EBC field personnel under the direct supervision of the Remedial Engineer. Monitoring during soil excavation will be performed to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been specifically developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health.

All intrusive and soil disturbance activities will be monitored by a qualified environmental professional (QEP) under the direct supervision of the Remedial Engineer who will record observations in the site field book and complete a photographic log of the daily activities. The QEP will provide daily updates to the Project Manager and Remedial Engineer who will both make periodic visits to the site as needed to assure construction quality.

4.1.4 Soil/Materials Management Plan (SoMP)

A SoMP has been prepared for excavation, handling, storage, transport and disposal of all soils/materials that are disturbed / excavated at the Site. The SoMP includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The SoMP is presented in Section 5.4.

4.1.5 Erosion and Sediment Control Plan (ESCP)

Erosion and sediment controls will be performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Typical measures that will be utilized at various stages of the project to limit the potential for erosion and migration of soil include the use of hay bales, temporary stabilized construction entrances/exits, placement of silt fencing and/or hay bales around soil stockpiles, and dust control measures.

4.1.6 Community Air Monitoring Plan (CAMP)

The CAMP provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals and locations of ventilation system intakes for nearby structures (i.e apartment buildings) at the downwind location.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air.

The primary concerns for this site are vapors, nuisance odors and dust particulates. The CAMP prepared for implementation of the RAWP is provided in **Attachment D**.

4.1.7 Contractors Site Operations Plan (SOP)

The Remedial Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they are in compliance with this RAWP. The Remedial Engineer is responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.8 Citizen Participation Plan (CPP)

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing. The approved Citizen Participation Plan for this project is provided in **Attachment E**.

Document repositories have been established at the following locations and contain all applicable project documents:

Queens Public Library - Far Rockaway Branch
1637 Central Avenue
Far Rockaway, NY 11691
(718) 327-2549

Hours:
Mon 9:00 AM - 8:00 PM
Tue 1:00 PM - 6:00 PM

Wed 10:00 AM - 6:00 PM

Thu 12:00 PM - 8:00 PM

Fri 10:00 AM - 6:00 PM

Sat 10:00 AM - 5:30 PM

Sun closed

4.2 GENERAL REMEDIAL ACTION INFORMATION

4.2.1 Project Organization

The Project Manager for the Remedial Activity will be Mr. Robert Bennett. Overall responsibility for the BCP project will be Mr. Charles B. Sosik, P.G., P.HG. The Remedial Engineer for this project is Mr. Ariel Czemerinski, P.E. Resumes of key personnel involved in the Remedial Action are included in **Attachment F**.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Mr. Ariel Czemerinski, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site. The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will review all pre-remedial plans submitted by contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal, and will certify compliance in the Final Remediation Report. The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

4.2.3 Remedial Action Schedule

The remedial action will begin with mobilization of equipment and material to the Site, which will begin approximately 2 weeks following RAWP approval and issuance of the building permit, and within 10 days of the distribution of the remedial construction Fact Sheet. A pre-construction meeting will be held among NYSDEC, the Remedial Engineer, and the selected remedial contractor prior to site mobilization. Mobilization will be followed by soil removal and disposal and confirmation sampling. The work is expected to take 8 weeks as part of the construction excavation and foundation installation. In accordance with 6 NYCRR 375-1.6(a)(4), NYSDEC shall be notified at least 7 days in advance of, and be allowed to attend, any field activities to be conducted under a NYSDEC approved work plan, as well as any pre-bid meetings, job progress meetings, substantial completion meeting and inspection, and final inspection and meeting.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Applicant of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

A construction fence will be erected around the entire property as required by the NYC Department of Buildings. The fence will be maintained as required and secured at the end of each work day.

4.2.6 Traffic Control

The Volunteer's construction management personnel will direct the arrival or departure of construction vehicles, and provide flag services as needed to maintain safe travel exiting the Site onto Rockaway Freeway (west bound) and entering the Site from Beach Channel Drive. Traffic related to on-going remedial activity will require the staging of 10-wheel dump trucks along Beach Channel Drive and Seagirt Boulevard on a daily basis during soil excavation activity. The soil disposal transport route will be as follows:

- ENTERING SITE - from the Van Wyck Expressway (I-678) heading south; take exit 1 to Nassau Expressway (878) East. Continue east and then south on the Nassau Expressway to the Seagirt Blvd. exit (last exit before toll). Head west on Seagirt Blvd. to Beach 34th Street. Turn right on Beach 34th Street heading north and take the first right on Far Rockaway Blvd to the Site Entrance on the right.

- EXITING SITE – Turn right onto Rockaway Freeway heading west to Seagirt Blvd. Turn left on to Seagirt Blvd. heading east to the merge with Nassau Expressway (878). Head north on the Nassau Expressway to the Van Wyck Expressway (I-678) heading north.

A map showing the truck routes is included as **Figure 9**.

4.2.7 Worker Training and Monitoring

An excavation contractor will remove historic fill and uncontaminated soil. The excavation contractor's on-site personnel will have a minimum of 24 hour Hazardous Waste Operations and Emergency Response Operations training.

All field personnel involved in remedial activities will participate in training, if required, under 29 CFR 1910.120, including 24 and 40-hour hazardous waste operator training and annual 8-hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment.

All on-site personnel engaged in remedial or sampling activities must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.

- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

4.2.8 Agency Approvals

The Applicant has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in **Table 8**. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Remediation Report.

4.2.9 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New York State

Brownfield Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager and contained in **Attachment G**.

4.2.10 Pre-Construction Meeting with NYSDEC

A pre-construction meeting with the Project Manager, Remedial Engineer, Construction Manager, Owner's Representative and the NYSDEC will take place prior to the start of major construction activities.

4.2.11 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in **Table 9**. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.12 Remedial Action Costs

The total estimated cost of the Remedial Action is $ 970,872. An itemized and detailed summary of estimated costs for all remedial activity is attached as **Attachment H**. This will be revised based on actual costs and submitted as an Appendix to the Final Remediation Report.

4.3 SITE PREPARATION

4.3.1 Mobilization

Mobilization will include the delivery of construction equipment and materials to the site. All construction personnel will receive site orientation and training in accordance with the site specific HASP, CAMP and established policies and procedures to be followed during the implementation of the RAWP. The remediation contractor, construction manager and all associated subcontractors will each receive a copy of the RAWP and the site specific HASP and will be briefed on their contents.

4.3.2 Erosion and Sedimentation Controls

Soil erosion and sediment control measures for management of storm water will be installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control. Haybales

and/or silt fence will be placed by the remedial contractor at locations surrounding excavation areas and within the perimeter fencing as needed, to control stormwater runoff and surface water from exiting the excavation. These control measures will be installed prior to initiating the soil excavation.

4.3.3 Stabilized Construction Entrance(s)

Stabilized construction entrances will be installed at all points of vehicle ingress and egress to the Site. The stabilized entrances will be constructed of a 4 to 6-inch bed of crushed stone or crushed concrete which will be sloped back toward the interior of the Site. The stabilized entrances will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

4.3.4 Utility Marker and Easements Layout

The Applicant and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Applicant and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

4.3.5 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities including excavation is the sole responsibility of the Applicant and its contractors. The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Applicant and its contractors must obtain any local, State or

Federal permits or approvals that may be required to perform work under this Plan. Further, the Applicant and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

4.3.6 Equipment and Material Staging

All equipment and work materials will be staged on-Site in areas as designated by the General Contractor, and / or Construction Site Superintendant.

4.3.7 Decontamination Area

A temporary truck decontamination pad will be constructed to decontaminate trucks and other vehicles/equipment leaving the Site. The pad will be constructed by placing a stone aggregate such as crushed rock or RCA. The pad will be bermed at the sides and sloped back to the interior of the Site. The truck pad will be sized to accommodate the largest construction vehicle used and located in line with the stabilized construction entrance.

4.3.8 Site Fencing

A chain link fence currently surrounds the property with entrance / exit gates located on Rockaway Freeway and Far Rockaway Blvd. This fence will be properly secured at the end of the day and supplemented, as needed, by installing orange safety fencing around open excavations to ensure on-site worker safety.

4.3.9 Demobilization

Demobilization will consist of the restoration of material staging areas and the disposal of materials and/or general refuse in accordance with acceptable rules and regulations. Materials used in remedial activities will be removed and disposed properly. All equipment will be decontaminated prior to leaving the Site.

4.4 REPORTING

All daily and monthly Reports will be included in the Final Engineering Report.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day in which remedial activity takes place. Daily reports will include:

- An update of progress made during the reporting day;
- Quantities of oxidant material applied at specific injection locations of the Site;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

4.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,

- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

4.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the Final Engineering Report.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions including noise, odor, truck traffic etc., will be recorded in the Site field book and reported to the NYSDEC via email on the same day as the complaint is received.

4.4.5 Deviations from the Remedial Action Work Plan

Minor deviations from the RAWP will be identified in the daily update report and will be noted in the Final Engineering Report. When deviations are reported a brief discussion will be provided which will state the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy.

Major changes to the scope of work must be discussed with the NYSDEC and the NYSDOH prior to implementation. If the changes are considered to be significant enough, an addendum to the RAWP Work Plan will be prepared and submitted to NYSDEC / NYSDOH for review.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Excavation work includes the following; the removal and off-Site disposal of the top 2 feet of the Site as historic fill material with an additional 2 feet excavated for construction of the proposed building's foundation (4,473 cubic yards). Soil excavation will be performed using conventional equipment such as track-mounted excavators, backhoes and loaders.

All excavation work will be performed in accordance with the Site-specific HASP and CAMP. Removal of the historic fill soil will be performed by the excavation contractor using trained personnel (24HR OSHA HAZWOPER). If an underground storage tank (UST) is discovered during excavation the NYSDEC Project Manager will be immediately notified and the UST removed and closed in accordance with DER-10, NYSDEC PBS regulations and NYC Fire Department regulations. It is anticipated that the excavation of historic fill materials and native soils will be performed by the excavation contractor for the construction project.

Historic fill materials will be excavated to a depth of approximately 2 feet throughout the Site or as needed to achieve SCOs. Excavation for the new building's foundation will continue to a depth of approximately 4 feet below grade. An excavation plan showing the excavation depths to achieve the Track 4 remedy is provided in **Figure 10**.

Dewatering is not anticipated for the excavation of contaminated areas or for foundation construction.

5.1 CONTINGENCY - UST REMOVAL METHODS

A UST, which is believed to remain in the northwestern corner of Lot 14, along with any unknown USTs which may be encountered, will be removed in accordance with the procedures described under the NYSDEC Memorandum for the Permanent Abandonment of Petroleum Storage Tanks and Section 5.5 of Draft DER-10 as follows:

- Remove all product to its lowest draw-off point
- Drain and flush piping into the tank

- Vacuum out the tank bottom consisting of water product and sludge
- Dig down to the top of the tank and expose the upper half of the tank
- Remove the fill tube and disconnect the fill, gauge, product and vent lines and pumps. Cap and plug open ends of lines
- Temporarily plug all tank openings, complete the excavation, remove the tank and place it in a secure location
- Render the tank safe and check the tank atmosphere to ensure that petroleum vapors have been satisfactorily purged from the tank
- Clean tank or remove to a storage yard for cleaning
- If the tank is to be moved it must be transported by licensed waste transported. Plug and cap all holes prior to transport leaving a 1/8 inch vent hole located at the top of the tank during transport
- After cleaning the tank must be made acceptable for disposal at a scrap yard cleaning the tank interior with a high pressure rinse and cutting the tank in several pieces.

During the tank and pipe line removal the following field observations should be made and recorded:

- A description and photographic documentation of the tank and pipe line condition (pitting, holes, staining, leak points, evidence of repairs, etc.)
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.)
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

5.2 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site are listed in **Table 1**. **Table 5** summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. A spider map showing all soil samples that exceed the SCOs proposed for this Remedial Action is provided as **Figure 6**.

5.3 REMEDIAL PERFORMANCE EVALUATION (POST EXCAVATION END-POINT SAMPLING)

Post excavation (endpoint) soil samples will be collected from across the Site following the soil removal to verify that remedial goals have been achieved. Endpoint soil samples will be collected from the Site as follows:

Site-wide endpoint soil samples will be collected following removal of all soil needed for construction of the buildings foundation to verify that remedial goals have been achieved (**Figure 11**). The Site-wide endpoint soil samples will be analyzed for those parameters which were previously reported above Restricted Residential SCOs in the top 5 feet of soil including SVOCs (PAHs) and metals. The collection of sidewall endpoint soil samples will be not be performed because excavation will proceed to the Site boundaries resulting in only off-Site areas in which to collect the sidewall soil samples.

5.3.1 End-Point Sampling Frequency

Endpoint sampling frequency will be in accordance with DER-10 section 5.4 which recommends the collection of one bottom sample per 900 sf of bottom area and one sidewall sample per 30 liner feet. Sidewall samples will not be collected if the excavation extends to the Site boundaries.

5.3.2 Methodology

Collected samples be placed in glass jars supplied by the analytical laboratory and stored in a cooler with ice to maintain a temperature of 4 degrees C. Samples will either be picked up at the Site by a laboratory dispatched courier at the end of the day or transported back to the AMC or EBC office where they will be picked up the following day by the laboratory courier. All samples will be analyzed by a NYSDOH ELAP certified environmental laboratory. All post excavation (endpoint) soil samples will be analyzed for SVOCs by EPA method 8270 (PAHs) and TAL metals.

5.3.3 Reporting of Results

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data

usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format.

5.3.4 QA/QC

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of 4^{o}C.

Dedicated disposable sampling materials will be used for soil samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory.

5.3.5 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RAWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in

Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RAWP will be included in the final Engineering Report.

5.3.6 Reporting of End-Point Data in FER

All endpoint data collected as part of this remedial action will be summarized and presented in the Final Engineering Report. The summary tables will include comparison of results to Restricted Residential SCOs to verify attainment of Track 4. Laboratory reports and the DUSR will be included as an appendix in the FER.

5.4 ESTIMATED MATERIAL REMOVAL QUANTITIES

An estimated 4,473 cubic yards (6,709.5 tons) of historic fill material will be generated by excavating the Site to a depth of 2 feet with an additional 2 feet excavated for construction of the building foundations.

5.5 SOIL/MATERIALS MANAGEMENT PLAN

5.5.1 Excavation Historic Fill Materials

Historic fill material has been identified across the Site to depths as great as 4 feet below grade. The historic fill material contains several metals above unrestricted Use SCOs. Historic fill material will be segregated from non-contaminated native soils and disposed of off-Site at a permitted disposal facility. Excavated historic fill materials will be secured and temporarily stored on-Site until arrangements can be made for off-Site disposal. As an alternative, pre-characterization samples may be collected to allow the soil to be loaded directly on to trucks for transport to the disposal facility. The historic fill material has been classified as a non-hazardous material. It is anticipated that the excavation of historic fill material will be performed by the excavation contractor for the construction project.

The final determination on classification will be based on the results of waste characterization analysis and the NYSDEC.

Soil excavation will be performed in accordance with the procedures described under Section 5.5 of DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined by the Remedial Engineer or his designee, and will depend on the horizontal and vertical extent of contaminated soils as identified through physical examination (PID response, odor, staining, etc.). The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the HASP;

- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated;

- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile or dispose of separate from the impacted soil;

- If USTs are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued removal of overburden to access the top of the structure or continued trenching around the perimeter to minimize its disturbance;

- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc), an attempt will be made to remove it to the extent not limited by the site boundaries. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separate dedicated plastic

sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present;

- Excavated soils which are temporarily stockpiled on-site will be covered with 6-mil polyethylene sheeting while disposal options are determined. Sheeting will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property;

- Once the Remedial Engineer is satisfied with the removal effort, verification or confirmatory samples will be collected from the excavation as described in **Section 6.2** of this document.

5.5.2 Excavation of Native Soils

Native soils are present directly below the fill materials and may require excavation for basement areas and foundation components during construction of the new buildings. Since excavation of the basement areas will begin following removal of historic fill, it is expected that native soils will not be contaminated. However, if evidence of contamination is discovered during the excavation of foundation areas, the contamination will be removed to the extent possible and segregated from clean native soils for proper disposal. Clean native soils will be stockpiled on-site and characterized for reuse on-site in areas over excavated to remove historic fill. Any excess soil will be disposed of off-site as a beneficial re-use material upon approval by the NYSDEC Region 2's Division of Materials Management. Clean native soils utilized on-site will be subject to a testing program to verify that they meet unrestricted SCOs prior to use.

It is anticipated that the excavation of native soil materials will be performed by the excavation contractor for the construction project.

5.5.3 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the Final Engineering Report.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

5.5.4 Stockpile Methods

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.

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. Hay bales will be used as needed near catch basins, surface waters and other discharge points. Water will be available on-site at suitable supply and pressure for use in dust control.

5.5.5 Materials Excavation and Load Out

The Remedial Engineer or a QEP under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

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).

Where effective, the equipment will be "dry" decontaminated using a broom and/or brushes. If significant amounts of soil or other contaminants remain after the dry decontamination, the equipment will also be pressure washed before leaving the Site. The QEP will be responsible for ensuring that all outbound trucks are dry-brushed or washed on the truck wash/equipment pad before leaving the Site until the remedial construction is complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking. The QEP will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill material and contaminated soil on-Site is prohibited. All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be located and shown on maps to be reported in the Final Engineering Report.

5.5.6 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.

Truck transport routes are as follows:

- ENTERING SITE - from the Van Wyck Expressway (I-678) heading south; take exit 1 to Nassau Expressway (878) East. Continue east and then south on the Nassau Expressway to the Seagirt Blvd. exit (last exit before toll). Head west on Seagirt Blvd. to Beach 34th Street. Turn right on Beach 34th Street heading north and take the first right on Far Rockaway Blvd to the Site Entrance on the right.

- EXITING SITE – Turn right onto Rockaway Freeway heading west to Seagirt Blvd. Turn left on to Seagirt Blvd. heading east to the merge with Nassau Expressway (878). Head north on the Nassau Expressway to the Van Wyck Expressway (I-678) heading north.

These routes are shown in **Figure 9**.

These are the most appropriate routes to and from the Site and 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; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside 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. Material transported by trucks exiting the Site will be secured with tight-fitting covers. If loads contain wet material capable of producing free liquid, truck liners will be used. All trucks will be inspected, dry-brushed and / or, as needed, before leaving the site.

5.5.7 Materials Disposal Off-Site

Multiple disposal facility designations may be employed for the materials removed from the Site. Once final arrangements have been made, the disposal location(s) will be reported to the NYSDEC Project Manager.

The total quantity of material expected to be disposed off-Site is 4,473 cubic yards of historic fill material.

Non-hazardous historic fill material and contaminated soil (if encountered) taken off-Site will be handled, at a minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill material and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Materials Management (DMM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DMM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

Soil classified as non-hazardous fill will be transported under a non-hazardous waste manifest obtained from the selected disposal facility. The multi-part manifest will be filled out for each load of soil shipped off of the Site. At a minimum, the following information will be recorded on each manifest:

1) Generator's Name, Address, and Phone Number
2) Destination Facility Name, Address and Phone Number
3) Transporter Name, Address, Phone Number, License Plate Number, Driver Name, and SW Haulers Permit #
4) Signatures – Generator or an authorized agent for the generator shall print, sign, and date each non-hazardous material manifest after each truck is loaded. The transporter shall then sign and date noting time material was picked up at the site. Both the transporter and a representative of the disposal facility will sign the non-hazardous material manifest when the material has been delivered to disposal facility.

A copy of the manifest will be retained by AMC on-Site personnel for each shipment. Final signed manifests will be forwarded by the disposal facility to the generator. Copies of the final manifests will be presented in the FER.

Scale Tickets

All trucks to be utilized for transport of hazardous or non-hazardous contaminated soil shall be weighed before and after unloading at the disposal facility. Disposal facilities must provide truck scales capable of generating load tickets measured in tons. The tonnage transported and disposed will be determined by the disposal facility and reported on a certified scale ticket which will be attached to each returned manifest. Weights will be reported on the certified scale ticket as Tare and Gross weights.

Clean Soil Disposal

Clean native soil removed from the Site for development purposes (i.e. foundation, footings, etc.) will be handled as unregulated or beneficial use disposal. This soil will undergo a testing program to confirm that it meets Unrestricted Use SCOs or Residential / Groundwater Protection SCOs prior to unregulated disposal or meets Restricted Residential Use SCOs from Appendix 5

in DER10 (Table 1A) prior to reuse on-Site. Confirmation testing of clean soils will be in accordance with DER-10 Section 5.4(e)(10) as follows:

Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	Each composite sample for analysis is created from 3-5 discrete samples from representative locations in the fill.
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 DER		

Uncontaminated native soil confirmed by the above testing program and removed from the site, will be disposed of as unregulated C&D material or sent to a beneficial re-use facility. The final destination of soils whether classified as contaminated or uncontaminated must be approved by the NYSDEC.

Concrete demolition material generated on the Site from building slabs, parking areas and other structures will be segregated, sized and shipped to a concrete recycling facility upon approval by the NYSDEC's Division of Materials Management for Region 2. Concrete crushing or processing on-Site is prohibited. Asphalt removed from the parking areas will be sent to a separate recycling facility.

Additionally, it is common to encounter scrap metals and large boulders (greater than one foot in diameter) during excavation which may not be accepted by either the licensed disposal facility or the C&D facility. These materials will be segregated and subsequently recycled at local facilities. Uncontaminated metal objects will be taken to a local scrap metal facility.

Bricks and other C&D material are also not accepted by most soil disposal facilities if present at greater then 5% by volume. This material, if encountered, will be sent to a C&D landfill or other

C&D processing facility if approved by the DEC. C&D material of this type is most often encountered on sites in which former basement structures have been filled in with material from demolishing a former building. There was no evidence of former basement areas identified during previous investigations performed at the Site.

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the Final Engineering Report. Documentation for materials disposed of at recycling facilities (such as metal, concrete, asphalt) and as non-regulated C&D will include transport tickets for each load stating the origin of the material, the destination of the material and the quantity transported.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

5.5.8 Materials Reuse On-Site

Re-use of on-Site clean native soil will be in compliance with DER-10 Section 5.4(e) and only be allowed if the material is found to meet Restricted Residential Use SCOs (DER-10 Appendix 5) through the verification testing program detailed above. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos. Concrete crushing or processing on-Site is prohibited. Contaminated on-Site material, including historic fill material and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

5.5.9 Fluids Management

As the depth to groundwater at the site is approximately 5 feet below the planned excavation depth, dewatering operations may be employed during construction. If dewatering from the accumulation of precipitation, surface runoff or groundwater becomes necessary, dewatering fluids will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site. Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

5.5.10 Backfill from Off-Site Sources

Off-site fill material may be needed to stabilize the entrance - exit areas of the Site, for temporary driveways for loading trucks and as an underlayment to structural components of the new buildings including slabs and footings. Recycled Concrete Aggregate (RCA) derived from recognizable and uncontaminated concrete and supplied by facilities permitted by, and in full

compliance with Part 360-16 and DSNY regulations, is an acceptable form of backfill material. The Remedial Engineer is responsible for ensuring that the facility is compliant with the registration and permitting requirements of 6 NYCRR Part 360 and DSNY regulations at the time the RCA is acquired. RCA imported from compliant facilities does not require additional testing unless required by NYS DEC and DSNY under its terms of operations for the facility. Documentation of part 360-16 and DSNY compliance must be provided to the Remedial Engineer before the RCA is transported to the Site.

Fill material may also consist of virgin mined sand, gravel or stone products. Materials from a virgin mined source may be imported to the Site without testing provided that that the material meets the specifications of the geotechnical engineer, Remedial Engineer, and Redevelopment Construction Documents and that the source of the material is approved by the Remediation Engineer and the NYSDEC Project Manager.

The source approval process will require a review of the following information:

- The origin of the material;
- The address of the facility which mines/processes the material;
- A letter from the facility stating that the material to be delivered to the site is a virgin mined material and that it has not been co-mingled with other materials during processing or stockpiling.

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with the provisions in DER-10 Section 5.4(e) and this RAWP prior to receipt at the Site. Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The Final Engineering Report will include the following certification by the Remedial Engineer: “I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan”.

Under no circumstances will fill materials be imported to the site without prior approval from the NYSDEC Project Manager. If sufficient documentation is not obtained, fill materials will be tested at a frequency consistent with that as specified in Table 4 of NYSDEC CP-51 Soil Cleanup Guidance Policy. Soils 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.

5.5.11 Stormwater Pollution Prevention

Barriers such as silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area to prevent the surface runoff of sediments off-site. All on-site drainage structures such as surface drains, catch basins etc. connected to the municipal sewer system will be similarly protected with barriers to prevent sediments from entering the structure.

Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Barriers will be inspected once a week and after every storm event. 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 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.

5.5.12 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for TCL volatiles and semi-volatiles (STARS parameters). Analyses will not be otherwise limited without NYSDEC approval.

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. These findings will be also included in daily and periodic electronic media reports.

5.5.13 Community Air Monitoring Plan

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at construction sites.

The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are odors associated with groundwater purging and sampling.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report. The complete CAMP developed for this site is included in **Attachment D** or this Work Plan.

5.5.14 Odor, Dust and Nuisance Control Plan

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

5.5.14.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site. If nuisance odors are identified, 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 all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the

Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (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.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

5.5.14.2 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:

- Dust suppression will be achieved though spraying water directly onto off-road areas including excavations and stockpiles.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water application.

5.5.14.3 Nuisance Control Plan

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 has been developed and utilized by the contractor for all remedial work and conforms, to NYCDEP noise control standards.

6.0 REMEDIAL ACTION: GROUNDWATER TREATMENT

6.1 CHEMICAL OXIDANT INJECTION PLAN

To address residual solvent mass in soil and groundwater, a chemical oxidant (sodium permanganate) will be injected within the impacted soil zone along the eastern property line (see **Figure 13**). Injections will be completed using probe drilling equipment and tooling by driving an injection tool to the target depth and injecting the permanganate solution under pressure while slowly retracting the tool string.

Sodium permanganate will be delivered to the site as a 40% solution in 55 gallon poly drums and mixed with water onsite to create a 12% solution by weight. The initial application will consist of approximately 11,468 pounds (1,006 gallons) of oxidant diluted with 3,832 gallons of water. The injections will be completed within an 80 ft strip located near the eastern property line and covering the two areas with residual contamination.

To calculate the overall oxidant demand in pounds of permanganate, this area was divided into two 20 ft x 40 ft treatment zones. Zone 1 covers the area in the vicinity of RIB10 and Zone 2 covers the area near RIB2. The estimate of contaminant mass for each parameter in soil was performed by assigning the average concentration for each parameter reported in soil at each of the two boring locations (RIB2, RIB10) during the RI. The total contaminant mass was then calculated by multiplying the area of the zone by the depth of impact, porosity and stoichiometric demand. The total contaminant demand to remediate the CVOCs within each zone was calculated at 7,071 pounds (620 gallons of 40% sodium permanganate) diluted with 2,363 gallons of water for Zone 1 and 4,397 pounds (385 gallons of 40% sodium permanganate) diluted with 1469 gallons of water for Zone 2.

Injections for Zone 1 will be performed from 20 to 35 feet below grade at 5 locations spaced 10 feet apart. Approximately 375 gallons of 12% solution will be injected at each location. Injections for Zone 2 will be performed from 15 to 30 feet below grade at 5 locations spaced 10 feet apart. Approximately 232 gallons of 12% solution will be injected at each location within this zone.

Following the injection, potassium permanganate cylinders will be emplaced at each location over the same 15 foot interval to allow a sustained release of permanganate over time. Chemical oxidant calculations and oxidant specifications are included in **Attachment I**.

6.2 REMEDIAL PERFORMANCE EVALUATION (POST TREATMENT SAMPLING)

Groundwater performance monitoring samples will be collected from three monitoring well locations, installed downgradient of the treatment area (see **Figure 13**).The monitoring wells will be constructed of 1-inch diameter pvc with a 15 ft 0.01-inch screened section from 15 to 30 feet below grade. The wells will be completed with a morie 00 filter pack to 1 foot above the screened section and a 2-foot hydrated bentonite pellet seal. The wells will be completed at the surface with a 5-inch bolt down manhole cover. If the wells are lost or damaged during construction activity they will be replaced.

Sample analysis will include the following parameters:

- VOCs by Method 8260C
- Field colorimetric evaluation

6.2.1 Methodology

A baseline round of sampling will be performed prior to initiating the oxidant application. During sampling One groundwater sample will be obtained from each monitoring well using a dedicated polyethylene tubing and a peristaltic pump. The sample will be drawn directly into pre-cleaned laboratory supplied glassware, stored in a cooler with ice. Samples will either be picked up at the Site by a laboratory dispatched courier at the end of the day or transported back to the EBC office where they will be picked up the following day by the laboratory courier. All samples will be analyzed by a NYSDOH ELAP certified environmental laboratory certified in the appropriate category. Groundwater samples will be submitted for analysis of VOCs by EPA method 8260C.

6.2.2 Reporting of Results

Sample analysis will be provided by a New York State ELAP certified environmental laboratory. Laboratory reports will include Analytical Systems Protocol July 2005 (ASP) category B data

deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format.

6.2.3 QA/QC

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be stored in the field in a cooler containing ice or cold-pak(s) to maintain a temperature of 4 degrees C. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of $4^{o}C$, +/- $2\ ^{o}C$.

Dedicated disposable sampling materials will be used for both groundwater samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory.

6.2.4 DUSR

The DUSR provides a thorough evaluation of analytical data with full third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RAWP will be reviewed and evaluated in accordance

with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RAWP will be included in the Final Engineering Report.

6.2.5 Reporting of Performance Data in FER

Chemical labs used for all performance monitoring and final post-remedial sampling analysis will be NYSDOH ELAP laboratory certified in the appropriate categories. The FER will provide a tabular and map summary of all performance monitoring and post-remedial sample results and exceedances of water quality standards.

7.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Since contaminated groundwater is expected to remain after the remedy is complete, an Institutional Control (IC) is required to protect human health and the environment. The IC is described hereafter. Long-term management of the IC will be executed under an Environmental Easement recorded with the NYC Department of Finance, Office of the City Register.

Engineering Controls (ECs) will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have the following EC systems:

1. Site Cover will be required to allow for restricted residential use of the Site. The cover will consist of the new building foundation, concrete capped rear parking area, and a demarcation barrier and 2 feet of certified clean soil/top soil in landscaped areas.

2. An active sub-slab depressurization system, and vapor barrier beneath all excavated areas of the proposed building.

The FER will report residual contamination on the Site in tabular and map form.

8.0 ENGINEERING CONTROLS

8.1 SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS)

An SSDS and vapor barrier were designed to be installed beneath the building slab in the occupied areas of the proposed building (see **Figure SSDS1 - Appendix J**). The SSDS will consist of a five venting zones (Zone 1- Zone 5) with each zone providing coverage of approximately 4,000 sf of slab area. This is consistent with USEPA sub-slab depressurization design guidance which recommends a separate vent loop for every 4,000 sf of slab area.

The horizontal vent line is constructed of a continuous loop of perforated 4-inch HDPE pipe. Fill material around the horizontal vent piping is virgin-mined, ½ inch to ¾ inch gravel. In each zone the horizontal pipe will extend to an adjacent utility chase-way where it will be piped individually to the roof via a 6-inch schedule 40 pvc line or cast iron line in accordance with the requirements of the NYC Fire Code. A radon type fan will be attached to each vent line on at the rood. The exhaust portion of the vent line will be located a minimum of 10 feet from windows and ventilation inlets and a minimum of 3 feet above the roof line. Each fan is/will be fitted with a pressure switch which will activate a visual and audible alarm if the fan stops operating.

A vapor barrier liner will be installed above the gravel layer and around the elevator shaft pit prior to pouring the replacement slab. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins, or equivalent. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner.

The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer’s recommendations and instructions.

A field inspector under the direct supervision of a professional engineer will inspect and photograph the vapor barrier at several critical stages before during and after the installation is

complete, to assure compliance with design specifications. Specifications for the vapor barrier and SSDS are included in **Appendix J**.

8.1.1 Criteria for Termination

The active SSDS will not be discontinued without written approval by the NYSDEC and NYSDOH. A proposal to discontinue use of the SSDS may be submitted by the property owner based on confirmatory data that justifies such a request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

8.2 SITE COVER SYSTEM

A site cover will be required to allow for restricted residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet (for restricted residential use) of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet (for restricted residential use) of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d). The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the soil cover system and underlying residual contamination are disturbed after the Remedial Action is complete. Maintenance of the soil cover system will be described in the Site Management Plan in the FER.

9.0 INSTITUTIONAL CONTROLS

Institutional Controls (ICs) will be incorporated into the remedy to render the overall Site remedy protective of public health and the environmental. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan (SMP).

A Site-Specific Environmental Easement will provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on the Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs.

The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

9.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than an Environmental Easement is required. If an Environmental Easement is needed following completion of the remedy an Environmental Easement approved by NYSDEC will be filed and recorded with the City of New York. The Environmental Easement (if needed) will be submitted as part of the Final Remediation Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the City of New York before the Certificate of Completion can

be issued by NYSDEC. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan (SMP), which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls which will be needed to support Engineering Controls are:

- Complete and submit to the NYSDEC 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 restricted residential, commercial and industrial uses 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 NYSDEC approved Site Management Plan.

9.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and

implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared 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.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. Initial periodic review will be no more than 18 months after issuance of the Certificate of Completion (COC).

The Site Management Plan in the Final Engineering Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site-wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately down-gradient of all volatile organic carbon remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.

No exclusions for handling of residual contaminated soils will be provided in the Site Management Plan (SMP). All handling of residual contaminated material will be subject to provisions contained in the SMP.

10.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) and request for a Certificate of Completion (COC) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The Final Engineering Report will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete Site Management Plan (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

The Final Engineering Report will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6 NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of

Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

10.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the Final Engineering Report in accordance with DER-10, section 1.5(b)4.. The certification will be signed by the Remedial Engineer [name] who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

11.0 SCHEDULE

A projected schedule for the remedial action will be developed prior to the start of construction, in accordance with DER-10, section 5.7. Also, in accordance with 6 NYCRR 375-1.6(a)(4), NYSDEC shall be notified at least 7 days in advance of, and be allowed to attend, any field activities to be conducted under a NYSDEC approved work plan, as well as any pre-bid meetings, job progress meetings, substantial completion meeting and inspection, and final inspection and meeting.

The remedial action will begin with mobilization of equipment and material to the Site which will begin approximately four weeks following RAWP approval and within 10 days of the distribution of the Construction Fact Sheet. Mobilization will be followed by removal and disposal of the lead hazardous impacted soil and historic fill material followed by confirmation sampling. The work is expected to take approximately two months as part of the construction excavation and foundation installation. The schedule of tasks completed under this RAWP is as follows:

Activity	**Date**
Conduct pre-construction meeting with NYSDEC	Within 4 weeks of RAWP approval
Mobilize equipment to the site and construct truck pad and other designated areas	Within 1 week following the pre-construction meeting and issuance of Pre-Construction Fact Sheet
Mobilize Excavation Contractor and equipment to the Site and begin excavation	Immediately following the pre-construction meeting, Duration - 1 week
Complete excavation and disposal of historic fill material and clean native soil.	Within 2 months of mobilization
Perform endpoint verification of entire site	Performed in sequence as final depth of each excavated area is complete.
Submit SMP	Approximately 90 days after completion of site work

TABLES

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
METALS							
Arsenic	7440-38 -2	16[f]	16[f]	16[f]	16[f]	13[f]	16[f]
Barium	7440-39 -3	350[f]	400	400	10,000 [d]	433	820
Beryllium	7440-41 -7	14	72	590	2,700	10	47
Cadmium	7440-43 -9	2.5[f]	4.3	9.3	60	4	7.5
Chromium, hexavalent [h]	18540-29-9	22	110	400	800	1[e]	19
Chromium, trivalent[h]	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50 -8	270	270	270	10,000 [d]	50	1,720
Total Cyanide [h]		27	27	27	10,000 [d]	NS	40
Lead	7439-92 -1	400	400	1,000	3,900	63[f]	450
Manganese	7439-96 -5	2,000[f]	2,000[f]	10,000 [d]	10,000 [d]	1600[f]	2,000[f]
Total Mercury		0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
Nickel	7440-02 -0	140	310	310	10,000 [d]	30	130
Selenium	7782-49 -2	36	180	1,500	6,800	3.9[f]	4[f]
Silver	7440-22 -4	36	180	1,500	6,800	2	8.3
Zinc	7440-66 -6	2200	10,000 [d]	10,000 [d]	10,000 [d]	109[f]	2,480
PESTICIDES / PCBs							
2,4,5-TP Acid (Silvex)	93-72-1	58	100[a]	500[b]	1,000[c]	NS	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 [e]	17
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 [e]	136
4,4'-DDD	72-54-8	2.6	13	92	180	0.0033 [e]	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04[g]	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71 -9	0.91	4.2	24	47	1.3	2.9
delta-BHC	319-86-8	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
Dibenzofuran	132-64-9	14	59	350	1,000[c]	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan II	33213-65-9	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan sulfate	1031-07 -8	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36 -3	1	1	1	25	1	3.2
SEMI-VOLATILES							
Acenaphthene	83-32-9	100[a]	100[a]	500[b]	1,000[c]	20	98
Acenapthylene	208-96-8	100[a]	100[a]	500[b]	1,000[c]	NS	107
Anthracene	120-12-7	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benz(a)anthracene	56-55-3	1[f]	1[f]	5.6	11	NS	1[f]
Benzo(a)pyrene	50-32-8	1[f]	1[f]	1[f]	1.1	2.6	22
Benzo(b) fluoranthene	205-99-2	1[f]	1[f]	5.6	11	NS	1.7
Benzo(g,h,i) perylene	191-24-2	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benzo(k) fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h) anthracene	53-70-3	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
Fluoranthene	206-44-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Fluorene	86-73-7	100[a]	100[a]	500[b]	1,000[c]	30	386
Indeno(1,2,3-cd) pyrene	193-39-5	0.5[f]	0.5[f]	5.6	11	NS	8.2
m-Cresol	108-39-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
Naphthalene	91-20-3	100[a]	100[a]	500[b]	1,000[c]	NS	12
o-Cresol	95-48-7	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
p-Cresol	106-44-5	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8[e]	0.8[e]
Phenanthrene	85-01-8	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Phenol	108-95-2	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
Pyrene	129-00-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
VOLATILES							
1,1,1-Trichloroethane	71-55-6	100[a]	100[a]	500[b]	1,000[c]	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33
1,2-Dichlorobenzene	95-50-1	100[a]	100[a]	500[b]	1,000[c]	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02[f]
cis-1,2-Dichloroethene	156-59-2	59	100[a]	500[b]	1,000[c]	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100[a]	100[a]	500[b]	1,000[c]	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1[e]	0.1[e]
Acetone	67-64-1	100[a]	100[b]	500[b]	1,000[c]	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100[a]	100[a]	500[b]	1,000[c]	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100[a]	100[a]	500[b]	1,000[c]	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100[a]	100[a]	500[b]	1,000[c]	100[a]	0.12
Methyl tert-butyl ether	1634-04 -4	62	100[a]	500[b]	1,000[c]	NS	0.93
Methylene chloride	75-09-2	51	100[a]	500[b]	1,000[c]	12	0.05
n-Propylbenzene	103-65-1	100[a]	100[a]	500[b]	1,000[c]	NS	3.9
sec-Butylbenzene	135-98-8	100[a]	100[a]	500[b]	1,000[c]	NS	11
tert-Butylbenzene	98-06-6	100[a]	100[a]	500[b]	1,000[c]	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100[a]	100[a]	500[b]	1,000[c]	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20 -7	100[a]	100[a]	500[b]	1,000[c]	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD). Footnotes

a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

TABLE 1A

Allowable Constituent Levels for Imported Fill or Soil
Subdivision 5.4(e)

Source: This table is derived from soil cleanup objective (SCO) tables in 6 NYCRR 375. Table 375-6.8(a) is the source for unrestricted use and Table 375-6.8(b) is the source for restricted use.

Note: For constituents not included in this table, refer to the contaminant for supplemental soil cleanup objectives (SSCOs) in the Commissioner Policy on *Soil Cleanup Guidance*. If an SSCO is not provided for a constituent, contact the DER PM to determine a site-specific level.

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Metals					
Arsenic	13	16	16	16	13
Barium	350	350	400	400	433
Beryllium	7.2	14	47	47	10
Cadmium	2.5	2.5	4.3	7.5	4
Chromium, Hexavalent[1]	1 [3]	19	19	19	1 [3]
Chromium, Trivalent[1]	30	36	180	1500	41
Copper	50	270	270	270	50
Cyanide	27	27	27	27	NS
Lead	63	400	400	450	63
Manganese	1600	2000	2000	2000	1600
Mercury (total)	0.18	0.73	0.73	0.73	0.18
Nickel	30	130	130	130	30
Selenium	3.9	4	4	4	3.9
Silver	2	8.3	8.3	8.3	2
Zinc	109	2200	2480	2480	109
PCBs/Pesticides					
2,4,5-TP Acid (Silvex)	3.8	3.8	3.8	3.8	NS
4,4'-DDE	0.0033 [3]	1.8	8.9	17	0.0033 [3]
4,4'-DDT	0.0033 [3]	1.7	7.9	47	0.0033 [3]
4,4'-DDD	0.0033 [3]	2.6	13	14	0.0033 [3]
Aldrin	0.005	0.019	0.097	0.19	0.14
Alpha-BHC	0.02	0.02	0.02	0.02	0.04 [4]
Beta-BHC	0.036	0.072	0.09	0.09	0.6
Chlordane (alpha)	0.094	0.91	2.9	2.9	1.3
Delta-BHC	0.04	0.25	0.25	0.25	0.04 [4]
Dibenzofuran	7	14	59	210	NS
Dieldrin	0.005	0.039	0.1	0.1	0.006
Endosulfan I	2.4[2]	4.8	24	102	NS
Endosulfan II	2.4[2]	4.8	24	102	NS
Endosulfan sulfate	2.4[2]	4.8	24	200	NS
Endrin	0.014	0.06	0.06	0.06	0.014
Heptachlor	0.042	0.38	0.38	0.38	0.14
Lindane	0.1	0.1	0.1	0.1	6
Polychlorinated biphenyls	0.1	1	1	1	1

TABLE 1A

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Semi-volatile Organic Compounds					
Acenaphthene	20	98	98	98	20
Acenaphthylene	100	100	100	107	NS
Anthracene	100	100	100	500	NS
Benzo(a)anthracene	1	1	1	1	NS
Benzo(a)pyrene	1	1	1	1	2.6
Benzo(b)fluoranthene	1	1	1	1.7	NS
Benzo(g,h,i)perylene	100	100	100	500	NS
Benzo(k)fluoranthene	0.8	1	1.7	1.7	NS
Chrysene	1	1	1	1	NS
Dibenz(a,h)anthracene	0.33 [3]	0.33 [3]	0.33 [3]	0.56	NS
Fluoranthene	100	100	100	500	NS
Fluorene	30	100	100	386	30
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	5.6	NS
m-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
Naphthalene	12	12	12	12	NS
o-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
p-Cresol(s)	0.33	0.33	0.33	0.33	NS
Pentachlorophenol	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]
Phenanthrene	100	100	100	500	NS
Phenol	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	30
Pyrene	100	100	100	500	NS
Volatile Organic Compounds					
1,1,1-Trichloroethane	0.68	0.68	0.68	0.68	NS
1,1-Dichloroethane	0.27	0.27	0.27	0.27	NS
1,1-Dichloroethene	0.33	0.33	0.33	0.33	NS
1,2-Dichlorobenzene	1.1	1.1	1.1	1.1	NS
1,2-Dichloroethane	0.02	0.02	0.02	0.02	10
1,2-Dichloroethene(cis)	0.25	0.25	0.25	0.25	NS
1,2-Dichloroethene(trans)	0.19	0.19	0.19	0.19	NS
1,3-Dichlorobenzene	2.4	2.4	2.4	2.4	NS
1,4-Dichlorobenzene	1.8	1.8	1.8	1.8	20
1,4-Dioxane	0.1 [3]	0.1 [3]	0.1 [3]	0.1 [3]	0.1
Acetone	0.05	0.05	0.05	0.05	2.2
Benzene	0.06	0.06	0.06	0.06	70
Butylbenzene	12	12	12	12	NS
Carbon tetrachloride	0.76	0.76	0.76	0.76	NS
Chlorobenzene	1.1	1.1	1.1	1.1	40
Chloroform	0.37	0.37	0.37	0.37	12
Ethylbenzene	1	1	1	1	NS
Hexachlorobenzene	0.33 [3]	0.33 [3]	1.2	3.2	NS
Methyl ethyl ketone	0.12	0.12	0.12	0.12	100
Methyl tert-butyl ether	0.93	0.93	0.93	0.93	NS
Methylene chloride	0.05	0.05	0.05	0.05	12

TABLE 1A

Volatile Organic Compounds (continued)					
Propylbenzene-n	3.9	3.9	3.9	3.9	NS
Sec-Butylbenzene	11	11	11	11	NS
Tert-Butylbenzene	5.9	5.9	5.9	5.9	NS
Tetrachloroethene	1.3	1.3	1.3	1.3	2
Toluene	0.7	0.7	0.7	0.7	36
Trichloroethene	0.47	0.47	0.47	0.47	2
Trimethylbenzene-1,2,4	3.6	3.6	3.6	3.6	NS
Trimethylbenzene-1,3,5	8.4	8.4	8.4	8.4	NS
Vinyl chloride	0.02	0.02	0.02	0.02	NS
Xylene (mixed)	0.26	1.6	1.6	1.6	0.26

All concentrations are in parts per million (ppm)
NS = Not Specified

Footnotes:
[1] The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.
[2] The SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.
[3] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
[4] This SCO is derived from data on mixed isomers of BHC.

TABLE 2 - SOIL BORING SAMPLING RESULTS
34-11 BEACH CHANNEL DRIVE SITE - ONSITE BORINGS
FAR ROCKAWAY, QUEENS, NEW YORK

Sample Location	RIB-1			RIB-2				RIB-3			RIB-4			RIB-5				RIB-6			NYSDEC Soil Cleanup Objectives for Unrestricted Use
Sample Depth (Feet Below Grade)	4-5	10-12	35-37	0-5	13-15	20-22	37-39	0-4	13-15	21-22	1-3	7-8	8-10	1-3	1-3 (Duplicate)	5-7	10-12	1-3	5-7	7-8	
Sample Stratigraphic Interval	Shallow Sand	Shallow Sand	Deep Clay	Fill	Shallow Sand	Shallow Clay	Deep Clay	Fill	Shallow Sand	Shallow Clay	Fill	Shallow Sand	Shallow Sand	Fill	Fill	Shallow Sand	Shallow Sand	Fill	Shallow Sand	Shallow Sand	
Sample Date	7/22/2013										7/23/2013							7/24/2013			
Volatile Organic Compounds (ug/kg)																					
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	5.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	330
1,2,4-Trichlorobenzene	0.85 J		ND	ND	ND	ND	ND	ND	ND	0.35 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,400
1,2-Dichlorobenzene	0.39 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,100
1,3-Dichlorobenzene	0.42 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,400
1,4-Dichlorobenzene	1.9	0.26 J	ND	ND	0.19 J	ND	ND	0.098 J	ND	0.44 J	0.19 J	0.13 J	0.43 J	0.19 J	0.19 J	ND	ND	0.31 J	0.30 J	0.91 J	1,800
Acetone	ND	2.9 J	22	ND	ND	ND	ND	ND	ND	40	ND	ND	**56 B**	2.0 JB	ND	27	30 B	ND	ND	**51**	50
Benzene	ND	0.23 J	ND	ND	0.41 J	ND	0.98 J	ND	ND	0.31 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60
Carbon disulfide	ND	2.1	6.4	ND	4.3	ND	3.3	0.18 J	2.5	18	ND	ND	10	ND	ND	1.6	16	ND	ND	37	2,700
cis-1,2-Dichloroethene	4.1	1.4	0.39 J	ND	17	**320,000**	**4,300 E**	ND	25	91	ND	0.23 J	ND	ND	ND	0.37 J	ND	ND	ND	0.29 J	250
Cyclohexane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.45 J	ND	ND	0.27 J	ND	ND	ND	ND	-
Ethylbenzene	ND	ND	ND	ND	ND	200 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,000
Isopropylbenzene	ND	ND	ND	ND	ND	130 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.24 J	ND	ND	ND	ND	2,300
m&p-Xylene	ND	ND	ND	ND	ND	**490 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	260 (total)
Methylene Chloride	2.5	ND	4.1	2.5	ND	ND	4.3	ND	ND	5.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Methyl cyclohexane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.76 J	ND	ND	0.31 J	ND	ND	ND	ND	-
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	13 J	ND	ND	7.0 J	ND	ND	4.8 J	1.03	ND	ND	10 J	120
MTBE	ND	ND	0.17 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.71 J	ND	ND	ND	930
o-Xylene	ND	ND	ND	ND	ND	230 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.32 J	ND	ND	ND	ND	260 (total)
Tetrachloroethene	ND	ND	ND	ND	ND	420 J	ND	ND	ND	ND	ND	ND	ND	1.3	1.0	ND	ND	15	0.43 J	ND	1,300
Toluene	ND	0.44 J	ND	ND	0.21 J	150 J	0.39 J	ND	ND	0.83 J	ND	ND	ND	ND	ND	0.22 J	ND	ND	ND	ND	700
trans-1,2-Dichloroethene	ND	0.16 J	ND	ND	2.6	**830 J**	39	ND	0.57 J	5.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	190
Trichloroethene	8.2	6.3	ND	ND	ND	**3,400**	20	ND	6.2	27	3.7	9.5	ND	ND	ND	0.22 J	ND	ND	ND	ND	470
Vinyl chloride	ND	6.5	1.2	ND	**56**	**14,000**	**170**	ND	ND	7.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Semivolatile Organic Compounds (ug/kg)																					
Anthracene	ND	NA	NA	110 J	NA	NA	NA	ND	NA	NA	98 J	NA	NA	ND	ND	NA	NA	77 J	NA	NA	100,000
Benzo[a]anthracene	ND	NA	NA	600	NA	NA	NA	34 J	NA	NA	460	NA	NA	44	45	NA	NA	340	NA	NA	1,000
Benzo[a]pyrene	ND	NA	NA	680	NA	NA	NA	44	NA	NA	520	NA	NA	40	51	NA	NA	370	NA	NA	1,000
Benzo[b]fluoranthene	ND	NA	NA	840	NA	NA	NA	37	NA	NA	660	NA	NA	44	59	NA	NA	390	NA	NA	1,000
Benzo[g,h,i]perylene	ND	NA	NA	670	NA	NA	NA	ND	NA	NA	260 J	NA	NA	29 J	29 J	NA	NA	300 J	NA	NA	100,000
Benzo[k]fluoranthene	ND	NA	NA	310	NA	NA	NA	19 J	NA	NA	260	NA	NA	15 J	20 J	NA	NA	210	NA	NA	800
Bis(2-ethylhexyl) phthalate	ND	NA	NA	160 J	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	50,000
Butyl benzyl phthalate	ND	NA	NA	1,300	NA	NA	NA	ND	NA	NA	200 J	NA	NA	ND	ND	NA	NA	ND	NA	NA	100,000
Carbazole	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	62 J	NA	NA	ND	ND	NA	NA	ND	NA	NA	-
Chrysene	ND	NA	NA	670	NA	NA	NA	ND	NA	NA	540	NA	NA	58 J	56 J	NA	NA	360	NA	NA	1,000
Dibenz(a,h)anthracene	ND	NA	NA	140	NA	NA	NA	ND	NA	NA	72	NA	NA	5.9 J	5.4 J	NA	NA	75	NA	NA	330
Di-n-butyl phthalate	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	45 J	NA	NA	ND	ND	NA	NA	ND	NA	NA	-
Di-n-octyl phthalate	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	100,000
Fluoranthene	ND	NA	NA	1,100	NA	NA	NA	48 J	NA	NA	940	NA	NA	56 J	83 J	NA	NA	450	NA	NA	100,000
Indeno[1,2,3-cd]pyrene	ND	NA	NA	**640**	NA	NA	NA	ND	NA	NA	300	NA	NA	22 J	28 J	NA	NA	270	NA	NA	500
Phenanthrene	ND	NA	NA	440	NA	NA	NA	ND	NA	NA	480	NA	NA	ND	ND	NA	NA	320 J	NA	NA	100,000
Pyrene	ND	NA	NA	840	NA	NA	NA	47 J	NA	NA	780	NA	NA	75 J	72 J	NA	NA	590	NA	NA	100,000
Target Analyte List Metals (mg/kg)																					
Aluminum	3,020	NA	NA	4980	NA	NA	NA	7,240	NA	NA	4,200	NA	NA	3,200	4,140	NA	NA	5,080	NA	NA	-
Antimony	ND	NA	NA	ND	NA	NA	NA	7.9	NA	NA	ND	NA	NA	ND	ND	NA	NA	1.9	NA	NA	-
Arsenic	4.0	NA	NA	5.5	NA	NA	NA	2.9	NA	NA	2.5	NA	NA	2.3	2.3	NA	NA	2.5	NA	NA	13
Barium	15.9 J	NA	NA	41.7	NA	NA	NA	17.2 J	NA	NA	72	NA	NA	22.7 J	103	NA	NA	40.8	NA	NA	350
Beryllium	ND	NA	NA	0.18 J	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	7.2
Cadmium	ND	NA	NA	0.23 J	NA	NA	NA	ND	NA	NA	ND	NA	NA	0.31 J	ND	NA	NA	ND	NA	NA	2.5
Calcium	660 J	NA	NA	9,320	NA	NA	NA	4,100	NA	NA	4,730	NA	NA	9,000	25,900	NA	NA	8,550	NA	NA	-
Chromium	11.4	NA	NA	**46.5**	NA	NA	NA	**539**	NA	NA	13.7	NA	NA	7.0	8.5	NA	NA	**172**	NA	NA	30
Cobalt	1.4 J	NA	NA	5.2 J	NA	NA	NA	8.3 J	NA	NA	4.2 J	NA	NA	1.9 J	2.1 J	NA	NA	4.0 J	NA	NA	30
Copper	13.5	NA	NA	**116**	NA	NA	NA	**431**	NA	NA	16.8	NA	NA	10.4	12.4	NA	NA	**608**	NA	NA	50
Iron	5,420	NA	NA	11,100	NA	NA	NA	17,600	NA	NA	10,100	NA	NA	5,030	6,180	NA	NA	11,200	NA	NA	-
Lead	11.5	NA	NA	**87.4**	NA	NA	NA	27.9	NA	NA	**86.7**	NA	NA	21.6	44.6	NA	NA	**67.4**	NA	NA	63
Magnesium	795 J	NA	NA	2,450	NA	NA	NA	2,240	NA	NA	2,210	NA	NA	1,270	2,440	NA	NA	3,190	NA	NA	-
Manganese	27.5	NA	NA	159	NA	NA	NA	354	NA	NA	264	NA	NA	57.5	90.3	NA	NA	185	NA	NA	1,600
Nickel	5.3 J	NA	NA	**33.9**	NA	NA	NA	**298**	NA	NA	27.4	NA	NA	4.8 J	5.6 J	NA	NA	**82.8**	NA	NA	30
Potassium	521 J	NA	NA	542 J	NA	NA	NA	229 J	NA	NA	510 J	NA	NA	377 J	362 J	NA	NA	254 J	NA	NA	-
Selenium	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	3.9
Silver	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	2
Sodium	232 J	NA	NA	293 J	NA	NA	NA	ND	NA	NA	234 J	NA	NA	ND	216 J	NA	NA	239 J	NA	NA	-
Thallium	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	-
Vanadium	10.3 J	NA	NA	15.1	NA	NA	NA	16.5	NA	NA	14.2	NA	NA	10.4	13.5	NA	NA	13.9	NA	NA	100
Zinc	19.0	NA	NA	**148**	NA	NA	NA	**279**	NA	NA	77.1	NA	NA	**277**	**156**	NA	NA	**451**	NA	NA	109
Mercury	ND	NA	NA	0.081	NA	NA	NA	0.020	NA	NA	0.034	NA	NA	0.027	0.061	NA	NA	**0.58**	NA	NA	0.18
Polychlorinated Biphenyls (mg/kg)	ND	NA	NA	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND	NA	NA	100

Notes:

J = Estimated concentration greater than the Method Detection Limit (MDL) and less than the Reporting Limit (RL).
E = Analyte exceeded range of instrumentation and a diluted sample was reanalyzed.
Bold shaded values indicate exceedances of the NYSDEC Soil Cleanup Objectives for Unrestricted Use.

- = Not established
B = Analyte detected in associated laboratory blank sample
Only compounds detected in one or more samples are reported. See lab report for complete data.
Boxed values exceed NYSDEC Soil Cleanup Objectives for commercial use.

ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
ND = Not detected
NA = Not analyzed

TABLE 3 - SOIL BORING SAMPLING RESULTS (CONTINUED)
34-11 BEACH CHANNEL DRIVE SITE - ONSITE BORINGS
FAR ROCKAWAY, QUEENS, NEW YORK

Sample Location	RIB-10					RIB-11				RIB-12				NYSDEC Soil Cleanup Objectives for Unrestricted Use
Sample Depth (Feet Below Grade)	2-3	26-27	27-28	27-28 (Duplicate)	38-39	5-6	23-24	24-25	39-40	2-3	21-22	22-23	37-38	
Sample Stratigraphic Interval	Fill	Shallow Sand	Shallow Clay	Shallow Clay	Deep Clay	Fill	Shallow Sand	Shallow Clay	Deep Clay	Fill	Shallow Sand	Shallow Clay	Deep Clay	
Sample Date	11/14/2014													
Volatile Organic Compounds (ug/kg)														
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	0.49 J	ND	ND	0.52 J	ND	ND	330
Acetone	ND	ND	ND	ND	ND	33	ND	22	34	ND	15	**59**	44	50
Benzene	ND	ND	ND	ND	ND	ND	ND	0.38 J	ND	ND	0.29 J	0.51 J	ND	60
Carbon disulfide	ND	ND	ND	ND	1.5*	ND	ND	4.4	2.2	ND	7.0	44	9.9	2,700
cis-1,2-Dichloroethene	0.62 J	**6,300**	**190,000**	**160,000**	4.9*	9.1	**880**	**450**	4.8	1.1	170	110	13	250
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	0.34 J	ND	ND	ND	ND	ND	1,000
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND	ND	ND	6.4	ND	ND	21	8.7	120
MTBE	ND	ND	ND	ND	1.0*	ND	ND	ND	ND	ND	ND	0.86 J	ND	930
o-Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.59 J	ND	ND	260 (total)
Tetrachloroethene	ND	970	**6,800**	**4,700 J**	ND	ND	ND	ND	ND	0.52 J	ND	ND	ND	1,300
Toluene	ND	ND	ND	ND	ND	ND	ND	0.86 J	ND	ND	ND	ND	ND	700
trans-1,2-Dichloroethene	ND	ND	**2,100 J**	**1,500 J**	ND	ND	ND	22	ND	ND	7.0	6.2	ND	190
Trichloroethene	1.9	**170,000**	**1,300,000**	**910,000**	5.2*	120	12 J	4.7	0.51 J	47	3.0	0.89 J	0.35 J	470
Vinyl chloride	ND	ND	**1,600 J**	**2,100 J**	ND	ND	**1,500**	**320**	13	ND	**410**	**950**	ND	20
Semivolatile Organic Compounds (ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Target Analyte List Metals (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Polychlorinated Biphenyls (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-

Notes:

J = Estimated concentration greater than the Method Detection Limit (MDL) and less than the Reporting Limit (RL).
Bold shaded values indicate exceedances of the NYSDEC Soil Cleanup Objectives for Unrestricted Use.
- = Not established
* = Laboratory QA/QC sample exceeds control criteria for this analyte.
Only compounds detected in one or more samples are reported. See lab report for complete data.
Boxed values exceed NYSDEC Soil Cleanup Objectives for commercial use.
ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
ND = Not detected
NA = Not analyzed

TABLE 4
33-11 Beach Channel Drive, Queens, NY

Parameters Dected Above Track 1 Soil Cleanup Objectives

COMPOUND	Range in Exceedences	Frequency of Detection	RIB2 (0-5')	RIB2 (13-15')	RIB2 (20-22')	RIB3 (0-4')	RIB3 (37-39')	RIB4 (1-3')	RIB4 (8-10')	RIB5 (1-3')	RIB6 (1-3')	RIB6 (7-8')	RIB10 (26-27')	RIB10 (27-28')	RIB11 (23-24')	RIB11 (24-25')	RIB12 (21-22')	RIB12 (22-23')
METALS			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	µg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Chromium	46.5 - 539	3	**46.5**			**539**					**172**							
Copper	116 - 608	3	**116**			**431**					**608**							
Lead	67.4 - 87.4	3	**87.4**					**86.7**			**67.4**							
Mercury	1	1									**0.58**							
Nickel	33.9-298	3	**33.9**			**298**					**82.8**							
Zinc	148-454	4	148			279				277	454							
SVOCS			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Indeno(1,2,3-cd)pyrene	640	1	640															
VOCS			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Acetone	51-59	3							56			51						**59**
Tetrachloroethene	6,800	1												6,800				
Cis-1,2-Dichloroethene	450-320,000	6			320,000		4,300						6,300	190,000	880	450		
m.p-xylene	490	1			490													
Trans-1,2-Dichloroethene	830-2,100	2			830									2,100				
Trichloroethene	3,400-1,300,000	3			3,400								1,300,000	910,000				
Vinyl Chloride	56-14,000	8		56	14,000								1,600	2,100	1,500	320	410	**950**

TABLE 5 - GROUNDWATER SAMPLING RESULTS - OCTOBER 2013
34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY. QUEENS. NEW YORK

ONSITE WELLS

Sample Location	MW-1S	MW-1I	MW-2S	MW-2S (Duplicate)	MW-2I	MW-3S	MW-3I	MW-4S	MW-4I	MW-5S	MW-5I	MW-6S	MW-6I	NYSDEC Class GA Ambient Water Quality Standard
Screen Interval (feet)	4 to 15	31 to 36	4 to 19	4 to 19	33 to 38	4 to 21	31 to 36	3 to 8	31 to 36	3 to 10	31 to 36	2 to 7	31 to 36	
Stratigraphic Interval	Shallow Sand	Inter. Sand	Shallow Sand	Shallow Sand	Inter. Sand	Shallow Sand	Inter. Sand	Shallow Sand	Inter. Sand	Shallow Sand	Inter. Sand	Shallow Sand	Inter. Sand	
Volatile Organic Compounds (ug/L)														
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
1,1-Dichloroethene	ND	ND	ND	ND	**10 J**	0.83 J	0.84 J	ND	ND	ND	0.25 J	ND	ND	5
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	28	ND	ND	50
Benzene	**1.6**	ND	**1.1**	1.0	**4.4 J**	0.38 J	**6.0**	ND	**3.7**	ND	0.28 J	ND	**4.4**	1
Carbon disulfide	ND	0.20 J	ND	0.32 J	ND	ND	0.19 J	0.61 J	ND	0.15 J	0.35 J	ND	ND	50
Chlorobenzene	ND	ND	ND	0.19 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Chloroethane	2.8	ND	ND	ND	ND	ND	**54**	ND	ND	ND	ND	ND	ND	5
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.20 J	ND	7
cis-1,2-Dichloroethene	3.9	4.2	**150**	**110**	**4,800**	**100**	**260**	4.5	**5.4**	**6.5**	**50**	1.6	2.9	5
Ethylbenzene	0.50 J	ND	ND	0.13 J	ND	ND	0.54 J	ND	0.28 J	ND	ND	ND	0.52 J	5
Isopropylbenzene	ND	ND	ND	ND	ND	ND	0.10 J	ND	ND	ND	ND	ND	ND	5
m&p-Xylene	0.79 J	ND	ND	ND	ND	ND	0.77 J	ND	0.62 J	ND	ND	ND	0.77 J	5
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	46 J	6.4 J	ND	50
Methyl isobutyl ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
MTBE	ND	6.7	ND	ND	ND	ND	ND	ND	0.24 J	ND	**11**	ND	0.62 J	10
o-Xylene	0.41 J	ND	ND	ND	ND	ND	0.23 J	ND	0.38 J	ND	ND	ND	0.33 J	5
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.39 J	ND	2.7	ND	5
Toluene	2.2	ND	0.65 J	0.59 J	ND	ND	**7.3**	ND	0.76 J	ND	0.32 J	ND	**7.7**	5
trans-1,2-Dichloroethene	4.1	0.39 J	**6.3**	**6.0**	**100**	1.2	**44**	ND	2.3	0.17 J	0.82 J	ND	**9.0**	5
Trichloroethene	4.3	0.79 J	0.66 J	0.17 J	**310**	**41**	**16**	1.8	0.63 J	0.29 J	2.4	0.25 J	0.52 J	5
Vinyl chloride	1.4	**23**	**340**	**440**	**420**	**2.7**	**180**	1.6	1.1	1.2	**6.9**	0.30 J	1.8	2

OFFSITE WELLS

Sample Location	MW-7S	MW-7I	MW-8S	MW-8I	MW-9S	MW-9I	NYSDEC Class GA Ambient Water Quality Standard
Screen Interval (feet)	2 to 12	36 to 41	2 to 8	30 to 35	2 to 9	31 to 36	
Stratigraphic Interval	Shallow Sand	Inter. Sand	Shallow Sand	Inter. Sand	Shallow Sand	Inter. Sand	
Volatile Organic Compounds (ug/L)							
1,1-Dichloroethane	ND	ND	ND	ND	ND	0.36 J	5
1,1-Dichloroethene	ND	ND	ND	0.18 J	ND	0.15 J	5
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	0.20 J	1
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.26 J	1
Acetone	31	**530**	**820**	5.6	39	**55**	50
Benzene	0.10 J	0.20 J	0.39 J	0.59 J	ND	**15**	1
Carbon disulfide	ND	0.58 J	ND	ND	ND	ND	50
Chlorobenzene	ND	ND	ND	ND	ND	0.29 J	5
Chloroethane	ND	ND	ND	ND	ND	ND	5
Chloroform	ND	ND	ND	ND	ND	ND	7
cis-1,2-Dichloroethene	ND	0.28 J	ND	**12**	0.24 J	**79**	5
Ethylbenzene	ND	ND	ND	ND	ND	0.70 J	5
Isopropylbenzene	ND	ND	ND	ND	ND	0.086 J	5
m&p-Xylene	ND	ND	ND	ND	ND	1.5 J	5
Methyl ethyl ketone	ND	**1,000**	**2,200**	15	**83**	32	50
Methyl isobutyl ketone	ND	ND	ND	ND	ND	1.6 J	50
MTBE	ND	ND	ND	1.6	ND	2.1	10
o-Xylene	ND	ND	ND	ND	ND	0.97 J	5
Tetrachloroethene	ND	ND	ND	ND	ND	ND	5
Toluene	ND	0.24 J	ND	0.22 J	ND	4.1	5
trans-1,2-Dichloroethene	ND	ND	ND	0.26 J	ND	**29**	5
Trichloroethene	ND	ND	ND	0.61 J	ND	ND	5
Vinyl chloride	ND	ND	ND	**12**	ND	**85**	2

Notes:

ug/L = micrograms per liter

J = Estimated concentration greater than the Method Detection Limit (MDL) and less than the Reporting Limit (RL), or estimated due to LCS issues.

Bold shaded values indicate exceedances of the NYSDEC Class GA Ambient Water Quality Standards.

ND = Not detected

Only compounds detected in one or more samples are reported. See lab report for complete data.

Table 6
34-11 Beach Channel Drive, Queens, New York
Parameters Detected Above Ambient Groundwater Standards

Compound	Range in Exceedences	Frequency of Detection	MW1S µg/L	MW1I µg/L	MW2S µg/L	MW2I µg/L	MW3S µg/L	MW3I µg/L	MW4I µg/L	MW5S µg/L	MW5S µg/L	MW6I µg/L
VOCS												
1,1-Dichloroethene	10	1 of 12				**10**						
Benzene	1.1-6.0	6 of 12	**1.6**		**1.1**	**4.4**		**6.0**	**3.7**			**4.4**
Chloroethane	54	1 of 12						**54**				
Cis-1.2-Dichloroethene	5.4-4,800	7 of 12			**150**	**4,800**	**100**	**260**	**5.4**	**6.5**	**50**	
MTBE	11	1 of 12									**11**	
Toluene	7.3	2 of 12						**7.3**				**7.7**
Trans-1.2-Dichloroethene	6.3-100	4 of 12			**6.3**	**100**		**44**				**9**
Trichloroethene	16-310	3 of 12				**310**	**41**	**16**				
Vinyl Chloride				**23**	**340**	**420**	**2.7**	**180**			**6.9**	
Metals												
Sodium	84,600-208,000	2 of 2								**208,000**	**84,600**	

TABLE 7 - SOIL VAPOR SAMPLING RESULTS
34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Sample Location	RISV-1	RISV-1D (Duplicate)	RISV-2	RISV-3	SV-4	SV-5	SV-6	SV-7	SV-7D (Duplicate)	SV-8	SV-9	SV-10	SV-11	SV-12	SV-13
Sample Date	10/2/2013				11/13/2014			11/14/2014							
Volatile Organic Compounds (micrograms per cubic meter)															
1,1,1-Trichloroethane	2.6	2.1	4.9	19 J	ND	2.0	ND	ND	ND	ND	1.5	ND	ND	0.60 J	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.0	ND	0.53 J
1,2,4-Trimethylbenzene	8.5 J	7.5 J	16 J	12 J	ND	17	17	8.0	7.3	ND	ND	5.2	5.5	1.0	1.2
1,3,5-Trimethylbenzene	4.5	4.5	5.3	4.8	2.5	6.5	8.2	3.0	3.1	1.2	ND	2.4	2.7	0.79	0.79
1,4-Dichlorobenzene	130	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2,4-trimethylpentane	19	19	26	16	20	22	28	8.0	7.6	14	ND	14	25	14	9.8
4-ethyltoluene	5.4	5.4	11 J	11	4.0	13	16	5.8	5.6	1.9	ND	4.4	5.4	1.3	1.3
Acetone	870	880	15,000	2,300	2,900	2,100	2,700	690	700	2,000	4,800	2,600	2,600	2,500	1,300
Benzene	9.1	10	20	13	18	19	29	8.9	8.6	12	42	12	46	15	9.3
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.89	ND	ND
Carbon disulfide	10	9.5	2.8	1.9	6.8	0.87	2.5	3.4	3.3	ND	10	8.4	25	0.53	1.3
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.63	ND	ND
Chloroform	2.0	2.0	1.5	2.2	ND	ND	ND	ND	ND	2.7	ND	8.1	ND	2.6	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	0.23 J	0.29 J	ND	0.27 J	2.8	0.33	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	2.3	ND	2.6	ND	ND	ND	ND	2.1	ND	ND	ND
Cyclohexane	4.3	5.6	14	6.6	43	13	22	5.6	5.6	10	3,600	14	29	12	6.4
Ethylbenzene	19 J	18 J	41 J	33 J	43	73	82	39	35	27	97	39	66	39	23
Freon 11	2.2	2.1	2.2	2.1	19	56	7.8	0.84	0.84	5.4	2.4	3.0	1.4	7.3	1.9
Freon 113	ND	ND	0.86 J	0.78 J	ND	1.1	0.77 J	ND	ND	ND	ND	ND	ND	ND	ND
Freon 114	ND	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 12	0.90	1.4	2.5	2.2	67	2.0	2.9	1.5	1.4	1.9	2.4	83	6.9	18	2.0
Heptane	23	14	98	37	70	80	89	27	27	41	5,700	54	75	47	35
Hexane	7.5 J	12 J	ND	ND	48	30	75	13	15	24	2,800	33	45	28	14
m&p-Xylene	74	68	150	120	130	340	270	140	140	79	160	130	160	110	73
Methyl butyl ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	ND	ND	ND
Methyl ethyl ketone	35	28	130	55	50	60	34 J	21	20	46	ND	55	59	45	32
Methyl isobutyl ketone	ND	ND	ND	ND	ND	5.0	ND	ND	0.74 J	ND	ND	4.2	5.0	ND	ND
Methylene chloride	ND	ND	1.7	0.95	0.69	ND	ND	ND	ND	ND	ND	ND	0.49 J	ND	ND
MTBE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.5	ND	ND	ND	ND
o-Xylene	15	14	25	19	38	75	75	39	36	23	72	33	54	27	20
Styrene	2.7	2.5	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	1.4	0.90 J	3.7	1.4	78	40	39	24	22	31	150	28	28	28	25
Toluene	76	72	190	110	320	450	670	150	170	240	190	140	250	170	190
Trichloroethene	ND	ND	19	ND	3.5	68	180	4.9	4.7	1,700	ND	200	ND	110	ND

Notes:
ND = Analyte not detected above reporting limit (RL).
J = Analyte detected at or below RL but above the method detection limit (MDL), or estimated due to LCS/LCSD issues.
Only compounds detected in one or more samples are reported. See lab reports for complete data.

TABLE 8

Project Permit Listing

To Be Updated as Project Progresses

Permit	*Permit Number*	*Originating Agency*	*Pursuant to*	*Issued*	*Expires*	*Contact Phone*
NO PERMITS ISSUED AT THIS TIME - TO BE ADDED						

Table 9
Emergency Contact List

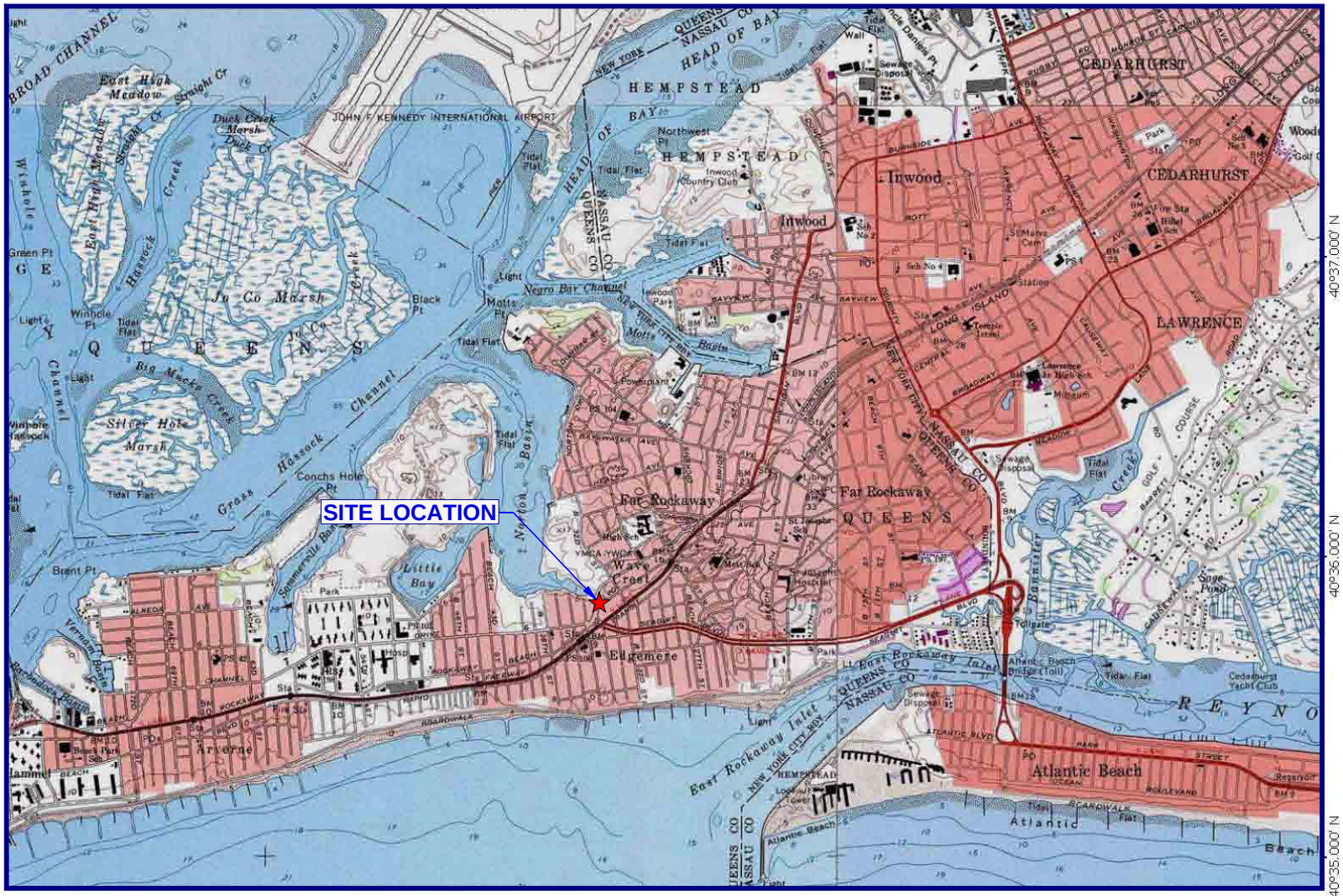
General Contacts

General Emergencies	911
NYC Police	911
NYC Fire Department	911
NYC Department of Health	212-676-2400
St Johns Episcopal Hospital	718-869-7000
Poison Control	800-222-1222
National Response Center	800-424-8802
NYSDEC Spills Hotline	800-457-7362

Project Contacts

NYSDEC Project Manager	Alicia Barraza	518-402-9690
NYSDOH Project Manager	Bridget Callaghan	518-402-7860
EBC Project Manager	Robert Bennett	631-504-6000
EBC BCP Program Manager	Charles Sosik	631-504-6000
EBC Site Safety Officer	Chawinie Miller	631-504-6000
Remedial Engineer	Ariel Czemerinski	516-987-1662
Construction Manager	Stephen Baltzer	516-547-0067

FIGURES



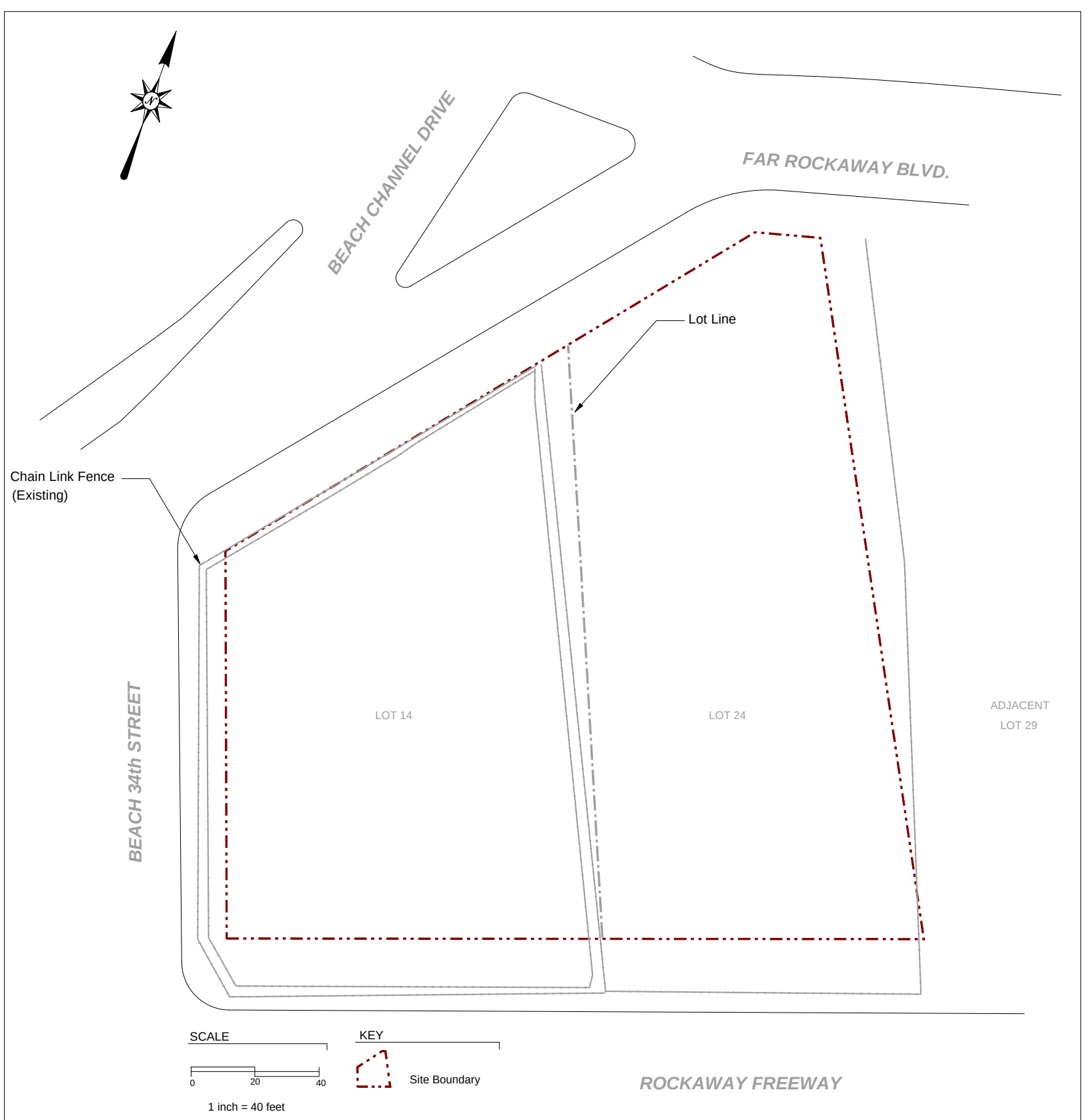
USGS Brooklyn Quadrangle 1995, Contour Interval = 10 feet

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD. RIDGE. NY 11961
Phone 631.504.6000
Fax 631.924.2780

34-11 BEACH CHANNEL DRIVE SITE

34-11 BEACH CHANNEL DRIVE, QUEENS, NY

FIGURE 1 SITE LOCATION MAP



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FIGURE 2

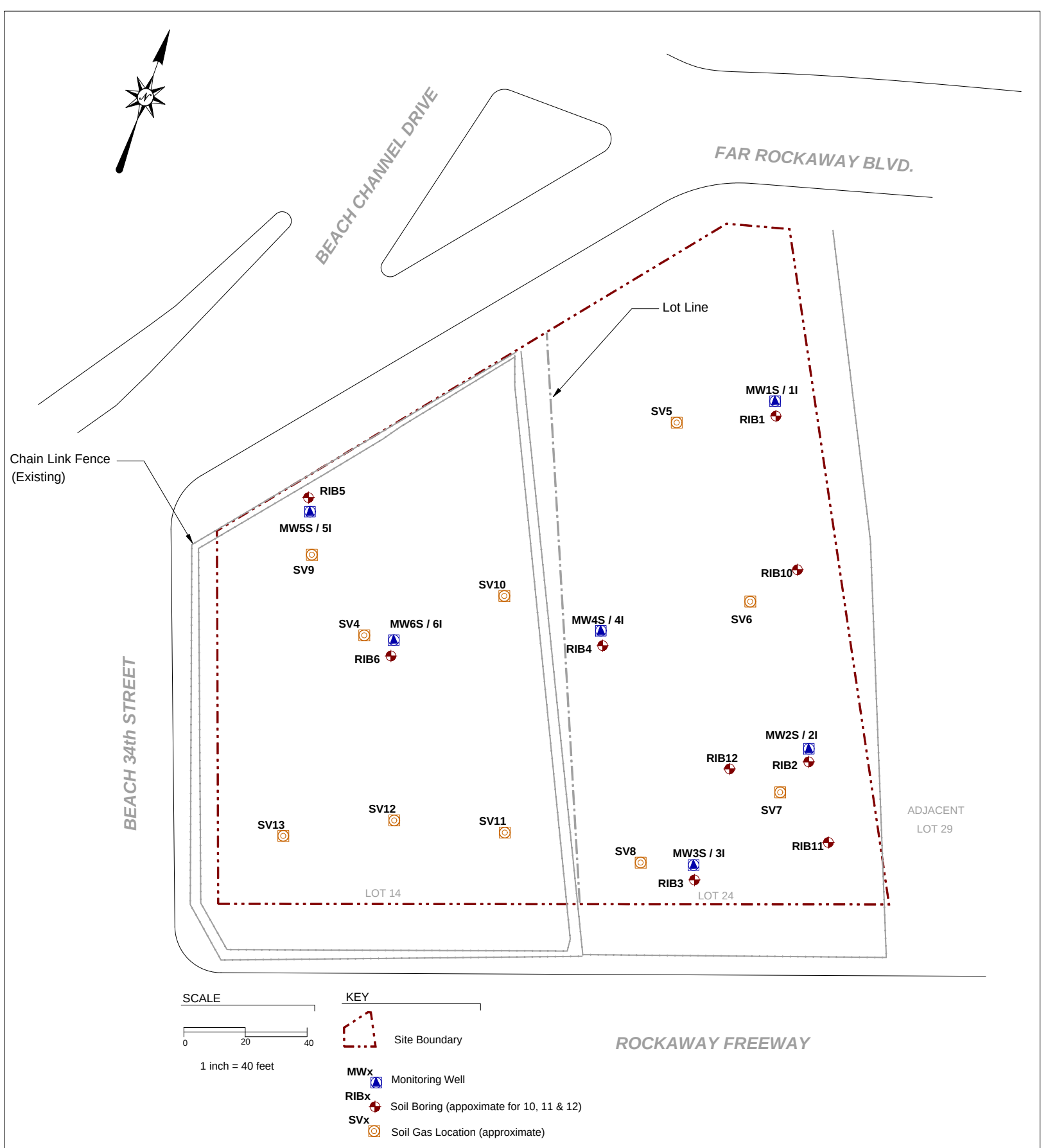
Site Address: 34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

Drawing Title: Site Plan

EBC
Environmental Business Consultants
1808 Middle Country Road. Ridge. NY 11961
Phone: 631.504.6000
Fax: 631.924.2780

34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

FIGURE 3 Project Site and Adjacent Properties



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FIGURE 4

Site Address: 34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

Drawing Title: RI Sampling Locations

LEGEND:

- SHALLOW WELLS WITH GROUNDWATER RELATIVE ELEVATION (FEET) — MW-1S (15.86)
- GROUNDWATER FLOW DIRECTION
- 16.0 — WATER TABLE CONTOURS (WESTERN WELLS)
- 16.1 — WATER TABLE CONTOURS (EASTERN WELLS)

FIGURE 5A

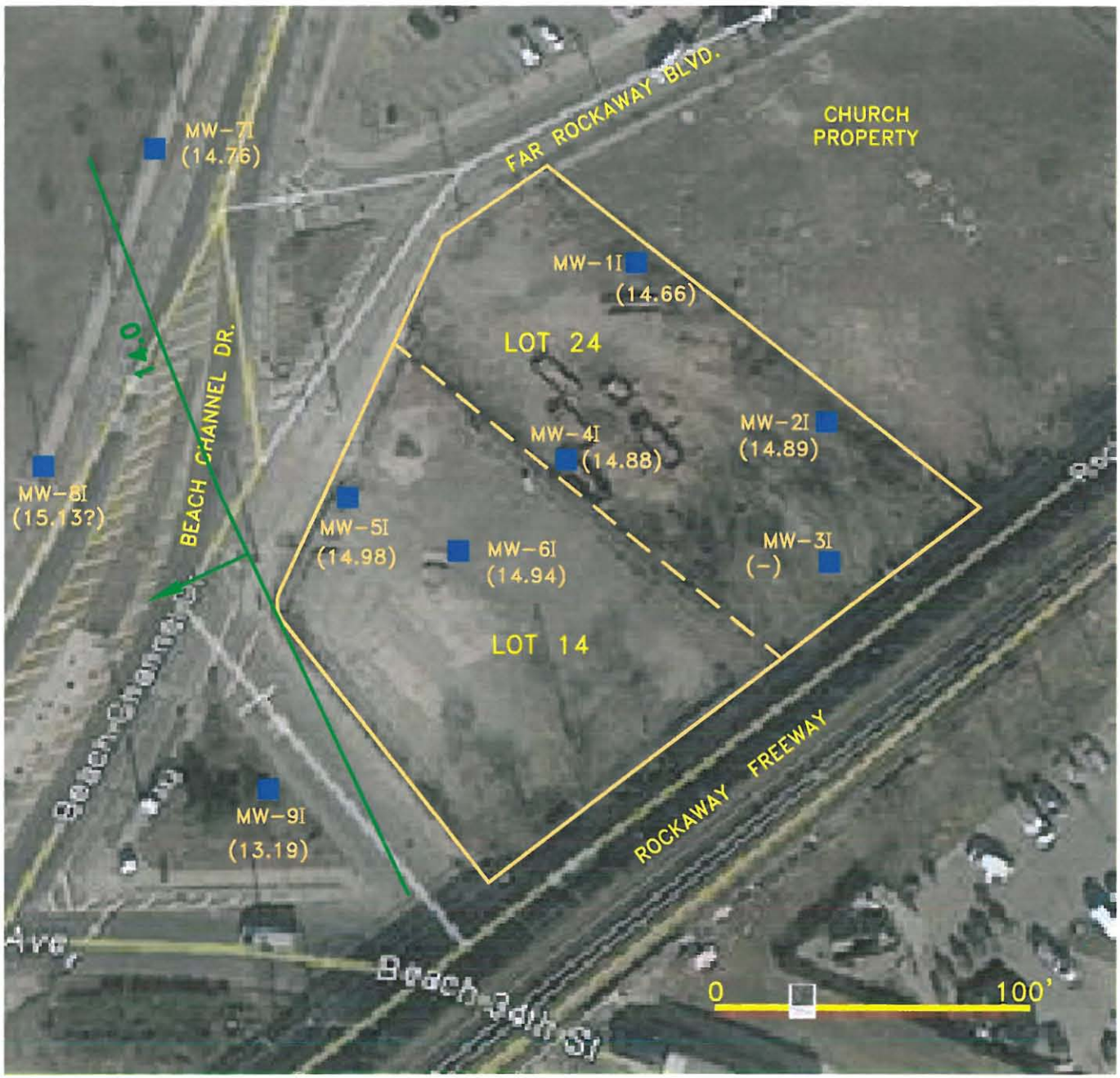
FPM GROUP

DECEMBER 2014
SHALLOW GROUNDWATER
RELATIVE ELEVATION CONTOURS

34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn By: H.C.	Checked By: S.D.	Date: 1/13/2015

H:\ALPROF\RI FIGURES\DEC 2014 SHALLOW GW ELEV.dwg, 1/14/2015 1:51:23 PM, Letter



LEGEND:

- INTERMEDIATE-LEVEL WELLS WITH GROUNDWATER RELATIVE ELEVATION (FEET) (e.g. MW-1I (14.66))
- GROUNDWATER FLOW DIRECTION
- 14.0 — INTERMEDIATE GROUNDWATER CONTOURS

FIGURE 5B

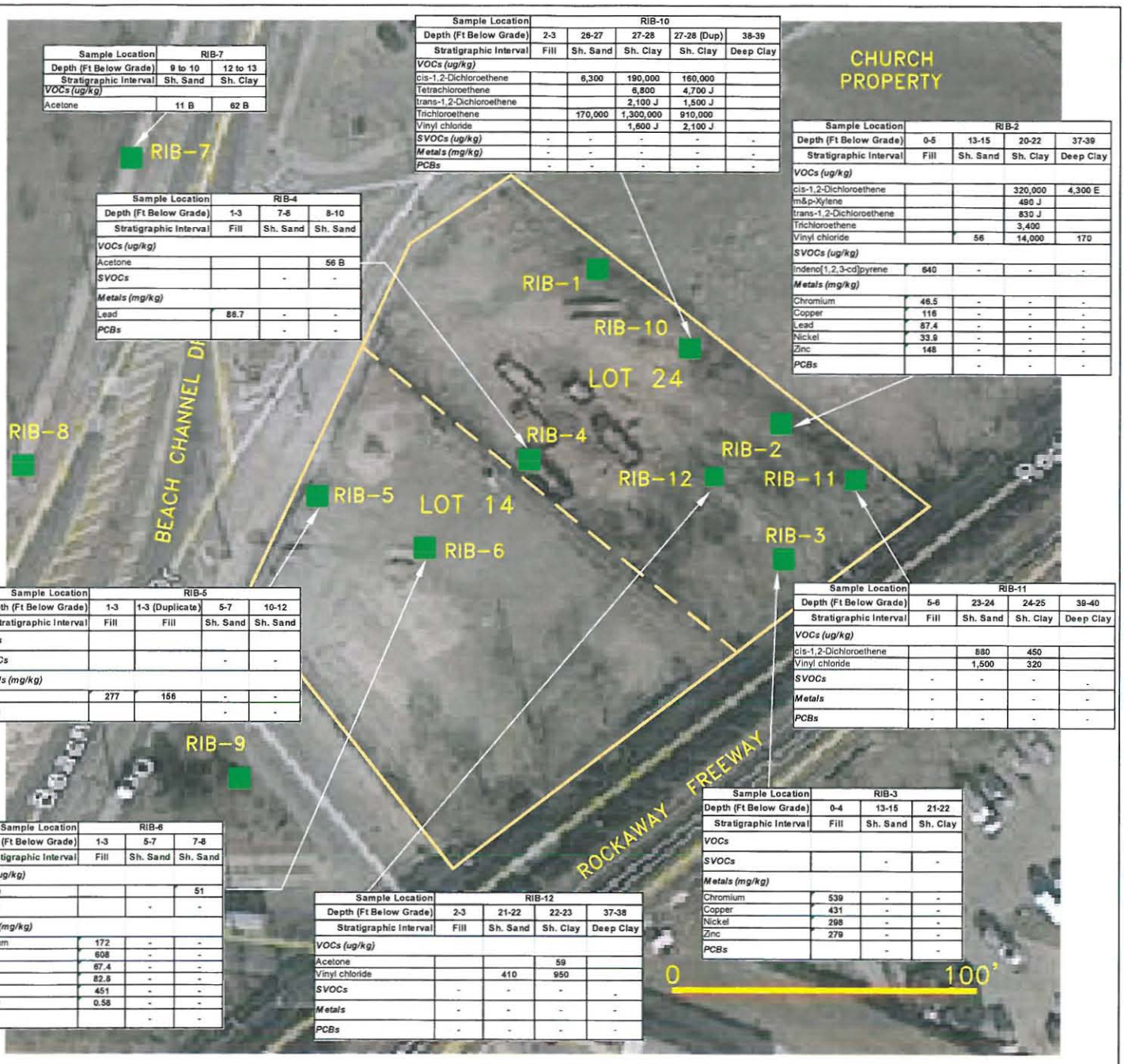
FPM GROUP

FIGURE 3.3.2.8
DECEMBER 2014
INTERMEDIATE GROUNDWATER
RELATIVE ELEVATION CONTOURS

34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn By: H.C.	Checked By: S.D.	Date: 1/13/2015

H:\ALPROF\RI FIGURES\DEC 2014 INTER GW ELEV.dwg, 1/20/2015 10:09:27 AM, Letter



Sample Location	RIB-7	
Depth (Ft Below Grade)	9 to 10	12 to 13
Stratigraphic Interval	Sh. Sand	Sh. Clay
VOCs (ug/kg)		
Acetone	11 B	62 B

Sample Location	RIB-10				
Depth (Ft Below Grade)	2-3	26-27	27-28	27-28 (Dup)	38-39
Stratigraphic Interval	Fill	Sh. Sand	Sh. Clay	Sh. Clay	Deep Clay
VOCs (ug/kg)					
cis-1,2-Dichloroethene		6,300	190,000	160,000	
Tetrachloroethene			6,800	4,700 J	
trans-1,2-Dichloroethene			2,100 J	1,500 J	
Trichloroethene		170,000	1,300,000	910,000	
Vinyl chloride			1,600 J	2,100 J	
SVOCs (ug/kg)	-	-	-	-	-
Metals (mg/kg)	-	-	-	-	-
PCBs	-	-	-	-	-

Sample Location	RIB-2			
Depth (Ft Below Grade)	0-5	13-15	20-22	37-39
Stratigraphic Interval	Fill	Sh. Sand	Sh. Clay	Deep Clay
VOCs (ug/kg)				
cis-1,2-Dichloroethene			320,000	4,300 E
m&p-Xylene			490 J	
trans-1,2-Dichloroethene			830 J	
Trichloroethene			3,400	
Vinyl chloride		56	14,000	170
SVOCs (ug/kg)				
Indeno[1,2,3-cd]pyrene	640	-	-	-
Metals (mg/kg)				
Chromium	46.5	-	-	-
Copper	116	-	-	-
Lead	87.4	-	-	-
Nickel	33.9	-	-	-
Zinc	148	-	-	-
PCBs		-	-	-

Sample Location	RIB-4		
Depth (Ft Below Grade)	1-3	7-8	8-10
Stratigraphic Interval	Fill	Sh. Sand	Sh. Sand
VOCs (ug/kg)			
Acetone			56 B
SVOCs		-	-
Metals (mg/kg)			
Lead	86.7	-	-
PCBs		-	-

Sample Location	RIB-5			
Depth (Ft Below Grade)	1-3	1-3 (Duplicate)	5-7	10-12
Stratigraphic Interval	Fill	Fill	Sh. Sand	Sh. Sand
VOCs				
SVOCs			-	-
Metals (mg/kg)				
Zinc	277	156	-	-
PCBs			-	-

Sample Location	RIB-11			
Depth (Ft Below Grade)	5-6	23-24	24-25	39-40
Stratigraphic Interval	Fill	Sh. Sand	Sh. Clay	Deep Clay
VOCs (ug/kg)				
cis-1,2-Dichloroethene		880	450	
Vinyl chloride		1,500	320	
SVOCs	-	-	-	-
Metals	-	-	-	-
PCBs	-	-	-	-

Sample Location	RIB-6		
Depth (Ft Below Grade)	1-3	5-7	7-8
Stratigraphic Interval	Fill	Sh. Sand	Sh. Sand
VOCs (ug/kg)			
Acetone			51
SVOCs		-	-
Metals (mg/kg)			
Chromium	172	-	-
Copper	608	-	-
Lead	87.4	-	-
Nickel	82.8	-	-
Zinc	451	-	-
Mercury	0.58	-	-
PCBs		-	-

Sample Location	RIB-12			
Depth (Ft Below Grade)	2-3	21-22	22-23	37-38
Stratigraphic Interval	Fill	Sh. Sand	Sh. Clay	Deep Clay
VOCs (ug/kg)				
Acetone			59	
Vinyl chloride		410	950	
SVOCs	-	-	-	-
Metals	-	-	-	-
PCBs	-	-	-	-

Sample Location	RIB-3		
Depth (Ft Below Grade)	0-4	13-15	21-22
Stratigraphic Interval	Fill	Sh. Sand	Sh. Clay
VOCs			
SVOCs		-	-
Metals (mg/kg)			
Chromium	539	-	-
Copper	431	-	-
Nickel	298	-	-
Zinc	279	-	-
PCBs		-	-

LEGEND:

SOIL BORING LOCATION

NOTED CONCENTRATIONS EXCEED NYSDEC OBJECTIVES FOR UNRESTRICTED USE

— NOT ANALYZED

FIGURE 6

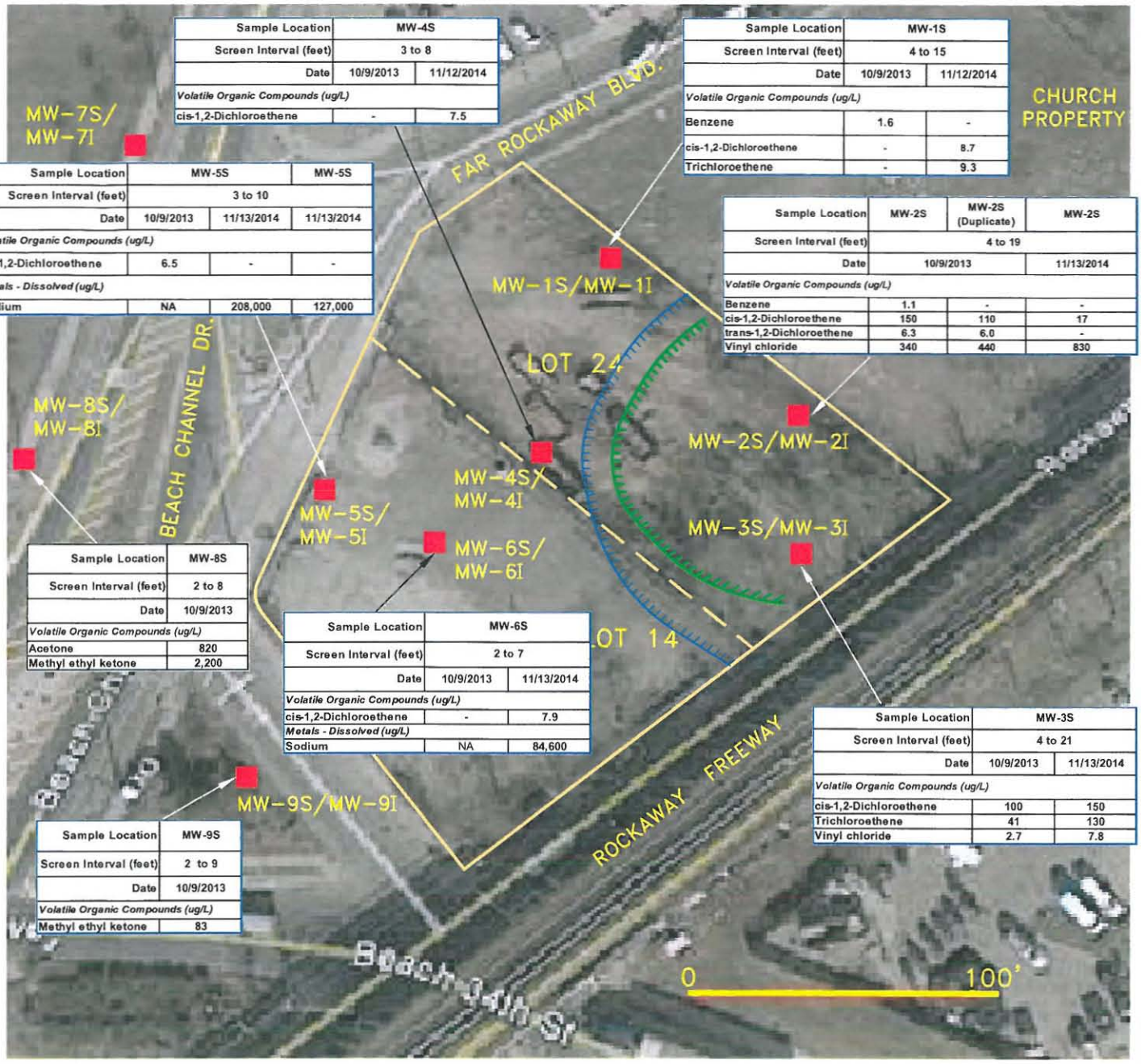
FPM GROUP

SOIL SAMPLES EXCEEDING NYSDEC OBJECTIVES

34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn By: H.C. | Checked By: S.D. | Date: 1/7/2015

H:\ALPROF\RI FIGURES\SOIL SAMPLES EXCEEDING NYSDEC OBJECTIVES.dwg, 1/7/2015 10:14:58 AM, 8 1/2x11



Sample Location	MW-4S	
Screen Interval (feet)	3 to 8	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
cis-1,2-Dichloroethene	-	7.5

Sample Location	MW-1S	
Screen Interval (feet)	4 to 15	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
Benzene	1.6	-
cis-1,2-Dichloroethene	-	8.7
Trichloroethene	-	9.3

Sample Location	MW-5S		MW-5S
Screen Interval (feet)	3 to 10		
Date	10/9/2013	11/13/2014	11/13/2014
Volatile Organic Compounds (ug/L)			
cis-1,2-Dichloroethene	6.5	-	-
Metals - Dissolved (ug/L)			
Sodium	NA	208,000	127,000

Sample Location	MW-2S	MW-2S (Duplicate)	MW-2S
Screen Interval (feet)	4 to 19		
Date	10/9/2013		11/13/2014
Volatile Organic Compounds (ug/L)			
Benzene	1.1	-	-
cis-1,2-Dichloroethene	150	110	17
trans-1,2-Dichloroethene	6.3	6.0	-
Vinyl chloride	340	440	830

Sample Location	MW-8S
Screen Interval (feet)	2 to 8
Date	10/9/2013
Volatile Organic Compounds (ug/L)	
Acetone	820
Methyl ethyl ketone	2,200

Sample Location	MW-6S	
Screen Interval (feet)	2 to 7	
Date	10/9/2013	11/13/2014
Volatile Organic Compounds (ug/L)		
cis-1,2-Dichloroethene	-	7.9
Metals - Dissolved (ug/L)		
Sodium	NA	84,600

Sample Location	MW-3S	
Screen Interval (feet)	4 to 21	
Date	10/9/2013	11/13/2014
Volatile Organic Compounds (ug/L)		
cis-1,2-Dichloroethene	100	150
Trichloroethene	41	130
Vinyl chloride	2.7	7.8

Sample Location	MW-9S
Screen Interval (feet)	2 to 9
Date	10/9/2013
Volatile Organic Compounds (ug/L)	
Methyl ethyl ketone	83

LEGEND:

SHALLOW WELLS WITH EXCEEDANCES OF NYSDEC STANDARDS

ELEVATED CHLORINATED VOCs (10/2013)

ELEVATED CHLORINATED VOCs (11/2014)

FIGURE 7A

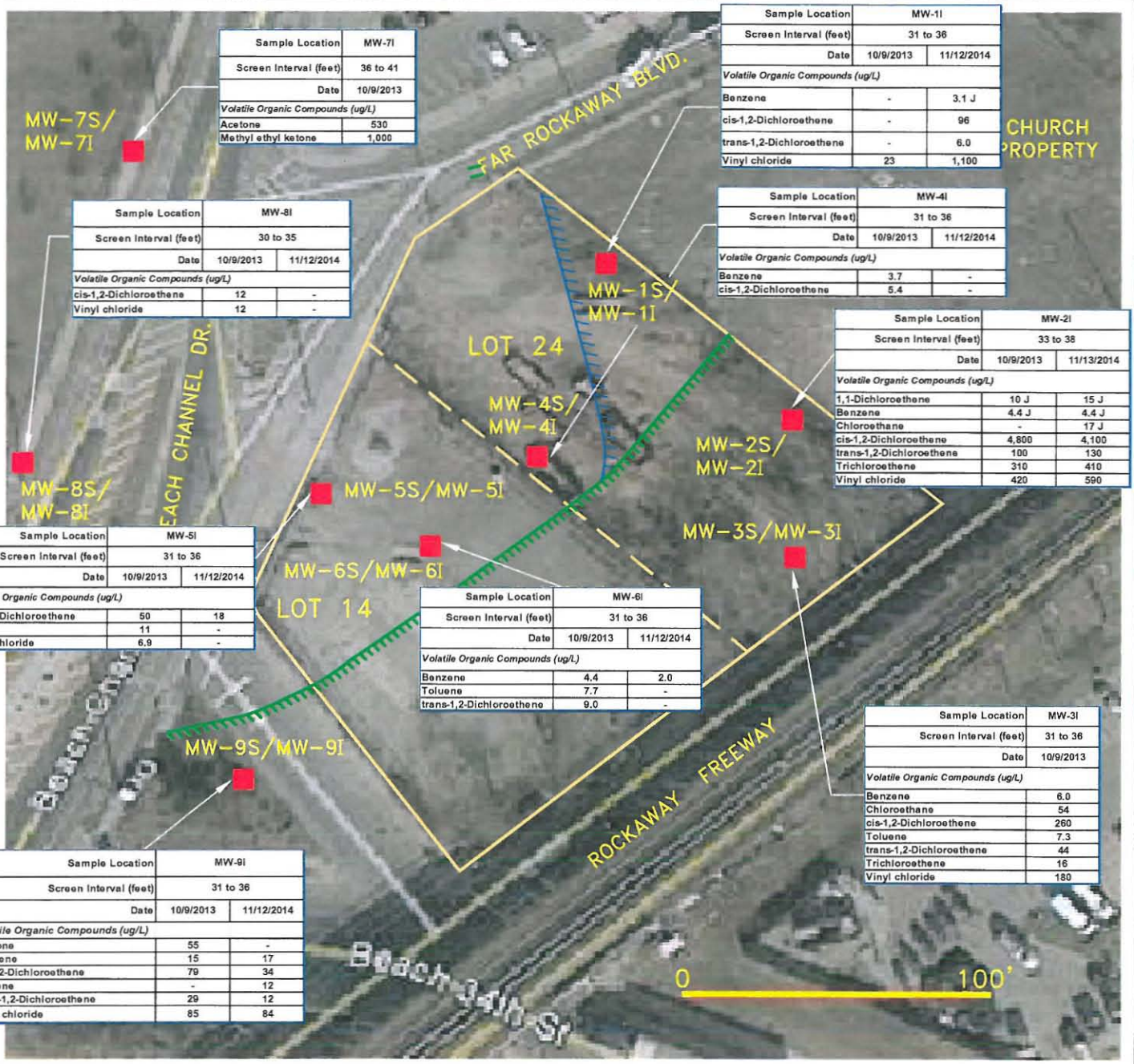
FPM GROUP

SHALLOW GROUNDWATER DATA MAP

34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn By: H.C.	Checked By: S.D.	Date: 1/6/2015

H:\ALPROF\RI FIGURES\SHALLOW GW DATA MAP.dwg, 1/6/2015 1:00:57 PM, 8 1/2x11



Sample Location	MW-7I
Screen Interval (feet)	36 to 41
Date	10/9/2013
Volatile Organic Compounds (ug/L)	
Acetone	530
Methyl ethyl ketone	1,000

Sample Location	MW-1I	
Screen Interval (feet)	31 to 36	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
Benzene	-	3.1 J
cis-1,2-Dichloroethene	-	96
trans-1,2-Dichloroethene	-	6.0
Vinyl chloride	23	1,100

Sample Location	MW-8I	
Screen Interval (feet)	30 to 35	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
cis-1,2-Dichloroethene	12	-
Vinyl chloride	12	-

Sample Location	MW-4I	
Screen Interval (feet)	31 to 36	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
Benzene	3.7	-
cis-1,2-Dichloroethene	5.4	-

Sample Location	MW-2I	
Screen Interval (feet)	33 to 38	
Date	10/9/2013	11/13/2014
Volatile Organic Compounds (ug/L)		
1,1-Dichloroethene	10 J	15 J
Benzene	4.4 J	4.4 J
Chloroethane	-	17 J
cis-1,2-Dichloroethene	4,800	4,100
trans-1,2-Dichloroethene	100	130
Trichloroethene	310	410
Vinyl chloride	420	590

Sample Location	MW-5I	
Screen Interval (feet)	31 to 36	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
cis-1,2-Dichloroethene	50	18
MTBE	11	-
Vinyl chloride	6.9	-

Sample Location	MW-6I	
Screen Interval (feet)	31 to 36	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
Benzene	4.4	2.0
Toluene	7.7	-
trans-1,2-Dichloroethene	9.0	-

Sample Location	MW-3I
Screen Interval (feet)	31 to 36
Date	10/9/2013
Volatile Organic Compounds (ug/L)	
Benzene	6.0
Chloroethane	54
cis-1,2-Dichloroethene	260
Toluene	7.3
trans-1,2-Dichloroethene	44
Trichloroethene	16
Vinyl chloride	180

Sample Location	MW-9I	
Screen Interval (feet)	31 to 36	
Date	10/9/2013	11/12/2014
Volatile Organic Compounds (ug/L)		
Acetone	55	-
Benzene	15	17
cis-1,2-Dichloroethene	79	34
Toluene	-	12
trans-1,2-Dichloroethene	29	12
Vinyl chloride	85	84

LEGEND:

INTERMEDIATE-LEVEL WELLS WITH EXCEEDANCES OF NYSDEC STANDARDS

ELEVATED CHLORINATED VOCs (10/2013)

ELEVATED CHLORINATED VOCs (11/2014)

FIGURE 7 B

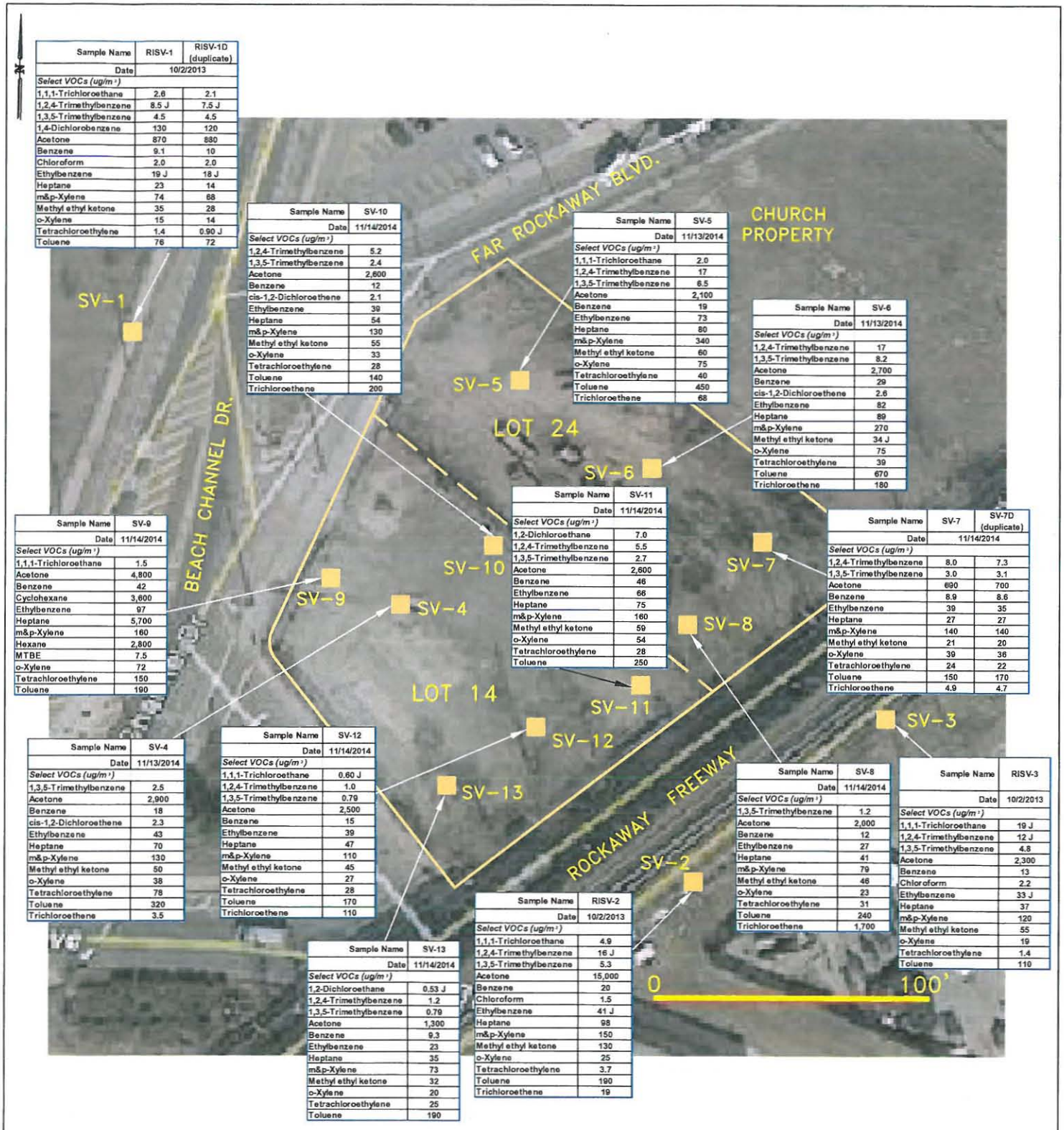
FPM GROUP

INTERMEDIATE GROUNDWATER DATA MAP

34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn By: H.C. | Checked By: S.D. | Date: 1/6/2015

H:\ALPROF\RI FIGURES\INTER_ GW DATA MAP.dwg, 1/6/2015 12:46:11 PM, 8 1/2x11



Sample Name	RISV-1	RISV-1D (duplicate)
Date	10/2/2013	
Select VOCs (ug/m³)		
1,1,1-Trichloroethane	2.6	2.1
1,2,4-Trimethylbenzene	8.5 J	7.5 J
1,3,5-Trimethylbenzene	4.5	4.5
1,4-Dichlorobenzene	130	120
Acetone	870	880
Benzene	9.1	10
Chloroform	2.0	2.0
Ethylbenzene	19 J	18 J
Heptane	23	14
m&p-Xylene	74	68
Methyl ethyl ketone	35	28
o-Xylene	15	14
Tetrachloroethylene	1.4	0.90 J
Toluene	76	72

Sample Name	SV-10
Date	11/14/2014
Select VOCs (ug/m³)	
1,2,4-Trimethylbenzene	5.2
1,3,5-Trimethylbenzene	2.4
Acetone	2,600
Benzene	12
cis-1,2-Dichloroethene	2.1
Ethylbenzene	39
Heptane	54
m&p-Xylene	130
Methyl ethyl ketone	55
o-Xylene	33
Tetrachloroethylene	28
Toluene	140
Trichloroethene	200

Sample Name	SV-5
Date	11/13/2014
Select VOCs (ug/m³)	
1,1,1-Trichloroethane	2.0
1,2,4-Trimethylbenzene	17
1,3,5-Trimethylbenzene	6.5
Acetone	2,100
Benzene	19
Ethylbenzene	73
Heptane	80
m&p-Xylene	340
Methyl ethyl ketone	60
o-Xylene	75
Tetrachloroethylene	40
Toluene	450
Trichloroethene	68

Sample Name	SV-6
Date	11/13/2014
Select VOCs (ug/m³)	
1,2,4-Trimethylbenzene	17
1,3,5-Trimethylbenzene	8.2
Acetone	2,700
Benzene	29
cis-1,2-Dichloroethene	2.6
Ethylbenzene	82
Heptane	89
m&p-Xylene	270
Methyl ethyl ketone	34 J
o-Xylene	75
Tetrachloroethylene	39
Toluene	670
Trichloroethene	180

Sample Name	SV-9
Date	11/14/2014
Select VOCs (ug/m³)	
1,1,1-Trichloroethane	1.5
Acetone	4,800
Benzene	42
Cyclohexane	3,600
Ethylbenzene	97
Heptane	5,700
m&p-Xylene	160
Hexane	2,800
MTBE	7.5
o-Xylene	72
Tetrachloroethylene	150
Toluene	190

Sample Name	SV-11
Date	11/14/2014
Select VOCs (ug/m³)	
1,2-Dichloroethane	7.0
1,2,4-Trimethylbenzene	5.5
1,3,5-Trimethylbenzene	2.7
Acetone	2,600
Benzene	46
Ethylbenzene	66
Heptane	75
m&p-Xylene	160
Methyl ethyl ketone	59
o-Xylene	54
Tetrachloroethylene	28
Toluene	250

Sample Name	SV-7	SV-7D (duplicate)
Date	11/14/2014	
Select VOCs (ug/m³)		
1,2,4-Trimethylbenzene	8.0	7.3
1,3,5-Trimethylbenzene	3.0	3.1
Acetone	690	700
Benzene	8.9	8.6
Ethylbenzene	39	35
Heptane	27	27
m&p-Xylene	140	140
Methyl ethyl ketone	21	20
o-Xylene	39	36
Tetrachloroethylene	24	22
Toluene	150	170
Trichloroethene	4.9	4.7

Sample Name	SV-4
Date	11/13/2014
Select VOCs (ug/m³)	
1,3,5-Trimethylbenzene	2.5
Acetone	2,900
Benzene	18
cis-1,2-Dichloroethene	2.3
Ethylbenzene	43
Heptane	70
m&p-Xylene	130
Methyl ethyl ketone	50
o-Xylene	38
Tetrachloroethylene	78
Toluene	320
Trichloroethene	3.5

Sample Name	SV-12
Date	11/14/2014
Select VOCs (ug/m³)	
1,1,1-Trichloroethane	0.60 J
1,2,4-Trimethylbenzene	1.0
1,3,5-Trimethylbenzene	0.79
Acetone	2,500
Benzene	15
Ethylbenzene	39
Heptane	47
m&p-Xylene	110
Methyl ethyl ketone	45
o-Xylene	27
Tetrachloroethylene	28
Toluene	170
Trichloroethene	110

Sample Name	SV-8
Date	11/14/2014
Select VOCs (ug/m³)	
1,3,5-Trimethylbenzene	1.2
Acetone	2,000
Benzene	12
Ethylbenzene	27
Heptane	41
m&p-Xylene	79
Methyl ethyl ketone	46
o-Xylene	23
Tetrachloroethylene	31
Toluene	240
Trichloroethene	1,700

Sample Name	RISV-3
Date	10/2/2013
Select VOCs (ug/m³)	
1,1,1-Trichloroethane	19 J
1,2,4-Trimethylbenzene	12 J
1,3,5-Trimethylbenzene	4.8
Acetone	2,300
Benzene	13
Chloroform	2.2
Ethylbenzene	33 J
Heptane	37
m&p-Xylene	120
Methyl ethyl ketone	55
o-Xylene	19
Tetrachloroethylene	1.4
Toluene	110

Sample Name	RISV-2
Date	10/2/2013
Select VOCs (ug/m³)	
1,1,1-Trichloroethane	4.9
1,2,4-Trimethylbenzene	16 J
1,3,5-Trimethylbenzene	5.3
Acetone	15,000
Benzene	20
Chloroform	1.5
Ethylbenzene	41 J
Heptane	98
m&p-Xylene	150
Methyl ethyl ketone	130
o-Xylene	25
Tetrachloroethylene	3.7
Toluene	190
Trichloroethene	19

Sample Name	SV-13
Date	11/14/2014
Select VOCs (ug/m³)	
1,2-Dichloroethane	0.53 J
1,2,4-Trimethylbenzene	1.2
1,3,5-Trimethylbenzene	0.79
Acetone	1,300
Benzene	9.3
Ethylbenzene	23
Heptane	35
m&p-Xylene	73
Methyl ethyl ketone	32
o-Xylene	20
Tetrachloroethylene	25
Toluene	190

LEGEND:

SOIL VAPOR SAMPLE LOCATIONS WITH SELECT VOC DETECTIONS

FIGURE 8

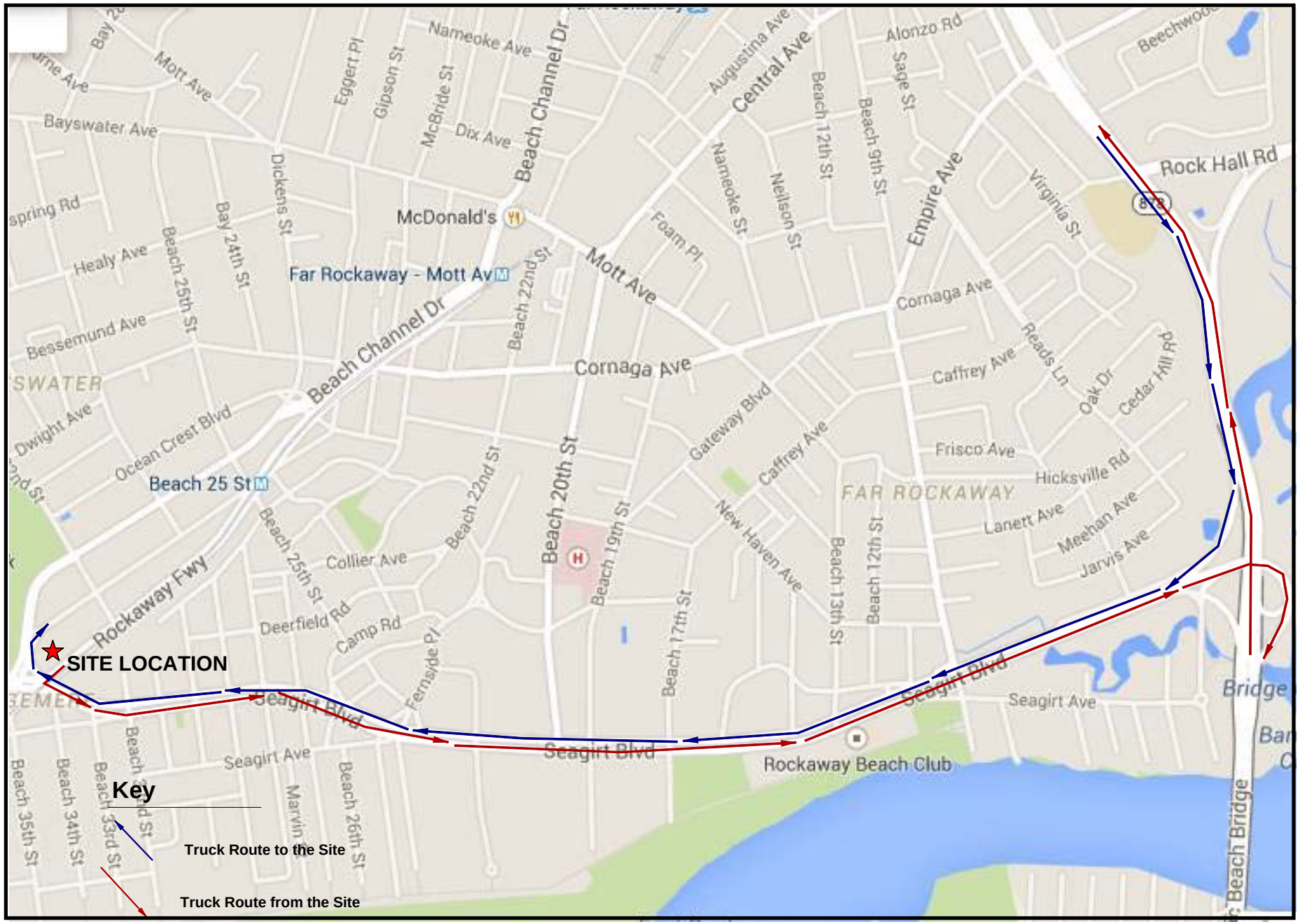
FPM GROUP

SOIL VAPOR DATA MAP

34-11 BEACH CHANNEL DRIVE SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn By: H.C. | Checked By: S.D. | Date: 1/6/2015

H:\ALPROF\RI FIGURES\SOIL VAPOR DATA MAP.dwg, 1/6/2015 1:53:24 PM, 8 1/2x11



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD. RIDGE. NY 11961
Phone 631.504.6000
Fax 631.924.2780

34-11 BEACH CHANNEL DRIVE SITE
34-11 BEACH CHANNEL DRIVE, QUEENS, NY

FIGURE 9 TRUCK ROUTES

EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924 .2870

FIGURE 10

Site Address: 34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

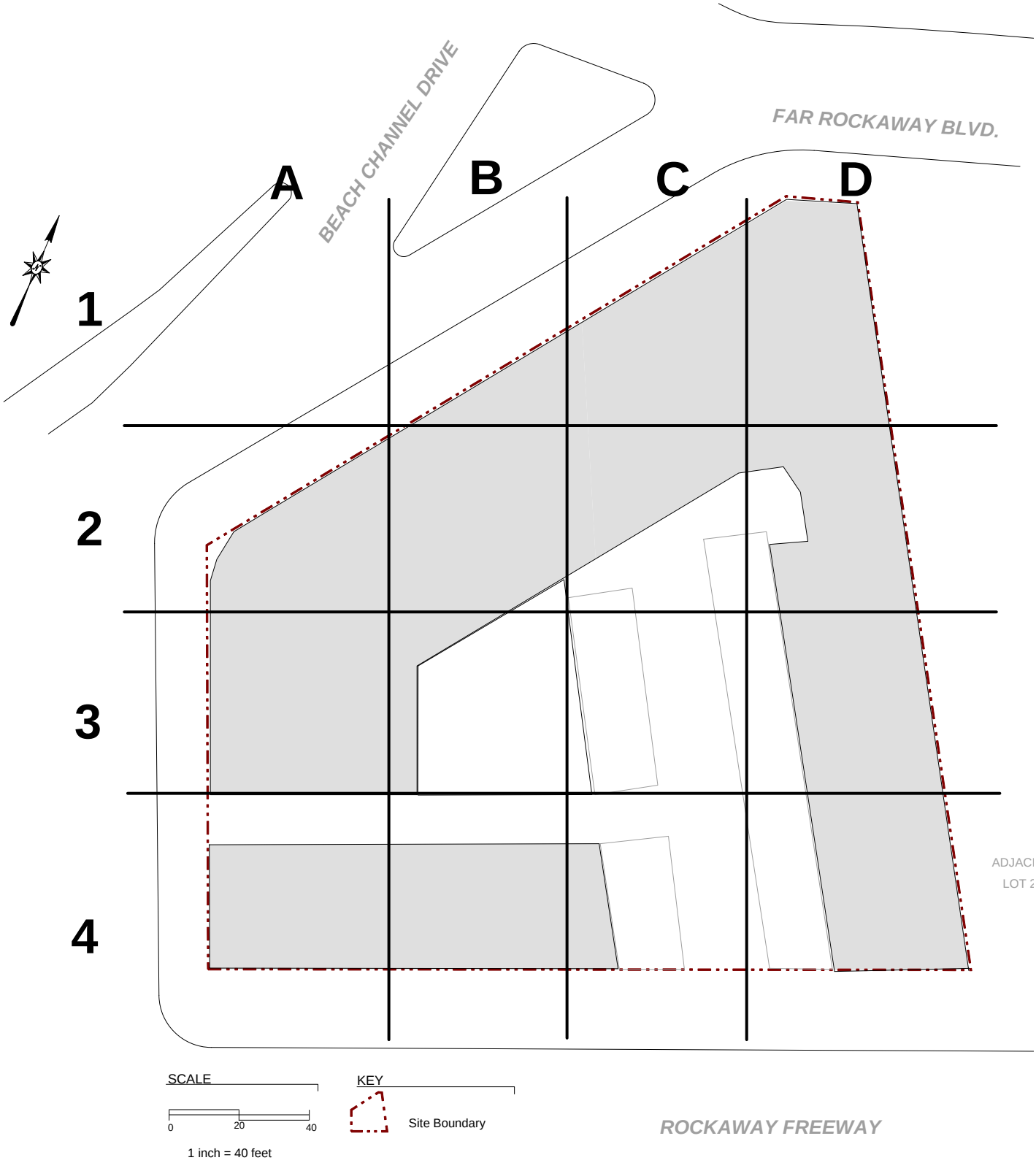
Drawing Title: Excavation Plan

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FIGURE 11

SITE ADDRESS: 34-11 BEACH CHANNEL DRIVE SITE
34-11 BEACH CHANNEL DRIVE, QUEENS, NY

DRAWING TITLE: END POINT SAMPLING LOCATIONS

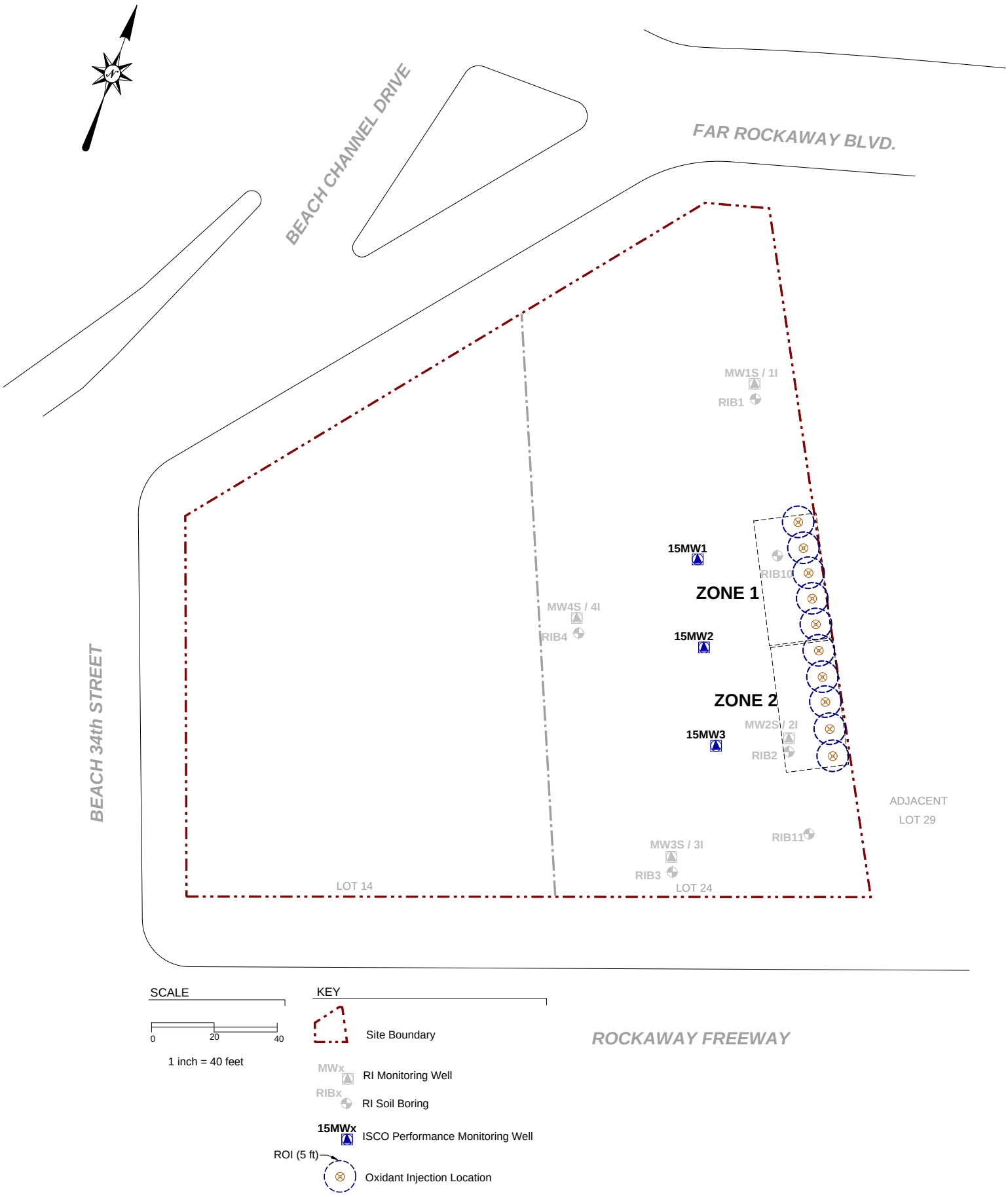


EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FIGURE 12

SITE ADDRESS: 34-11 BEACH CHANNEL DRIVE SITE
34-11 BEACH CHANNEL DRIVE, QUEENS, NY

DRAWING TITLE: ALPHA - NUMERIC GRID MAP



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FIGURE 13

Site Address: 34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

Drawing Title: Chemical Oxidant Injection Plan

ATTACHMENT A
Metes and Bounds Description of Property

LOT 14

BEGINNING at the corner formed by the Intersection of the southerly side of Far Rockaway Boulevard with the easterly side of Seagirt Avenue known as Seagirt Avenue:

RUNNING THENCE easterly along the southerly side of Far Rockaway Boulevard a distance of 124.61 feet;

THENCE southerly on a line forming an Interior angle of62 degrees 16 minutes 08 seconds with the southerly side of Far Rockaway Boulevard a distance of 185.98 feet to the land now or formerly of the Long Island Railroad Company;

THENCE westerly along said land now or formerly of the long Island Railroad Company on 8 line forming an Interior angle of 86 degrees 38 minutes 00 seconds with the preceding course a distance of 117.61 feet to the easterly side of Seagirt Avenue;

THENCE northerly along the easterly side of Seagirt Avenue a distance of 121.33 feet to the corner aforesaid at the point or place of BEGINNING.

SAID PREMISES being known as 34·14 Seagirt Boulevard and 34·11 Far Rockaway Boulevard, Far Rockaway, New York.

LOT 24

All that / those certain piece/s or parcel/s of land together with any improvements thereof situate, lying and being in the Borough of Queens, City and State of New York, designated on the Tax Map of the City of New York for the Borough of Queens, as said Tax Map was on April 11, 1978.

Block 15950, Lot 24

ATTACHMENT B
Health and Safety Plan

34-11 BEACH CHANNEL DRIVE SITE

34-11 BEACH CHANNEL DRIVE, QUEENS, NEW YORK
Block 15950 Lots 14 and 24

CONSTRUCTION HEALTH AND SAFETY PLAN

FEBRUARY 2015

Prepared By:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS

1808 Middle Country Road
Ridge, NY 11961

HEALTH AND SAFETY PLAN

Site:	**Redevelopment Project**
Location:	**34-11 Beach Channel Drive, Queens, NY**
Prepared By:	**ENVIRONMENTAL BUSINESS CONSULTANTS**
Date Prepared:	**February - 2015**
Version:	**1**
Revision:	**0**

Project Description:

Waste types:	Solid, vapor, groundwater
Characteristics:	SVOCs (PAHs) and Metals in historic fill (From grade to depths as great as 5 feet), CVOCs in soil vapor, VOCs and CVOCs in groundwater.
Overall Hazard:	Low

ENVIRONMENTAL BUSINESS CONSULTANTS (EBC) AND EBC'S SUBCONTRACTORS DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION.

CONSTRUCTION HEALTH AND SAFETY PLAN
Table of Contents

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY11961
Phone 631.604.4000
Fax 631.924.2870

Table of Contents (Continued)

FIGURES

APPENDICES

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD RIDGE, NY11961
PHONE 631.604.4000
FAX 631.924.2870

STATEMENT OF COMMITMENT

This Construction Health and Safety Plan (CHASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Activities planned for 34-11 Beach Channel Drive, Queens, New York.

This CHASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This CHASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. The General Contractor and their subcontractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees. The General contractor has the option of adopting this CHASP or providing its own for the planned scope of work under the Remedial Action Plan.

1.0 INTRODUCTION

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for implementation of a Remedial Action Plan at a Redevelopment Project located at 34-11 Beach Channel Drive, Queens, New York, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during the removal of underground storage tanks and the excavation and loading of contaminated soil. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The CHASP may be revised by EBC at the request of the Developer and/or the New York State Department of Environmental Conservation (NYCDEC) upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's Project Manager, site safety officer and/or the EBC Health and Safety Consultant.

1.1 Scope

This CHASP addresses the potential hazards related to the site Remedial Action Plan (RAP). The RAP activities are as described below:

1) Site mobilization of General Contractor (GC) and Subcontractors to install the buildings' foundations.
    a) Excavate historic fill required for construction of the new proposed building.

1.2 Application

The CHASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- General Contractor
- EBC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the CHASP. Amendments to the CHASP are acknowledged by completing forms included in **Appendix B**.

1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Construction Health and Safety Plan are:

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Name	Title	Address	Contact Numbers
Mr. Robert Bennett	EBC Project Manager	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000
Mr. Kevin Waters	EBC Site Safety Officer	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this CHASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this CHASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.

6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located in Queens County, New York City, New York and is identified as Block 15950 Lots 14 and 24 on the New York City Tax Map. A United States Geological Survey (USGS) topographical quadrangle map shows the Site location. The Site consists of a two tax parcels totaling 36,657 sf (0.84-acre) and is bounder by Far Rockaway Boulevard to the north and northwest, Beach Channel Drive to the northwest, Rockaway Expressway and the Manhattan Transit Authority A-Line to the south, and a vacant lot (Lot 29) to the east. There are no structures present on either lot and both lots are currently being used by a waste transporting company, PCI Contracting, for the storage of roll-off containers.

2.1 Remedial Investigation

A Remedial Investigation was completed at the Site by FPM Group (FPM) from July 2013 through November 2014. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- Sampling for non-petroleum contaminants such as pesticides, PCBs and metals in soil and groundwater including the analysis of soil and groundwater samples
- Soil sampling and analysis for petroleum compounds in soil samples from soil boring locations;
- The installation of groundwater monitoring wells
- The collection and analysis of groundwater samples for petroleum compounds;
- The collection of analysis of soil gas and indoor air samples for VOCs from soil gas sampling locations.

The field work portion of the RI was initially performed by FPM in July and November 2013 with a secondary mobilization in November 2014. The results of sampling performed during the RI identified fill materials containing elevated levels of metals throughout the Site at a depth which ranged 1 to 5 feet below grade.

In addition CVOCs were documented in soils at depth along a 110 ft strip near the Lot 24 eastern property line and extending up to 45 feet onto the Site. The contamination was reported in clay and sand units from 21 to 28 feet below grade extending to a deeper clay unit at 39 feet at one location closest to the east property line.

Based on the groundwater flow direction and distribution, a CVOC groundwater plume appears to be migrating onto the property from a known source on the adjacent property to the east (upgradient). CVOCs are either off-gassing from affected groundwater beneath the site, or migrating onto the site in vapor form.

Qualitative Human Health Exposure Assessment
The qualitative exposure assessment identified potential completed routes of exposure to construction workers and remediation workers through inhalation, ingestion and dermal contact

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

during excavation activities. The Health and Safety Plan prepared for the site identifies such exposures and provides instructions for on-site workers to minimize potential exposure. Occupants in the proposed on-site residential buildings may be exposed to CVOCs originating from an off-site source through the vapor intrusion pathway if preventive measures are not incorporated into the design of the new building.

Potential environmental impacts through the groundwater to surface water discharge are unlikely based on the concentration of CVOCs in groundwater and the distance to the Harlem River (approximately 1,700 feet).

2.2 Redevelopment Plans

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. The Remedial Action contemplated under this RAWP will be implemented as part of the proposed redevelopment plan.

The site is to be redeveloped through the new construction of a single 6-7-story apartment building with 4,500 sf of retail space, 4,500 sf of community space and 16,120 sf of residential facility / service space on the first floor and 148,368 sf of residential space (154 apartments) on floors 2 through 7.

2.3 Description of Remedial Action Plan

Site activities included within the Remedial Action Plan that are included within the scope of this CHASP include the following:

The proposed remedial action will consist of:

1. Removal of underground storage tanks (USTs) from Lot 14, and the removal remediation of any grossly contaminated soil and groundwater resulting from leakage of the UST, if present;
2. Excavation of soil/fill as needed for the construction of the new buildings foundation to a minimum depth of 2 feet below grade. ;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 4 Restricted Residential Use SCOs;
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
6. Import of materials to be used for backfill and cover in compliance with Appendix 5 of DER-10: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. Perform in-situ chemical oxidation (ISCO) to treat CVOCs in soil and groundwater at the eastern property line;
8. All future on-site buildings constructed at the Site will have a subslab depressurization systems (SSDS), or similar engineered system to prevent the migration of vapors into the buildings.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

9. A site cover will be constructed to allow for restricted residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable SCOs. Where the soil cover is required, it will be a minimum of two feet of soil meeting the SCOs in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer;
10. Implementation of a Site Management Plan (SMP) for long term maintenance of the Institutional and Engineering Controls.
11. An Environmental Easement will be filed against the Site to ensure implementation of the SMP.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.1 Physical Hazards

3.1.1 Tripping Hazards

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Climbing Hazards

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

3.1.3 Cuts and Lacerations

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

3.1.4 Lifting Hazards

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.5 Utility Hazards

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.6 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
    a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
    b. Work in Pairs. Individuals should avoid undertaking any activity alone.
    c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
    d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
    a Heat Rash (or prickly heat):
        Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
        Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
        Treatment: Remove source or irritation and cool skin with water or wet cloths.

    b. Heat Cramps (or heat prostration)
        Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
        Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.
        Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.
    c. Heat Stroke
        Cause: Same as heat exhaustion. This is also an extremely serious condition.
        Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.
        Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

3.3 Chemical Hazards

Soil collected from the site as part of several subsurface investigations performed at the site have revealed elevated levels of metals and SVOCs in historic fill, elevated levels of VOCs in groundwater and elevated levels of CVOCs in soil vapor.

Metals reported to be present at elevated concentrations in historic fill materials at the Site include the following:

Chromium	Copper	Mercury	Nickel	Zinc

SVOCs reported to be present at elevated concentrations in historic fill materials at the Site include the following:

Ideno (1,2.3-cd)pyrene

VOCs reported to be present at elevated concentrations in groundwater at the Site include the following:

Benzene	Chloroethane	Cis-1,2-dichloroethene	MTBE	Toluene	Trans-1,2-dichloroethene
Vinyl Chloride	Trichloroethene				

CVOCs reported to be present at elevated concentrations in soil vapor at the Site include the following:

Trichloroethene	Tetrachloroethene

The primary routes of exposure to identified contaminants in soil to on-site construction workers are through inhalation, ingestion and absorption.

Appendix C includes information sheets for all detected chemicals that may be encountered at the site.

3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m3 over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150 $\mu g/m^3$ over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

3.3.3 Organic Vapors

Although no VOCs were detected within any of the soil samples collected at the Site, the site safety officer will periodically monitor organic vapors with a Photo-ionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work clothes, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when sustained concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), by more than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection, engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

1 The SSO will be consulted immediately
2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
3 Monitoring will be continued until intrusive work resumes.

5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	• Continue excavating • Level D protection • Continue monitoring every 10 minutes
1-5 ppm Above Background, Sustained Reading	1-10%	• Continue excavating • Go to Level C protection or employ

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

		engineering controls • Continue monitoring every 10 minutes
5-25 ppm Above Background, Sustained Reading	10-20%	• Discontinue excavating, unless PID is only action level exceeded. • Level C protection or employ engineering controls • Continue monitoring for organic vapors 200 ft downwind • Continuous monitoring for LEL at excavation pit
>25 ppm Above Background, Sustained Reading	>20%	• Discontinue excavating • Withdraw from area, shut off all engine ignition sources. • Allow pit to vent • Continuous monitoring for organic vapors 200 ft downwind.

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less then 5 ppm (see Community Air Monitoring Plan).

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

6.0 SITE CONTROL

6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book.

Due to the dimensions of the Site and the work area, it is expected that an exclusion zone will include the entire fenced area with the exception of the construction entrance area, which will serve as the decontamination zone. A support zone if needed will be located outside of the fenced area. All onsite workers who will come into contact with hazardous materials must provide evidence of OSHA 24 or 40-hour Hazardous Waste Operations and Emergency Response Operations training to conduct work within the exclusion zone established by the site safety officer. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer, if provided.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

7.1 Emergency Equipment On-site

Private telephones:	Site personnel.
Two-way radios:	Site personnel where necessary.
Emergency Alarms:	On-site vehicle horns*.
First aid kits:	On-site, in vehicles or office.
Fire extinguisher:	On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

7.2 Emergency Telephone Numbers

General Emergencies	911
Suffolk County Police	911
NYC Fire Department	911
St Johns Episcopal Hospital Emergency	(718) 869-7000
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(518) 402-9690
NYSDOH Project Manager	(718) 402-7860
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	1-631-504-6000
Site Safety Officer	1-631-504-6000

7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

- Determine the cause of incidents and make recommendations to prevent recurrence; and,

- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager Mr. Robert Bennett (631) 504-6000
- Site Safety Officer Mr. Kevin Waters (631) 504-6000

7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**).and information on the chemical(s) to which they may have been exposed (**Appendix C**).

7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

APPENDIX A

SITE SAFETY ACKNOWLEDGEMENT FORM

DAILY BREIFING SIGN-IN SHEET

Date:_____ Person Conducting Briefing:_____

Project Name and Location:_____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc…):

_____

_____

_____

_____

2. OTHER ISSUES (HASP changes, attendee comments, etc…):

_____

_____

_____

3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

APPENDIX B

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT FORM

Site Safety Plan Amendment #: _____

Site Name: _____

Reason for Amendment: _____

_____

_____

_____

Alternative Procedures: _____

_____

_____

_____

Required Changes in PPE: _____

_____

_____

_____

_____ _____

Project Superintendent (signature) **Date**

_____ _____

Health and Safety Consultant (signature) **Date**

_____ _____

Site Safety Officer (signature) **Date**

APPENDIX C

CHEMICAL HAZARDS

CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

International Chemical Safety Cards

TOLUENE

ICSC: 0078

Methylbenzene
Toluol
Phenylmethane
$C_6H_5CH_3$ / C_7H_8
Molecular mass: 92.1

ICSC # 0078
CAS # 108-88-3
RTECS # XS5250000
UN # 1294
EC # 601-021-00-3
October 10, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•**INHALATION**	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•**SKIN**	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•**EYES**	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II

ICSC: 0078

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TOLUENE

ICSC: 0078

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 50 ppm 190 mg/m³ H
Peak limitation category: II(4) Pregnancy risk group: C (DFG 2004).
OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
NIOSH IDLH: 500 ppm See: 108883

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmiaandunconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 111°C
Melting point: -95°C
Relative density (water = 1): 0.87
Solubility in water: none
Vapour pressure, kPa at 25°C: 3.8
Relative vapour density (air = 1): 3.1
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
Flash point: 4°C c.c.
Auto-ignition temperature: 480°C
Explosive limits, vol% in air: 1.1-7.1
Octanol/water partition coefficient as log Pow: 2.69

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1294
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

Material Safety Data Sheet

Version 4.2
Revision Date 01/19/2011
Print Date 12/07/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	*trans*-1,2-Dichloroethene
Product Number	:	48527
Brand	:	Supelco
Product Use	:	For laboratory research purposes.

Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA	Manufacturer	: Sigma-Aldrich Corporation 3050 Spruce St. St. Louis, Missouri 63103 USA
Telephone	:	+1 800-325-5832		
Fax	:	+1 800-325-5052		
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555		
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956		

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Harmful by ingestion., Irritant

Target Organs

Central nervous system, Liver, Kidney

GHS Classification
Flammable liquids (Category 2)
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Oral (Category 4)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Acute aquatic toxicity (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H302 + H332	Harmful if swallowed or if inhaled.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H402	Harmful to aquatic life.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	Harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : *trans*-1,2-Dichloroethene
trans-1,2-Dichloroethylene
trans-Acetylene dichloride

Formula : $C_2H_2Cl_2$ $C_2H_2Cl_2$
Molecular Weight : 96.94 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
trans-Dichloroethylene			
156-60-5	205-860-2	602-026-00-3	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Carbon oxides, Phosgene gas
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
trans-Dichloroethylene	156-60-5	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Eye irritation			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid, clear
Colour	light yellow

Safety data

pH	no data available
Melting/freezing point	Melting point/range: -50 °C (-58 °F)
Boiling point	48 °C (118 °F)
Flash point	6.0 °C (42.8 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	9.7 %(V)
Upper explosion limit	12.8 %(V)
Vapour pressure	no data available
Density	1.257 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Oxidizing agents, Bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Carbon oxides, Phosgene gas
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 1,235 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 24100 ppm

Remarks: Behavioral:Somnolence (general depressed activity).

Dermal LD50
LD50 Dermal - rabbit - > 5,000 mg/kg
Remarks: Prolonged skin contact may cause skin irritation and/or dermatitis. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
prolonged or repeated exposure can cause:, narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information

RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 220.00 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE
Marine pollutant: No

IATA
UN-Number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Harmful by ingestion., Irritant

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

cis-1,2-Dichloroethylene, 97%

ACC# 97773

Section 1 - Chemical Product and Company Identification

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers: AC113380000, AC113380025, AC113380100
Synonyms: cis-Acetylene dichloride.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
156-59-2	cis-1,2-Dichloroethylene	97	205-859-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
Chronic: Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

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. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 6 deg C (42.80 deg F)
Autoignition Temperature: 440 deg C (824.00 deg F)
Explosion Limits, Lower:9.70 vol %
Upper: 12.80 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

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. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm TWA	none listed	none listed

OSHA Vacated PELs: cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Pleasant odor
pH: Not available.
Vapor Pressure: 201 mm Hg @ 25 deg C
Vapor Density: 3.34 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 60 deg C @ 760 mm Hg
Freezing/Melting Point:-80 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.2800
Molecular Formula:C2H2Cl2
Molecular Weight:96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 156-59-2: KV9420000
LD50/LC50:
CAS# 156-59-2:
Inhalation, rat: LC50 = 13700 ppm;
.

Carcinogenicity:
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

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

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	1,2-DICHLOROETHYLENE
Hazard Class:		3
UN Number:		UN1150
Packing Group:		II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 156-59-2 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.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
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# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

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:
XN F
Risk Phrases:

R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 156-59-2: No information available.

Canada - DSL/NDSL

CAS# 156-59-2 is listed on Canada's NDSL List.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 2/09/1998
Revision #5 Date: 3/16/2007

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
Acetylene trichloride
C_2HCl_3 / $ClCH=CCl_2$
Molecular mass: 131.4

ICSC # 0081
CAS # 79-01-6
RTECS # KX4550000
UN # 1710
EC # 602-027-00-9
April 10, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs . Dry. Keep in the dark. Ventilation along the floor. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0081 OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene , hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2007).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)
NIOSH REL: Ca See Appendix A See Appendix C
NIOSH IDLH: Ca 1000 ppm See: 79016

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 87°C
Melting point: -73°C
Relative density (water = 1): 1.5
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 7.8
Relative vapour density (air = 1): 4.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3
Auto-ignition temperature: 410°C
Explosive limits, vol% in air: 8-10.5
Octanol/water partition coefficient as log Pow: 2.42
Electrical conductivity: 800pS/m

ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-61S1710

NFPA Code: H2; F1; R0;
Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response.
Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.

ADDITIONAL INFORMATION

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
C_2Cl_4 / $Cl_2C=CCl_2$
Molecular mass: 165.8

ICSC # 0076
CAS # 127-18-4
RTECS # KX3850000
UN # 1897
EC # 602-028-00-4
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles , face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Separated from metals ,(see Chemical Dangers), food and feedstuffs . Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0076

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
NIOSH IDLH: Ca 150 ppm See: 127184

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 121°C
Melting point: -22°C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20°C: 0.015

Vapour pressure, kPa at 20°C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

METHYL TERT-BUTYL ETHER

ICSC: 1164

tert-Butyl methyl ether
MTBE
Methyl-1,1-dimethylethyl ether
2-Methoxy-2-methyl propane
$(CH_3)_3COCH_3$ / $C_5H_{12}O$
Molecular mass: 88.2

ICSC # 1164
CAS # 1634-04-4
RTECS # KN5250000
UN # 2398
EC # 603-181-00-X
November 04, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Drowsiness. Dizziness. Headache. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety goggles or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants, strong acids.	F symbol Xi symbol R: 11-38 S: 2-9-16-24 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1164

International Chemical Safety Cards

METHYL TERT-BUTYL ETHER

ICSC: 1164

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire hazard. The substance decomposes on contact with acids.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; A3; (ACGIH 2004).
MAK: 50 ppm, 180 mg/m³;
Peak limitation category: I(1.5); Carcinogen category: 3B; Pregnancy risk group: C;
(DFG 2004).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the skin. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure far above the OEL could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES

Boiling point: 55°C
Melting point: -109°C
Relative density (water = 1): 0.7
Solubility in water, g/100 ml at 20°C: 4.2
Vapour pressure, kPa at 20°C: 27
Relative vapour density (air = 1): 3.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.5
Flash point:
-28°C c.c.
Auto-ignition temperature: 375°C
Explosive limits, vol% in air: 1.6-15.1
Octanol/water partition coefficient as log Pow: 1.06

ENVIRONMENTAL DATA

It is strongly advised not to let the chemical enter into the environment because it persists in the environment.

NOTES

Much less likely to form peroxides than other ethers. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-30GF1-I+II

ADDITIONAL INFORMATION

International Chemical Safety Cards

1-CHLOROETHANE

ICSC: 0132

Ethyl chloride
Monochloroethane
C_2H_5Cl / CH_3CH_2Cl
Molecular mass: 64.5
(cylinder)

ICSC # 0132
CAS # 75-00-3
RTECS # KH7525000
UN # 1037
EC # 602-009-00-0
October 04, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding) if in liquid state. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water.
EXPOSURE		STRICT HYGIENE!	
•INHALATION	Dizziness. Dullness. Headache. Abdominal cramps.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain. Blurred vision.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Personal protection: self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Fireproof.	Special insulated cylinder. Special fittings. F+ symbol Xn symbol R: 12-40-52/53 S: 2-9-16-33-36/37-61 UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

1-CHLOROETHANE

ICSC: 0132

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance decomposes on heating or on burning producing toxic gases (hydrogen chloride - see ICSC 0163, phosgene - see ICSC 0007).

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 100 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
EU OEL: 268 mg/m³; 1200 ppm as TWA (EU 2006).
OSHA PEL: TWA 1000 ppm (2600 mg/m^3)
NIOSH REL: Handle with caution in the workplace. See Appendix C (Chloroethanes)
NIOSH IDLH: 3800 ppm 10%LEL See: 75003

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is mildly irritating to the eyes , the skin and the respiratory tract . Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system . Exposure far above the OEL may result in unconsciousness , cardiac dysrhythmia and death .

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES

Boiling point: 12.5°C
Melting point: -138°C
Relative density (water = 1): 0.918
Solubility in water, g/100 ml at 20°C: 0.574
Vapour pressure, kPa at 20°C: 133.3
Relative vapour density (air = 1): 2.22

Flash point:
-50°C c.c.
Auto-ignition temperature: 519°C
Explosive limits, vol% in air: 3.6-14.8
Octanol/water partition coefficient as log Pow: 1.54

ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms.

N O T E S

Use of alcoholic beverages enhances the harmful effect. Rinse contaminated clothes (fire hazard) with plenty of water. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Card has been partly updated in April 2005: see sections Occupational Exposure Limits, Emergency Response. Card has been partly updated in October 2006: see section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1037 or 20G2F

NFPA Code: H 2; F 4; R 0;

ADDITIONAL INFORMATION

International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082

Chloroethene
Chloroethylene
VCM
C_2H_3Cl / $H_2C=CHCl$
Molecular mass: 62.5
(cylinder)

ICSC # 0082
CAS # 75-01-4
RTECS # KU9625000
UN # 1086 (stabilized)
EC # 602-023-00-7
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Protective gloves. Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from incompatible materials .(See Chemical Dangers.) Cool. Store only if stabilized.	Note: D F+ symbol T symbol R: 45-12 S: 53-45 UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0082

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.

CHEMICAL DANGERS:
The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride , phosgene). Attacks iron and steel in the presence of moisture.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 1;
(DFG 2004).
OSHA PEL: 1910.1017 TWA 1 ppm C 5 ppm 15-minute
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca N.D. See: IDLH INDEX

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes . The liquid may cause frostbite. The substance may cause effects on the central nervous system . Exposure could cause lowering of consciousness. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, spleen, blood andperipheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: -13°C
Melting point: -154°C
Relative density (water = 1): 0.9 (liquid)
Density: 8 (vapour) at 15°C
g/l
Solubility in water:
none

Relative vapour density (air = 1): 2.2
Flash point:
-78°C c.c.
Auto-ignition temperature: 472°C
Explosive limits, vol% in air: 3.6-33
Octanol/water partition coefficient as log Pow: 0.6

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to ground water contamination.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1086

NFPA Code: H 2; F 4; R 2;

ADDITIONAL INFORMATION

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # NK9300000
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

I **M** **P**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:**

O R T A N T D A T A	**CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004).	Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 536°C Melting point: 164°C Solubility in water: none	Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish. 	

N O T E S

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730 **INDENO(1,2,3-cd)PYRENE**

International Chemical Safety Cards

NICKEL

ICSC: 0062

Ni
Atomic mass: 58.7
(powder)

ICSC # 0062
CAS # 7440-02-0
RTECS # QR5950000
EC # 028-002-00-7
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
•INHALATION	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0062

International Chemical Safety Cards

NICKEL

ICSC: 0062

I

PHYSICAL STATE; APPEARANCE:
SILVERY METALLIC SOLID IN VARIOUS FORMS.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of the dust.

IMPORTANT DATA	Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (Inhalable fraction) 1.5 mg/m³ as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004). MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah); Carcinogen category: 1; (DFG 2004). OSHA PEL*†: TWA 1 mg/m^3 *Note: The PEL does not apply to Nickel carbonyl. NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A *Note: The REL does not apply to Nickel carbonyl. NIOSH IDLH: Ca 10 mg/m^3 (as Ni) See: 7440020	**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation. Inhalation of fumes may cause pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 2730°C Melting point: 1455°C Density: 8.9 g/cm3	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

ADDITIONAL INFORMATION

ICSC: 0062 **NICKEL**

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

Blue powder
Merrillite
Zn
Atomic mass: 65.4
(powder)

ICSC # 1205
CAS # 7440-66-6
RTECS # ZG8600000
UN # 1436 (zinc powder or dust)
EC # 030-001-00-1
October 24, 1994 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•**INHALATION**	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
•**SKIN**	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
•**EYES**		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
ODOURLESS GREY TO BLUE POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of fumes may cause metal fume fever. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 907°C
Melting point: 419°C
Relative density (water = 1): 7.14
Solubility in water: reaction
Vapour pressure, kPa at 487°C: 0.1
Auto-ignition temperature: 460°C

ENVIRONMENTAL DATA

N O T E S

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R1;

ADDITIONAL INFORMATION

ICSC: 1205 **ZINC POWDER**

International Chemical Safety Cards

COPPER

ICSC: 0240

Cu
(powder)

ICSC # 0240
CAS # 7440-50-8
RTECS # GL5325000
September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0240

International Chemical Safety Cards

COPPER

ICSC: 0240

I

M

P

PHYSICAL STATE; APPEARANCE:
RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

O **R** **T** **A** **N** **T** **D** **A** **T** **A**	Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.2 mg/m³ fume (ACGIH 1992-1993). TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993). Intended change 0.1 mg/m³ Inhal., A4 (not classifiable as a human carcinogen); MAK: 0.1 mg/m³ (Inhalable fraction) Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005). OSHA PEL*: TWA 1 mg/m^3 *Note: The PEL also applies to other copper compounds (as Cu) except copper fume. NIOSH REL*: TWA 1 mg/m^3 *Note: The REL also applies to other copper compounds (as Cu) except Copper fume. NIOSH IDLH: 100 mg/m^3 (as Cu) See: 7440508	**EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of fumes may cause metal fume fever. See Notes. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

The symptoms of metal fume fever do not become manifest until several hours.

ADDITIONAL INFORMATION

ICSC: 0240 **COPPER**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•**INHALATION**	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•**SKIN**		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•**EYES**	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

I

M

P

PHYSICAL STATE; APPEARANCE:
GREY POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

ROUTES OF EXPOSURE:

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

O R T A N T D A T A	**CHEMICAL DANGERS:** Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m^3 See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m^3 See Appendix C NIOSH IDLH: 250 mg/m^3 (as Cr) See: 7440473 **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation tothe eyesandthe respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³ Solubility in water: none
ENVIRONMENTAL DATA	

N O T E S

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

ICSC: 0029 **CHROMIUM**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 0.1 mg/m³ Sh
Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003).
OSHA PEL†: C 0.1 mg/m^3
NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 skin
Other: C 0.1 mg/m^3 skin
NIOSH IDLH: 10 mg/m^3 (as Hg) See: 7439976

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour!

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous systemandkidneys. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 357°C
Melting point: -39°C
Relative density (water = 1): 13.5
Solubility in water:
none

Vapour pressure, Pa at 20°C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

ICSC: 0056 **MERCURY**

APPENDIX D

HOSPITAL INFORMATION AND MAP

FIELD ACCIDENT REPORT

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME _____ PROJECT. NO._____

Date of Accident _____ Time _____ Report By _____

Type of Accident (Check One):

( ) Vehicular ( ) Personal ( ) Property

Name of Injured _____ DOB or Age _____

How Long Employed _____

Names of Witnesses _____

_____

Description of Accident _____

_____

_____

Action Taken _____

_____

_____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

_____

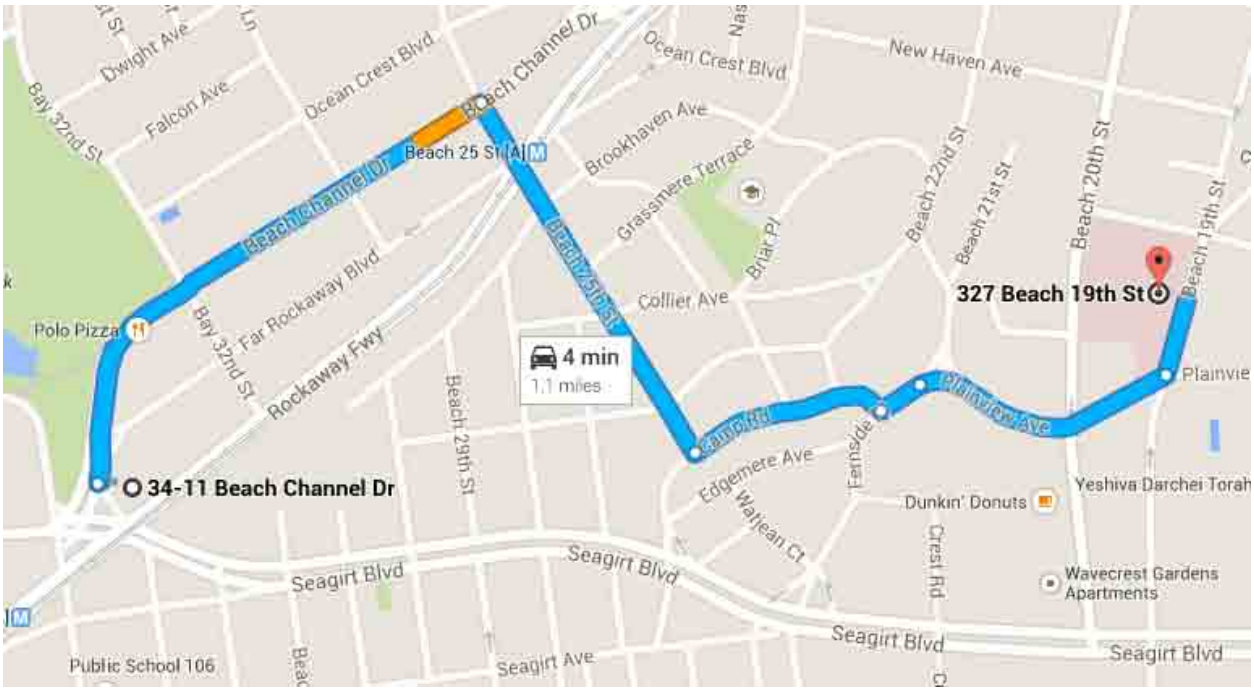
(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

St Johns Episcopal Hospital Emergency
327 Beach 19th Street, Far Rockaway, NY 11691
(718) 869-7000
1.1 Miles – About 4 Minutes



34-11 Beach Channel Dr
Far Rockaway, NY 11691

1. Head **north** on **Beach Channel Dr** toward **Far Rockaway Blvd** — 0.4 mi
2. Turn **right** onto **Bay 25th St/Beach 25th St** — 0.3 mi
   Continue to follow Beach 25th St
3. Turn **left** onto **Camp Rd** — 0.1 mi
4. Turn **left** onto **Fernside Pl** — 171 ft
5. Turn **right** onto **Plainview Ave** — 0.2 mi
6. Turn **left** onto **Beach 19th St** — 289 ft

327 Beach 19th St
Far Rockaway, NY 11691

ATTACHMENT C
Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN
34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

Prepared on behalf of:

ALPROF REALTY LLC
VFP REALTY LLC
85 Forestdale Road
Rockville Centre, New York, 11570

Prepared by:

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961

TABLE OF CONTENTS

QUALITY ASSURANCE PROJECT PLAN
34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

TABLES

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the approved work plan.

To ensure the successful completion of the project each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Charles Sosik will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Director will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities. Ms. Chawinie Miller will serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- conduct periodic field and sampling audits;
- interface with the analytical laboratory to resolve problems; and
- interface with the data validator and/or the preparer of the DUSR to resolve problems.

Kevin Brussee will serve as the Project Manager and will be responsible for implementation of the Remedial Action Workplan and coordination with field sampling crews and subcontractors. Reporting directly to the Project Manager will be the Field Operations Officer, Kevin Waters; who will serve as the on-Site qualified environmental professional who will record observations, direct the drilling crew and be responsible for the collection and handling of all samples.

1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager

.

GENERAL RESPONSIBILITY	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Field Operations	Supervision of Field Crew, sample collection and handling	K. Waters, EBC
Project Manager	Implementation of the RAWP.	Robert Bennett, EBC
Laboratory Analysis	Analysis of soil samples by NYSDEC ASP methods Laboratory	NYSDOH-Certified Laboratory
Data review	Review for completeness and compliance	3rd party validation

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory, certified in the appropriate categories. Data generated from the laboratory will be used to evaluate contaminants such as metals and semi-volatile organic compounds (SVOCs) in both historic fills and hot-spot areas, chlorinated volatile organic compounds (VOCs) in soil, soil gas and groundwater and SVOCs in groundwater. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve detection levels low enough to meet required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005). The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in NYSDEC ASP 07/2005.

2.2.2 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

2.2.3 Method Blanks

Method blank or preparation blank is prepared from an analyte·free matrix which includes the same reagents, internal standards and surrogate standards as me related samples. II is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 Trip Blanks.

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized. laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will be not opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

2.2.5 Surrogate Spike Analysis

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NYSDEC ASP protocols for samples falling within the quantification limits without dilution.

2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSDIMSB) Analysis

MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS / MSD / MSB samples will be analyzed for each group of samples of a similar matrix at a rate of one for every 20 field samples. The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Where:

SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 + D^2)/2} \times 100$$

Where:
RPD = relative percent difference
D^1 = first sample value
D^2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Remedial Investigation Work Plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

3.0 ANALYTICAL PROCEDURES

3.1 Laboratory Analysis

Samples will be analyzed by the NYSDEC ASP laboratory for one or more of the following parameters: VOCs in soil by USEPA Method 8260C, SVOCs in soil by USEPA Method 8270D, Target Analyte Metals 6010C in soil, pesticides and PCBs by USEPA Method 8081B/8082A. If any modifications or additions to the standard procedures are anticipated. and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

4.0 DATA REDUCTION, REVIEW, AND REPORTING

4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Analytical results shall be presented on standard NYSDEC ASP-B forms or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Note that waste characterization samples (if collected) will be in results only format and will not be evaluated in the DUSR.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

4.3 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples will be in results only format and will not be evaluated in the DUSR.

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

TABLE 1
SUMMARY OF
SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Approximate Number of Samples	Frequency	Rationale for Sampling	Laboratory Analysis	Duplicates	Matrix Spikes	Spike Duplicates	Trip Blanks
Soil	Excavation Bottom	40	1 per 900 square feet	Endpoint verification	SVOCs (PAHs),TAL Metals 6010C, Hexavalent Cr	1 per day	1 per 20 samples	1 per 20 samples	1 per trip

TABLE 2
SAMPLE COLLECTION AND ANALYSIS PROTOCOLS

Sample Type	Matrix	Sampling Device	Parameter	Sample Container	Sample Preservation	Analytical Method#	CRQL / MDLH	Holding Time
Soil	Soil	Scoop Direct into Jar	VOCs	(1) 2 oz Jar	Cool to 4^{o} C	EPA Method 8260C	Compound specific (1-5 ug/kg)	14 days*
Soil	Soil	Scoop Direct into Jar	SVOCs	(1) 8 oz jar	Cool to 4^{o} C	EPA Method 8270D	Compound specific (1-5 ug/kg)	14 day ext/40 days*
Soil	Soil	Scoop Direct into Jar	Pest/PCBs	from 8oz jar above	Cool to 4^{o} C	EPA Method 8081B/8082A	Compound specific (1-5 ug/kg)	14 day ext/40 days*
Soil	Soil	Scoop Direct into Jar	Metals	from above	Cool to 4^{o} C	TAL Metals 6010C	Compound specific (01-1 mg/kg)	6 months*

Notes:
All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise. * Holding time listed is from time of sample collection.
The number in parentheses in the "Sample Container" column denotes the number of containers needed.
Triple volume required when collected MS/MSD samples
The number of trip blanks are estimated.
CRQL / MDL = Contract Required Quantitation Limit / Method Detection Limit.
MCAWW = Methods for Chemical Analysis of Water and Wastes.
NA = Not available or not applicable.
* = all collection and holding times will be as be the ASP

ATTACHMENT D
Community Air Monitoring Plan

COMMUNITY AIR MONITORING PLAN

34-11 BEACH CHANNEL DRIVE SITE
34-11 BEACH CHANNEL DRIVE, QUEENS, NY

FEBRUARY - 2015

COMMUNITY AIR MONITORING PLAN
TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for the excavation and building activities to be performed under a Remedial Action Work Plan (RAWP) at the 34-11 Beach Channel Drive Site. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial activities) from potential airborne contaminant releases resulting from remedial activities at the site.

Compliance with this CAMP is required during all activities associated with soil excavation that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include excavation of soils, stockpiling, loading, and backfilling. This CAMP has been prepared to ensure that soil disturbance activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of construction-related contaminants to offsite areas.

1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;

- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2.0 AIR MONITORING

VOCs in air and metals / SVOCs in dust are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during soil disturbance activities is through real-time VOC and air particulate (dust) monitoring.

2.1 Meteorological Data

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

2.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before activities begin. These points will be monitored periodically in series during the site work. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), minirae 2000, or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan

3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion 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 over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remedial activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 6-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- applying vapor suppressant foam (BioSolve, Pinkwater or similar).

4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during excavation and loading activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns (PM_{10}) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter ($\mu g/m_3$). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 $\mu g/m^3$ above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 150 $\mu g/m^3$ for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 100 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 100 $\mu g/m^3$ above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 100 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 $\mu g/m^3$ at any time during remediation activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 8-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- limiting vehicle speeds onsite.

Work may continue with dust suppression techniques provided that downwind PM_{10} levels are not more than 150 $\mu g/m^3$ greater than the upwind levels.

There may also be situations where the dust is generated by remediation activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 $\mu g/m^3$, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

5.0 DATA QUALITY ASSURANCE

5.1 Calibration

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

5.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

5.3 Data Review

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

6.0 RECORDS AND REPORTING

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.

1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

APPENDIX A
ACTION LIMIT REPORT

CAMP
ACTION LIMIT REPORT

Project Location: _____

Date: _____ Time: _____

Name: _____

Contaminant: _____ PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: Location: _____ Level Reported: Level Reported: _____

ACTIONS TAKEN

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

ATTACHMENT E
Citizen Participation Plan

New York State Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan

for

34-11 Beach Channel Drive

34-11 Beach Channel Drive
Far Rockaway, NY 11691

February 2013

Contents

* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **Alprof Realty LLC and VFP Realty LLC ("Applicant")**
Site Name: **34-11 Beach Channel Drive ("Site")**
Site Address: **34-11 Beach Channel Drive and Far Rockaway Boulevard**
Site County: **Queens**
Site Number: **C241141**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC), which oversees Applicants that conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When the NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html.

2. Citizen Participation Activities

Why the NYSDEC Involves the Public and Why It Is Important

The NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well being. The NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interest in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process;

- Providing citizens with early and continuing opportunities to participate in the NYSDEC's site investigation and cleanup process;

- Ensuring that the NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the Site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies the NYSDEC project contacts to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the Site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC's web site. If this occurs, the NYSDEC will inform the public in fact sheets distributed about the Site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the Site (such as fieldwork), as well as availability of project documents and announcements about public comment periods. The site contact list includes, at a minimum:

- The chief executive officer and planning board chairperson of each county, city, town and village in which the Site is located;
- Residents, owners, and occupants of the Site and properties adjacent to the Site;
- The public water supplier which services the area in which the Site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility; and
- The location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contacts identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods, and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact NYSDEC project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

The NYSDEC must determine if the Site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the Site, as described in Section 5.

If the Site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the Site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the Site, and that its members' health, economic well-being, or enjoyment of the environment may be affected by a release or threatened release of contamination at the Site.

For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html.

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Requirements (Activities)	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repositories	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement:	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about proposed RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that summarizes the Final Engineering Report • Distribute fact sheet to site contact list announcing issuance of Certificate of Completion (COC)	At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the Site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

No major issues of public concern are anticipated in relation to the Site or the contemplated investigation and clean up activities. The Site is presently largely vacant, underutilized industrial land. The area to the north of the Site is developed for commercial use. One- and two-family residential uses and Bayswater Park are located to the west, across Beach Channel Drive. Apartment complexes are located across Rockaway Freeway to the south of the Site. A vacant property adjoins the east side of the Site. The investigation and cleanup activities are anticipated to result in Site conditions that are conducive to redevelopment of the Site with residential and commercial uses, which may include affordable housing and retail services that can be utilized by the community. The Queens Borough President and other community public officials have been placed on the Site contact list so that they can be informed and fully participate in the planned investigation and remediation of this Site.

Significant adverse effects to traffic, noise, and/or air quality are not anticipated to result from the investigation or clean up activities. These activities will be performed under work plans approved by the NYSDEC that contain provisions for traffic management as needed and noise and air quality monitoring and mitigation measures such that adverse impacts are avoided. There should be no impact to the community during site investigation and clean up.

Public concern for potential environmental impacts is not anticipated for the investigation or cleanup activities as no environmental impacts are anticipated. There are no wetland areas within one-half mile of the Site. Jamaica Bay is within one-half mile of the Site, as is the Atlantic Ocean. Although the head of Norton Basin is located approximately 500 feet north-northwest of the Site, potential impacts to this body of water are not anticipated as it is located crossgradient from the documented direction of groundwater flow (west). Other recreational/natural areas, including Rockaway Community Park, DuBos Point Wildlife Sanctuary, and Rockaway Beach and Boardwalk, are nearby. However, activities in these areas will not be impacted by remedial activities as the remedial activities are anticipated to be limited to the Site and these areas are not in close proximity. Nesting habitat for the piping plover, an endangered species, is located on Rockaway Beach, but none of the Site activities will interfere with the piping plover's nesting habitat.

No surface water is located near the Site. Groundwater is not used as potable water in Queens County, and no Federal public water supply system wells or State wells are within a mile of the site. Although the groundwater beneath the Site is impacted, the Site is not located near a wellhead protection area or a groundwater recharge area. Therefore, there are no health concerns anticipated with respect to groundwater.

The Site is located within a large African-American community. In addition, there is also a large Hispanic-American community nearby. Therefore, the NYSDEC has determined that Site is within an Environmental Justice area. The Applicant has filled out the attached Scoping Sheet for Major Issues of Public Concern to help them identify any further issues.

4. Site Information

Appendix C contains a map identifying the location of the Site.

Site Description

Location: 34-11 Beach Channel Drive, Far Rockaway, NY 11691
Setting: Urban
Site size: 0.85 acres
Adjacent properties: The area to the north of the Site is developed for commercial use. One- and two-family residential uses and Bayswater Park are located to the west across Beach Channel Drive. Apartment complexes are located across Rockaway Freeway to the south of the Site. A vacant lot (Lot 29) is located immediately to the east of the Site.

History of Site Use, Investigation, and Cleanup

The .85-acre Site is composed of two separate parcels bounded by Far Rockaway Boulevard to the north, Beach Channel Drive to the west, and Rockaway Expressway to the south. A vacant lot (Lot 29) is present immediately to the east of the Site. The eastern portion of the Site is referred to as Lot 24, and the western portion of the Site is referred to as Lot 14.

Onsite Lot 14

Lot 14 of the Site was historically operated as an automotive service and gasoline filling station. As of 2002 the building on Lot 14 was used as an auto parts store and contained vacant commercial units. This use has been discontinued and the buildings have been demolished. Lot 14 is currently used for storage of containers. The historic auto repair and garage operations on Lot 14 contributed to petroleum (gasoline) contamination in the subsurface soil.

An Environmental Site Assessment was performed for Lot 14 in 2002 to identify potential environmental issues prior to a potential property purchase. This assessment revealed no evidence of previous environmental investigations or disposal of hazardous waste. Underground storage tanks existed on Lot 14 in connection with the former filling station operations; concrete-filled tank ports were observed and one tank was identified during the assessment. No electrical transformers or other equipment that may contain contaminated oils was identified. Groundwater was sampled and found to contain gasoline-related compounds at levels slightly exceeding the NYSDEC groundwater standards. Soil samples were found to contain gasoline-related compounds.

A limited investigation of Lot 14 was conducted by the Applicant in 2012 in association with litigation. The results of this investigation indicated that groundwater and soil vapor on Lot 14 are impacted with solvents used for metal cleaning.

Onsite Lot 24

Lot 24 of the Site was historically a vacant lot and is currently used for storage of containers.

Groundwater was sampled in 2007 during the investigation of the offsite Lot 29 property. Elevated levels of solvents used for metal cleaning or dry cleaning were detected in the groundwater samples from Lot 24 well in excess of the NYSDEC groundwater standards.

Groundwater and soil sampling were conducted on Lot 24 in 2008 as part of an investigation related to offsite Lot 29. Contamination was not identified in the soil samples. The groundwater samples were found to contain elevated levels of solvents used for metal cleaning.

Additional soil sampling was conducted on Lot 24 in 2009 following removal of contaminated soil from Lot 29 near the property line of Lot 24. Some solvents such as trichloroethene (TCE) were found in shallow soil samples.

A limited investigation of Lot 24 was conducted in 2012 by the Applicant in association with litigation. The results of this investigation indicated that groundwater, deeper soil, and soil vapor on Lot 24 are impacted with solvents used for metal cleaning, including TCE and compounds formed from its breakdown, including cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC). Some petroleum compounds commonly found in fuel oil and gasoline were also identified. No solvents were found in shallow soil samples.

Offsite Lot 29

The offsite property to the east of Lot 24 is referred to as Lot 29. Lot 29 is ~~not~~ owned by the Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-Day Saints (the Mormon Church), and not the Applicant, and is not part of this cleanup. A large building historically used as a plumbing supply warehouse and a garage was formerly located on Lot 29 immediately adjacent to Lot 24 of the Site. An extensive investigation has occurred in connection with Lot 29 and has revealed soil and groundwater impacts by solvents used for metal cleaning or dry cleaning and impacts by petroleum. These impacts originated from Lot 29 and have affected soil, groundwater, and soil vapor on both Lots 24 and 14 of the Site. Lot 29 has been assigned NYSDEC Spill No. 0207599. Investigation and remediation of Lot 29 is being handled under the NYSDEC Spills Program and is not part of the investigation and cleanup of Lots 14 and 24 under the Brownfield Cleanup Program.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a Volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants. The Volunteer's ownership took place well after the former gasoline station operator departed from the Site, and after the plumbing supply and garage operations were removed from the adjoining Lot 29. The Applicant has not engaged in operations that could contribute to contamination at the Site. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish, and wildlife to contaminants on the ~~s~~ite and to contamination that has migrated from the Site.

The Applicant in its application proposes that the Site will be used for restricted purposes. The Applicant has not finalized development plans at this time, but anticipates that they will be in compliance with the current applicable zoning laws.

To achieve this goal, the Applicant will conduct investigation and cleanup activities at the Site with oversight provided by the NYSDEC. The Brownfield Cleanup Agreement executed by the NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

Investigation

The Applicant has completed a partial site investigation before it entered into the BCP. For the partial investigation, the NYSDEC will determine if the data are useable.

The Applicant will conduct a full investigation of the Site, officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The remedial investigation has several goals:

1) Define the nature and extent of contamination in soil, surface water, groundwater, and any other parts of the environment that may be affected;
2) Identify the source(s) of the contamination;
3) Assess the impact of the contamination on public health and the environment; and
4) Provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

When the remedial investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The remedial investigation report is subject to review and approval by the NYSDEC.

The NYSDEC will use the information in the remedial investigation report to determine if the Site poses a significant threat to public health or the environment. If the Site is a "significant threat," it must be cleaned up using a remedy selected by the NYSDEC from an analysis of alternatives prepared by the Applicant and approved by the NYSDEC. If the Site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Remedy Selection

When the investigation of the Site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its remedial investigation report that no action is necessary at the Site. In this case, the NYSDEC would make the remedial investigation report available for public comment for 45 days. The NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the remedial investigation report. The NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its remedial investigation report that action needs to be taken to address site contamination. After the NYSDEC approves the remedial investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the Site.

When the Applicant submits a proposed Remedial Work Plan for approval, the NYSDEC would announce the availability of the proposed plan for public review during a 45-day public comment period.

Cleanup Action

The NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

The Applicant may then design and perform the cleanup action to address the site contamination. The NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a Final Engineering Report (FER) that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. The NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the Site.

Certificate of Completion

When the NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the Site, it will approve the FER. The NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the Site after it receives a COC.

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the Site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An institutional control is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all, uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until the NYSDEC determines that it is no longer needed.

Appendix A
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Alicia Barraza
Project Manager
NYSDEC
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12233-7016
(518) 402-9690

Thomas V. Panzone
Regional Citizen Participation Specialist
NYSDEC Region 2
47-40 21st Street
Long Island City, NY 11101
(718) 482-4953
tvpanzon@gw.dec.state.ny.us

New York State Department of Health (NYSDOH):
Bridget Callaghan
Project Manager
NYSDOH
Empire State Plaza
Corning Tower, Room 1787
Albany, NY 12237
(518) 402-7860

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Far Rockaway Branch
Queensborough Public Library
1637 Central Avenue
Far Rockaway, NY 11691
(718) 327-2549

Queens Community Board #14
1931 Mott Avenue, Room 311
Far Rockaway, NY 11691

Appendix B
Site Contact List

The Mayor of the City of New York:
Hon. Michael Bloomberg
NYC Mayor
City Hall
New York, NY 10007

The New York City Comptroller's Office:
Hon. John Liu
NYC Comptroller
1 Centre Street
New York, NY 10007

Public Advocate:
Hon. Bill de Blasio
1 Centre Street,
New York, NY 10007

Queens County Clerk
88-11 Sutphin Boulevard, 1st Floor
Jamaica, NY 11439

Amanda Burden, Commissioner
NYC Dept. of City Planning
22 Reade Street
New York, NY 10007

Dr. Robert Kulikowski, Director
NYC Office of Environmental Coordination
100 Gold Street– 2nd Floor
New York, NY 10038

John Wuthenow
Office of Environmental Assessment & Planning
NYC Dept. of Environmental Protection
96-05 Horace Harding Expressway
Flushing, NY 11373

Queens Community Board # 14

Dolores Orr, Chairperson
Queens Community Board # 14
1931 Mott Avenue, Room 311
Far Rockaway, NY 11691

Jonathan Gaska, District Manager
Queens Community Board # 14
1931 Mott Avenue, Room 311
Far Rockaway, NY 11691

The Queensborough President's Office:

Hon. Helen M. Marshall, Queens Borough President
120-55 Queens Boulevard
Kew Gardens, NY 11424
718-286-3000

The Queens County Office of the New York City Dept. of City Planning:

Queens Office
120-55 Queens Blvd., Room 201
Kew Gardens, NY 11424
718-286-3170

The public water supplier that services the area where the site is located:

Hon. Carter Strickland, Commissioner
New York City Department of Environmental Protection
59-17 Junction Boulevard, 19th Floor
Flushing, NY 11373

Local news media from which the community typically obtains information:

New York Daily News
4 New York Plaza
New York, NY 10004

NY 1 News
75 Ninth Avenue
New York, NY 10011

New York Post
1211 Avenue of the America's
New York, NY 10036

Press of Southeast Queens
150-50 14th Road
Whitestone, NY 11357

Rockaway Wave
88-08 Rockaway Beach Boulevard
Rockaway Beach, NY 11693

Local Elected Officials:

NYC Council District # 31
234-26 Merrick Boulevard
Laurelton, NY 11422

Hon. James Sanders Jr.
NYS Assemblymember
161-10 Jamaica Avenue, Suite 504
Jamaica, NY 11432

Hon. Phillip Goldfeder
NYS Senator
108-14 Cross Bay Boulevard
Ozone Park, NY 11417

Hon. Charles Schumer
U.S. Senator
780 Third Avenue
New York, NY 10017

Hon. Kirsten Gillibrand
U.S. Senator
780 Third Avenue, Suite 2601
New York, NY 10017

Hon. Gregory Meeks
U.S. House of Representatives
1931 Mott Avenue, Room 305
Far Rockaway, NY 11691

Civic, Community, Religious and other Educational Institutions:

Bayswater Civic Association
Attn: Enid Glabman
33-32 Bay Court
Far Rockaway, NY 11691

Bayswater Homeowners Association
Attn: President Bernice Williams
23-28 Beach Channel Drive
Far Rockaway, NY 11691

Deerfield Civic Association
P.O. Box 1456
Far Rockaway, NY 11691
Attn: Barbara Smith, Director

Chamber of Commerce of the Rockaways
Attn: John Lepore
253 Beach 116 Street
Rockaway Park, NY 11694

Rockaway Development Revitalization Corporation
1920 Mott Avenue, 2nd Floor
Far Rockaway, NY 11691
Attn: Director

Margaret Community Corporation
325 Beach 37th Street
Far Rockaway, NY 11691
Attn: Joseph Barden, Housing Information Director

Rockaway Senior Center
307 Beach 37th Street
Far Rockaway, NY 11691
Attn: Director

Queens Chamber of Commerce
75-20 Astoria Blvd, Suite 140
Jackson Heights, NY 11372
Attn: Carol Ann Conslato

Rockaway Waterfront Alliance
PO box 900645
Far Rockaway, NY 11690

Rockaway Surf Anglers
C/o Jim Snyder
121-08 Newport Avenue
Rockaway Park, NY 11694

Any person who has requested to be placed on the site contact list:

No person has yet requested to be placed on the Site contact list.

The administrator of any school or day care facility located on or near the site:

P.S. 106
180 Beach 35th Street
Far Rockaway, NY 11691
Attn: Principal

Daycare Center
422 Beach 36th Street
Far Rockaway, NY 11691
Attn: Dawn Moore

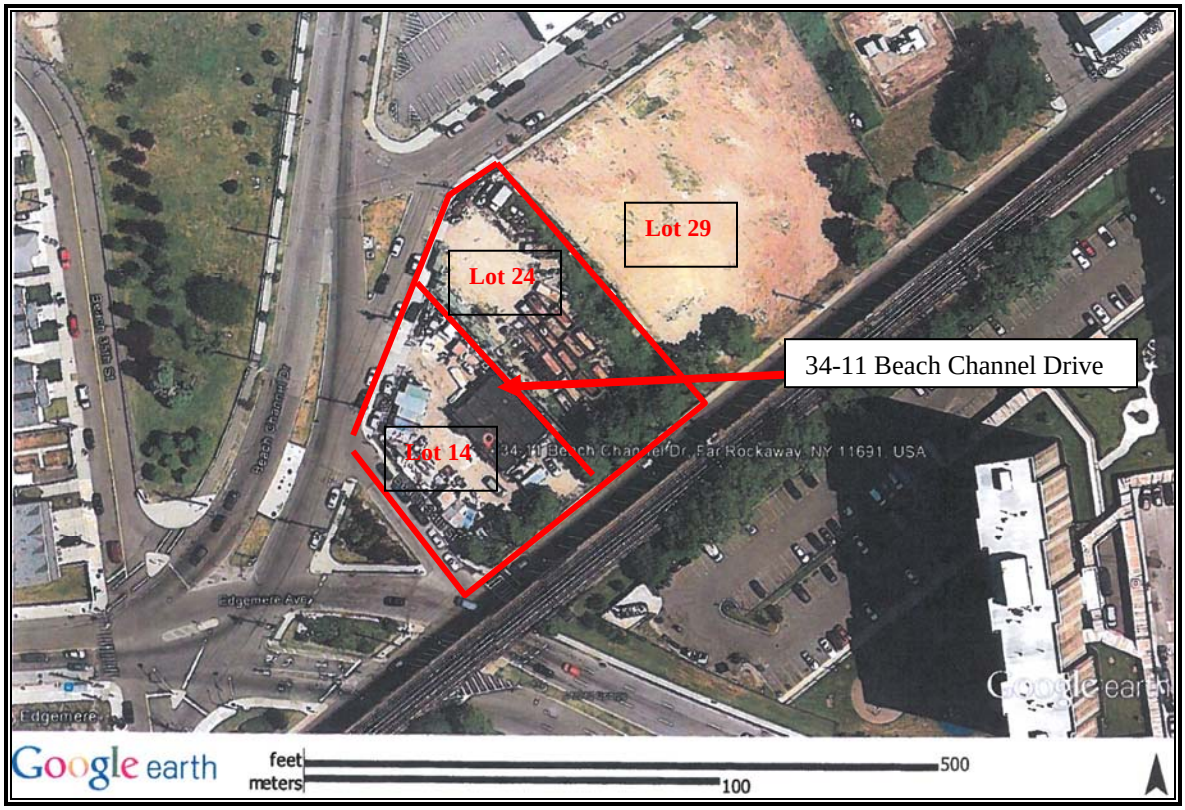
Daycare Center
331 Beach 31st Street
Far Rockaway, NY 11691
Attn: Neythsyria Pedlar

The location of the local document repository for the project:

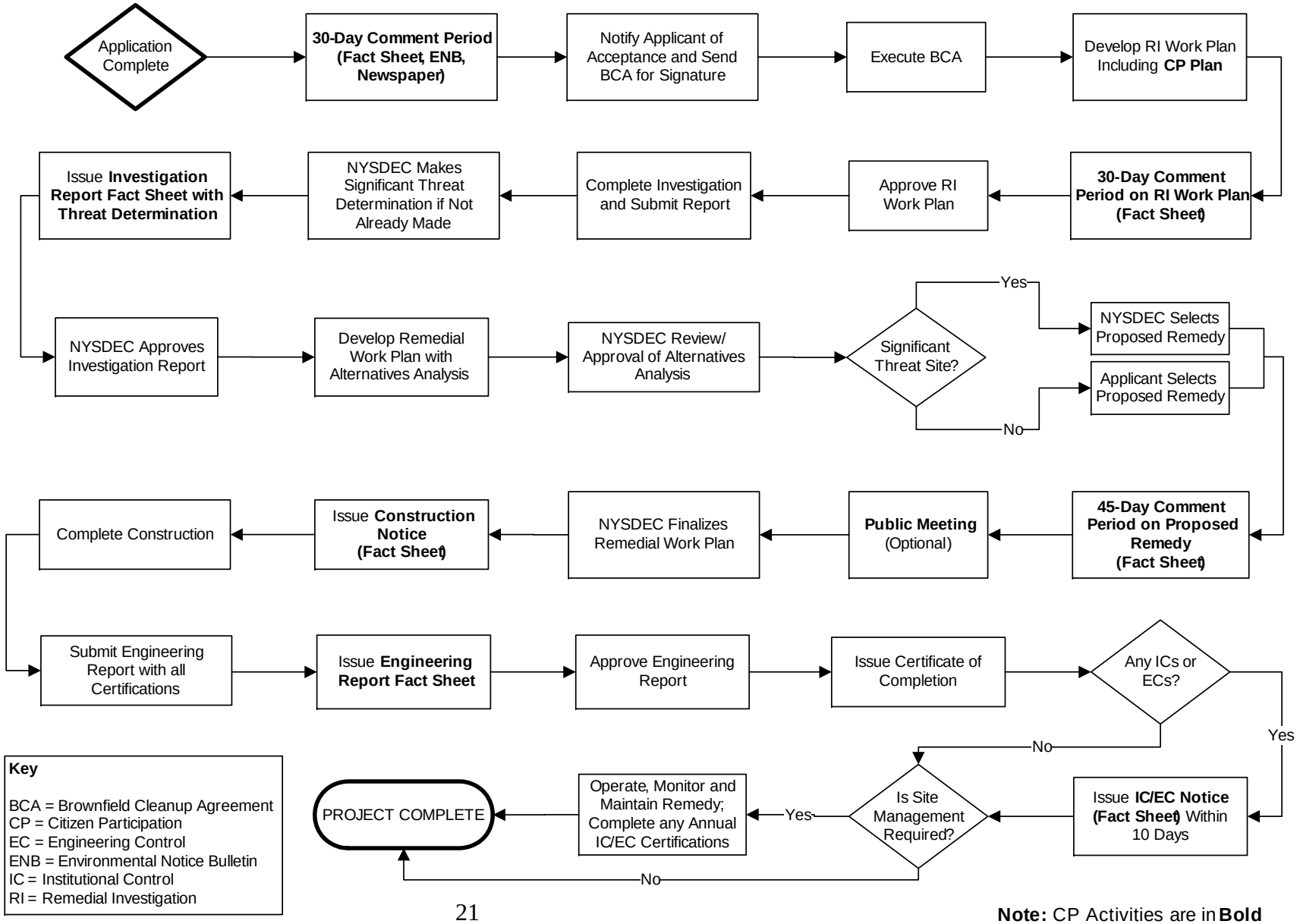
Far Rockaway Branch
Queensborough Public Library
1637 Central Avenue
Far Rockaway, NY 11691
(718) 327-2549

Queens Community Board #14
1931 Mott Avenue, Room 311
Far Rockaway, NY 11691

Appendix C
Site Location Map



Appendix D– Brownfield Cleanup Program Process



Note: CP Activities are in **Bold**

ATTACHMENT F
Resumes

AMC Engineering
99 Jericho Turnpike, Suite 300J
Jericho, NY 11590
Phone: (516) 417-8588

ARIEL CZEMERINSKI, P.E.

Mr. Czemerinski is a New York State Professional Engineer and CEO of AMC Engineering PLLC an EBC affiliate. Mr. Czemerinski has with 20 years of experience in the chemical and environmental areas. Areas of expertise include environmental compliance, permitting, remedial system design, process and plant safety, and management of a production facility. Mr. Czemerinski is a Registered Professional Engineer in NY, IN, IL, and MI.

Professional Experience
AMC: 14
Prior: 6 years

Education
Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990. Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

Areas of Expertise

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements and Environmental Impact Assessments under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Dewatering & Treatment System Design
- NYCDEP Sewer Discharge Permitting
- Transfer Station Permitting and Compliance
- Chemical Process Design and Optimization
- Wastewater Treatment Systems and Permitting, SPEDES, Air
- Zoning Regulations and Permitting
- Safety and Environmental Training
- Waste Management Plans

Professional Certifications

- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

Professional Experience

25 years

Education

MS, Hydrogeology, Adelphi University, NY
BS, Geology, Northern Arizona University, AZ

Areas of Expertise

- Brownfields Redevelopment
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Remedial Planning and "Cost to Cure" Analysis
- Strategic Planning
- Real Estate Transactions
- NYC "E" Designations

Professional Certification

- Professional Geologist, NH
- Professional Geologist, Hydrogeologist, WA
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor
- NYC OER Qualified Environmental Professional

Professional Affiliation / Committees

- NYS Council of Professional Geologists (NYSCPG)
- Association of Groundwater Scientists & Engineers (AGSE)
- NYS RBCA Advisory Committee
- Massachusetts LSP Association
- New Hampshire Association of Professional Geologists
- Interstate Technology Regulatory Council/MTBE Team
- Environmental Business Association, Brownfields Task Force
- Part 375 Working Group

PROFILE

Mr. Sosik has 25 years of experience in environmental consulting. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

For the past 10 years Mr. Sosik has been primarily engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

SELECTED PROJECTS

Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY

Water Treatment Plant EIS - Focused EIS - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

Advanced Residential Communities, Rockville Centre, NY

Brownfield Project – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

Former Temco Uniform site, West Haverstraw, NY

Brownfield Project – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC's review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

Grovick Properties, Jackson Heights, NY

Brownfield Project – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in

purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

Metro Management, Bronx, NY

Brownfield Project – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

The project was awarded the 2009 NYC Brownfield Award for Innovation.

Brandt Airflex, NY

Technical Consulting Services - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX

Jet Fuel Investigation - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identifled remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

KeySpan – Former LILCO Facilities, Various NY Locations

Pesticide Impact Evaluation - Mr. Sosik developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vunerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

Former Computer Circuits (Superfund) Site, Hauppauge, NY

CERCLA RI/FS - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activites for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

Sun Oil, Seaford, NY

Remediation Consuliting Services & Project Management - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

Con Edison, Various Locations, NY

Hydrogeologic Consulting Services - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

Keyspan - Tuthill Substation, Aqueboque, NY

Accelerated Site Characterization - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbacide and its metobolites aplied at utility sites in the 1980's The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and eficient manner.

NYSDEC Spill, East Moriches, NY

Spill Release Analysis - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by

Charles B. Sosik, PG, PHG, Principal

the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

Minmilt Realty, Farmingdale, NY

Fate & Transport Modeling - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

Sebonack Golf Course Project, Town of Southampton, NY

IPM Pesticide Study - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

NYSDEC, Spills Division, Regions 1 – 4

Petroleum Spills Investigation & Remediation - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

Sun Oil, E. Meadow, NY

Exposure Assessment - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and transport model to show that degradation processes would achieve standards within a reasonable time.

Sand & Gravel Mine, NY

Property Development - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

NYSDEC, Mamaroneck, NY

Site Characterization / Source Identification - In a complex hydrogeologic setting consisting of contaminant transport through fractured metomorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

Riverhead Municipal Water District, NY

Site Characterization / Remedial Planning - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

Montauk Fire Department, NY

Site Assessment - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a $500,000, and rising, claim against the department by the water district and the NYSDEC.

PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1999-2006

Environmental Assessment & Remediation, Patchogue, NY
Senior Project Manager, 1994-1999

Miller Environmental Group, Calverton, NY
Project Manager, 1989-1994

DuPont Biosystems, Aston, PA
Hydrogeologist, 1988-1989

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

EXPERT WITNESS TESTIMONY AND DEPOSITIONS

Fact Witness -Testimony on relative age of petroleum spill based on nature and extent of residual and dissolved components at the Delta Service Station in Uniondale, NY Fall/1999

Expert Witness / Expert Report for defendant in cost recovery case by NYS Attorney General regarding a Class II Inactive Hazardous Waste (State Superfund) project by the NYSDEC (October 2004 – present, Report: March 2005, Deposition: April 2005, 2nd Report: Aug. 2013, 2nd Deposition Nov. 2013, Bench Trial: December 2013 - qualified as expert in Federal Court),

Expert Witness / Fact Witness for plaintiff seeking compensation for partial expenses incurred during the investigation and remediation of a USEPA CERCLA site due to the release and migration of contaminants from an "upgradient" industrial property. (Deposition May 2005, case settled April 2007).

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Holtzville, NY (Deposition April 2005 - case settled).

Expert Witness – Statement of opinion and expert testimony at trial for plaintiff seeking damages from a major oil corporation for contamination under a prior leasing agreement in Rego Park, NY. Case decided in favor of plaintiff. Trial July 2007, in favor of Plaintiff. Qualified as Expert.

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Lindenhurst, NY (Trial date Dec. 2009, in favor of plaintiff. Qualified as Expert State Supreme Court.

Expert Witness - for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Riverhead, NY. Case settled July 2008.

Expert Witness for plaintiffs in class action case with respect to damages from chlorinated plume impact to residences in Dayton, OH. (Draft Report – May 2013).

Expert Witness / Fact Witness for defendant with respect to cost recovery and third party responsibility for a NYSDEC petroleum spill site in Lindenhurst, NY (Expert Statement of Fact – October 2005).

Expert Witness for plaintiff seeking damages related to a petroleum spill from the previous owner/operator of a gas station in College Point, NY. Case settled 2009.

Expert Witness for plaintiff (municipal water supply purveyor) seeking damages from major oil companies and manufacturer of MTBE at various locations in Suffolk County, NY. Expert reports July 2007, August 2007 and October 2007, Case settled August, 2008.

Expert Witness - Deposition for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Sag Harbor, NY. August 2002

Expert Witness for defendant responding to a claim from adjacent commercial property owner on the origin of chlorinated solvents on plaintiff's property located in Cedarhurst, NY. Expert opinion submitted to lead counsel on March 6, 2009, case settled April 2009.

Expert Report - for Attorney General on modeling performed to determine the spill release scenario at a NYSDEC petroleum spill site in East Moriches, NY. June 2000.

Expert Witness - for plaintiff in case regarding impact to private wells from a spill at adjacent Town and County properties with open gasoline spill files in Goshen, NY. Expert report submitted August 2013.

Expert Witness for defendant with respect to cost recovery from Sunoco for a NYSDEC petroleum spill site. (Declaration – January 2013).

Expert Witness - for plaintiff (municipal water supply purveyor) seeking damages from Dow Chemical for PCE impact at various locations in Suffolk County, NY. Affidavit submitted 2011.

MODELING EXPERIENCE (PARTIAL LISTING)

PROJECT	MODEL	APPLICATION
Riverhead Water District, Riverhead, NY	MODFLOW, MODPATH	Remediation system design to intercept MTBE plume and prevent continued impact to municipal well field.
NYSDEC - Region 1, Holbrook, NY	MODFLOW, MODPATH	Simulate transport of MTBE plume to predict future impact.
NYSDEC - Region 1, East Moriches, NY	HSSM	Evaluate release scenario and start date of petroleum spill in support of cost recovery by NYS AG office.
AMOCO, Deer Park, NY	HSSM	Estimate release amount, start date and spill scenario to evaluate the potential for mass unaccounted for
Keyspan Energy, Nassau/Suffolk Counties Substations	PRZM	Estimate mass load of simazine used at 211 electric substations and screen sites according to potential for human health and ecological impacts.
Saboneck Golf Club, Southampton NY	PRZM	Estimate mass load of proposed pesticides on new golf course to evaluate acceptability under an IPM program.
Suffolk County Department of Public Works (SCDPW) Scavenger Waste Treatment Plant, Yaphank, NY	DYNFLOW, DYNTRAC	Evaluate time-transport and nitrogen impact on local river system.
SCDPW SUNY Waste Water Treatment Plant, Stony Brook, NY	DYNFLOW, DYNTRAC	Determine outfall location and time-transport of nitrogen from proposed upgrades to an existing wastewater treatment plant
Water Authority of Great Neck North Great Neck, NY	MODFLOW, MODPATH, MT3D	Review of modeling study performed by EPA to evaluate potential future impact to Well field from PCE plume. Identified serious flaws in model construction and implementation, which invalidated conclusions

PUBLICATIONS / PROFESSIONAL PAPERS

Smart Pump & Treat Strategy for MTBE Impacting a Public Water Supply (14th Annual Conference on Contaminated Soils Proceedings, 1998)

Transport & Transformation of BTEX & MTBE in a Sand Aquifer (Groundwater Monitoring & Remediation 05/1998)

Characteristics of Gasoline Releases in the Water Table Aquifer of Long Island (Petroleum Hydrocarbons Conference Proceedings, 1999)

Field Applications of the Hydrocarbon Spill Screening Model (HSSM) (USEPA Interactive Modeling Web Course www.epa.gov/athens/software/training/webcourse Authored module on model application and applied use of calculators, 02/2000)

Comparative Evaluation of MTBE Sites on Long Island, US EPA Workshop on MTBE Bioremediation (Cincinnati, 02/2000)

Comparison of Four MTBE Plumes in the Upper Glacial Aquifer of Long Island (American Geophysical Union, San Francisco, 12/1996)

Analysis and Simulation of the Gasoline Spill at East Patchogue, New York (American Geophysical Union, San Francisco, 12/1998)

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Robert Bennett, Project Manager

Professional Experience

EBC: February 2015
Prior: 7 years

Education

Bachelor of Science, Environmental Science, State University of New York College at Oneonta, Oneonta, NY

Associates in Applied Sciences, Field Biology, State University of New York College at Delhi, Delhi, NY

Areas of Expertise

- Phase I / Phase II Property Assessments
- Waste Characterization / Soil Management
- Brownfield Closure and Planning Board
- Remedial Investigations
- Landfill Closure and Monitoring
- Dredging Monitoring and Management
- Title V & NY Air Permitting and Registrations
- NYS / Nassau & Suffolk County Sanitary Code Compliance

Professional Certification

- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Safety
- NYSDOH Asbestos Inspector & Project Monitor
- NYCDEP Asbestos Investigator
- EPA Lead-Based Paint Inspector & Risk Assessor

PROFILE

Mr. Bennett has 7 years experience as an environmental consultant and is responsible for assessment and investigative services for a wide variety of projects, including industrial and commercial properties, mass transit facilities, parking structures, and sanitary and wastewater treatment facilities. Mr. Bennett has conducted Phase I, II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York, New Jersey, and Massachusetts.

Mr. Bennett conducts research and provides support for various projects on a daily basis and coordinates with clients, regulatory agencies, attorneys and sub-contractors to provide cost-effective business solutions for a plethora of environmental concerns. Mr. Bennett's field experience includes tank removal and installations, dredging oversight and monitoring, asbestos and lead inspections, compliance audits, spill management and closure, soil and groundwater sampling, and both the oversight and operation of soil boring and well installation equipment. In

Robert Bennett, Project Manager

addition, Mr. Bennett has performed project research, data reduction and evaluation, and has prepared reports for both regulatory and client use.

PREVIOUS EXPERIENCE

Dvirka & Bartilucci Engineers and Architects, P.C., Woodbury, NY
Environmental Scientist II, 2014-2015

Gannett Fleming Engineers and Architects, P.C., Woodbury, NY
Environmental Scientist, 2012-2014

Apex Companies L.L.C., Bohemia, NY
Environmental Scientist / Project Manager, 2008-2012

SELECT PROJECT EXPERIENCE

Project:	Governor's Office of Storm Recovery (GOSR) New York Rising Buyout and Acquisition Program / Superstorm Sandy Relief Program
Location:	Long Island and New York City
Type:	Phase I Environmental Site Assessments (ESAs) and Property Evaluation
Contamination:	Asbestos, Lead, Mold and PCBs
Role:	Environmental Scientist II responsible for the creation and review of a high volume of Phase I ESAs

Project:	WMATA Metrorail System Assessment Program
Location:	Washington D.C. Area
Type:	Hazardous materials inspection and evaluation for planning and engineering design purposes.
Contamination:	Asbestos, Lead and PCBs
Role:	Environmental Scientist and Inspection Team Leader

Project:	Armonk Square Redevelopment Plan
Location:	Armonk Square, Armonk, NY
Type:	Monitoring well and recovery well installation. Sub-slab depressurization system (SSDS) installation and operational modifications.
Contamination:	Chlorinated Solvents
Role:	Environmental Scientist responsible for the planning and oversight of monitoring well and recovery well installation. Planning, oversight, and modifications to SSDS.

Project:	Newtown Creek Dredging Project for NYCDEP
Location:	NYCDEP Newtown Creek Wastewater Treatment Facility, Brooklyn, NY
Type:	Navigational waterway dredging
Contamination:	Hazardous and biological pollutants in bottom sediment.

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Robert Bennett, Project Manager

Role:	Environmental Scientist responsible for the implementation and operation of engineering controls and turbidity monitoring.
Project:	Boring / Coring Program, Northeast U.S. Region
Location:	New Bedford Harbor, New Bedford, MA. Long Island and Massachusetts.
Type:	Bathymetric surveys. Borings and Corings advanced through deep sediment and bedrock to determine the proper allocation dredge areas and confined aquatic disposal zones. Additionally, Vibracore drilling was conducted in shallow and easily accessible areas.
Contamination:	PCBs
Role:	Environmental Scientist / Project Manager serving as an on-site geologist to interpret and record geological investigations.
Project:	New York State Air Permit Facilities
Location:	Westchester, Orange and Rockland County, NY
Type:	Title V Air Permits, state registration and permitting for multiple industrial laundering facilities.
Contamination:	Hazardous Air Pollutants
Role:	Environmental Scientist / Project Manager responsible for all air permitting work for a NY-branch office.
Project:	Dredging Oversight and Water Quality Monitoring
Location:	New Bedford Harbor, New Bedford, MA
Type:	Bathymetric surveys. Supervised maintenance dredging and confined aquatic disposal zone excavation operations. Turbidity and sediment flocculation monitoring.
Contamination:	PCBs
Role:	Environmental Scientist providing project oversight, coordinating daily with Mass DEP and sub-contractors. Documenting geological data.
Project:	Stormwater Abatement System Inspections, Repairs and Reporting
Location:	Multiple retailer locations throughout New York State
Type:	Stormwater drainage system and stormwater control structure inspections and repairs
Contamination:	PCBs
Role:	Environmental Scientist / Project Manager assigned to coordinate and perform routine inspections of drainage systems and stormwater control structures. Made repairs to stormwater appurtenances where neccesary.
Project:	ConEdison Truck-flush facility, effluent discharge monitoring.
Location:	Multiple ConEdison truck-flush facilities located throughout New York City, NY.

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Robert Bennett, Project Manager

Type:	Compliance sampling and evaluation with regard to New York City Sewer Effluent Limitations.
Contamination:	Oil & Grease, Metals, Pesticides/PCBs , VOCs, SVOCs
Role:	Effluent sampling. Coordinating with client and laboratory to conduct quarterly sampling events.
Project:	RCRA Closure Support
Location:	Pall Corporation Former Headquarters, East Hills, NY
Type:	Environmental closure of a medical equipment manufacturing facility
Contamination:	Formic Acid, Dimethylacetamide (DMAC)
Role:	Environmental Scientist / Project Manager responsible for the supervision of the removal of all process tanks, piping and associated appurtenances. Accomplished final decommissioning activities. RCRA Closure Report.
Project:	Brownfield Closure Support
Location:	Multiple locations throughout New York City
Type:	Remedial investigations. Interim remedial measures. Soil vapor intrusion studies. RCRA Closure.
Contamination:	VOCs, SVOCs, Oil & Grease, Pesticides/PCBs , Metals
Role:	Environmental Scientist / Project Manager responsible for preparing and conducting remedial investigations, interim remedial measures, soil vapor intrusion studies and RCRA closure.
Project:	Mirant Bowline Power Plant Asbestos Survey
Location:	West Haverstraw, NY
Type:	Asbestos inspection. Personal exposure monitoring. Asbestos labeling Program. Reporting.
Contamination:	Asbestos
Role:	Environmental Scientist / Project Manager serving as a team leader to conduct large scale asbestos inspection, labeling program and reporting.
Project:	Estee Lauder SPCC Facilities
Location:	Multiple manufacturing facilities throughout Long Island
Type:	Spill Prevention Control & Countermeasures (SPCC) inspections, evaluation and reporting.
Contamination:	N/A
Role:	Environmental Scientist / Project Manager responsible for conducting inspections, facility engineering review, and reporting.
Project:	Nassau and Suffolk County Sanitary Code Facility Compliance Audits
Location:	Multiple medical equipment manufacturing facilities throughout Long Island.
Type:	Article XI and XII Sanitary Code Compliance Audits and multiple medical equipment manufacturing facilities.

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Robert Bennett, Project Manager

Contamination: N/A
Role: Environmental Scientist / Project Manager responsible for conducting inspections, facility engineering review, and reporting.

PUBLICATIONS

Dredging and Beach Nourishment Public Notices
(Cape Cod Times, 2008-2010)

Dredging and Beach Nourishment Public Notices
(Yarmouth Weekly, 2008-2010)

Environmental Business Consultants •1808 Middle Country Road, Ridge, NY 11961
Ph 631.504.6000 • Fax 631.924.2870 • Email rbennett@ebcincny.com

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Chawinie Miller, Project Manager / Industrial Hygienist

Professional Experience
EBC: March 2013
Prior: 8 years

Education
Bachelor of Science, Environmental Health and Safety, Stony Brook University, NY

Areas of Expertise
- Phase I / Property Condition Assessments
- Occupational Health and Safety Sampling
- Indoor Air Quality (IAQ) Investigations
- Mold Investigations and Remediation
- Soil and Ground Water Investigations
- Noise Studies
- Lead Paint and Asbestos Surveys
- Hazardous Materials Assessments

Professional Certification
- OSHA 40-hr HAZWOPER
- NYS Asbestos Inspector
- NYC Asbestos Investigator
- USEPA Lead Inspector
- USEPA Lead Risk Assesor
- OSHA 10-hr Construction Health and Safety
- Hazard Analysis and Critical Control Point (HACCP) Certified

PROFILE

Ms. Miller has 9 years experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Ms. Miller has conducted Phase Is and Property Condition Assessments for commercial, industrial, and residential properties in New York, New Jersey and Connecticut. In addition, Ms. Miller has conducted various IAQ, asbestos, mold and occupational health and safety sampling investigations for a variety of city, state, federal and private clients.

PREVIOUS EXPERIENCE

The Louis Berger Group, New York, New York
Industrial Hygienist, 2008-2013

AEI Consultants, Jersey City, New Jersey
Environmental Scientist, 2005-2008

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Kevin Waters, Hydrogeologist

Professional Experience
EBC: October 2010
Prior: 5 years

Education
Bachelor of Science, Geology, State University of New York, Stony Brook

Areas of Expertise
- Field Operations
- Phase II and RI Implementation, Site Characterization Studies
- Health & Safety Monitoring and Oversight
- Waste Characterization / Soil Management
- Site Logistics

Professional Certification
- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

PROFILE

Mr. Waters has 7 years experience as an environmental consultant and has worked on a wide range of environmental projects. Mr. Waters has conducted Phase II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York.

Mr. Waters' field experience includes soil, air and groundwater sampling, operations and maintenance of groundwater remediation systems, tank removals, spill management and closure, and oversight of monitoring well installations. In addition, Mr. Waters has prepared reports for both regulatory and client use.

PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Field Hydrogeologist, 2003-2008

SELECT PROJECT EXPERIENCE

Project:	Former Gas Station / car wash to mixed use affordable housing / commercial
Location:	Bronx, NY, Southern Boulevard
Type:	NYS BCP, NYC E-Site Hazmat, Former gas station / gar wash
Contamination:	Petroleum - Gasoline
Role:	Field Operations Manager, Health and Safety Officer

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Kevin Waters, Hydrogeologist

SELECT PROJECT EXPERIENCE

Project:	Former Uniforms for Industry Site – Richmond Hill Senior Living Residences / Richmond Place
Location:	Jamaica Ave, Richmond Hill Queens, NY
Type:	NYS BCP, NYC E-Site Hazmat, Noise, Former industrial Laundry
Contamination:	Chlorinated Solvents, Historic Fill, Petroleum - Fuel oil/Mop oil
Role:	Field Operations Manager, Health and Safety Monitoring and Field Oversight

Project:	Rikers Island – West Intake Facility
Location:	NYC Department of Corrections, Rikers Island, NY
Type:	Municipal Construction Project
Contamination:	Hazardous levels of lead, heavy metals in Historic fill
Role:	Field Operations Manager, Health and Safety Monitoring and Field Oversight

Project:	Residential Redevelopment Project
Location:	Williamsburg Section of Brooklyn, Wallabout Street
Type:	NYC E-Designation Site
Contamination:	Hazardous levels of lead, heavy metals, SVOCs in Historic fill
Role:	Implement RI Work Plan, Supervise sample collection in all media

ATTACHMENT G
BCP Signage Specifications

New York State Brownfields Cleanup Program

34-11 BEACH CHANNEL DRIVE
BCP Site No. C-241141
ALPROF REALTY LLC
VFP REALTY LLC

Governor Andrew M. Cuomo
NYSDEC Commissioner Joe Martens
Mayor Bill de Blasio

Transform the Past. Build for the Future.

SIGNS FOR REMEDIAL PROGRAMS

Instructions

Signs are required at sites where remedial activities are being performed under one of the following remedial programs: State Superfund, Voluntary Cleanup Program (VCP), Brownfield Cleanup Program (BCP), Environmental Restoration Program (ERP), Brownfield Opportunity Area (BOA) Program (note: activities under this program would be for investigation). The cost of the sign will be borne by the parties performing the remedial activities based on the legal document the activities are being performed under (i.e. volunteers/participants would pay 100% of the cost under the BCP; municipalities would be reimbursed for 90% of the cost under the ERP).

Sign Requirements

Size: **Horizontal format - 96" wide by 48" high**

Construction Materials: **Aluminum or wood blank sign boards with vinyl sheeting.**

Inserts: **"Site Name", "Site Number", "Name of Party Performing Remedial Activities" and "Municipal Executive".**
Indicate position, size and topography for specific inserts.

Color Scheme: **Copy surrounding DEC logo - "NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION" - PMS 355**

DEC logo: **PMS 301 Blue**
PMS 355 Green

Text:

Program (choose one):	**PMS 301**
Brownfield Cleanup Program	
Voluntary Cleanup Program	
Brownfield Opportunity Areas Program	
Petroleum Remediation Program	
State Superfund Program	
1996 Clean Water/Clean Air Bond Act - Environmental Restoration Program	
Site Name, Site Number, Party Performing Remedial Activities	**PMS 355**
Names of Governor, Commissioner, Municipal Executive	**PMS 301**
Transform the Past.....Build for the Future	**PMS 355**

Type Specifications: **All type is Caslon 540, with the exception of the logotype.**
Format is: center each line of copy with small caps and initial caps.

Production Notes: **96" wide x 48" high aluminum blanks will be covered with vinyl sheeting to achieve background color. Copy and logo will be silk screened on this surface.**

See attached format

ATTACHMENT H
Estimated Remedial Costs

34-11 BEACH CHANNEL DRIVE
Far Rockaway, NY

Summary of Project Costs

TASK - ENVIRONMENTAL REMEDIATION	NYS Brownfields Cleanup Program Costs by Task Alternative 1 - Track 1		NYS Brownfields Cleanup Program Costs by Task Alternative 2 - Track 4	
BCP Entry Documents		Completed		Completed
Supplemental Investigation And RI Report		Completed		Completed
Remedial Work Plan, Remedy Scoping & Coordination	$	15,450.00	$	15,450.00
Remedial Program Implementation	$	4,953,367.91	$	769,972.50
Final Engineering Report, Site Management Plan & IC/ECs	$	-	$	125,450.00
DEC / DOH Fees (estimated)	$	60,000.00	$	60,000.00
Total	**$**	**5,028,817.91**	**$**	**970,872.50**

ATTACHMENT I
Chemical Oxidant Calculations and Specifications

CARUS REMEDIATION



CAS Registry No. 10101-50-5
EINECS No. 233-251-1

RemOx® L ISCO Reagent

FACT SHEET

RemOx® L ISCO reagent has been specifically manufactured for environmental applications such as remediation of soils and associated groundwater. This product can be used to degrade a variety of contaminants including chlorinated solvents, polyaromatic hydrocarbons, phenolics, organo-pesticides, and substituted aromatics. RemOx L is shipped with a certificate of analysis to document assay, pH, and trace metals.

PRODUCT SPECIFICATIONS

Assay
39.5-41.0% as $NaMnO_4$

pH
5.0-8.0

Trace Metals
(see Table 1)

CHEMICAL/PHYSICAL DATA

Formula	$NaMnO_4$
Formula Weight	141.93 g/mol
Appearance	Dark Purple Solution
Specific Gravity	1.365-1.385 g/mL
Freezing Point	-15° C/ 5° F
Solubility in Water	Miscible with water in all proportions.

Material will pass through a 10 micron filter.

APPLICATIONS

RemOx L is used for soil and groundwater remediation by *in situ* or *ex situ* chemical oxidation and as an active agent in subsurface reactive barriers for treatment of: chlorinated ethenes, phenolic compounds, polyaromatic hydrocarbons, RDX, HMX, and various pesticides.

SHIPPING CONTAINERS

5-gallon pail (20-L) (UN Specification: UN3H1/Y1.8/100) Made of high-density polyethylene (HDPE), weighs 3.5 lbs (1.6 kg). The net weight is 57 lbs (25.9 kg). The pail stands approximately 14.8 in (37.6 cm) tall, 10.6 in (26.9 cm) wide, and 11.0 in (27.9 cm) deep. (Domestic and international)

55-gallon drum (208-L) (UN Specification: UN1H1/Y1.41100) Made of high-density polyethylene (HDPE), weighs 22 lbs (10 kg). The net weight is 550 lbs (250 kg). The drum stands approximately 34.8 in (88.3 cm) tall, has an outside diameter of 23.3 in (59.1 cm). (Domestic and international)

SHIPPING CONTAINERS

275-gallon IBC (Intermediate Bulk Container) (1040-L) (UN Specification: UN31HA1/Y1.9/100) They are also marked "MX" for multi-trip. IBC weighs 139 lbs (65 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.4 in (115.3 cm) high, 48 in (121.9 cm) long, and 40 in (101.6 cm) wide. The IBC has a 2 in (5 cm) butterfly valve with NPT threads in bottom sump. (Domestic)

275-gallon IBC (Intermediate Bulk Container) (1040-L) (UN Specification: UN31HA1/Y1.9/100) They are also marked "MX" for multi-trip. IBC weighs 132.5 lbs (60 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.8 in (116.2 cm) high, 39.4 in (100.0 cm) long, and 47.3 in (120.0 cm) wide. The IBC has a 2 in (5 cm) butterfly valve with NPT threads in bottom sump. (International)

Bulk Shipping- Quantities up to 4000-gallons (15,142-L) are available. (Domestic only)

HANDLING, STORAGE, AND INCOMPATIBILITY

Like any strong oxidizer RemOx L should be handled with care. Protective equipment during handling should include face shields and/or goggles, rubber or plastic gloves, and rubber or plastic apron. If clothing becomes spotted, wash off immediately; spontaneous ignition can occur with cloth or paper. In cases where significant exposure exists use the appropriate NIOSH-MSHA dust or mist respirator.

Store in accordance with NFPA 30 requirements in the United States or the European Fire Protection Association in Europe for Class II oxidizers. Additional regulations in Europe are REACH (Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals), and CLP (Classification, Labeling, Packaging). REACH is a regulation that increases the responsibility of the industry to manage the risks that the chemical may pose. For REACH registration numbers refer to the eSDS. The product should be stored in a cool, dry area in closed containers. Concrete floors are preferred. Check local regulations to ensure proper storage. Avoid wooden decks. Spillage should be collected and disposed of properly. To clean up spills and leaks follow the steps recommended in our MSDS or eSDS.

Avoid contact with acids, peroxides, and all combustible organic or readily oxidizable materials including inorganic oxidizable materials and metal powders. With hydrochloric acid, chlorine gas is liberated. RemOx L is not combustible, but will support combustion. It may decompose if exposed to intense heat. Fires may be controlled and extinguished by using large quantities of water. Refer to the MSDS or eSDS for more information.

CARUS CORPORATION ONE COMPANY, ENDLESS SOLUTIONS

CORPORATE HEADQUARTERS I 315 Fifth Street, Peru IL 61354 I Tel + 1.815.223.1500 / 1-800-435-6856 I Fax + 1.815.224.6697 I Web: www.caruschem.com I E-Mail: salesmkt@caruschem.com

CARUS EUROPE I Parque Empresarial de ASIPO I C/Secundino Roces 3, Planta 1, Oficina 13-14 I 33428 Cayes, Llanera Spain I Tel +34.985.78.55.13 / Fax +34.985.78.55.10

rev. 09/13
form RX 1603

CARUS REMEDIATION



CAS Registry No. 10101-50-5
EINECS No. 233-251-1

RemOx® L ISCO Reagent

FACT SHEET

RemOx® L ISCO reagent is classified as an oxidizer for both domestic and international transportation. Liquid permanganate is shipped domestically as Freight Class 70 and in E.U. as Class 5.1.

Proper Shipping Name: Permanganates, inorganic, aqueous solution n.o.s. (contains sodium permanganate).

Hazard Class: Oxidizer, Class 5.1
Identification Number: UN 3214
Division/APR/RID Class: 5.1
Label Requirements: Oxidizer, 5.1
Packaging Group: II
Packaging Requirements: 49 CFR Parts 171 to 180
Sections: 173.152, 173.202, 173.242
Quantity Limitations:

1 liter net for passenger aircraft or railcar:
5 liters net for cargo aircraft.

Vessel Stowage, (IMDG Regulation):

D-material must be stowed " on-deck" on a cargo vessel, but is prohibited on a passenger vessel. Other provisions: stow separately from ammonium compounds, hydrogen peroxide, peroxides, super-oxides, cyanide compounds, and powdered metal.

H.S. Code 28.41.69.00

SHIPPING CONTAINERS

RemOx L is compatible with many metals and synthetic materials. Natural rubbers and fibers are often incompatible. Solution pH and temperature are also important factors. The material selected for use with liquid permanganate must be compatible with any kind of acid or alkali being used.

In neutral and alkaline solutions, RemOx L is not corrosive to carbon steel and 316 stainless steel. However, chloride corrosion of metals may be accelerated when an oxidant such as liquid permanganate is present in solution. Plastics such as Teflon, polypropylene, and HDPE are also compatible with liquid permanganate.

Aluminum, zinc, copper, lead, and alloys containing these metals may be (slightly) affected by RemOx L. Actual corrosion or compatibility studies should be made under the conditions in which RemOx L will be used.

Table 1: Typical Trace Metal Content and Specifications

Element	Typical Analysis (mg/kg)	Specifications (mg/kg)	DL* (mg/kg)	Element	Typical Analysis (mg/kg)	Specifications (mg/kg)	DL* (mg/kg)
Ag	BDL	0.15	0.034	Fe	BDL	2.00	0.053
Al	BDL	2.00	0.24	Hg	BDL	0.03	0.003
As	BDL	4.00	0.006	Ni	BDL	0.1	0.03
Ba	2.96	15.00	0.016	Pb	BDL	0.70	0.16
Be	BDL	0.50	0.08	Sb	BDL	0.70	0.16
Cd	BDL	0.10	0.016	Se	0.0034	0.50	0.0003
Cr	3.2	5.00	0.031	Tl	BDL	3.50	0.80
Cu	BDL	0.10	0.022	Zn	0.034	0.40	0.011

DL* is detection limit
BDL is below detection limit

CORPORATE HEADQUARTERS I 315 Fifth Street, Peru IL 61354 I Tel + 1.815.223.1500 / 1-800-435-6856 I Fax + 1.815.224.6697 I Web: www.caruschem.com I E-Mail: salesmkt@caruschem.com

CARUS EUROPE I Parque Empresarial de ASIPO I C/Secundino Roces 3, Planta 1, Oficina 13-14 I 33428 Cayes, Llanera Spain I Tel +34.985.78.55.13 / Fax +34.985.78.55.10

rev. 09/13
form RX 1603

CARUS
REMEDIATION



CAS Registry No. 7722-64-7 EINECS No. 231-760-3

CAS Registry No. 64742-51-4 EINECS No. 265-154-5

RemOx® SR ISCO Reagent

FACT SHEET

RemOx® SR ISCO reagent has been specifically manufactured for environmental applications such as remediation of soils and associated groundwater. This product can be used to degrade a variety of contaminants including chlorinated solvents, polyaromatic hydrocarbons, phenolics, organo-pesticides, and substituted aromatics.

REMEDIATION GRADE

RemOx SR is manufactured with RemOx® S ISCO reagent. RemOx S meets Carus specifications and a certificate of analysis is available upon request for the RemOx S product used to manufacture RemOx SR.

CHEMICAL/PHYSICAL DATA

Formula $KMnO_4$ in paraffin wax

Formula Weight $KMnO_4$: 158.0 g/mol
Wax: not determined

Form Extruded solid of granular crystalline inside wax

Decomposition of $KMnO_4$ may start at 150° C/ 302° F

Congealing point of wax is 54-57° C/ 129-134° F

Paraffin wax will start to melt at 55° C/ 132° F

DESCRIPTION

Potassium permanganate crystals or granules are dark purple encapsulated in a clear wax.

Standard sizes are 1.35 in (3.4 cm) or 2.5 in (6.4 cm) diameter by 18 in (45.7 cm) long with 77-83% by weight $KMnO_4$.

APPLICATIONS

RemOx SR was developed to provide a sustained release of potassium permanganate for soil and groundwater treatment of: chlorinated ethenes, phenolic compounds, polyaromatic hydrocarbons, RDX, HMX, and various pesticides. RemOx SR can be emplaced in the subsurface using direct push technology or suspended into existing wells. This technology can be used for source treatment as well as barrier applications.

SHIPPING CONTAINERS

RemOx SR 1.35 in (3.4 cm) by 18 in (45.7 cm) cylinders - Qty 12/box Corrugated box that is 12.5 in (31.75 cm) by 10.625 in (26.987 cm) by 22 in (55.88 cm) with foam insert. Weight of box is 3.383 lbs (1.534 kg). Weight per cylinder is 1.931 lbs (0.875 kg) or 23.172 lbs (10.510 kg) per box. Total weight of box and cylinders is 26.555 lbs (12.045 kg). (Domestic and international)

RemOx SR 2.5 in (6.4 cm) by 18 in (45.7 cm) cylinder - Qty 6/box Corrugated box that is 12.5 in (31.75 cm) by 10.625 in (26.987 cm) by 22 in (55.88 cm) with foam insert. Weight of box is 3.303 lbs (1.498 kg). Weight per cylinder is 6.348 lbs (2.879 kg) or 38.088 lbs (17.276 kg) per box. Total weight of box and cylinders is 41.391 lbs (18.774 kg). (Domestic and international)

Specialty packaging above was designed to insure delivery of cylinders without breakage.

Orders can only be placed as full boxes in multiples of 6 or 12 depending on the cylinder dimensions.

Packaging meets UN performance-oriented packaging requirements.

SHIPPING

RemOx SR is classified as an oxidizer in accordance with the classification requirements of the Hazardous Materials Transportation regulations. It is shipped under Interstate Commerce Commission's (ICC) Tariff 19.

Proper Shipping Name: Oxidizing solid, n.o.s. (potassium permanganate) (RQ-100)

Hazard Class: Oxidizer

Identification Number: UN 1479

Label Requirements: Oxidizer

Packaging Requirements: 49 CFR Parts 100 to 199

Sections: 173.152, 173.153, 173.194

Shipping Limitations:

Minimum quantities:

Rail car: See Tariff for destination

Truck: No minimum

Postal regulations:

Information applicable to packaging of oxidizers for shipment by the U.S. Postal Service to domestic and foreign destinations is readily available from the local postmaster. United Parcel Service accepts 25 lbs as largest unit quantity properly packaged; (consult United Parcel Service). Regulations concerning shipping and packing should be consulted regularly due to frequent changes.

CORPORATE HEADQUARTERS I 315 Fifth Street, Peru IL 61354 I Tel + 1.815.223.1500 / 1-800-435-6856 I Fax + 1.815.224.6697 I Web: www.caruschem.com I E-Mail: salesmkt@caruschem.com

CARUS EUROPE I Parque Empresarial de ASIPO I C/Secundino Roces 3, Planta 1, Oficina 13-14 I 33428 Cayes, Llanera Spain I Tel +34.985.78.55.13 / Fax +34.985.78.55.10

CARUS WATER, JINING I Jiangmiao Village, Ershilipu Town, Rencheng District, Jining City, I Shandong Province, China. 272000 I Tel +86.053.7279.1228 / Fax +86.053.7279.1339

rev. 01/13
form RX 1649

CARUS
REMEDIATION



CAS Registry No. 7722-64-7 EINECS No. 231-760-3

CAS Registry No. 64742-51-4 EINECS No. 265-154-5

RemOx® SR ISCO Reagent

FACT SHEET

CORROSIVE PROPERTIES

RemOx® SR ISCO reagent is compatible with many metals and synthetic materials. Natural rubbers and fibers are often incompatible. Solution pH and temperature are also important factors. The material must be compatible with either the acid or alkali also being used.

In neutral and alkaline solutions, RemOx SR is not corrosive to iron, mild steel, or stainless steel; however, chloride corrosion of metals may be accelerated when an oxidant such as permanganate is present in solution. Plastics such as polypropylene, polyvinyl chloride Type I (PVC I), epoxy resins, fiberglass reinforced plastic (FRP), Penton, Lucite, Viton A, and Hypalon are suitable. Teflon FEP and TFE, and Tefzel ETFE are best. Refer to Material Compatibility Chart.

Aluminum, zinc, copper, lead, and alloys containing these metals may be (slightly) affected by RemOx SR solutions. Actual studies should be made under the conditions in which permanganate will be used.

HANDLING, STORAGE, AND INCOMAPTIBILITY

Protect containers against physical damage. Eye protection should also be worn when handling RemOx SR as a solid or in solution. Avoid breathing vapors or mists of the wax. Exposure or inhalation may cause irritation.

RemOx SR is stable and will keep indefinitely if stored in a cool, dry area in closed containers. Concrete floors are preferred to wooden decks. To clean up spills and leaks, follow the steps recommended in the MSDS or eSDS. Be sure to use goggles, rubber gloves, and respirator when cleaning up a spill or leak.

Avoid contact with acids, peroxides, and all combustible organic or readily oxidizable materials including inorganic oxidizable materials and metal powders. With hydrochloric acid, chlorine gas is liberated. Avoid heating wax to 200° C (392° F) in the presence of potassium permanganate. RemOx SR is not combustible, but it will support combustion. It may decompose if exposed to intense heat. Fires may be controlled and extinguished by using large quantities of water. Refer to the MSDS or eSDS for more information.

CARUS CORPORATION

ONE COMPANY, ENDLESS SOLUTIONS

CORPORATE HEADQUARTERS I 315 Fifth Street, Peru IL 61354 I Tel + 1.815.223.1500 / 1-800-435-6856 I Fax + 1.815.224.6697 I Web: www.caruschem.com I E-Mail: salesmkt@caruschem.com

CARUS EUROPE I Parque Empresarial de ASIPO I C/Secundino Roces 3, Planta 1, Oficina 13-14 I 33428 Cayes, Llanera Spain I Tel +34.985.78.55.13 / Fax +34.985.78.55.10

CARUS WATER, JINING I Jiangmiao Village, Ershilipu Town, Rencheng District, Jining City, I Shandong Province, China. 272000 I Tel +86.053.7279.1228 / Fax +86.053.7279.1339

rev. 01/13
form RX 1649

ZONE1
OXIDANT CALCULATIONS

Parameters	Units	Estimates
*** Site Description ***		
Length	Ft.	40
Width	Ft.	20
Area	Sq. Ft.	800
Thickness	Ft.	15
Total Volume	Cu. Yd.	444
Porosity	%	30
Plume Total Pore Volume	Gal.	26933
Avg. Contaminant Conc.	ppm	855
Mass of Contaminant	lb.	194.81688
NOD	g/kg	1.41
Effective NOD %	10	0.141
NOD	lb/yd3	0.629800893
NOD Oxidant Demand	lb	279.91
Avg. Stoichiometric Demand	lb/lb	2.4
Contaminant Oxidant Demand	lb.	467.560512
Theoritical Oxidant Demand	lb.	747.47
SWAG Factor	*???*	4.3
Calculated Oxidant Demand		3214.13
*** Injection Design ***		
Radius of Influence	Ft.	5.00
Number of Injection Points		8
Injection Concentration	% wt/wt	12.00%
Flow Rate - Per Injection Point	GPM	1.00
Number of Wells per Phase		5
Total Injection Flow Rate	GPM	10.00
Estimated Injection Pressure	PSIG	10.00
Injection Volume/Hole	Gal	373.00
*** Injection Schedule ***		
Hours per Day	Hrs	8.00
Days Per Week	Days	5.00
Number of Inj. Days	Days	0.62
Number of Inj. Weeks	Weeks	0.12

40% NaMnO4 Injection Options

Pounds of 40% NaMnO4 Solution	Gallons of 40% Solution	Number of Pails	Number of Drums	Number of Totes	Price per Lb of Solution	
7,071	620.27	124.05	12.92	2.82		$

Total Gallons of Dillution Water Required	Dillution Water Flow Rate - GPM	NaMnO4 40% Solution Flow Rate - GPM		Dillution Water Gals per Pail	Dillution Water Gals per Drum	
2,363.71	7.92	2.08	OR	19.05	182.92	

Dry KMnO4 Injection Options

Pounds of KMnO4 (Dry Crystals)	Number of Pails	Number of Drums	Number of Totes	Price per Lb (Dry)	
3,214	58.44	9.74	0.97		$

Total Gallons of Dillution Water Required	Dillution Water Flow Rate - GPM		Dillution Water Gals per Pail	Dillution Water Gals per Drum	
2,826.17	10.00	OR	48.36	290.17	

ZONE 2
OXIDANT CALCULATIONS

Parameters	Units	Estimates
*** Site Description ***		
Length	Ft.	40
Width	Ft.	20
Area	Sq. Ft.	800
Thickness	Ft.	15
Total Volume	Cu. Yd.	444
Porosity	%	30
Plume Total Pore Volume	Gal.	26933
Avg. Contaminant Conc.	ppm	338
Mass of Contaminant	lb.	77.015328
NOD	g/kg	1.41
Effective NOD %	10	0.141
NOD	lb/yd3	0.629800893
NOD Oxidant Demand	lb	279.91
Avg. Stoichiometric Demand	lb/lb	2.4
Contaminant Oxidant Demand	lb.	184.8367872
Theoritical Oxidant Demand	lb.	464.75
SWAG Factor	*???*	4.3
Calculated Oxidant Demand		1998.42
*** Injection Design ***		
Radius of Influence	Ft.	5.00
Number of Injection Points		8
Injection Concentration	% wt/wt	12.00%
Flow Rate - Per Injection Point	GPM	1.00
Number of Wells per Phase		5
Total Injection Flow Rate	GPM	10.00
Estimated Injection Pressure	PSIG	10.00
Injection Volume/Hole	Gal	231.91
*** Injection Schedule ***		
Hours per Day	Hrs	8.00
Days Per Week	Days	5.00
Number of Inj. Days	Days	0.39
Number of Inj. Weeks	Weeks	0.08

40% NaMnO4 Injection Options

Pounds of 40% NaMnO4 Solution	Gallons of 40% Solution	Number of Pails	Number of Drums	Number of Totes	Price per Lb of Solution	
4,397	385.66	77.13	8.03	1.75		$

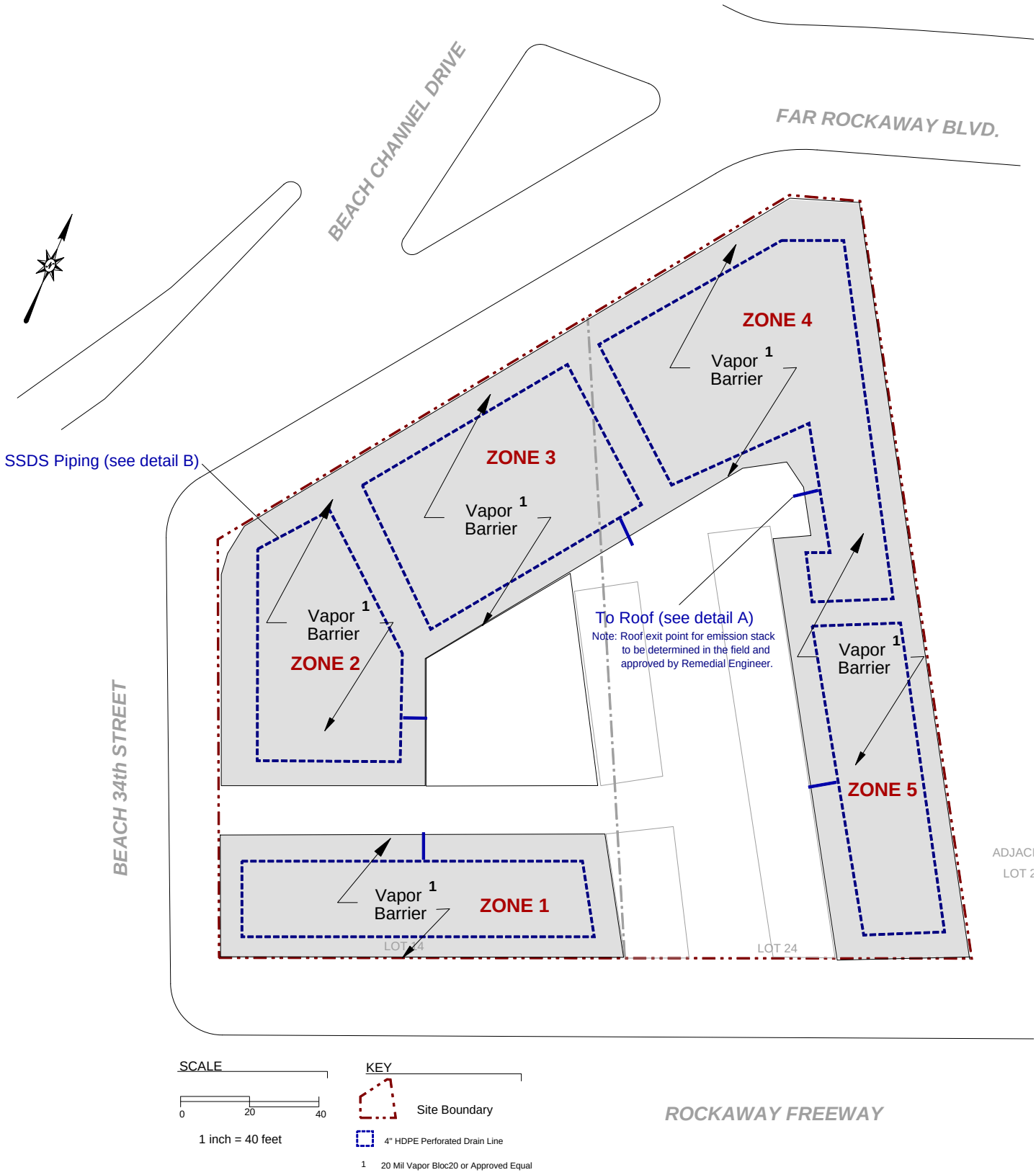
Total Gallons of Dillution Water Required	Dillution Water Flow Rate - GPM	NaMnO4 40% Solution Flow Rate - GPM		Dillution Water Gals per Pail	Dillution Water Gals per Drum	
1,469.66	7.92	2.08	OR	19.05	182.92	

Dry KMnO4 Injection Options

Pounds of KMnO4 (Dry Crystals)		Number of Pails	Number of Drums	Number of Totes	Price per Lb (Dry)	
1,998		36.33	6.06	0.61		$

Total Gallons of Dillution Water Required	Dillution Water Flow Rate - GPM		Dillution Water Gals per Pail	Dillution Water Gals per Drum	
1,757.20	10.00	OR	48.36	290.17	

ATTACHMENT J
SSDS and Vapor Barrier Design Details



AMC Engineering
99 Jericho Turnpike, Suite 300J
Jericho, NY 11590

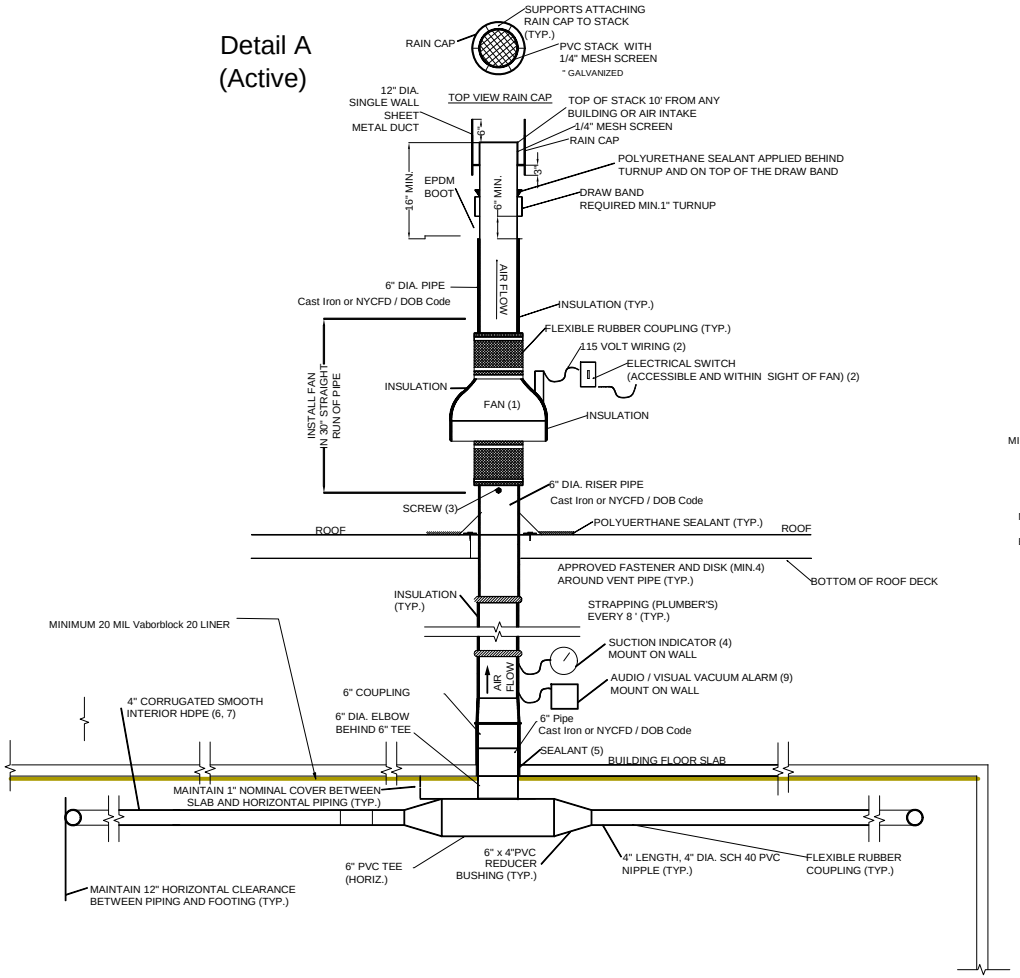
FIGURE
SSDS 1

Site Address: 34-11 Beach Channel Drive Site
34-11 Beach Channel Drive, Queens, NY

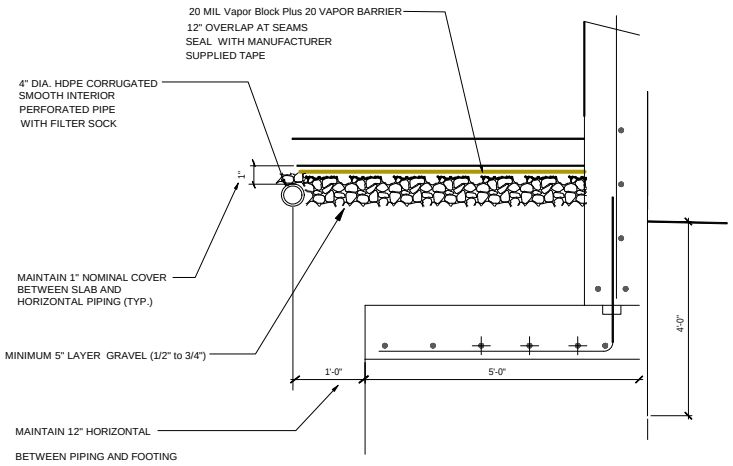
Drawing Title: SSDS Layout

Detail A (Active)

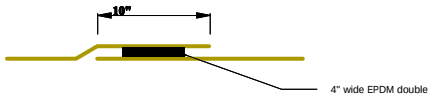
N.T.S.



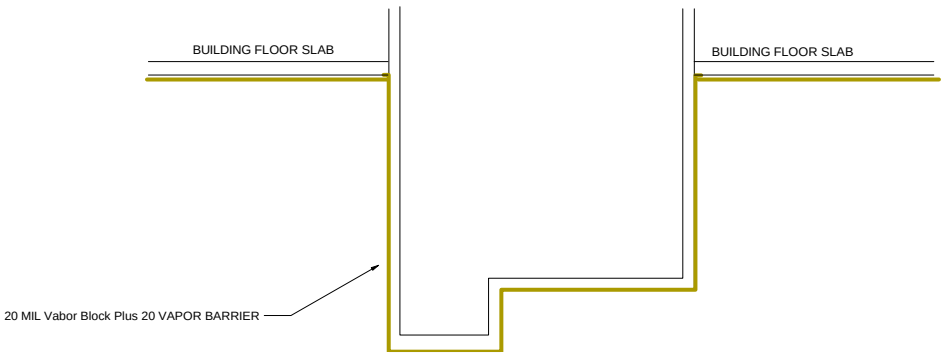
Detail B



Detail C



Detail D Elevator Shaft



NOTES:

1. FAN TO BE RADONAWAY HIGH-FLOW IN-LINE FAN, MODEL RP 265, OR APPROVED EQUAL.
2. FAN AND ON/OFF SWITCH TO BE HARD-WIRED TOGETHER TO 115 VOLT CIRCUIT.
3. SECURE RUBBER COUPLING WITH SCREW TO PREVENT FAN ASSEMBLY FROM SLIPPING DOWN VERTICAL PIPE.
4. DWYER MAGNAHELIC DIAL TYPE VACUUM GAUGE MODEL 2002-M OR APPROVED EQUAL. ACTIVE SYSTEM ONLY
5. SEAL OPENING WITH ELASTOMERIC JOINT SEALANT AS DEFINED IN ASTM C920.
6. HIGH DENSITY POLYETHYLENE CORRUGATED PERFORATED PIPE ADS N-12 OR APPROVED EQUAL.
7. WRAP 4" HDPE PIPE WITH GEOTEXTILE FABRIC, GSE NW4 OR APPROVED EQUAL.
8. AMC MUST PRE-APPROVE ALL FILLMATERIAL BEFORE DELIVERY TO SITE.
9. CHECKPOINT IIA OR APPROVED EQUAL.

AMC Engineering
99 Jericho Turnpike, Suite 300J
Jericho, NY 11590

Figure No.
SSDS 2

Site Name: 34-11 Beach Channel Drive Site
Site Address: 34-11 Beach Channel Drive, Queens, NY
Drawing Title: Subslab Depressurization System Details

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

RAVEN INDUSTRIES

Product Description

VaporBlock® Plus™ 20 is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock® Plus™ 20 is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock® Plus™ 20 is more than 100 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs.

VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in a 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock® Plus™ 20 is produced within the strict guidelines of our ISO 9001:2008 Certified Management System.

Product Use

VaporBlock® Plus™ 20 resists gas and moisture migration into the building envelop when properly installed to provide protection from toxic/harmful chemicals. It can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock® Plus™ 20 works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

Size & Packaging

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.

Under-Slab Vapor/Gas Retarder

Product	Part #
VaporBlock Plus 20	VBP 20

APPLICATIONS

- Radon Barrier
- Methane Barrier
- VOC Barrier
- Under-Slab Vapor Retarder
- Foundation Wall Vapor Retarder

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VAPORBLOCK® PLUS™ VBP20

ISO 9001:2008 CERTIFIED MANAGEMENT SYSTEM

Under-Slab Vapor / Gas Barrier

		VAPORBLOCK PLUS 20	
PROPERTIES	**TEST METHOD**	**IMPERIAL**	**METRIC**
Appearance		White/Gold	
Thickness, Nominal		20 mil	0.51 mm
Weight		102 lbs/MSF	498 g/m²
Classification	ASTM E 1745	CLASS A, B & C	
Tensile Strength lbf/in (N/cm) average MD & TD (new material)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
Impact Resistance	ASTM D 1709	2600 g	
Maximum Use Temperature		180° F	82° C
Minimum Use Temperature		-70° F	-57° C
Permeance (new material)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.0051 Perms grains/(ft²·hr·in·Hg)	0.0034 Perms g/(24hr·m²·mm Hg)
Radon Diffusion Coeffiecient	K124/02/95	$< 1.1 \times 10^{-13}$ m²/s	
Methane Permeance	ASTM D 1434	$< 1.7 \times 10^{-10}$ m²/d• atm 0.32 GTR (Gas Transmission Rate) ml/m²•D•ATM	

VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.
Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.
ASTM E-1643 also provides general installation information for vapor retarders.

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VaporBlock® Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission.

RAVEN INDUSTRIES
Engineered Films Division
P.O. Box 5107
Sioux Falls, SD 57117-5107
Ph: (605) 335-0174 • Fx: (605) 331-0333

Toll Free: **800-635-3456**
Email: **efdsales@ravenind.com**
www.ravenefd.com

Limited Warranty available at www.RavenEFD.com

RadonAway™
The world's leading radon fan manufacturer

RP Series

Radon Mitigation Fan

All RadonAway™ fans are specifically designed for radon mitigation. RP Series Fans provide superb performance, run ultra-quiet and are attractive. They are ideal for most sub-slab radon mitigation systems.

Features

- Energy efficient
- Ultra-quiet operation
- Meets all electrical code requirements
- Water-hardened motorized impeller
- Seams sealed to inhibit radon leakage (RP140 & RP145 double snap sealed)
- RP140 and RP260 Energy Star® Rated
- ETL Listed - for indoor or outdoor use
- Thermally protected motor
- Rated for commercial and residential use

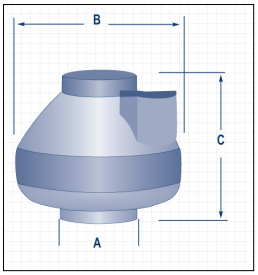
MODEL	P/N	FAN DUCT DIAMETER	WATTS	MAX. PRESSURE"WC	TYPICAL CFM vs. STATIC PRESSURE WC				
					0"	.5"	1.0"	1.5"	2.0"
RP140*	23029-1	4"	15-21	0.8	135	70	-	-	-
RP145	23030-1	4"	41-72	2.1	166	126	82	41	3
RP260*	23032-1	6"	50-75	1.6	272	176	89	13	-
RP265	23033-1	6"	91-129	2.3	334	247	176	116	52
RP380*	28208	8"	95-152	2.3	497	353	220	130	38

*Energy Star® Rated

Made in USA with US and imported parts

ETL Listed

All RadonAway inline radon fans are covered by our 5-year, hassle-free warranty



Model	A	B	C
RP140	4.5"	9.7"	8.5"
RP145	4.5"	9.7"	8.5"
RP260	6"	11.75"	8.6"
RP265	6"	11.75"	8.6"
RP380	8"	13.41"	10.53"

For Further Information Contact

9/12
P/N 02008

RadonAway™

The World's Leading
Radon Fan Manufaturer



RP Series
Installation Instructions

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

P/N IN020-REV K 4/11

Series Fan Installation Instructions

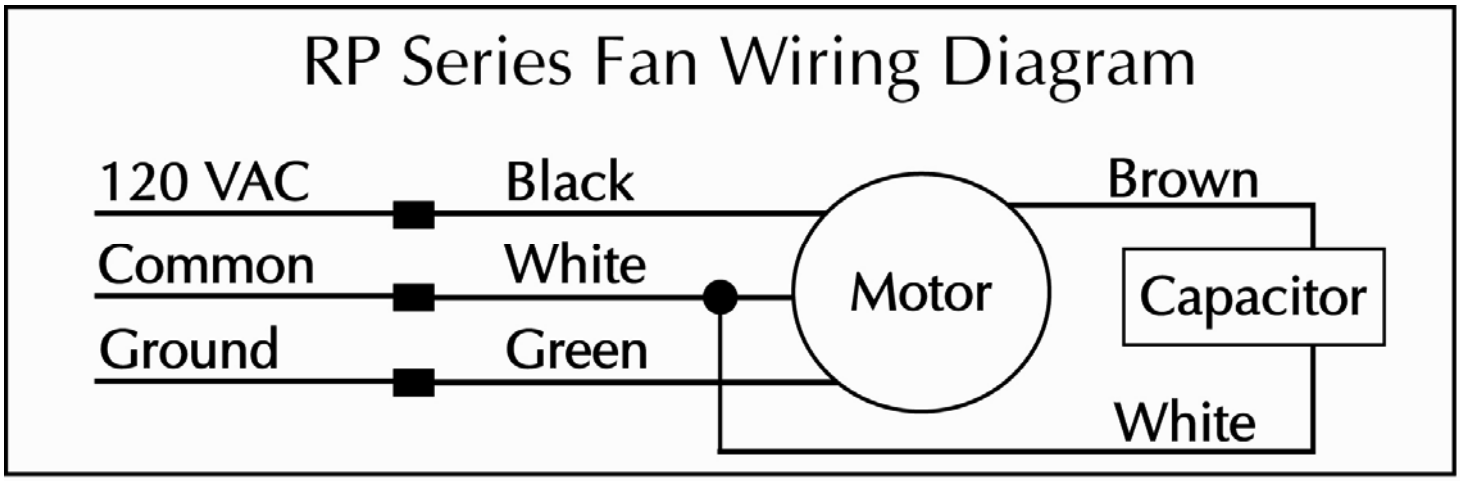
Please Read and Save These Instructions.

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 combustible 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 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!** 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.
8. **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.



1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The RP 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 an RP Series 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 RP 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 RP 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.

(To ensure quiet operation of ENERGY STAR qualified in-line and remote fans, each fan shall be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct shall be installed between the exhaust or supply grille(s) and the fan).

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 RP 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

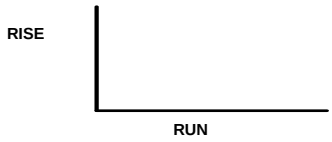
The RP Series Fan can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the RP Series Fan best suited for the sub-slab material can improve the slab coverage. The RP140/145/155 are best suited for general purpose use. The RP260 can be used where additional airflow is required and the RP265/380 is best suited for large slab, high airflow applications. 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 RP 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 RP Series Fans are **NOT** suitable for underground burial.

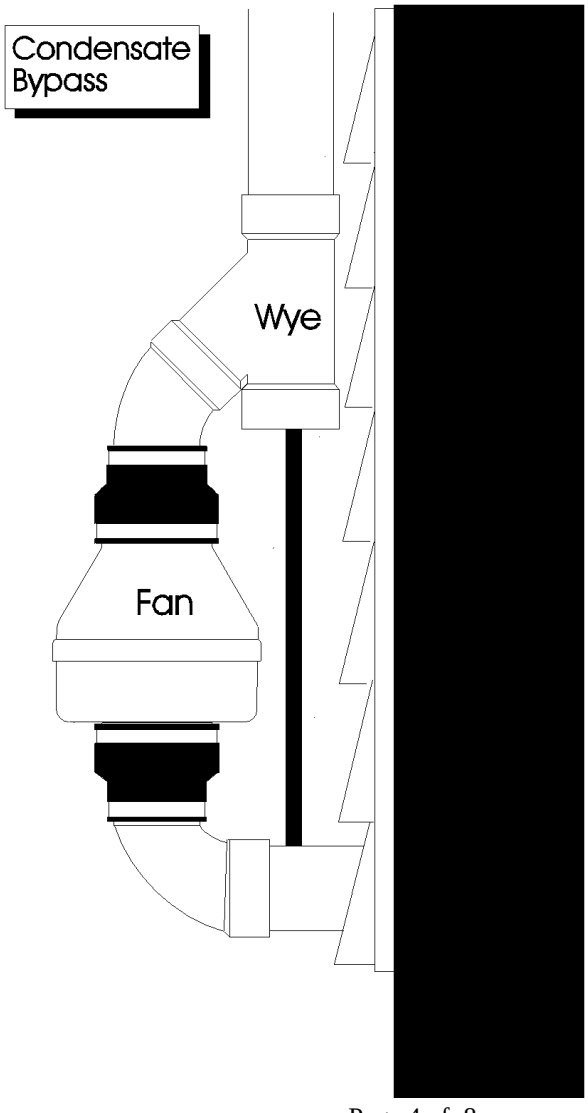
For RP Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Dia.	Minimum Rise per Ft of Run*				
	@25 CFM	@50 CFM	@100 CFM	@200 CFM	@300 CFM
6"	-	3/16	1/4	3/8	3/4
4"	1/8	1/4	3/8	2 3/8	-
3"	1/4	3/8	1 1/2	-	-



*Typical RP1xx/2xx Series Fan operational flow rate is 25 - 90 CFM 0n 3" and 4" pipe. (For more precision, determine flow rate by measuring Static Pressure, in WC, and correlate pressure to flow in the performance 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

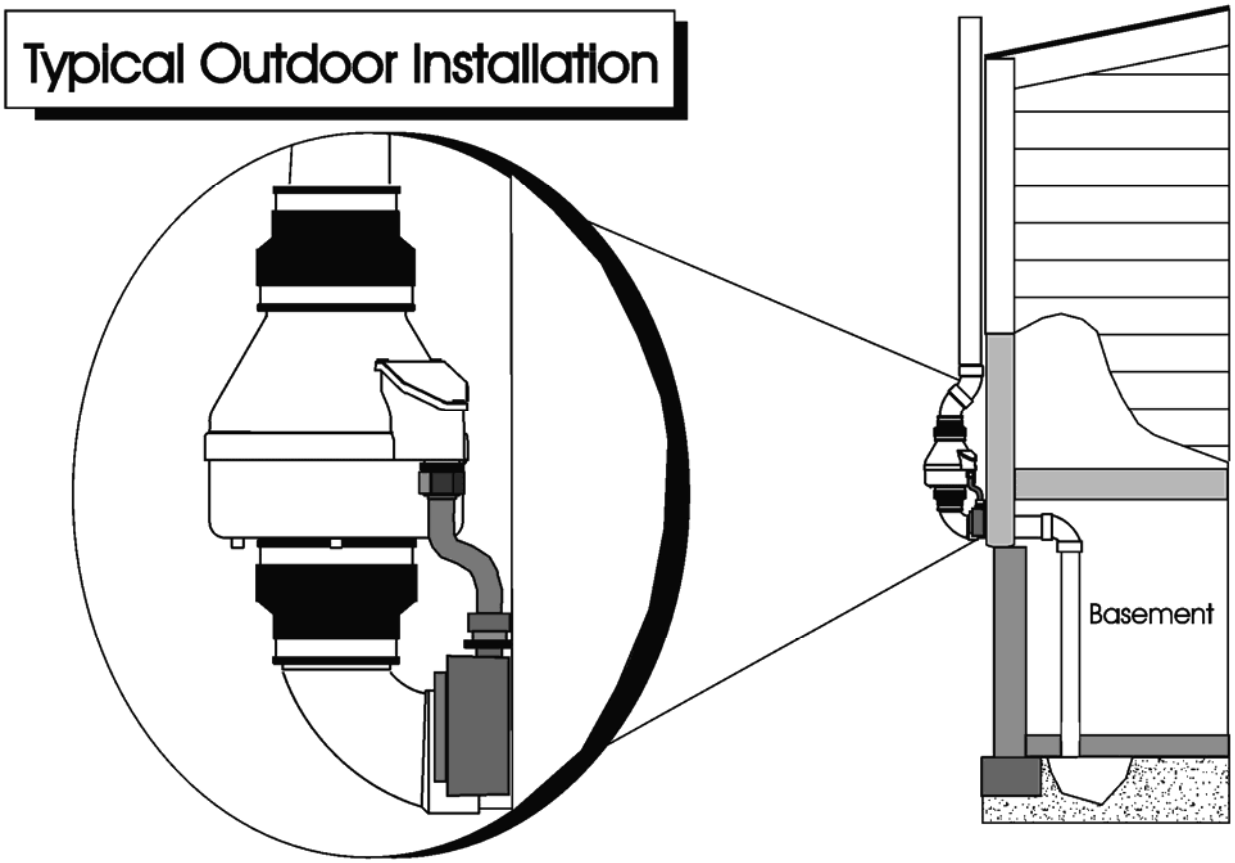
The RP Series Fans operate on standard 120V 60 Hz. AC. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must 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 sealed to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.9 SPEED CONTROLS

The RP Series Fans are rated for use with electronic speed controls, however, they are generally not recommended. If used, the recommended speed control is Pass & Seymour Solid State Speed Control Cat. No. 94601-I.

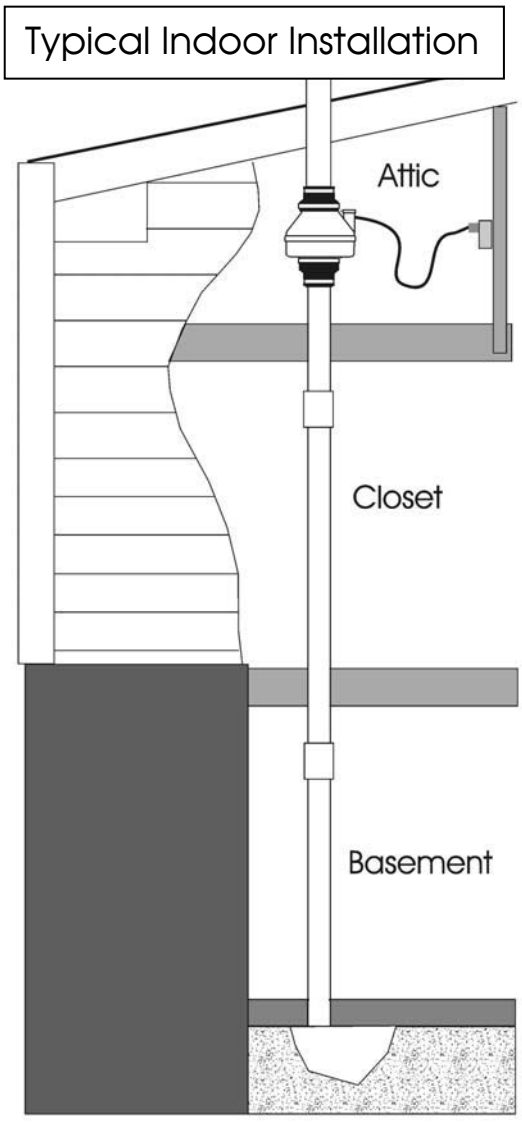
2.0 INSTALLATION

The RP Series Fan can be mounted indoors or outdoors. (It is suggested that EPA recommendations be followed in choosing the fan location.) The RP 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 RP 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 RP Series Fan may be optionally secured with the RadonAway P/N 25007-2 (25033 for RP385) mounting bracket. 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 (See Section 1.8):

Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

2.5 VENT MUFFLER (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 RP 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.**

RP SERIES PRODUCT SPECIFICATIONS

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

Typical CFM Vs Static Pressure "WC									
	0"	.25"	.5"	.75"	1.0"	1.25"	1.5"	1.75"	2.0"
RP140	135	103	70	14	-	-	-	-	-
RP145	166	146	126	104	82	61	41	21	3
RP260	272	220	176	138	103	57	13	-	-
RP265	334	291	247	210	176	142	116	87	52
RP380*	497	401	353	281	220	176	130	80	38

* Tested with 6" inlet and discharge pipe.

Power Consumption 120 VAC, 60Hz 1.5 Amp Maximum		Maximum Recommended Operating Pressure* (Sea Level Operation)**	
RP140	17 - 21 watts	RP140	0.8" W.C.
RP145	41 - 72 watts	RP145	1.7" W.C.
RP260	52 - 72 watts	RP260	1.5" W.C.
RP265	91 - 129 watts	RP265	2.2" W.C.
RP380	95 - 152 watts	RP380	2.0" W.C.

**Reduce by 10% for High Temperature Operation*
***Reduce by 4% per 1000 feet of altitude*

	Size	Weight	Inlet/Outlet
RP140	8.5H" x 9.7" Dia.	5.5 lbs.	4.5" OD (4.0" PVC Sched 40 size compatible)
RP145	8.5H" x 9.7" Dia.	5.5 lbs.	4.5" OD (4.0" PVC Sched 40 size compatible)
RP260	8.6H" x 11.75" Dia.	5.5 lbs.	6.0" OD
RP265	8.6H" x 11.75" Dia.	6.5 lbs.	6.0" OD
RP380	10.53H" x 13.41" Dia.	11.5 lbs.	8.0" OD

Recommended ducting: 3" or 4" RP1xx/2xx, 6" RP380, Schedule 20/40 PVC Pipe
Mounting: Mount on the duct pipe or with optional mounting bracket.
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
Thermally Protected
3000 RPM
Rated for Indoor or Outdoor Use

LISTED Electric Fan ETL® 77728 Tested to UL Std. 507

ENERGY STAR **RP140 and RP260 Only.**

TESTED/CERTIFIED HOME VENTILATING INSTITUTE® DIVISION OF AMCA

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the GP/XP/XR/RP 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 GP/XP/XR/RP 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_____

INSTALLATION & OPERATING INSTRUCTIONS
Instruction P/N IN015 Rev E
FOR *CHECKPOINT IIa*™ P/N 28001-2 & 28001-3
RADON SYSTEM ALARM

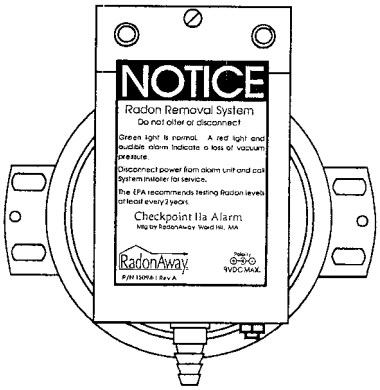
INSTALLATION INSTRUCTIONS
(WALL MOUNTING)

Select a suitable wall location near a vertical section of the suction pipe. The unit should be mounted about four or five feet above the floor and as close to the suction pipe as possible. Keep in mind that with the plug-in transformer provided, the unit must also be within six feet of a 120V receptacle. **NOTE: The Checkpoint IIa is calibrated for vertical mounting, horizontal mounting will affect switchpoint calibration.**

Drill two ¼" holes 4" apart horizontally where the unit is to be mounted.

Install the two ¼" wall anchors provided.

Hang the CHECKPOINT IIa from the two mouting holes located on the mounting bracket. Tighten the mounting screws so the unit fits snugly and securely against the wall.



Drill a 5/16" hole into the side of the vent pipe about 6" higher than the top of the unit.

Insert the vinyl tubing provided about 1" inside the suction pipe.

Cut a suitable length of vinyl tubing and attach it to the pressure switch connector on the CHECKPOINT IIa.

CALIBRATION AND OPERATION.

The CHECKPOINT IIa units are calibrated and sealed at the factory to alarm when the vacuum pressure falls below the factory setting and should not normally require field calibration. Factory Settings are:
28001-2 -.25" WC Vacuum
28001-3 -.10" WC Vacuum

To Verify Operation:

With the exhaust fan off or the pressure tubing disconnected and the CHECKPOINT IIa plugged in, both the red indicator light and the audible alarm should be on.

Turn the fan system on or connect the pressure tubing to the fan piping. The red light and the audible alarm should go off. The green light should come on.

Now turn the fan off. The red light and audible alarm should come on in about two or three seconds and the green light should go out.

WARRANTY INFORMATION

Subject to applicable consumer protection legislation, RadonAway warrants that the CHECKPOINT IIa will be free from defective material and workmanship for a period of (1) year from the date of purchase. Warranty is contingent on installation in accordance with the instructions provided. This warranty does not apply where repairs or alterations have been made or attempted by others; or the unit has been abused or misused. Warranty does not include damage in shipment unless the damage is due to the negligence of RadonAway. All other warranties, expressed or written, are not valid. To make a claim under these limited warranties, you must return the defective item to RadonAway with a copy of the purchase receipt. RadonAway is not responsible for installation or removal cost associated with this warranty. In no case is RadonAway liable beyond the repair or replacement of the defective product FOB RadonAway.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THERE IS NO WARRANTY OF MERCHANTIBILITY. ALL OTHER WARRANTIES, EXPRESSED OR WRITTEN, ARE NOT VALID.

For service under these warranties, 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 costs to and from factory.

Manufactured by:
RadonAway
Ward Hill, MA
(978)-521-3703

INSTALLATION & OPERATING INSTRUCTIONS
Instruction P/N IN015 Rev E
FOR *CHECKPOINT IIa*™ P/N 28001-2 & 28001-3
RADON SYSTEM ALARM

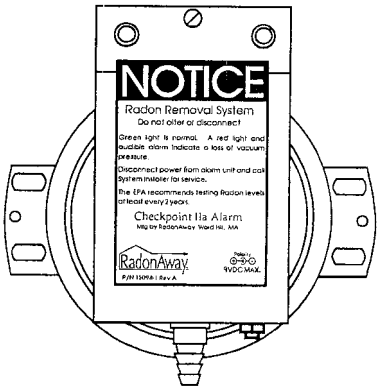
INSTALLATION INSTRUCTIONS
(WALL MOUNTING)

Select a suitable wall location near a vertical section of the suction pipe. The unit should be mounted about four or five feet above the floor and as close to the suction pipe as possible. Keep in mind that with the plug-in transformer provided, the unit must also be within six feet of a 120V receptacle. **NOTE: The Checkpoint IIa is calibrated for vertical mounting, horizontal mounting will affect switchpoint calibration.**

Drill two ¼" holes 4" apart horizontally where the unit is to be mounted.

Install the two ¼" wall anchors provided.

Hang the CHECKPOINT IIa from the two mouting holes located on the mounting bracket. Tighten the mounting screws so the unit fits snugly and securely against the wall.



Drill a 5/16" hole into the side of the vent pipe about 6" higher than the top of the unit.

Insert the vinyl tubing provided about 1" inside the suction pipe.

Cut a suitable length of vinyl tubing and attach it to the pressure switch connector on the CHECKPOINT IIa.

CALIBRATION AND OPERATION.

The CHECKPOINT IIa units are calibrated and sealed at the factory to alarm when the vacuum pressure falls below the factory setting and should not normally require field calibration. Factory Settings are:
28001-2 -.25" WC Vacuum
28001-3 -.10" WC Vacuum

To Verify Operation:

With the exhaust fan off or the pressure tubing disconnected and the CHECKPOINT IIa plugged in, both the red indicator light and the audible alarm should be on.

Turn the fan system on or connect the pressure tubing to the fan piping. The red light and the audible alarm should go off. The green light should come on.

Now turn the fan off. The red light and audible alarm should come on in about two or three seconds and the green light should go out.

WARRANTY INFORMATION

Subject to applicable consumer protection legislation, RadonAway warrants that the CHECKPOINT IIa will be free from defective material and workmanship for a period of (1) year from the date of purchase. Warranty is contingent on installation in accordance with the instructions provided. This warranty does not apply where repairs or alterations have been made or attempted by others; or the unit has been abused or misused. Warranty does not include damage in shipment unless the damage is due to the negligence of RadonAway. All other warranties, expressed or written, are not valid. To make a claim under these limited warranties, you must return the defective item to RadonAway with a copy of the purchase receipt. RadonAway is not responsible for installation or removal cost associated with this warranty. In no case is RadonAway liable beyond the repair or replacement of the defective product FOB RadonAway.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THERE IS NO WARRANTY OF MERCHANTIBILITY. ALL OTHER WARRANTIES, EXPRESSED OR WRITTEN, ARE NOT VALID.

For service under these warranties, 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 costs to and from factory.

Manufactured by:
RadonAway
Ward Hill, MA
(978)-521-3703