REMEDIAL INVESTIGATION
WORK PLAN

PREPARED FOR

FORMER PENINSULA HOSPITAL SITE

51-15 BEACH CHANNEL DRIVE
AND
50-04 ROCKAWAY BEACH BOULEVARD
FAR ROCKAWAY, QUEENS, NEW YORK 11691

NYSDEC BCP SITE NO. C241200

PREPARED BY

FPM group™

909 MARCONI AVENUE
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APRIL 2018

REMEDIAL INVESTIGATION WORK PLAN

Prepared for

Facility: Former Peninsula Hospital Site
Far Rockaway, Queens, New York 11691

FPM File No: 1214g-16-01 (02)

I, Stephanie O. Davis, PG, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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SECTION 1.0
INTRODUCTION AND PURPOSE

This Remedial Investigation (RI) Work Plan has been prepared by FPM Group (FPM) for the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site #C241200, identified as the Former Peninsula Hospital Site located at 51-15 Beach Channel Drive and 50-04 Rockaway Beach Boulevard, Far Rockaway, Queens County, New York (Site). This work plan describes the procedures to further evaluate the nature and extent of contamination associated with the Site. This work plan has been developed in accordance with the procedures outlined in the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010).

1.1 Site Location and Description

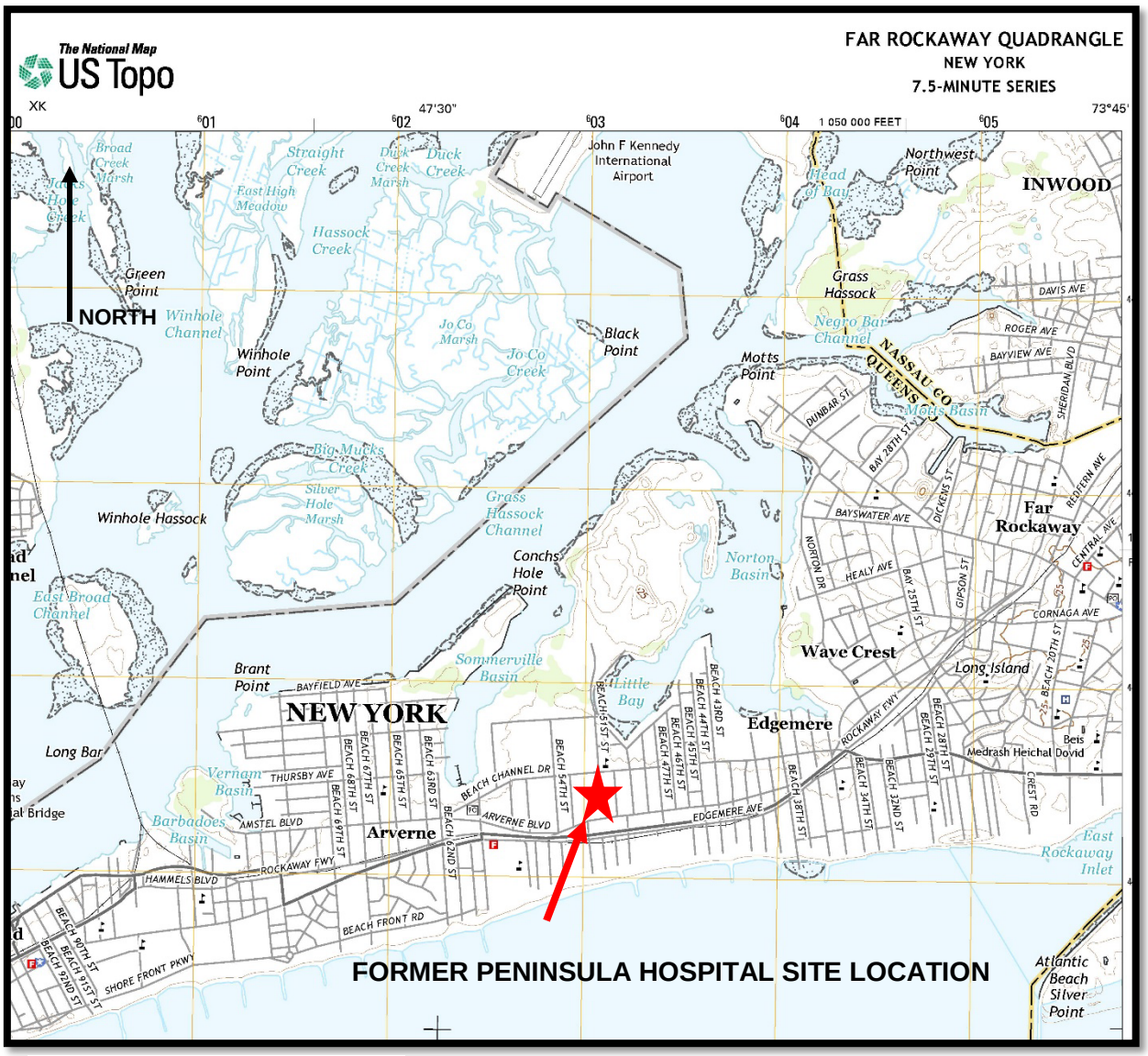
The Site is identified as the Former Peninsula Hospital Site and is located in Far Rockaway, Queens County, New York. The Site is owned by Peninsula Rockaway Limited Partnership. The Site occupies approximately 8.76 acres and is identified by the New York City Tax Map as Borough of Queens, Block 15843, Lot 1 and Block 15842, Lot 1; these lots are presently being merged. The Site is located in an R5 residential zone (1.25 floor area ratio, or FAR) with a C1-2 and C8-1 commercial overlay; this zoning permits both residential and commercial uses. The Site is to be rezoned under Large Scale General Development with C4-4 assumed for FAR and parking. The general location of the Site is presented in Figure 1.1.1. A plan of the Site and its vicinity is included as Figure 1.1.2.

The Site is presently developed with a large hospital building and surrounding parking areas. The building is presently vacant and was formerly occupied by the Peninsula Hospital until it closed in 2012. The hospital building was constructed between 1957 and 1962. A small maintenance building was formerly present on the southwest corner of the Site from 1983 until it was removed (between 1994 and 2003). Prior to the hospital use, the Site was undeveloped except for the southwestern corner, which was formerly occupied successively by a small hotel (from prior to 1912 until sometime before 1933), several residences, and three small stores (by 1951).

The hospital building was formerly serviced by municipal water and sewer provided by the City of New York. Electric and gas services were provided to the Site by Con Edison of New York. These utilities have been disconnected in anticipation of building demolition. The Site's solid waste was formerly removed by the New York City Department of Sanitation; solid waste is no longer generated onsite.

The hospital building was formerly heated via fuel oil-fired heating equipment located in the boiler room in the south wing of the building. The associated fuel oil underground storage tanks (USTs) were removed with NYSDEC oversight in 2016. An above-ground storage tank (AST) for fuel oil was also removed in 2016 and a geophysical survey was performed to locate any additional tanks. Several geophysical anomalies were identified and excavated in 2016, but no additional tanks were identified.

A petroleum release (NYSDEC spill #1508760) was identified in association with the fuel oil USTs. Petroleum-impacted soil and floating product on the water table in the vicinity of the USTs were removed during the 2016 tank removal activities. This spill remains open.



Source: US Geological Survey, 2016

SCALE: ONE MILE

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FIGURE 1.1.1

FORMER PENINSULA HOSPITAL SITE LOCATION

51-15 BEACH CHANNEL DRIVE AND 50-04 ROCKAWAY BEACH BOULEVARD
FAR ROCKAWAY, QUEENS, NEW YORK

Drawn by: SOD	Checked By: BC	Date: 11/28/2017

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FIGURE 1.1.2		
SITE VICINITY PLAN 51-15 BEACH CHANNEL DRIVE AND 50-04 ROCKAWAY BEACH BOULEVARD FAR ROCKAWAY, QUEENS, NEW YORK		
Drawn by: SOD	Checked By: BC	Date: 11/28/2017

1.2 Site Environmental Setting

The surface topography of the Site and surrounding vicinity was obtained from the USGS Far Rockaway, New York Quadrangle (2016), a portion of which is shown in Figure 1.1.1. The topographic elevation of the Site vicinity is approximately 5 to 10 feet above mean sea level (MSL) and the ground surface is relatively flat.

Previous subsurface investigations (discussed in Section 2.0) document that the Site has been modified from its original configuration (former marsh with an elevation near sea level) by placement of historic fill. The historic fill was found to consist primarily of sand with variable amounts of gravel and brick, asphalt, and concrete fragments.

Beneath the historic fill, the Site is underlain successively by organic marsh deposits in places, and by Upper Glacial Formation sand, silt, and clay outwash deposits (USGS, 1963). The Gardiners Clay, consisting of clay with interbedded silt and sand, is present below the Upper Glacial Formation. The top of the Gardiners Clay is present at an approximate elevation of between -50 and -100 feet MSL in the Site vicinity and acts as an aquitard between the Upper Glacial Formation and the deeper Magothy Formation.

The depth to groundwater beneath the Site is approximately 4 to 8 feet below grade, based on information obtained during previous investigations performed at the Site. The regional groundwater flow direction in the property vicinity (USGS, 2009) is anticipated to be to the north, but the Site-specific groundwater flow direction has not yet been determined.

There are no surface water bodies on or adjoining the Site. The closest surface water bodies are the Atlantic Ocean at Rockaway Beach (about 0.25 miles south), Conch Bay of Little Bay (about 0.25 miles northeast), and Sommerville Basin (about 0.35 miles west). These areas are separated from the Site by one or more multi-lane streets and/or the MTA Subway A Line.

The NYSDEC's databases of public water supply wells and Long Island wells were searched and no public water or other supply wells were identified within one-half mile of the Site. As documented by the US Geological Survey (USGS, 1963), very little (if any) fresh groundwater is anticipated to be present in the Upper Glacial or Magothy Aquifers in the Site vicinity due to the Site's location close to the Atlantic Ocean and Jamaica Bay. Based on the urban nature of the surrounding area, the availability of public water via the New York City water supply system, and the saline nature of the groundwater in the underlying Upper Glacial and Magothy Aquifers, water supply wells are unlikely to have been installed in the Site vicinity.

1.3 Site History

Based on available historic records, the Site was developed in its current configuration between 1957 and 1962 and was used for hospital purposes until 2012, when the hospital closed. A small maintenance building was formerly present on the southwest corner of the Site from 1983 until it was removed (between 1994 and 2003). Prior to the hospital use, the Site was undeveloped except for the southwestern corner. Previous uses on the southwestern portion of the Site included a small hotel (from prior to 1912 until sometime before 1933), several residences, and three small stores (by 1951).

Subsurface investigations were performed at the Site between 2015 and 2017 and are discussed in detail in Section 2.0

The scope of investigation included herein is intended to provide additional information concerning the nature and extent of contaminants present onsite and in proximity to the Site that may be related to Site operations. Information will also be obtained for use in evaluating potential remedial measures. The scope of RI work included herein is intended to provide sufficient data to support development of remedial measures sufficient to achieve a Track 1 (unrestricted use) cleanup.

1.4 Property Usage Immediately Adjacent to Site

The Site is bounded to the south by Rockaway Beach Boulevard, as shown on Figure 1.1.2. Properties across Rockaway Beach Boulevard to the south include multiple commercial buildings, a church, and an electrical substation. The MTA Subway A Line is present further to the south.

The Site is bounded to the west by Beach 53rd Street. Properties across Beach 53rd Street to the west include multi-story buildings used for multi-family residences and a nursing care center, and parking lots.

The Site is bounded to the north by Beach Channel Drive. Properties across Beach Channel Drive to the north include multi-story residential buildings (north and northwest), and Public School (PS) 105 and Conch Playground (northeast).

The Site is directly adjoined to the northeast by the multi-story Peninsula Nursing Home. Beach 50th Street adjoins the Site to the east. Further to the east (across Beach 50th Street) are parking lots.

SECTION 2.0
SUMMARY OF PREVIOUS INVESTIGATIONS

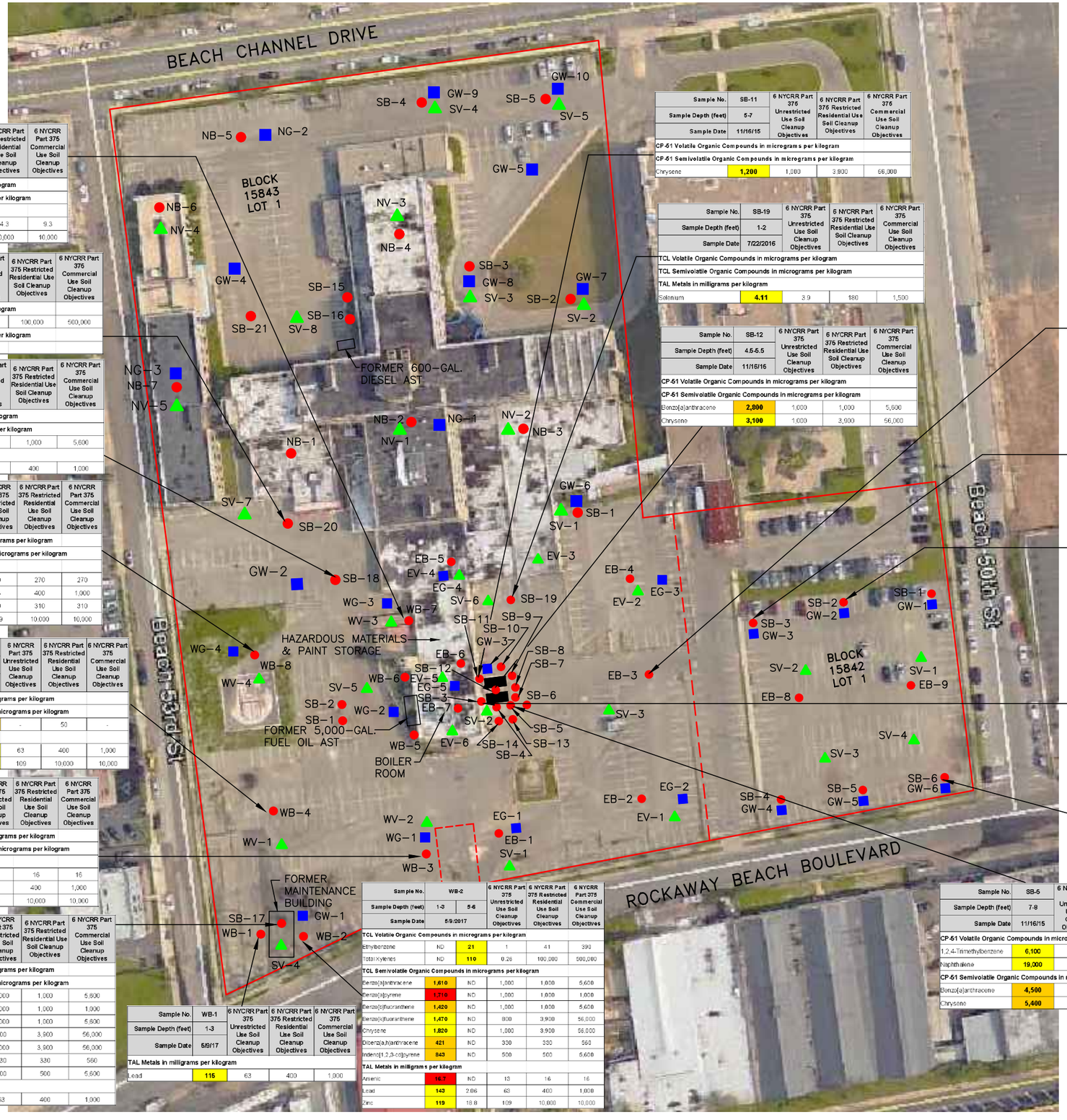
The Site was initially investigated in 2015 during environmental site assessments of the portion of the Site that includes the former hospital building. Additional investigations and remedial actions were performed at the Site between 2016 and 2017 to further evaluate Site conditions, perform tank removals, and address contamination associated with former fuel oil USTs; these investigations and remedial activities are summarized below. Summaries of the existing soil and soil vapor data that exceed applicable regulatory criteria are shown on Figures 2.1 and 2.2, respectively. Excerpts from the previous investigation reports are included in Appendix A.

Environmental data from the Site are evaluated relative to applicable New York State standards, criteria, and guidance (SCGs). The applicable SCGs include the 6 CRR-NY Part 375-6 soil cleanup objectives (SCOs) for soil, the 6 CRR-NY Part 703.5 Class GA Ambient Water Quality Standards (Standards) for groundwater, and the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, and May 2017 updated matrices). In particular, the soil data are compared to the unrestricted use SCOs and the SCOs for the planned use of the property when it is redeveloped, which include restricted residential and commercial uses.

2.1 2015 Environmental Investigations

The portion of the Site that includes the former hospital building was initially investigated in 2015 by PVE Sheffler/Lawrence Environmental Group (PVE) during a Phase I Environmental Site Assessment (ESA) and Phase II ESA. Information from the Phase I ESA report indicated that this portion of the Site was identified as Petroleum Bulk Storage (PBS) site 2-316660 due to the presence of several tanks. These tanks included two 10,000-gallon #6 fuel oil USTs installed December 1957 and closed in place in November 1998; one 550-gallon diesel UST closed in place in November 1998; one 5,000-gallon #2 fuel oil AST installed in June 2007 and listed as in service; and one 600-gallon diesel AST listed as in service. Two NYSDEC Spills were noted, including #9104015 (tank test failure of 550-gallon diesel UST), and #1311139 (electrical fire with non-PCB dielectric fluid release). This parcel was also identified as a Resource Conservation and Recovery Act (RCRA) hazardous waste generator between at least 1989 and 2012, with multiple types of hazardous waste generated, including D001 (ignitable), D002 (corrosive), D003 (reactive), F001 through F005 (spent solvents), U044 (chloroform), U122 (formaldehyde), and U188 (phenol). The location of a former maintenance building was also identified on the southwestern portion of the Site and floor drains were suspected in the hospital boiler room.

The Phase II ESA performed by PVE in 2015 included soil and soil vapor sampling in select locations around the former hospital building, including the proximity of the #6 fuel oil USTs associated with the boiler room and two geophysical anomalies identified on the west side of the building that were suspect UST locations. Fuel oil-impacted soil was identified in proximity to the #6 fuel oil USTs and a petroleum spill (#1508760) was reported to the NYSDEC. Soil vapor at one location near the former maintenance building was found to contain the chlorinated solvents tetrachloroethene (PCE) and trichloroethene (TCE) at levels for which mitigation for soil vapor intrusion (SVI) could be needed if a building was present. The source(s) of these solvents was not identified and no groundwater sampling was performed.



LEGEND:

- GW–3 GROUNDWATER SAMPLE LOCATION
- SB–19 SOIL BORING LOCATION
- SV–3 SOIL VAPOR SAMPLE LOCATION
- FORMER 10,000–GALLON #6 FO UST

0' 100' 200'

APPROXIMATE SCALE

Sample No.	WB-7	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	3-4			
Sample Date	5/9/2017			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Cadmium	**3.06**	2.5	4.3	9.3
Zinc	**128**	109	10,000	10,000

Sample No.	SB-20	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3			
Sample Date	7/22/2016			
TCL Volatile Organic Compounds in micrograms per kilogram				
Acetone	**98**	50	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				

Sample No.	SB-18	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3			
Sample Date	7/22/2016			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
Benzo[a]anthracene	**1,020**	1,000	1,000	5,600
TAL Metals in milligrams per kilogram				
Lead	**68.7**	63	400	1,000

Sample No.	WB-8	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3			
Sample Date	5/9/2017			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Copper	**199**	50	270	270
Lead	**348**	63	400	1,000
Nickel	**34.4**	30	310	310
Zinc	**1,920**	109	10,000	10,000

Sample No.	WB-4	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3			
Sample Date	5/9/2017			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
Bis(2-ethylhexyl)phthalate	**75.0 CCV-E,J**	-	50	-
TAL Metals in milligrams per kilogram				
Lead	**207**	63	400	1,000
Zinc	**120**	109	10,000	10,000

Sample No.	WB-3	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3			
Sample Date	5/9/2017			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Arsenic	**24.0**	13	16	16
Lead	**74.0**	63	400	1,000
Zinc	**156**	109	10,000	10,000

Sample No.	SB-17	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	0-2			
Sample Date	7/22/16			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
Benzo[a]anthracene	**26,500**	1,000	1,000	5,600
Benzo[a]pyrene	**9,280**	1,000	1,000	1,000
Benzo[b]fluoranthene	**9,640**	1,000	1,000	5,600
Benzo[k]fluoranthene	**11,000**	800	3,900	56,000
Chrysene	**21,800**	1,000	3,900	56,000
Dibenz[a,h]anthracene	**1,710**	330	330	560
Indeno[1,2,3-cd]pyrene	**2,870**	500	500	5,600
TAL Metals in milligrams per kilogram				
Lead	**174**	63	400	1,000

Sample No.	WB-1	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3			
Sample Date	5/9/17			
TAL Metals in milligrams per kilogram				
Lead	**115**	63	400	1,000

Sample No.	WB-2		6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3	5-6			
Sample Date	5/9/2017				
TCL Volatile Organic Compounds in micrograms per kilogram					
Ethylbenzene	ND	**21**	1	41	390
Total Xylenes	ND	**110**	0.26	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram					
Benzo[a]anthracene	**1,610**	ND	1,000	1,000	5,600
Benzo[a]pyrene	**1,710**	ND	1,000	1,000	1,000
Benzo[b]fluoranthene	**1,420**	ND	1,000	1,000	5,600
Benzo[k]fluoranthene	**1,470**	ND	800	3,900	56,000
Chrysene	**1,820**	ND	1,000	3,900	56,000
Dibenz(a,h)anthracene	**421**	ND	330	330	560
Indeno[1,2,3-cd]pyrene	**843**	ND	500	500	5,600
TAL Metals in milligrams per kilogram					
Arsenic	**16.7**	ND	13	16	16
Lead	**143**	2.06	63	400	1,000
Zinc	**119**	18.8	109	10,000	10,000

Sample No.	SB-11	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	5-7			
Sample Date	11/16/15			
CP-51 Volatile Organic Compounds in micrograms per kilogram				
CP-51 Semivolatile Organic Compounds in micrograms per kilogram				
Chrysene	**1,200**	1,000	3,900	56,000

Sample No.	SB-19	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-2			
Sample Date	7/22/2016			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Selenium	**4.11**	3.9	180	1,500

Sample No.	SB-12	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	4.5-5.5			
Sample Date	11/16/16			
CP-51 Volatile Organic Compounds in micrograms per kilogram				
CP-51 Semivolatile Organic Compounds in micrograms per kilogram				
Benzo[a]anthracene	**2,800**	1,000	1,000	5,600
Chrysene	**3,100**	1,000	3,900	56,000

Sample No.	EB-3	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	2.0-3.5			
Sample Date	5/9/17			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Zinc	**622**	109	10,000	10,000

Sample No.	SB-3	NYSDEC Unrestricted Use Soil Cleanup Objectives	NYSDEC Restricted-Residential Use Soil Cleanup Objectives	NYSDEC Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	0-2			
Sample Date	3/29/16			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Lead	**440**	63	400	1,000
Zinc	**190**	109	10,000	10,000

Sample No.	SB-2	NYSDEC Unrestricted Use Soil Cleanup Objectives	NYSDEC Restricted-Residential Use Soil Cleanup Objectives	NYSDEC Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	0-2			
Sample Date	3/29/16			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Chromium	**46**	30	180	1,500
Lead	**750**	63	400	1,000

Sample No.	SB-3	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	6-7			
Sample Date	11/16/15			
CP-51 Volatile Organic Compounds in micrograms per kilogram				
CP-51 Semivolatile Organic Compounds in micrograms per kilogram				
Benzo[a]anthracene	**1,300**	1,000	1,000	5,600
Chrysene	**1,400**	1,000	3,900	56,000

Sample No.	SB-6	NYSDEC Unrestricted Use Soil Cleanup Objectives	NYSDEC Restricted-Residential Use Soil Cleanup Objectives	NYSDEC Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	0-2			
Sample Date	3/29/16			
TCL Volatile Organic Compounds in micrograms per kilogram				
TCL Semivolatile Organic Compounds in micrograms per kilogram				
TAL Metals in milligrams per kilogram				
Lead	**69**	63	400	1,000

Sample No.	SB-5	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	7-8			
Sample Date	11/16/15			
CP-51 Volatile Organic Compounds in micrograms per kilogram				
1,2,4-Trimethylbenzene	**6,100**	3,600	52,000	190,000
Naphthalene	**19,000**	12,000	100,000	500,000
CP-51 Semivolatile Organic Compounds in micrograms per kilogram				
Benzo[a]anthracene	**4,500**	1,000	1,000	5,600
Chrysene	**5,400**	1,000	3,900	56,000

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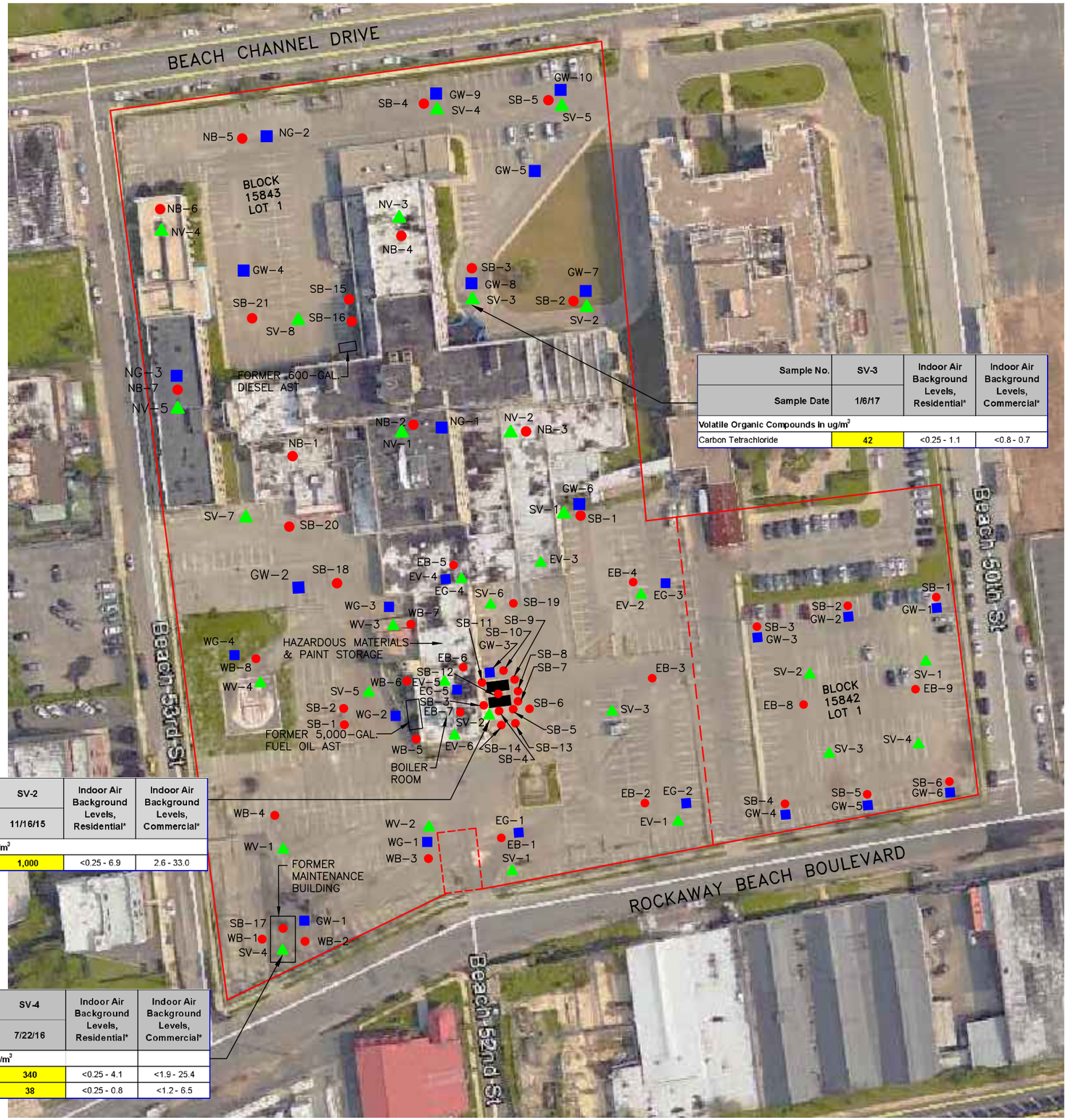
FIGURE 2.1
SOIL SAMPLE DATA

FORMER PENINSULA HOSPITAL SITE
51–15 BEACH CHANNEL DRIVE &
50–04 ROCKAWAY BEACH BOULEVARD
FAR ROCKWAY, QUEENS, NY

Drawn By: H.C. | Checked By: S.D. | Date: 11/29/17



Sample No.	SV-3	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	1/6/17		
Volatile Organic Compounds in ug/m^3			
Carbon Tetrachloride	42	<0.25 - 1.1	<0.8 - 0.7

Sample No.	SV-2	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	11/16/15		
Volatile Organic Compounds in ug/m^3			
1,1,1-Trichloroethane	1,000	<0.25 - 6.9	2.6 - 33.0

Sample No.	SV-4	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	7/22/16		
Volatile Organic Compounds in ug/m^3			
Tetrachloroethene	340	<0.25 - 4.1	<1.9 - 25.4
Trichloroethene	38	<0.25 - 0.8	<1.2 - 6.5

LEGEND:

- GW-3 GROUNDWATER SAMPLE LOCATION
- SB-19 SOIL BORING LOCATION
- SV-3 SOIL VAPOR SAMPLE LOCATION
- FORMER 10,000-GALLON #6 FO UST

0' 100' 200'

APPROXIMATE SCALE

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FIGURE 2.2
SOIL VAPOR SAMPLE DATA

FORMER PENINSULA HOSPITAL SITE
51-15 BEACH CHANNEL DRIVE &
50-04 ROCKAWAY BEACH BOULEVARD
FAR ROCKWAY, QUEENS, NY

Drawn By: H.C. | Checked By: S.D. | Date: 11/29/17

2.2 Additional Investigations and Remediation

Additional investigations were conducted on both parcels the comprise the Site in 2016 and 2017 and included soil, groundwater, and soil vapor sampling. The results from these investigations are summarized below. Remedial activities were conducted in 2016 to locate and remove all tanks on the Site and address the identified petroleum contamination in the #6 fuel oil UST area. The remedial activities are also summarized below.

2.2.1 Investigation Results

The reports documenting the additional investigations and remediation conducted at the Site include the following:

Block 15843, Lot 1 (former hospital):

- Tank Closure Report, FPM Group, Ltd. August 29, 2016
- Phase II Environmental Site Assessment, FPM Group, Ltd., August 30, 2016
- Phase II Environmental Site Assessment, FPM Group, Ltd., January 26, 2017
- Phase II Environmental Site Assessment, FPM Group, Ltd, June 26, 2017

Block 15842, Lot 1 (former hospital parking lot):

- Phase I Environmental Site Assessment, FPM Group, Ltd., March 2016
- Phase II Environmental Site Assessment, FPM Group, Ltd., April 12, 2016
- Phase II Environmental Site Assessment, FPM Group, Ltd, June 26, 2017

The ESA investigations demonstrated the following:

Soil – Historic fill containing asphalt, brick and concrete is present at up to 5 feet below grade throughout much of the Site. Petroleum impacts, including volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) are found in soil in proximity to the former #6 fuel oil USTs (now removed) on the portion of the Site that includes the former hospital. Some of the SVOC impacts exceed the restricted residential use SCOs. Petroleum-impacted soil was removed during the tank removals, as discussed below. SVOCs and metals (including arsenic, cadmium, copper, chromium, lead, nickel, and zinc) are present in historic fill beneath the Site; some of these impacts exceed the restricted residential use SCOs and arsenic exceeds the commercial use SCOs in the southwestern portion of the Site, as shown on Figure 2.1. Additional soil investigation is needed to delineate the identified impacts, further evaluate soils in the areas where chlorinated solvents were detected in soil vapor, and test for additional analyte groups.

Groundwater – Groundwater was found at a depth of between 4 and 8 feet below grade at the property, but the Site-specific groundwater flow direction was not determined. Free-phase product was identified on the water table surface in proximity to the former #6 fuel oil USTs and was removed during remedial efforts, as described below. Groundwater sampling has been performed for VOCs only; none of the VOC detections exceeded the groundwater Standards. Additional groundwater investigation is needed for additional analyte groups and to further assess groundwater quality in the areas where chlorinated solvents have been identified in soil vapor.

Soil Vapor - 1,1,1-Trichloroethane (1,1,1-TCA) was identified in soil vapor in proximity to the former hospital boiler room, PCE and TCE have been identified in soil vapor on the southwest portion of the Site in proximity to a former maintenance building location, and carbon tetrachloride

was identified in proximity to the former hospital building, as shown on Figure 2.2. The concentrations of these constituents were at levels for which mitigation for SVI may be needed, depending on the levels of these VOCs in indoor air. Additional investigation is needed to locate potential sources of these vapors and delineate the extent of impacted soil vapor.

2.2.2 Remediation

The remaining petroleum storage tanks on the Site were located and removed in 2016 following a work plan (FPM May 23, 2016) that was reviewed and approved by the NYSDEC. The scope of work completed included a geophysical survey of the known and suspected UST areas, a visual survey of the building perimeter and nearby areas, and subsurface explorations to locate all of the USTs. The remaining USTs and ASTs at the Site were located and properly removed and disposed, with the appropriate Fire Department of New York (FDNY) Affidavit filed. These tanks included a 5,000-gallon #2 fuel oil AST, and two closed-in-place 10,000-gallon #6 fuel oil USTs.

An elevated platform for a backup diesel generator with an associated AST was observed on the northwest side of the former hospital building. Although some generator equipment and piping were still present, the former AST was previously removed. The removed AST appears to have been the 600-gallon diesel AST registered with the NYSDEC and noted to be in service in 2015.

A diligent search was made for the 550-gallon diesel UST that was reportedly closed in place, including a geophysical survey, a visual survey of the entire perimeter of the building for vent or fill pipes, and subsurface exploration using an excavator and hand excavation. However, the UST was not located and it was concluded that it was previously removed.

A limited amount of petroleum-impacted soil and free-phase product were removed from the former #6 fuel oil UST area and properly disposed offsite to address spill #1508760, which remains open. Residual petroleum-stained soil remains present approximately 7 feet below grade in the former source area.

2.2.3 Demolition

Demolition of the Site buildings commenced in January 2018 and is anticipated to be completed in mid-2018. Prior to demolition, the buildings were inspected for asbestos-containing materials (ACMs) and all ACMs were properly abated in 2016. ACM abatement documentation was provided to the NYC Department of Environmental Protection (DEP), which issued Asbestos Project Completion Forms on October 6, 2016.

The buildings were also inspected by FPM representatives on December 21, 2017 for the purpose of observing Site conditions prior to demolition and identifying any remaining chemicals or other materials that should be removed and properly disposed prior to demolition. Very limited materials were identified for removal; information about these materials and their locations was provided to the demolition contractor for use in pre-demolition removal and disposal activities. These materials were removed, properly characterized and properly disposed in early 2018.

Demolition includes all above-grade building materials and below-grade foundation elements. The concrete is being crushed and re-used onsite as needed for temporary backfill in the depressed areas that resulted from building demolition, as per NYC Department of Buildings backfill requirements for grading sites after demolition. It should be noted that redevelopment plans include removal of the temporarily-placed crushed concrete during future construction. All other building materials, including excess crushed concrete, will be removed and disposed offsite.

Demolition activities are being performed in a staged manner, with demolition of the above-grade

elements performed first, followed by demolition of the below-grade elements. Demolition materials are staged onsite and may be moved as needed to allow for completion of the RI activities. The Volunteer will coordinate with the demolition contractor to accommodate the RI activities.

SECTION 3.0
SCOPE OF REMEDIAL INVESTIGATION

The scope of RI work presented below has been developed to evaluate the nature and extent of contamination in all media at this Site, including further evaluation of petroleum contamination associated with the former #6 fuel oil USTs, further evaluation of potential sources of chlorinated solvents in soil vapor, and an assessment of the impacts identified in soil. Further evaluations will be performed in suspect areas, including the former maintenance building area, the boiler room area, and the hazardous materials and paint storage areas. Additional assessment will also be performed site-wide. This scope of work has been developed in accordance with the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010) and correspondence with the NYSDEC, and includes soil, soil vapor, and groundwater sampling.

FPM will conduct the RI on behalf of the Volunteer, Peninsula Rockaway Limited Partnership. All RI work will be overseen by a Qualified Environmental Professional (QEP). Contact information for the principal personnel for this project and the Site owner is provided in Table 3.1. Resumes of the principal technical personnel for this project are included in Appendix B.

TABLE 3.1
PROJECT PERSONNEL
FORMER PENINSULA HOSPITAL SITE, QUEENS, NEW YORK

Role	Name	Phone Numbers		Email
		Office	Cell	
Senior Manager	Stephanie Davis, PG	631-737-6200 ext. 228	516-381-3400	s.davis@fpm-group.com
Project Manager	John Bukoski, PG	631-737-6200 ext. 218	516-381-3535	j.bukoski@fpm-group.com
Volunteer Contact	Alex Arker	516-277-9300	-	alex@arkercompanies.com

All field work will be performed using a site-specific Health and Safety Plan (HASP), a copy of which is included in Appendix C. Please note that the HASP includes a Community Air Monitoring Plan (CAMP) prepared in accordance with DER-10, Appendix 1A. FPM will implement the CAMP during all intrusive activities at the Site.

A Citizen Participation Plan (CPP) has been approved for this Site. A copy of the approved CPP is located at the document repositories.

3.1 RI Scope of Work

The RI sampling activities have been developed based, in part, on an evaluation of the existing Site data presented in Section 2. The sampling locations were selected for the purpose of investigating and characterizing the nature and extent of contamination that may be present throughout the Site, including further evaluating previously-identified onsite soil and soil vapor conditions and conducting sufficient sampling to fully characterize the onsite soil, soil vapor, and groundwater conditions.

The proposed RI sampling locations are shown on Figure 3.1.1, together with the previous sampling locations. In accordance with guidance from the NYSDEC, an approximate 100-foot by 100-foot grid (yellow lines) has been superimposed on the Site plan for use in determining soil sample locations needed to characterize soil conditions to support a Track 1 cleanup, as discussed below. The scope of work includes the following components:

- Soil sampling will be conducted at 38 locations (open red circles near the center of each grid box on Figure 3.1.1). The soil samples from these locations will be tested to characterize the general nature and extent of contamination that may be present in the Site soil in each grid box. The resulting data will be used to evaluate soil remedial options that could be used to achieve a Track 1 (unrestricted use) cleanup for soil;

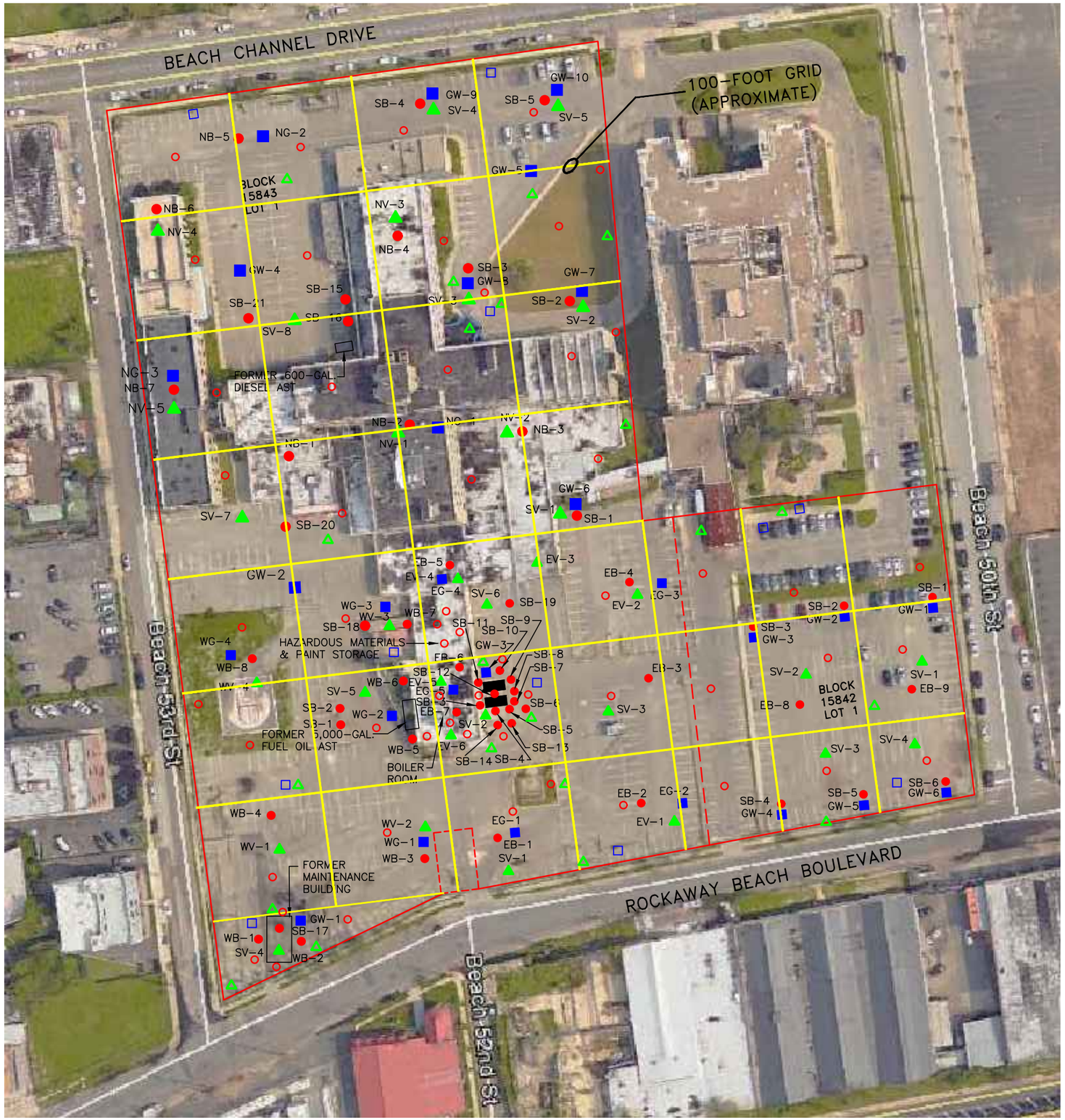
- Soil sampling will also be performed in proximity to areas where soil contamination has previously been identified (#6 fuel oil spill area) or is suspected (former maintenance building, boiler room and hazardous materials and paint storage areas). Four soil borings will be performed in each of these suspect areas (open red circles in the immediate vicinity of these areas). Four additional soil borings will be performed in areas of the Site for which the NYSDEC has requested additional information, including two locations along the eastern Site boundary and one area each to the south and west of the former hospital building location (open red circles in these areas). In some cases, the boring that is used to characterize the soil in the grid box that includes the suspect area will also be used to evaluate soil conditions in proximity to the suspect area;

- Soil vapor sampling will be conducted at 20 locations (open green triangles on Figure 3.1.1) to fill in data gaps from previous sampling efforts and to further evaluate soil vapor conditions in the three areas where elevated concentrations of chlorinated solvents were previously detected. The results from this sampling will also be used to evaluate the potential for offsite soil vapor impacts;

- A network of ten groundwater monitoring wells will be installed onsite (open blue boxes on Figure 3.1.1); the network of wells has been designed to include three wells on the anticipated upgradient side of the Site (south) and three wells on the anticipated downgradient side of the Site (north). Using these wells, the Site-specific groundwater flow direction will be determined and groundwater sampling will be performed to further evaluate onsite groundwater conditions and the potential for Site-related groundwater contamination to extend offsite; and

- A Qualitative Human Health Exposure Assessment will be performed, as described in DER-10, to identify the areas and chemicals of concern, actual or potential exposure pathways, potentially exposed receptors, and how any unacceptable exposures might be eliminated/mitigated.

No sub-slab soil vapor or indoor air sampling is planned as the hospital building that was formerly present has been demolished. No offsite sampling is planned at this time as none of the existing Site data suggest that Site-related contamination extends to offsite properties.



LEGEND:

FORMER 10,000-GALLON #6 FO UST

EXISTING LOCATIONS

- GW-3 GROUNDWATER SAMPLE LOCATION
- SB-19 SOIL BORING LOCATION
- SV-3 SOIL VAPOR SAMPLE LOCATION

PROPOSED LOCATIONS

- GROUNDWATER SAMPLE LOCATION
- SOIL BORING LOCATION
- SOIL VAPOR SAMPLE LOCATION

0' 100' 200'

APPROXIMATE SCALE

FPM GROUP

FIGURE 3.1.1
PROPOSED SAMPLE LOCATIONS

FORMER PENINSULA HOSPITAL SITE
51-15 BEACH CHANNEL DRIVE &
50-04 ROCKAWAY BEACH BOULEVARD
QUEENS, NY

Drawn By: H.C.	Checked By: S.D.	Date: 4/25/18

3.2 Sampling Procedures

The procedures for each type of sampling shown on Figure 3.1.1. are described below. Quality assurance/quality control (QA/QC) procedures are presented in Section 4. Prior to any intrusive work the One Call service will be contacted to mark the utilities on the public streets adjoining the Site. The markings will be reviewed by the QEP and drilling personnel to evaluate the potential presence of subsurface utilities in the work areas and sampling locations may be adjusted so as to avoid obstructions.

- Soil Sampling

Soil borings will be performed at 56 onsite locations utilizing direct-push sampling equipment. The soil borings will each be performed through the historic fill and/or crushed concrete backfill and into native materials. In instances where historic fill is very thin or absent (primarily on the northern portion of the Site), each boring will be performed into the native soil to a minimum depth of five feet below grade. If visibly-impacted material is encountered in a boring, then that boring will be extended through the visibly-impacted material and into underlying visibly-clean materials. The soil samples from each boring will be obtained continuously, visually examined, screened by an environmental professional with a calibrated photoionization detector (PID), and classified using the Unified Soil Classification System (USCS). The soil observations will be recorded on boring logs and the boring locations will be identified using a global positioning system (GPS).

Soil samples will be collected from each boring and submitted for laboratory analysis. This sampling program is intended to characterize the uppermost two-foot soil interval at all locations, the deeper historic fill (if present), and native soil underlying the historic fill in the grid boxes. For the 38 locations where the soil data will be used to characterize the nature of soil present in the 100-foot by 100-foot grid boxes, one sample will be collected from the uppermost two-foot interval of soil (historic fill or native soil) at each location. In instances where more than three feet of historic fill are present, then a second sample of historic fill will be collected from the deepest two-foot interval of fill. In all instances where historic fill is present, a soil sample will also be collected from the uppermost two-foot interval of native soil underlying the historic fill.

For the 18 additional borings where the data will be used to evaluate the nature and extent of contamination that may be present in the suspect areas (#6 fuel oil spill, former maintenance building, boiler room and hazardous materials and paint storage areas) and the additional locations requested by the NYSDEC, one sample will be collected from the uppermost two-foot interval of soil (historic fill or native soil) at each location. In the #6 fuel oil spill area the borings will be extended to below the depth of visible contamination, with soil sampling in the most visibly-impacted interval and soil sampling in visibly-clean soil below the impacted interval. In the other suspect areas a deeper soil sample will also be collected.

For all soil sampling locations additional soil samples will be collected as necessary to vertically delineate any visible contamination. If visibly-impacted material is encountered, then at a minimum the soil samples will be collected from the most visibly-impacted material and from visibly-unimpacted material below the impacted interval.

In instances where crushed concrete has been used to backfill surface depressions resulting from building demolition, the soil underlying the crushed concrete will be sampled following the above-described procedures.

The samples retained for VOC analysis will be collected using Method 5035A preservation procedures. Upon completion of sampling, the sample containers will be sealed, labeled, managed, transported, and tracked as described in Section 3.3. Sample analysis is also discussed in Section 3.3. The completed borings will be backfilled with soil cuttings and their surface locations will be marked with surveyor's flags for future reference.

- Soil Vapor Sampling

Soil vapor sampling will be conducted at 20 locations as shown on Figure 3.1.1; the sample locations will be identified in the field using a GPS. At each location a boring will be advanced using a direct-push rig or a hand auger and a temporary vapor sampling point will be installed. As the depth to groundwater generally ranges from 4 to 8 feet below grade across the Site, the depth of the sampling points will vary; each point will be installed to a depth that is at least one foot above the water table, but is at least three feet below grade, if feasible. Each sampling point will consist of a stainless-steel vapor implant connected to sufficient inert tubing so as to bring the tubing above grade. Each implant will be surrounded with a least a one-foot interval of inert porous backfill. The boring above the backfill and around the tubing will be backfilled for a minimum distance of three feet, as feasible, with a bentonite slurry so as to seal the implant zone from the atmosphere.

Following implant installation, one to three volumes of air will be purged through the implant and tubing at a rate of less than 0.2 liters per minute using an air pump to ensure that a representative sample is obtained. To confirm the integrity of the bentonite seal a helium tracer gas will be confined over the surface seal and the potential presence of helium in the tubing will be checked with a helium meter. Following purging and the seal integrity check, the soil vapor sample will be collected into a laboratory-supplied Summa canister equipped with a calibrated flow controller that is set so as not to exceed a flow of 0.2 liters per minute. FPM will observe the flow controllers and seal the canisters while some vacuum remains. Upon completion of sampling, each canister will be sealed, labeled, managed, transported, and tracked as described in Section 3.3. Sample analysis is also discussed in Section 3.3. Following the completion of sampling, the tubing and implants will be removed, as feasible, and the surface locations will be marked with surveyor's flags for future reference.

- Groundwater Monitoring Well Installation and Sampling

The proposed monitoring wells will be installed by an experienced well installation contractor at the ten locations shown on Figure 3.1.1. Well locations may be adjusted in the field as necessary to avoid obstructions. An FPM environmental professional will observe each well installation and prepare a boring log/well installation diagram to document the well construction. The monitoring well locations will be identified using a GPS.

Based on previous observations of subsurface conditions, including the shallow water table, it is anticipated that each well will include a two-inch diameter 0.02-inch machine-slotted PVC screen approximately 5 feet long installed to a depth of approximately 4 feet into the water table. The annulus will be backfilled with Morie #1 well gravel, or equivalent, to approximately one to two feet above the top of the screen (depending on the depth to groundwater) with an overlying one to two-foot bentonite seal, and the balance will be backfilled with bentonite or cement bentonite grout. The top of each well casing will be capped with an expansion-fit locking well cap and the casing will be protected with a bolt-down flush-mounted manhole cover set in concrete. Protective

bollards may be installed around each manhole, as needed, to clearly mark each well's location and to protect the surface completion.

Following installation, the wells will be developed by pumping and surging until the produced groundwater is clear (turbidity less than 50 NTU) and the parameters pH, temperature, and conductivity vary by less than 10 percent between removals of successive casing volumes of groundwater.

Following well installation, a survey will be performed in which the relative elevation of the top of the PVC casing for each well will be determined to the nearest 0.01 foot. The static water level for each of the Site wells will be measured and used in conjunction with the surveyed well casing relative elevations to calculate the Site-specific groundwater flow direction. This information will be used to determine which wells are on the upgradient and downgradient sides of the Site, and to select the appropriate analytical protocols for each sample, as discussed in Section 3.3 below.

Groundwater sampling will be performed at least one week after the wells are installed and the groundwater flow direction determined to allow for groundwater conditions in proximity to the wells to stabilize. At each well the depth to the static water level and depth of the well will be measured with an interface probe. The potential presence of non-aqueous-phase liquid (NAPL) will also be assessed. Then a decontaminated low-flow pump will be 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, will be monitored. When all stability parameters vary by less than 10 percent between the removal of successive well volumes, the well will be sampled. Well sampling forms documenting the well purging and sampling procedures will be completed.

Following purging, sampling will be performed. Samples for the per- and polyfluoroalkyl substances (PFAS) will be obtained from the wells designated for this testing before any other sampling is performed. Samples for all analyses except the PFAS may be obtained directly from the pump or using dedicated disposable polyethylene bailers suspended from dedicated cotton or polypropylene lines. PFAS samples will be obtained using only dedicated disposable high-density polyethylene (HDPE) bailers suspended from dedicated cotton or polypropylene lines. The retrieved samples will be decanted into laboratory-supplied sample containers. Upon completion of sampling, the sample containers will be sealed, labeled, managed, transported, and tracked as described in Section 3.3. Sample analysis is also discussed in Section 3.3.

3.3 Sample Management and Analyses

Each sample container will be labeled using a ball-point pen, and the labeled containers containing soil or groundwater samples will be placed in a cooler with ice (blue ice packs will not be used) to depress the sample temperature. Samples for PFAS testing will be placed into individual sealed Zip-lock bags and stored in a separate cooler from all other samples. The filled labeled Summa canisters will be secured in shipping containers. A chain of custody form will be completed and kept with each of the coolers and shipping containers to document the sequence of sample possession. At the end of each day, the filled coolers and shipping containers will be transported by FPM or overnight courier to the analytical laboratory.

The anticipated analytical laboratory for all soil, groundwater, and soil vapor samples is Alpha Analytical of Westborough, Massachusetts, which is NYSDOH ELAP-certified for the proposed analyses.

All of the soil and groundwater samples will be analyzed for TCL VOCs plus 10 tentatively-identified compounds (TICs) using EPA Method 8260C; TCL SVOCs plus 20 TICs using Method 8270D, TAL metals using Method 6010C, mercury using Methods 7471A or 7470A, total cyanide using Methods 9010C/9012B, PCBs using Method 8082A, and pesticides using Method 8081B. In the event that the turbidity of a groundwater sample is not below 50 NTU, then a separate aliquot of that groundwater sample will be obtained, filtered to remove turbidity, and analyzed for TAL metals using Method 6010C and mercury using Methods 7471A or 7470A. The analytical methods used will be as per NYS Analytical Services Protocol (ASP) with Category B deliverables. Electronic data deliverables (EDDs) will be prepared and uploaded into the NYSDEC's environmental information management system.

As directed by the NYSDEC in a November 24, 2017 email, one upgradient groundwater sample and several downgradient groundwater samples will also be tested for PFAS and 1,4-dioxane to evaluate if these constituents may be present at the Site. Additional testing for these constituents may be required if the initial results show them to be present at levels that present a concern. These samples will be tested for PFAS by the modified EPA Method 537 with reporting limits of 2 nanograms per liter (ng/l, or parts per trillion) in water. These samples will also be tested for 1,4-dioxane using Method 8270D and a mass spectrometer in selective ion monitoring (SIM) mode. The detection limit for 1,4-dioxane will be no higher than 0.28 micrograms per liter (µg/l, or parts per billion).

The soil vapor samples will be analyzed for VOCs using Method TO-15. The analytical method used will be as per NYS ASP with Category B-equivalent deliverables. EDDs will also be prepared and uploaded into the NYSDEC's environmental information management system.

Additional details concerning sampling, analysis, and QA/QC is provided in the Quality Assurance Project Plan presented in Section 4.

3.4 Management of Investigation-Derived Waste

3.4.1 Soil Cuttings and Groundwater

A limited amount of soil cuttings may be generated during the onsite work. In the event that excess soil cuttings are generated, they will be managed in accordance with DER-10, Section 3.3(e).

All groundwater generated during well development and purging will be containerized. The containers will be labeled as to their origin and staged onsite in a designated area. The groundwater generated during well development and purging will be examined by the QEP for visual and olfactory indications of potential contamination and any groundwater exhibiting indications of potential contamination will be containerized separately. FPM will review the groundwater sample results to evaluate if any constituents are found at levels in excess of the NYSDEC Standards. Groundwater exhibiting visible contamination or with constituent levels in excess of NYSDEC Standards will be disposed offsite, as described below. Groundwater that does not exhibit visible contamination and does not contain constituents in excess of the NYSDEC Standards will be discharged to the NYC sewer system.

3.4.2 Waste Disposal

Any soil cuttings that are generated and cannot be managed onsite in accordance with DER-10 and that exhibit indications of potential contamination, and any containerized groundwater that cannot be discharged to the municipal sewer system will be transported by a licensed waste transporter and properly disposed offsite at permitted waste disposal facilities. Waste transport and disposal will be documented with manifests, copies of which will be included in the RI Report. Dedicated disposable investigation equipment (gloves, etc.) will be containerized and properly disposed offsite as solid waste.

3.5 Exposure Assessment

A qualitative human health exposure assessment will be performed during the RI in accordance NYSDEC DER-10 Section 3.3(c)4 to identify the areas and chemicals of concern, actual or potential exposure pathways, potentially exposed receptors, and how any unacceptable exposures might be eliminated/mitigated. This assessment will consider the reasonably anticipated future land use at the Site (commercial and restricted residential) and reasonably anticipated future groundwater use (none). The five exposure pathway elements that will be examined include:

- Descriptions of the contaminants and affected media;
- An explanation of the contaminant release and transport mechanisms to the potentially exposed population;
- Identification of potential exposure points where the potential for human contact with contaminated media may occur;
- A description of routes of exposure (i.e., ingestion, inhalation, dermal contact); and
- A characterization of the receptor population that may be exposed to contaminants at a point of exposure.

3.6 Fish and Wildlife Resources Impact Analysis

A fish and wildlife resources impact analysis (FWRIA) is not planned to be performed during the RI as fish and wildlife resources are not anticipated to be present. The Site is located in an urban setting and is presently nearly completely covered by pavement and the former hospital building. The only non-covered areas present consist of small lawn areas near the Site perimeter. These conditions indicate that there are no ecological resources anticipated to be present on the Site.

The Site is surrounded by paved streets and other fully-developed parcels that are used for multi-family residential and commercial purposes. The closest natural areas are the Atlantic Ocean at Rockaway Beach (about 0.25 mile south) and Conch Bay of Little Bay (about 0.25 mile northeast). These areas are separated from the Site by one or more multi-lane streets and/or the MTA Subway A Line. Based on these conditions, there are no ecological resources anticipated to be present in the vicinity of the Site.

3.7 Reporting and Schedule

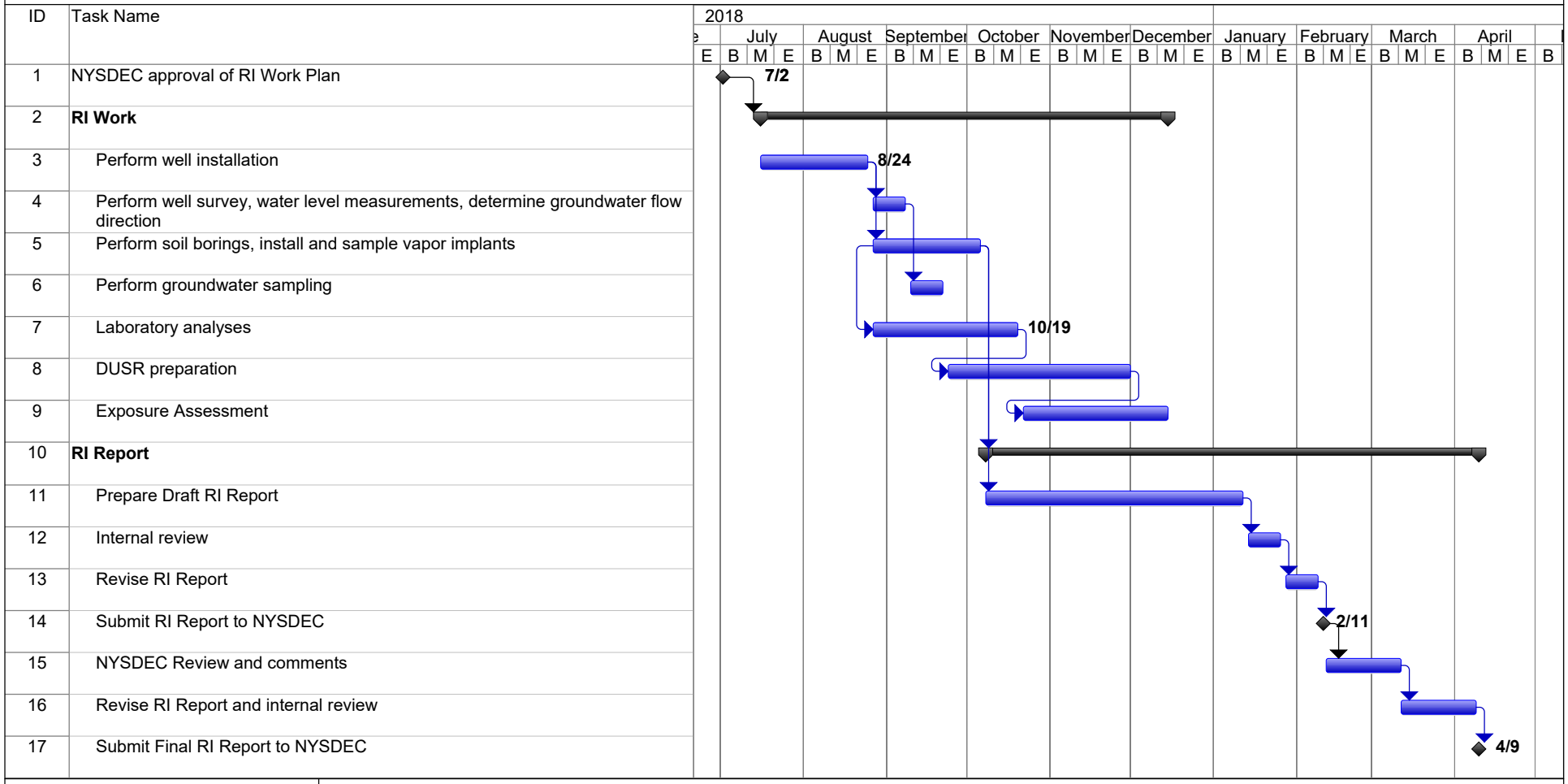
The proposed schedule for the RI is shown in Figure 3.7.1. The NYSDEC will be notified at least 10 working days prior to the anticipated start of the RI fieldwork. The NYSDEC will also be notified of any changes to the RI fieldwork schedule.

Following the completion of the RI sampling activities, the receipt of all sample results, and preparation of the qualitative human health exposure assessment, FPM will prepare an RI Report. The RI Report will be prepared in accordance with NYSDEC DER-10 Section 3.14 and will include an updated site plan, a summary of the work performed, the resulting chemical analytical data, an interpretation of the data, the qualitative exposure assessment, and conclusions. As requested by the NYSDEC, all of the tabulated soil data will be presented in parts per million (ppm). Copies of all field logs, the complete laboratory analytical packages, and the Data Usability Summary Reports (DUSRs) will be provided separately from the RI Report as an electronic submission, in accordance with DER-10 Section 3.14(b).

In accordance with 6 NYCRR Part 375-2, the soil data will be evaluated with respect to the NYSDEC SCOs for unrestricted use (Table 375-6(a)). However, as the planned Site use will be commercial and multi-family residential, the soil data will also be compared to the NYSDEC SCOs for commercial and restricted residential uses (Table 375-6(b)). The soil vapor data will be evaluated with respect to NYSDOH soil vapor intrusion guidance. Groundwater results will be compared to the NYSDEC Class GA Ambient Water Quality Standards and other applicable criteria. A further discussion of standards, criteria and guidance (SCGs) is included in Section 4.

Monthly progress reports will be prepared and submitted to the NYSDEC and NYSDOH during the above-described RI work. The monthly progress reports will include information regarding activities conducted during the reporting period, activities planned for the next reporting period, a summary of any sampling results and community monitoring results, any changes to the schedule, any problems encountered, and other pertinent project information.

FIGURE 3.7.1
RI SCHEDULE
FORMER PENINSULA HOSPITAL SITE
51-15 BEACH CHANNEL DRIVE AND 50-04 ROCKAWAY BEACH BOULEVARD, FAR ROCKAWAY, QUEENS, NEW YORK



Project: RI Schedule
Date: Tue 4/24/18

Task		External Milestone		Manual Summary Rollup	
Split		Inactive Task		Manual Summary	
Milestone		Inactive Milestone		Start-only	
Summary		Inactive Summary		Finish-only	
Project Summary		Manual Task		Progress	
External Tasks		Duration-only		Deadline	

SECTION 4.0
QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) is applicable to all RI activities at this Site. The RI work is intended to evaluate the nature and extent of contamination in all media throughout this Site, including further evaluations of petroleum contamination associated with the former #6 fuel oil USTs, potential sources of chlorinated solvents in soil vapor, and impacts identified in historic fill. Further evaluations will also be performed in suspect areas, including the former maintenance building area, the boiler room area, and the hazardous materials and paint storage areas.

The RI will be performed by FPM on behalf of the Volunteer, Peninsula Rockaway Limited Partnership. The FPM project manager is Stephanie O. Davis, PG. Additional project personnel are identified on Table 3.1. Resumes for project personnel are included in Appendix B.

Sampling procedures are presented in Section 3.2 and sample management is presented in Section 3.3 of this RI Work Plan. A Site plan showing the existing sample locations and proposed RI sample locations is presented on Figure 3.1.1. Table 4.1 presents a summary of the analytical methods and the QA/QC sample program. QA/QC samples are further discussed below.

4.1 Data Quality Objectives

The Data Quality Objectives (DQOs) will be applicable to all data-gathering activities at the Site. DQOs will be incorporated into sampling, analysis, and quality assurance tasks associated with RI activities. A QEP will oversee all RI activities.

The data users for this project are FPM, the NYSDEC, and the NYSDOH. The Site owner will also be provided with the data. No other data users are anticipated. The collected data are intended to further evaluate the nature and extent of contaminants in onsite soil, groundwater, and soil vapor.

For this project, field screening will be performed during sampling activities. Field screening includes monitoring for organic vapors in the soil cuttings as they are generated and in the air in the work zone using a Photovac MicroTIP PID (or equivalent) and visual observations of soil and groundwater characteristics. All readings and observations will be recorded by the FPM QEP in his or her field notebook.

4.2 Standards, Criteria, and Guidance

The following standards, criteria, and guidance (SCGs) have been identified for the Site:

- NYSDEC DER-10;
- The NYSDEC Class GA Ambient Water Quality Standards (Standards), which are used to evaluate the groundwater chemical analytical results;

TABLE 4.1
REMEDIAL INVESTIGATION SAMPLING MATRIX
FORMER PENINSULA HOSPITAL SITE
FAR ROCKAWAY, QUEENS, NEW YORK

Sample Location/Type	Matrix	Sample Depths (feet below grade)	Number/Frequency	Preparation and Analysis	Sample Bottles/Preservation	Holding Time
Soil Samples	Soil	Variable, depending on observed conditions. Generally 0 to 2, and one or more deeper samples	est. 112/once	TCL VOCs plus TICs (Methods 5035/5035a and 8260C)	One Glass VOA Vial with MeOH Two Glass VOA vials with water One 2 oz. CWM glass	Frozen within 48 hours of collection, 14 days until analysis.
			est. 112/once	BN-TCL SVOCs plus TICs, TAL Metals, TCL pesticides, and PCBs (Methods 3541 and 3510C/8270D, 3050B/6010B, 3546/8081B/8082A, and 7470A/7241A)	Two 8 oz. CWM glass	SVOCs, pesticides and PCBs: 7 days until extraction, 40 days after extraction, Metals: 28 days
Soil Vapor Samples	Vapor	At least 3 below grade and 1 above groundwater	20/once	VOCs (Method TO-15)	One Summa Canister	30 days
Groundwater Samples	Groundwater	4 feet into the water table	10/once	TCL VOCs plus TICs (Methods 5030B/8260C)	Two 40 ml glass VOA vials with HCL	14 days
				BN-TCL SVOCs plus TICs, pesticides, and PCBs (Methods 3541/8270D, and 3546/8081B/8082A)	1-liter amber glass	7 days until extraction, 40 days after extraction.
				TAL metals (Methods 3050B/6010C and 7470A/7241A)	500 ml plastic w/HNO3	28 days
			4/once	PFAS as per Full PFAS Target Analyte List (Method 537M with SIM-isotope dilution)	Three 250 ml plastic with Trizma	14 days until extraction, 28 days after extraction.
				1,4-Dioxane (Method 8270D with SIM-isotope dilution)	Two 1-liter amber glass, Teflon-lined	7 days until extraction, 40 days after extraction.
Equipment blanks	Lab water	-	One per day during soil or groundwater sampling, PFAS and 1,4-dioxane only when these are sampled	TCL VOCs plus TICs (Methods 5030B/8260C)	Two glass VOA vials with HCL	14 days
				BN-TCL SVOCs plus TICs, pesticides, and PCBs (Methods 3541/8270D, and 3546/8081B/8082A)	1-liter amber glass	7 days until extraction, 40 days after extraction.
				TAL metals (Methods 3050B/6010C and 7470A/7241A)	500 ml plastic w/HNO3	28 days
				PFAS as per Full PFAS Target Analyte List (Method 537M with SIM-isotope dilution)	Three 250 ml plastic with Trizma	14 days until extraction, 28 days after extraction.
				1,4-Dioxane (Method 8270D with SIM-isotope dilution)	Two 1-liter amber glass, Teflon-lined	7 days until extraction, 40 days after extraction.
Trip blanks	Lab water	-	One per cooler with soil or groundwater VOC samples	TCL VOCs plus TICs (Method 8260C)	Two glass VOA vials with HCL	14 days
Blind duplicates	Soil Vapor	Same as associated primary samples	One per 20 primary samples	VOCs (Method TO-15)	One Summa Canister	30 days
	Soil		One per 20 primary samples	TCL VOCs plus TICs (Methods 5035/5035a and 8260C)	One Glass VOA Vial with MeOH Two Glass VOA vials with water One 2 oz. CWM glass	Frozen within 48 hours of collection, 14 days until analysis.
				BN-TCL SVOCs plus TICs, TAL Metals, pesticides, and PCBs (Methods 3541 and 3510C/8270D, 3050B/6010C, 3546/8081B/8082A, and 7470A/7241A)	Two 8 oz. CWM glass	SVOCs, pesticides and PCBs: 7 days until extraction, 40 days after extraction, Metals: 28 days
	Groundwater		One per 20 primary samples	TCL VOCs plus TICs (Methods 5030B/8260C)	Two 40 ml glass VOA vials with HCL	14 days
				BN-TCL SVOCs plus TICs, pesticides, and PCBs (Methods 3541/8270D, and 3546/8081B/8082A)	1-liter amber glass	7 days until extraction, 40 days after extraction.
				TAL metals (Methods 3050B/6010C and 7470A/7241A)	500 ml plastic w/HNO3	28 days
				PFAS as per Full PFAS Target Analyte List (Method 537M with SIM-isotope dilution)	Three 250 ml plastic with Trizma	14 days until extraction, 28 days after extraction.
				1,4-Dioxane (Method 8270D with SIM-isotope dilution)	Two 1-liter amber glass, Teflon-lined	7 days until extraction, 40 days after extraction.
MS/MSD	Soil	Same as associated primary samples	One per 20 primary soil samples	TCL VOCs plus TICs (Methods 5035/5035a and 8260C)	One Glass VOA Vial with MeOH Two Glass VOA vials with water One 2 oz. CWM glass	Frozen within 48 hours of collection, 14 days until analysis.
				BN-TCL SVOCs plus TICs, TAL Metals, pesticides, and PCBs (Methods 3541/8270D, 3050B/6010C, 3546/8081B/8082A, and 7470A/7241A)	Two 8 oz. CWM glass	SVOCs, pesticides and PCBs: 7 days until extraction, 40 days after extraction, Metals: 28 days
	Groundwater		One per 20 primary groundwater samples	TCL VOCs plus TICs (Methods 5030B/8260C)	Two 40 ml glass VOA vials with HCL	14 days
				BN-TCL SVOCs plus TICs, pesticides, and PCBs (Methods 3541/8270D, and 3546/8081B/8082A)	1-liter amber glass	7 days until extraction, 40 days after extraction.
				TAL metals (Methods 3050B/6010C and 7470A/7241A)	500 ml plastic w/HNO3	28 days

Notes:

MS/MSD = Matrix spike/matrix spike duplicate
VOCs = Volatile organic compounds
SVOCs - Semivolatile organic compounds

TAL = Target Analyte List
HCL = hydrochloric acid
CWM = clear wide-mouth

BN = Base-neutral
TICs = tentatively-identified compounds
MEOH = Methanol

TCL = Target Compound List
HNO3 = nitric acid
PCBs = polychlorinated biphenyls

PFAS = Per and poly-fluorinated alkyl substances
TICs = Tentatively-identified compounds

- NYSDEC-provided guidance for PFAS and 1,4-dioxane;

- The 6 NYCRR Subpart 375-6 Remedial Program Soil Cleanup Objectives (SCOs), which are used to evaluate soil sample results;

- The 6 NYCRR Parts 370, 371, and 372 regulations for hazardous waste management, which are used to guide hazardous waste characterization and disposal; and

- The NYSDOH *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006, with May 2017 updated matrices), which is used to evaluate soil vapor sample results.

4.3 Quality Assurance/Quality Control Procedures

QA/QC procedures will be utilized during the performance of the RI field work to ensure that the resulting chemical analytical data accurately represent subsurface conditions. The following sections include descriptions of the QA/QC procedures to be utilized.

➢ Equipment Decontamination Procedures

All non-disposable downhole equipment (i.e., direct-push rods, hand auger, etc.) used during sampling activities will be decontaminated by washing in a potable water and Alconox solution and rinsing in potable water prior to use at each location to reduce the potential for cross contamination. All sampling equipment will be either dedicated disposable equipment or will be decontaminated prior to use at each location. The decontamination procedures utilized for all non-disposable sampling equipment will be as follows:

1. The equipment will be scrubbed in a bath of potable water and low-phosphate detergent (Alconox or Liquinox) followed by a potable water rinse;

2. The equipment will be rinsed with distilled water; and

3. The equipment will be allowed to air dry, if feasible.

In addition, for sampling activities involving PFAS, the following procedures will be followed due to the prevalence of these compounds in consumer products:

- No field clothing or PPE containing Gore-Tex, Tyvek, or fabric softener, will be worn. Any wet weather clothing will be made of polyurethane or PVC only;

- Waterproof field books, plastic clipboards, binders, or hard cover notebooks will not be used. No materials with adhesives (tape, post-it notes, etc.) will be used. Permanent markers (e.g. Sharpies) will not be used (ballpoint pens are acceptable);

- Field personnel will not use cosmetics, moisturizers, hand cream, sunscreen or insect repellent on the day of sampling. Field personnel must wash hands prior to donning nitrile gloves used during sampling;

- All decontamination will be performed using laboratory-provided PFAS-free water, Alconox, and/or Liquinox. Aluminum foil will not be used;

- All field equipment must not contain Teflon or low-density polyethylene materials. All sampling materials must be made from stainless steel, high-density polyethylene, acetate, silicon, or polypropylene; and

- PFAS samples must be maintained in a separate cooler from other types of samples (some sample containers contain PFAS). Coolers containing PFAS samples may be cooled with regular ice only; blue ice packs may not be used.

➢ QA/QC Samples

QA/QC samples will be collected and utilized to evaluate the potential for field or laboratory contamination and to evaluate the laboratory's analytical precision and accuracy. A sampling chart showing the number and types of primary samples, analytical methods, and QA/QC samples was presented on Table 4.1. The specific types of QA/QC samples to be collected are described below.

The decontamination procedures will be evaluated by the use of equipment blank samples. These samples consist of aliquots of laboratory-supplied water that are poured over or through the dedicated or decontaminated sampling equipment and then submitted to the laboratory for analysis. An equipment blank sample will be prepared for each day that soil or groundwater sampling is conducted at the Site and will be analyzed for the same analytes as the primary environmental samples collected that day. The equipment blanks will be labeled in a manner to prevent identification by the analytical laboratory.

Particular care will be taken with the equipment blank samples for PFAS. Laboratory-provided PFAS-free water containing the required preservative will be used to prepare the equipment blank sample for PFAS testing. The filled equipment blank container and the empty container that formerly contained the PFAS-free water must be labeled, placed in individual Zip-lock bags, and returned to the laboratory in the same cooler as the PFAS samples.

Trip blank samples will be utilized to evaluate the potential for VOC cross-contamination between samples in the same cooler or shipping container. Trip blank samples consist of laboratory-provided containers filled with laboratory water or laboratory air that are sealed in sample containers at the laboratory and that are transported to and in the field with the other sample containers. A trip blank will be shipped with each group of soil and groundwater samples and will be managed in the field and analyzed in the laboratory in the same manner as the primary environmental samples.

Blind duplicate samples will be obtained at a frequency of at least one per every 20 environmental samples and will be used to attest to the precision of the laboratory. A blind duplicate consists of a separate aliquot of sample collected at the same time, in the same manner, and analyzed for the same parameters as the primary environmental sample. The blind duplicate samples are labeled in a manner such that they cannot be identified by the laboratory. The sample results are compared to those of the primary environmental sample to evaluate laboratory analytical precision.

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of one per 20 environmental soil or groundwater samples. The purpose of the MS/MSD samples is to confirm the accuracy and precision of laboratory results based on a particular matrix. The MS/MSD results will be evaluated during the preparation of the DUSRs, as discussed below.

- Chain-of-Custody Procedures

For each day of sampling, chain-of-custody (COC) sheets will be completed and submitted to the laboratory with the samples collected that day. A copy of each COC sheet will be retained by the FPM QEP for sample tracking purposes. Each COC sheet will include the project name, the sampler's signature, the sampling locations and intervals, and the analytical parameters requested.

- Data Usability Summary Reports

All chemical analytical results will be evaluated using the sample data packages, sample data summary packages, and case narratives provided by the analytical laboratory. The data evaluation will be performed to verify that the analytical results are of sufficient quality to be relied upon to assess the potential presence of contaminants in the groundwater, soil vapor, indoor air, and/or soil samples. A data usability summary report (DUSR) will be prepared for each data package following the "Guidance for the Development of Data Usability Summary Reports" provided by the NYSDEC (Appendix 2B of DER-10). The resume of the anticipated DUSR preparer, Richard Baldwin, PG with Ramboll Environ, who is independent from this project, is included in Appendix B.

4.4 Sample Analysis

All samples will be submitted to NYSDOH ELAP-certified laboratories. The anticipated analytical laboratory for all samples is Alpha Analytical of Westborough, Massachusetts. The analytical data will be provided by the laboratory in electronic format, in accordance with DER-10, Section 1.15. Electronic data deliverables (EDDs) will also be prepared and uploaded into the NYSDEC's environmental information management system.

All of the soil and groundwater samples will be analyzed for TCL VOCs plus 10 tentatively-identified compounds (TICs) using EPA Method 5035/5035A and 8260B; TCL SVOCs plus 20 TICs using Methods 3541 or 3510C/8270C, TAL metals using Methods 3050B or 3010A/6010B, mercury using Methods 7471A or 7470A, PCBs using Methods 3546/8082, and pesticides using Methods 3510C or 3535A and 8141A/8151B/8081/8082. The analytical methods used will be as per NYS Analytical Services Protocol (ASP) with Category B deliverables.

As directed by the NYSDEC in a November 24, 2017 email, one upgradient groundwater sample and several downgradient groundwater samples are also to be tested for PFAS and 1,4-dioxane. These samples will be tested for PFAS using EPA Method 537(modified) using the mass spectrometer in the selective ion monitoring (SIM) mode with a reporting limit of 2 nanograms per liter (ng/l, or parts per trillion). The testing for 1,4-dioxane will be via EPA Method 8270D using the mass spectrometer in the SIM mode with isotope dilution; the reporting limit will be 0.15 ug/l and the method detection limit will be 0.075 ug/l. Category B-equivalent deliverables will be provided.

The soil vapor samples will be analyzed for VOCs using Method TO-15. The analytical method used will be as per NYS ASP with Category B-equivalent deliverables.

4.5 Data Evaluation

The data collected will be assembled, reviewed, and evaluated. The laboratory data for the soil samples will be converted to ppm, if necessary, prior to incorporation into the data tables. The soil and groundwater samples will be used to further assess the nature and extent of contamination in the soil and groundwater at the Site. The soil vapor samples will be used to assess the potential for soil vapor intrusion.

4.6 Project Organization

The project manager for this project will be Stephanie Davis, PG, who is a Senior Hydrogeologist and Senior Project Manager. Mr. John Bukoski, PG, who has provided field services at FPM for over 15 years, will be the field supervisor and will also serve as the health and safety officer. The QA/QC officer will be Mr. Ben Cancemi, PG, who is also a Senior Hydrogeologist. Resumes for project personnel are included in Appendix B. Subcontracted services will include direct-push/drilling services (subcontractor to be determined), laboratory services (Alpha Analytical), and DUSR preparation (Ramboll Environ).

SECTION 5.0
REFERENCES

FPM Group, Ltd., March 2016. *Phase I Environmental Site Assessment for the property located at Rockaway Beach Boulevard/Beach 50th Street, Far Rockaway, New York.*

FPM Group, Ltd., April 12, 2016. *Phase II Investigation Report, Queens Block 15842, Lot 1, Far Rockaway, New York.*

FPM Group, Ltd., May 23, 2016. *NYSDEC Spill #1508760, PBS #2-316660, Tank Removal Work Plan, 51-15 Beach Channel Drive, Far Rockaway, New York.*

FPM Group, Ltd., August 29, 2016. *Tank Closure Report, 51-15 Beach Channel Drive, Far Rockaway, New York.*

FPM Group, Ltd., August 30, 2016. *Phase II Investigation Report – Hospital Property, Queens Block 15843, Lot 1, Far Rockaway, New York.*

FPM Group, Ltd., January 26, 2017. *Phase II Investigation Report – East Side of Peninsula North Site, Queens Block 15843, Lot 1, Far Rockaway, New York.*

FPM Group, Ltd., June 26, 2017. *Phase II Investigation Report – Peninsula Hospital and Parking Lot, Queens Block 15843, Lot 1 and Queens Block 15842, Lot 1, Far Rockaway, New York.*

New York State Department of Health. October 2006 and May 2017. *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (including updated matrices).

New York State Department of Environmental Conservation. May 2010. *DER-10 Technical Guidance for Site Investigation and Remediation.*

New York State Department of Environmental Conservation. 2017. *Correspondence concerning the subject property.*

PVE Sheffler/Lawrence Environmental Group, October 21, 2015. *Phase I Environmental Site Assessment, 51-15 Beach Channel Drive, Far Rockaway, Queens, New York.*

PVE Sheffler/Lawrence Environmental Group, November 24, 2015. *Subsurface Investigation* (*Phase II ESA), 51-15 Beach Channel Drive, Far Rockaway, Queens, New York.*

U.S. Department of the Interior. 2016. Far Rockaway*, NY 15' Quadrangle (Map)*. *U.S. Geological Service, National Mapping Division. Reston, VA.*

US Geological Survey. 2009. *Water-Table and Potentiometric Surface Altitudes in the Upper Glacial, Magothy, and Lloyd Aquifers beneath Long Island, New York, March-April 2006.*

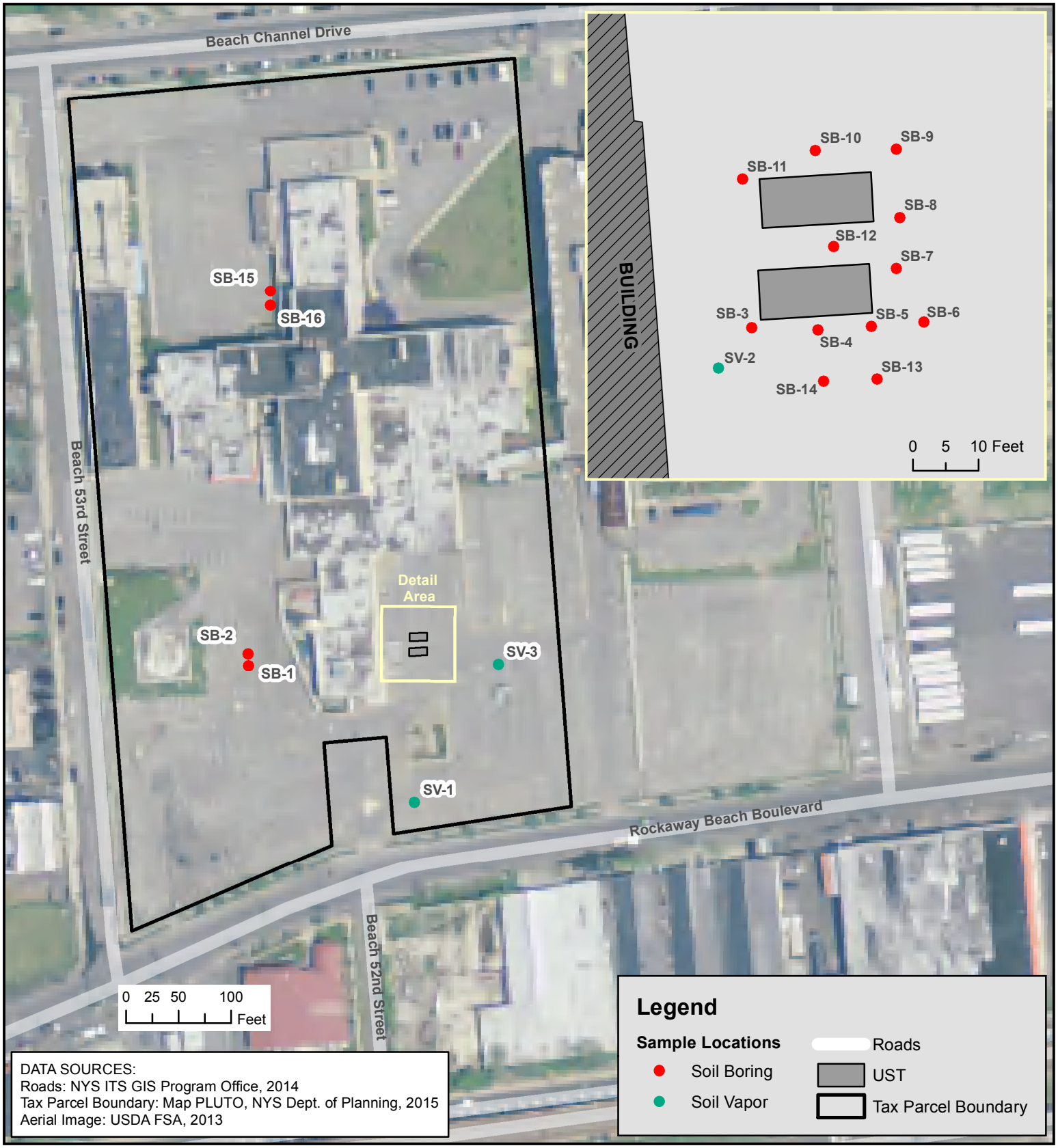
US Geological Survey. 1963. *Geology and Ground-Water Conditions in Southern Nassau and Southeastern Queens Counties, Long Island, N.Y.*

APPENDIX A

PREVIOUS INVESTIGATION DATA

PVE Sheffler/Lawrence Environmental Group

Phase II ESA Data (2015)



SAMPLE LOCATIONS

51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, QUEENS, NEW YORK

FIGURE 3

DATE:	11/20/2015
SCALE:	As Indicated
PROJECT NUMBER:	500070

ALL LOCATIONS APPROXIMATE

PVE Sheffler
Engineering • Survey • Environmental

48 Springside Avenue
Poughkeepsie, New York 12603
Phone: (845) 454-2544
Fax: (845) 454-2655

Table 1 - Soil Vapor Sample Results
Samples collected Novmeber 16, 2015
Collected from: 5115 Beach Channel Drive, Far Rockaway, New York
PVES/LEG File #500070

					Date Sampled	11/16/2015			11/16/2015			11/16/2015		
					Location	SV-1			SV-2			SV-3		
					Sample ID	SV-1 20151116			SV-2 20151116			SV-3 20151116		
Analyte	CAS RN	NYSDOH INDOOR AIR MEDIAN CONCENTRATION	NYSDOH INDOOR AIR 99TH PERCENTILE	Unit	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q
1,1,1,2-Tetrachloroethane	630-20-6	NE	NE		ND< 1.2	ug/m3	U	ND< 1.2	ug/m3	U	ND< 1.2	ug/m3	U
1,1,1-Trichloroethane	71-55-6	0.3	41	ug/m3	ND< 0.95	ug/m3	U	**1000**	**ug/m3**	**D**	ND< 0.98	ug/m3	U
1,1,2,2-Tetrachloroethane	79-34-5	0.25	0.8	ug/m3	ND< 1.2	ug/m3	U	ND< 1.2	ug/m3	U	ND< 1.2	ug/m3	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NE	NE		ND< 1.3	ug/m3	U	ND< 1.4	ug/m3	U	ND< 1.4	ug/m3	U
1,1,2-Trichloroethane	79-00-5	0.25	1	ug/m3	ND< 0.95	ug/m3	U	ND< 0.98	ug/m3	U	ND< 0.98	ug/m3	U
1,1-Dichloroethane	75-34-3	0.25	0.4	ug/m3	ND< 0.7	ug/m3	U	**140**	**ug/m3**	**D**	ND< 0.73	ug/m3	U
1,1-Dichloroethene	75-35-4	0.25	6.3	ug/m3	ND< 0.69	ug/m3	U	**1.8**	**ug/m3**	**D**	ND< 0.71	ug/m3	U
1,2,4-Trichlorobenzene	120-82-1	0.25	26	ug/m3	ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U
1,2,4-Trimethylbenzene	95-63-6	1.9	35	ug/m3	**5**	**ug/m3**	**D**	**2.5**	**ug/m3**	**D**	**4.7**	**ug/m3**	**D**
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.25	0.25	ug/m3	ND< 1.3	ug/m3	U	ND< 1.4	ug/m3	U	ND< 1.4	ug/m3	U
1,2-Dichlorobenzene	95-50-1	0.25	2.3	ug/m3	ND< 1	ug/m3	U	ND< 1.1	ug/m3	U	ND< 1.1	ug/m3	U
1,2-Dichloroethane	107-06-2	0.25	0.4	ug/m3	ND< 0.7	ug/m3	U	ND< 0.73	ug/m3	U	ND< 0.73	ug/m3	U
1,2-Dichloropropane	78-87-5	0.25	9	ug/m3	ND< 0.8	ug/m3	U	ND< 0.83	ug/m3	U	ND< 0.83	ug/m3	U
1,2-Dichlorotetrafluoroethane	76-14-2	0.25	23	ug/m3	ND< 1.2	ug/m3	U	ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	0.6	25	ug/m3	**1.2**	**ug/m3**	**D**	ND< 0.88	ug/m3	U	**1.2**	**ug/m3**	**D**
1,3-Butadiene	106-99-0	NE	NE		ND< 2.3	ug/m3	U	6.9	ug/m3	D	7.1	ug/m3	D
1,3-Dichlorobenzene	541-73-1	0.25	1.6	ug/m3	ND< 1	ug/m3	U	ND< 1.1	ug/m3	U	ND< 1.1	ug/m3	U
1,3-Dichloropropane	142-28-9	NE	NE		ND< 0.8	ug/m3	U	ND< 0.83	ug/m3	U	ND< 0.83	ug/m3	U
1,4-Dichlorobenzene	106-46-7	0.25	25	ug/m3	ND< 1	ug/m3	U	ND< 1.1	ug/m3	U	ND< 1.1	ug/m3	U
1,4-Dioxane (P-Dioxane)	123-91-1	NE	NE		ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U
2-Hexanone	591-78-6	0.3	16	ug/m3	**6.6**	**ug/m3**	**D**	ND< 1.5	ug/m3	U	ND< 1.5	ug/m3	U
4-Ethyltoluene	622-96-8	2.1	120	ug/m3	**3.8**	**ug/m3**	**D**	**2.3**	**ug/m3**	**D**	**3.5**	**ug/m3**	**D**
Acetone	67-64-1	21	200	ug/m3	**46**	**ug/m3**	**D**	**190**	**ug/m3**	**D**	**100**	**ug/m3**	**D**
Acrylonitrile	107-13-1	NE	NE		ND< 0.38	ug/m3	U	ND< 0.39	ug/m3	U	ND< 0.39	ug/m3	U
Allyl Chloride (3-Chloropropene)	107-05-1	NE	NE		ND< 2.7	ug/m3	U	ND< 2.8	ug/m3	U	ND< 2.8	ug/m3	U
Benzene	71-43-2	2.1	120	ug/m3	**3.5**	**ug/m3**	**D**	**4.1**	**ug/m3**	**D**	**4.4**	**ug/m3**	**D**
Benzyl Chloride	100-44-7	NE	NE		ND< 0.9	ug/m3	U	ND< 0.93	ug/m3	U	ND< 0.93	ug/m3	U
Bromodichloromethane	75-27-4	NE	NE		ND< 1.1	ug/m3	U	ND< 1.1	ug/m3	U	ND< 1.1	ug/m3	U
Bromoethene/ Vinyl Bromide	593-60-2	NE	NE		ND< 0.76	ug/m3	U	ND< 0.79	ug/m3	U	ND< 0.79	ug/m3	U
Bromoform	75-25-2	NE	NE		ND< 1.8	ug/m3	U	ND< 1.9	ug/m3	U	ND< 1.9	ug/m3	U
Bromomethane	74-83-9	0.25	3.2	ug/m3	ND< 0.67	ug/m3	U	ND< 0.7	ug/m3	U	ND< 0.7	ug/m3	U
Carbon Disulfide	75-15-0	NE	NE		7.7	ug/m3	D	2.7	ug/m3	D	13	ug/m3	D
Carbon Tetrachloride	56-23-5	0.25	3.2	ug/m3	ND< 0.27	ug/m3	U	ND< 0.28	ug/m3	U	ND< 0.28	ug/m3	U
Chlorobenzene	108-90-7	0.25	3.2	ug/m3	ND< 0.8	ug/m3	U	ND< 0.83	ug/m3	U	ND< 0.83	ug/m3	U
Chloroethane	75-00-3	0.25	0.9	ug/m3	ND< 0.46	ug/m3	U	ND< 0.47	ug/m3	U	ND< 0.47	ug/m3	U
Chloroform	67-66-3	0.25	13	ug/m3	ND< 0.85	ug/m3	U	**3**	**ug/m3**	**D**	**1.2**	**ug/m3**	**D**
Chloromethane	74-87-3	0.5	14	ug/m3	**1.4**	**ug/m3**	**D**	**1.3**	**ug/m3**	**D**	**1**	**ug/m3**	**D**
Cis-1,2-Dichloroethylene	156-59-2	0.25	4.6	ug/m3	ND< 0.69	ug/m3	U	ND< 0.71	ug/m3	U	ND< 0.71	ug/m3	U
Cis-1,3-Dichloropropene	10061-01-5	0.25	2.1	ug/m3	ND< 0.79	ug/m3	U	ND< 0.82	ug/m3	U	ND< 0.82	ug/m3	U
Cyclohexane	110-82-7	0.8	88	ug/m3	**3.1**	**ug/m3**	**D**	**3.2**	**ug/m3**	**D**	**2.4**	**ug/m3**	**D**
Dibromochloromethane	124-48-1	NE	NE		ND< 1.4	ug/m3	U	ND< 1.4	ug/m3	U	ND< 1.4	ug/m3	U
Dichlorodifluoromethane	75-71-8	0.25	180	ug/m3	**2**	**ug/m3**	**D**	**1.9**	**ug/m3**	**D**	**2**	**ug/m3**	**D**
Ethyl Acetate	141-78-6	NE	NE		ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U	ND< 1.3	ug/m3	U
Ethylbenzene	100-41-4	1	26	ug/m3	**2.6**	**ug/m3**	**D**	**7.3**	**ug/m3**	**D**	**2.5**	**ug/m3**	**D**
Hexachlorobutadiene	87-68-3	0.25	29	ug/m3	ND< 1.9	ug/m3	U	ND< 1.9	ug/m3	U	ND< 1.9	ug/m3	U
Isopropanol	67-63-0	NE	NE		13	ug/m3	D	30	ug/m3	D	4.1	ug/m3	D
M,P-Xylene	179601-23-1	NE	NE		9.4	ug/m3	D	21	ug/m3	D	8.6	ug/m3	D
Methyl Ethyl Ketone (2-Butanone)	78-93-3	3.4	79	ug/m3	**8.6**	**ug/m3**	**D**	**17**	**ug/m3**	**D**	**24**	**ug/m3**	**D**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	0.3	16	ug/m3	ND< 0.71	ug/m3	U	ND< 0.74	ug/m3	U	ND< 0.74	ug/m3	U
Methyl Methacrylate	80-62-6	NE	NE		ND< 0.71	ug/m3	U	ND< 0.74	ug/m3	U	ND< 0.74	ug/m3	U
Methyl Tert-Butyl Ether (MTBE)	1634-04-4	0.8	230	ug/m3	ND< 0.63	ug/m3	U	ND< 0.65	ug/m3	U	ND< 0.65	ug/m3	U
Methylene Chloride	75-09-2	1.4	310	ug/m3	**4.5**	**ug/m3**	**D**	ND< 1.3	ug/m3	U	**2.1**	**ug/m3**	**D**
N-Heptane	142-82-5	2.8	72	ug/m3	**6.6**	**ug/m3**	**D**	**4.8**	**ug/m3**	**D**	**6.5**	**ug/m3**	**D**
N-Hexane	110-54-3	1.6	93	ug/m3	**11**	**ug/m3**	**D**	**5.4**	**ug/m3**	**D**	**9**	**ug/m3**	**D**
O-Xylene (1,2-Dimethylbenzene)	95-47-6	1.1	32	ug/m3	**3.7**	**ug/m3**	**D**	**5.5**	**ug/m3**	**D**	**3.5**	**ug/m3**	**D**
Propylene	115-07-1	NE	NE		ND< 0.3	ug/m3	U	ND< 0.31	ug/m3	U	ND< 0.31	ug/m3	U
Styrene	100-42-5	0.3	6.2	ug/m3	ND< 0.74	ug/m3	U	ND< 0.77	ug/m3	U	ND< 0.77	ug/m3	U
Tetrachloroethylene (PCE)	127-18-4	0.3	20	ug/m3	ND< 0.29	ug/m3	U	**13**	**ug/m3**	**D**	**10**	**ug/m3**	**D**
Tetrahydrofuran	109-99-9	0.25	19	ug/m3	ND< 1	ug/m3	U	ND< 1.1	ug/m3	U	ND< 1.1	ug/m3	U
Toluene	108-88-3	9.6	300	ug/m3	**11**	**ug/m3**	**D**	**16**	**ug/m3**	**D**	**9.9**	**ug/m3**	**D**
Trans-1,2-Dichloroethene	156-60-5	NE	NE		ND< 0.69	ug/m3	U	ND< 0.71	ug/m3	U	ND< 0.71	ug/m3	U
Trans-1,3-Dichloropropene	10061-02-6	0.25	0.25	ug/m3	ND< 0.79	ug/m3	U	ND< 0.82	ug/m3	U	ND< 0.82	ug/m3	U
Trichloroethylene (TCE)	79-01-6	0.25	7.4	ug/m3	ND< 0.23	ug/m3	U	ND< 0.24	ug/m3	U	ND< 0.24	ug/m3	U
Trichlorofluoromethane	75-69-4	NE	NE		1.4	ug/m3	D	1.3	ug/m3	D	2.6	ug/m3	D
Vinyl Acetate	108-05-4	NE	NE		ND< 0.61	ug/m3	U	ND< 0.63	ug/m3	U	ND< 0.63	ug/m3	U
Vinyl Chloride	75-01-4	0.25	0.8	ug/m3	ND< 0.44	ug/m3	U	ND< 0.46	ug/m3	U	ND< 0.46	ug/m3	U

Notes:

Standards are for respective NYSDOH Indoor Air Guidance Values

All concentrations are in ppbv unless otherwise indicated;

Yellow shading indicates value exceeding Median concentration and red shading indicates value exceeding 99th Percentile.

NE = No standard established.

MDL = Method Detection Limit

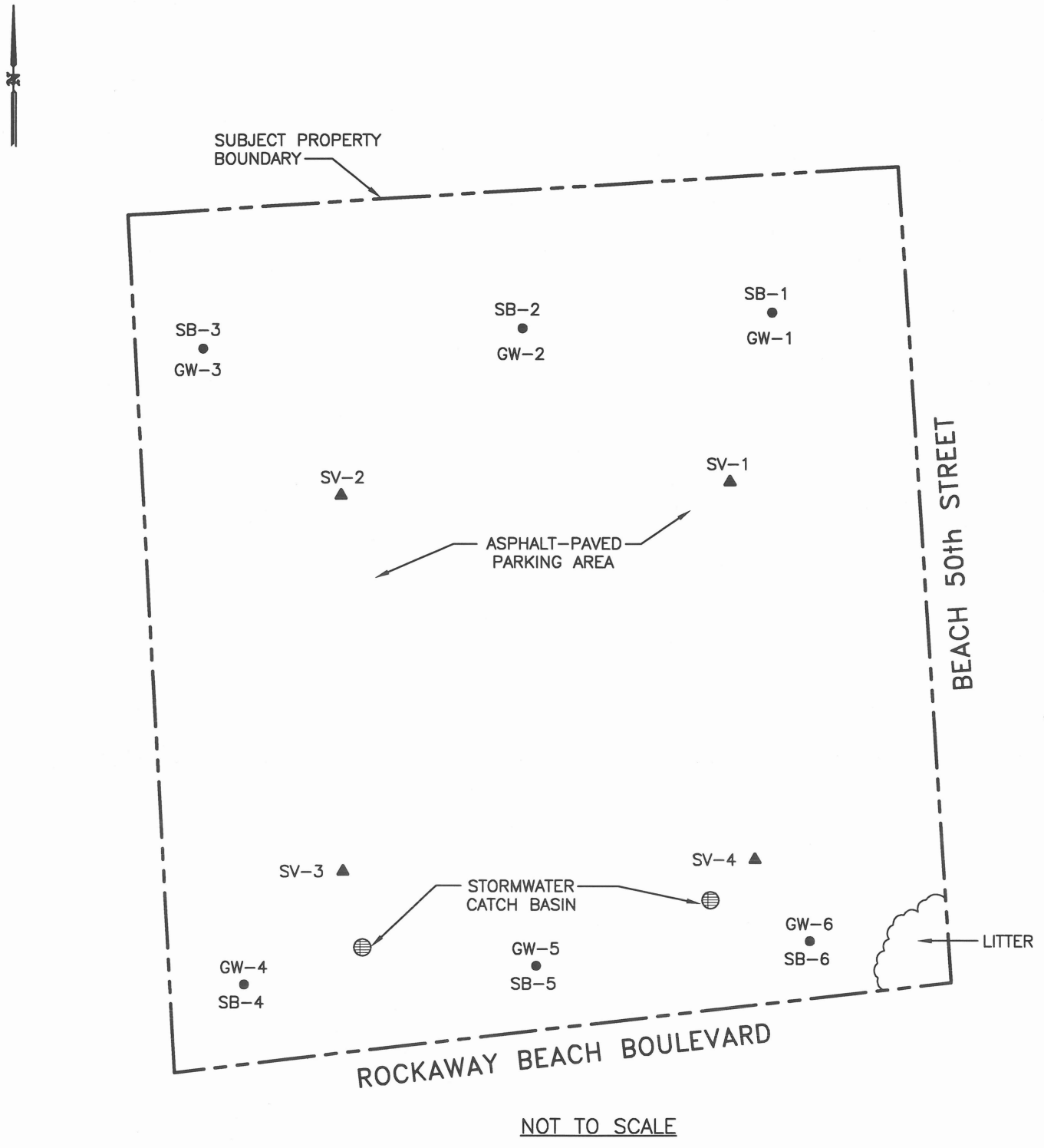
ND= Not detected at MDL for sample.

Table 2 - Soil Sample Results
Samples collected November 16, 2015
Collected from: 5115 Beach Channel Drive, Far Rockaway, New York
FVES/LEG File #500070

			Date Sampled	11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015				11/16/2015			
			Location	SB-1				SB-2				SB-3				SB-4				SB-5				SB-6				SB-7				SB-8				SB-9				SB-10				SB-11			
			Sample ID	SB-1 20151116				SB-2 20151116				SB-3 20151116				SB-4 20151116				SB-5 20151116				SB-6 20151116				SB-7 20151116				SB-8 20151116				SB-9 20151116				SB-10 20151116				SB-11 20151116			
Method	Analyte	CAS RN	CP-51	Unit	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q	Result	Unit	Q
SW8260	1,2,4-Trimethylbenzene	95-63-6	3600	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	530	ug/kg		0.4	ug/kg	J	**6100**	**ug/kg**		0.67	ug/kg	J	ND< 0.96	ug/kg	U	2.3	ug/kg	J	0.75	ug/kg	J	ND< 1.1	ug/kg	U	1	ug/kg		480	ug/kg		ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	1,3,5-Trimethylbenzene	108-67-8	8400	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	220	ug/kg		ND< 0.98	ug/kg	U	2400	ug/kg		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	0.91	ug/kg	J	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.9	ug/kg	U	ND< 98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	Benzene	71-43-2	60	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	ND< 110	ug/kg	U	ND< 0.98	ug/kg	U	ND< 200	ug/kg	U	ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.9	ug/kg	U	ND< 98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	Cymene	99-87-6	10000	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	630	ug/kg		ND< 0.98	ug/kg	U	1000	ug/kg		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	0.36	ug/kg	J	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.9	ug/kg	U	180	ug/kg		ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	Ethylbenzene	100-41-4	1000	ug/kg	ND< 1.1	ug/kg	U	0.74	ug/kg	J	ND< 110	ug/kg	U	4.8	ug/kg		ND< 200	ug/kg	U	7.6	ug/kg		1.3	ug/kg		1.8	ug/kg		2	ug/kg		1.6	ug/kg		1.3	ug/kg		ND< 98	ug/kg	U	0.95	ug/kg	J	1.1	ug/kg		2.2	ug/kg		3.6	ug/kg	
SW8260	Isopropylbenzene (Cumene)	98-82-8	2300	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	ND< 110	ug/kg	U	ND< 0.98	ug/kg	U	230	ug/kg		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.98	ug/kg	U	0.37	ug/kg	J	ND< 1.1	ug/kg	U	0.45	ug/kg	J	ND< 98	ug/kg	U	ND< 1.1	ug/kg	U	0.59	ug/kg	J	ND< 0.87	ug/kg	U
SW8260	Methyl Tert-Butyl Ether (MTBE)	1634-04-4	930	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	ND< 110	ug/kg	U	ND< 0.98	ug/kg	U	ND< 200	ug/kg	U	ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.9	ug/kg	U	ND< 98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	M-P-Xylene	136777-6	NE	ug/kg	ND< 2.2	ug/kg	U	2.2	ug/kg	J	ND< 220	ug/kg	U	14	ug/kg		ND< 400	ug/kg	U	26	ug/kg		3.2	ug/kg		4.7	ug/kg		5.4	ug/kg		5.1	ug/kg		3.7	ug/kg		ND< 200	ug/kg	U	3.1	ug/kg		3.7	ug/kg		5.6	ug/kg		11	ug/kg	
SW8260	Naphthalene	91-20-3	12000	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	450	ug/kg		ND< 0.98	ug/kg	U	**13000**	**ug/kg**		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	0.8	ug/kg	J	1.9	ug/kg	J	ND< 1.1	ug/kg	U	2.2	ug/kg	J	2400	ug/kg	J	ND< 1.1	ug/kg	U	ND< 0.96	ug/kg	U	1.3	ug/kg	J	ND< 0.87	ug/kg	U
SW8260	N-Butylbenzene	104-51-8	12000	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	1000	ug/kg		ND< 0.98	ug/kg	U	4100	ug/kg		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	0.53	ug/kg	J	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	6.5	ug/kg		530	ug/kg		ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	N-Propylbenzene	103-65-1	3900	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	ND< 110	ug/kg	U	ND< 0.98	ug/kg	U	530	ug/kg		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.98	ug/kg	U	0.47	ug/kg	J	ND< 1.1	ug/kg	U	0.43	ug/kg	J	140	ug/kg		ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	O-,P-Xylene (1,2-Dimethylbenzene)	95-47-6	NE		ND< 2.2	ug/kg	U	3.53	ug/kg	J	ND< 220	ug/kg	U	3.2	ug/kg	J	ND< 400	ug/kg	U	7	ug/kg	J	1.2	ug/kg	J	1.5	ug/kg	J	1.5	ug/kg	J	1.2	ug/kg	J	1	ug/kg	J	ND< 200	ug/kg	U	0.81	ug/kg	J	1	ug/kg	J	1.5	ug/kg	J	3	ug/kg	J
SW8260	Sec-Butylbenzene	135-98-8	11000	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	180	ug/kg		ND< 0.98	ug/kg	U	730	ug/kg		ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	0.46	ug/kg	J	0.54	ug/kg	J	ND< 1.1	ug/kg	U	4.1	ug/kg		220	ug/kg		ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	T-Butylbenzene	98-06-6	5900	ug/kg	ND< 1.1	ug/kg	U	ND< 1	ug/kg	U	ND< 110	ug/kg	U	ND< 0.98	ug/kg	U	ND< 200	ug/kg	U	ND< 1	ug/kg	U	ND< 0.96	ug/kg	U	ND< 0.98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.9	ug/kg	U	ND< 98	ug/kg	U	ND< 1.1	ug/kg	U	ND< 1.1	ug/kg	U	ND< 0.87	ug/kg	U
SW8260	Toluene	108-88-3	700	ug/kg	ND< 1.1	ug/kg	U	1	ug/kg	J	ND< 110	ug/kg	U	1.3	ug/kg	J	ND< 200	ug/kg	U	1.3	ug/kg	J	1.5	ug/kg	J	1.3	ug/kg	J	1.5	ug/kg	J	1.5	ug/kg	J	0.94	ug/kg	J	ND< 98	ug/kg	U	1.3	ug/kg	J	1.3	ug/kg	J	2.1	ug/kg	J	2.6	ug/kg	J
SW8270	Acenaphthene	83-32-9	20000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	6200	ug/kg		ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	340	ug/kg	J	1200	ug/kg		ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Acenaphthylene	208-96-8	100000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	ND< 1900	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 380	ug/kg	U	250	ug/kg	J	ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Anthracene	120-12-7	100000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	8000	ug/kg	D	ND< 370	ug/kg	U	4800	ug/kg		ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	170	ug/kg	J	ND< 360	ug/kg	U	ND< 380	ug/kg	U	200	ug/kg	J	ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Benzo(A)Anthracene	56-55-3	1000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	**1300**	**ug/kg**		ND< 370	ug/kg	U	**4500**	**ug/kg**		93	ug/kg	J	110	ug/kg	J	110	ug/kg	J	ND< 360	ug/kg	U	80	ug/kg	J	560	ug/kg		**2800**	**ug/kg**	**J**	ND< 360	ug/kg	U	ND< 390	ug/kg	U	350	ug/kg	J	88	ug/kg	J
SW8270	Benzo(A)Pyrene	50-32-8	1000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	ND< 1900	ug/kg	U	71	ug/kg	J	81	ug/kg	J	ND< 350	ug/kg	U	ND< 360	ug/kg	U	65	ug/kg	J	540	ug/kg	J	ND< 370	ug/kg	U	ND< 360	ug/kg	U	ND< 390	ug/kg	U	330	ug/kg	J	ND< 370	ug/kg	U
SW8270	Benzo(B)Fluoranthene	205-99-2	1000	ug/kg	ND< 390	ug/kg	U	100	ug/kg	J	ND< 440	ug/kg	U	130	ug/kg	J	ND< 1900	ug/kg	U	210	ug/kg	J	130	ug/kg	J	130	ug/kg	J	ND< 360	ug/kg	U	130	ug/kg	J	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 360	ug/kg	U	ND< 390	ug/kg	U	870	ug/kg	J	ND< 370	ug/kg	U
SW8270	Benzo(G,H,I)Perylene	191-24-2	100000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	ND< 1900	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	220	ug/kg	J	ND< 370	ug/kg	U	ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	79	ug/kg	J
SW8270	Benzo(K)Fluoranthene	207-08-9	800	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	ND< 1900	ug/kg	U	72	ug/kg	J	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 360	ug/kg	U	ND< 390	ug/kg	U	250	ug/kg	J	ND< 370	ug/kg	U
SW8270	Chrysene	218-01-9	1000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	**1400**	**ug/kg**		ND< 370	ug/kg	U	**5400**	**ug/kg**		93	ug/kg	J	130	ug/kg	J	110	ug/kg	J	97	ug/kg	J	97	ug/kg	J	**1200**	**ug/kg**		**3100**	**ug/kg**		ND< 360	ug/kg	U	ND< 390	ug/kg	U	380	ug/kg	J	95	ug/kg	J
SW8270	Dibenz(A,H)Anthracene	53-70-3	330	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	ND< 1900	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Fluoranthene	206-44-0	100000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	630	ug/kg	J	ND< 370	ug/kg	U	1700	ug/kg	J	200	ug/kg	J	290	ug/kg	J	140	ug/kg	J	93	ug/kg	J	120	ug/kg	J	350	ug/kg	J	230	ug/kg	J	ND< 360	ug/kg	U	ND< 390	ug/kg	U	710	ug/kg	J	120	ug/kg	J
SW8270	Fluorene	86-73-7	30000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	1300	ug/kg	J	ND< 370	ug/kg	U	4700	ug/kg	J	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	270	ug/kg	J	1600	ug/kg	J	ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Indeno(1,2,3-C,D)Pyrene	193-39-5	500	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	ND< 1900	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Naphthalene	91-20-3	12000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 440	ug/kg	U	ND< 370	ug/kg	U	6900	ug/kg		ND< 380	ug/kg	U	ND< 370	ug/kg	U	ND< 350	ug/kg	U	ND< 360	ug/kg	U	ND< 360	ug/kg	U	ND< 380	ug/kg	U	940	ug/kg		ND< 360	ug/kg	U	ND< 390	ug/kg	U	ND< 380	ug/kg	U	ND< 370	ug/kg	U
SW8270	Phenanthrene	85-01-8	100000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	630	ug/kg	J	D ND< 370	ug/kg	U	22000	ug/kg		D ND< 380	ug/kg	U	200	ug/kg	J	150	ug/kg	J	180	ug/kg	J	ND< 360	ug/kg	U	790	ug/kg		11000	ug/kg		ND< 360	ug/kg	U	ND< 390	ug/kg	U	240	ug/kg	J	160	ug/kg	J
SW8270	Pyrene	129-00-0	100000	ug/kg	ND< 390	ug/kg	U	ND< 380	ug/kg	U	1800	ug/kg		ND< 370	ug/kg	U	6800	ug/kg		350	ug/kg	J	320	ug/kg	J	440	ug/kg	J	210	ug/kg	J	450	ug/kg	J	2300	ug/kg	J	D 3000	ug/kg		ND< 360	ug/kg	U	ND< 390	ug/kg	U	1500	ug/kg	J	260	ug/kg	J

Notes:
Standards are for respective Soil Cleanup Objectives per NYSDEC CP-51
All concentrations are in ug/kg unless otherwise indicated;
Bold type designates those compounds detected at concentrations exceeding CP-51 standards;
NE = No standard established.
MDL = Method Detection Limit
ND= Not detected at MDL for sample.

FPM Group
Phase II ESA Data (April 12, 2016)



NOT TO SCALE

LEGEND:

SB-1/GW-1 ● SOIL BORING/GROUNDWATER SAMPLE LOCATION

SV-1 ▲ SOIL VAPOR SAMPLE LOCATION

FPM GROUP

FIGURE 1
SITE PLAN
ROCKAWAY BEACH BOULEVARD/BEACH 50th STREET
FAR ROCKAWAY, NEW YORK

Drawn By: H.C.	Checked By: C.L.	Date: 4/11/16

Z:\PENINSULA ROCKAWAY\FIG 1_SITE PLAN.dwg, 4/12/2016 10:53:51 AM

TABLE 1
SOIL CHEMICAL ANALYTICAL RESULTS
ROCKAWAY BEACH BOULEVARD/BEACH 50TH STREET, FAR ROCKAWAY, NEW YORK

Sample No.	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	NYSDEC Unrestricted Use Soil Cleanup Objectives	NYSDEC Restricted-Residential Use Soil Cleanup Objectives	NYSDEC Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	**0-2**	**0-2**	**0-2**	**0-2**	**0-2**	**0-2**			
Sample Date	**3/29/16**								
Volatile Organic Compounds in micrograms per kilogram									
Acetone	1.8 J	2.2 J	1.5 J	3.4 J	ND	ND	50	100,000	500,00
Semivolatile Organic Compounds in micrograms per kilogram									
2-Methylnapthalene	ND	ND	ND	ND	45 J	ND	-	-	-
Acenaphthene	ND	ND	43 J	ND	ND	ND	20,000	100,000	500,000
Acenaphthylene	100 J	53 J	99 J	55 J	63 J	ND	100,000	100,000	500,000
Anthracene	57 J	48 J	150 J	ND	ND	ND	100,000	100,000	500,000
Benzo(a)anthracene	170	130	380	100 J	120 J	43 J	1,000	1,000	5,600
Benzo(a)pyrene	190	130 J	370	100 J	130 J	44 J	1,000	1,000	1,000
Benzo(b)fluoranthene	270	170	500	130 J	170 J	62 J	1,000	1,000	5,600
Benzo(g,h,i)perylene	140	88 J	300	110 J	140 J	32 J	100,000	100,000	500,000
Benzo(k)fluoranthene	90 J	73 J	180 J	ND	59 J	ND	800	3,900	56,000
Bis(2-Ethylhexyl)phthalate	ND	ND	130 J	ND	ND	ND	-	-	-
Carbazole	ND	ND	69 J	ND	ND	ND	-	-	-
Chrysene	180	130	370	100 J	130 J	45 J	1,000	3,900	56,000
Dibenzo(a,h)anthracene	40 J	25 J	78 J	ND	ND	ND	330	330	560
Fluoranthene	300	230	710	150 J	210 J	75 J	100,000	100,000	500,000
Fluorene	ND	ND	54 J	ND	ND	ND	30,000	100,000	500,000
Indeno(1,2,3-cd)pyrene	120 J	82 J	220 J	64 J	93 J	27 J	500	500	5,600
Naphthalene	ND	ND	47 J	ND	77 J	ND	12,000	100,000	500,000
Phenanthrene	110	140	510	84 J	140 J	43 J	100,000	100,000	500,000
Pyrene	280	240	740	150 J	230	84 J	100,000	100,000	500,000
Metals in milligrams per kilogram									
Aluminum	2,200	2,300	2,000	1,900	1,700	2,200	-	-	-
Antimony	ND	ND	0.76 J	ND	ND	ND	-	-	-
Arsenic	2.2	7.2	4.2	3.3	3.6	2.5	13	16	16
Barium	27	28	92	16	15	25	350	400	400
Beryllium	0.08 J	0.10 J	ND	0.09 J	0.09 J	0.13 J	7.2	72	590
Cadium	ND	ND	0.27 J	ND	ND	ND	2.5	4.3	9.3
Calcium	4,100	6,200	7,100	13,000	4,300	30,000	-	-	-
Chromium	7.0	**46**	9.2	5.6	5.9	8.2	30	180	1,500
Cobalt	1.7	7.5	1.7	1.5 J	1.4 J	1.8	-	-	-
Copper	10	26	31	9.9	6.6	17	50	270	270
Iron	5,300	67,000	5,600	4,700	4,700	5,400	-	-	-
Lead	43	**750**	**440**	23	16	**69**	63	400	1,000
Magnesium	1,300	1,000	1,300	7,000	1,500	17,000	-	-	-
Manganese	59	180	53	61	59	64	1,600	2,000	10,000
Mercury	0.10	0.08	0.14	0.07	0.03 J	0.05 J	0.18	0.81	2.8
Nickel	6.0	9.5	6.5	3.6	3.3	5.0	30	310	310
Potassium	320	290	320	210	210 J	240	-	-	-
Selenium	0.26 J	1.5 J	0.66 J	0.31 J	ND	0.66 J	3.9	180	1,500
Sodium	38 J	46 J	61 J	26 J	73 J	56 J	-	-	-
Vanadium	11	8.4	18	11	9.3	12	-	-	-
Zinc	35	59	**190**	23	17	42	109	10,000	10,000

Notes:

Only analytes detected in one or more samples are included herein. See laboratory report for a complete list of analytes.

- = Not established

J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.

ND = Not detected at or above the Method Detection Limit.

Bold Shaded values indicate exceedances of the NYSDEC Unrestricted Use Soil Cleanup Objectives.

NYSDEC = New York State Department of Environmental Conservation.

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TABLE 2
GROUNDWATER ANALYTICAL DATA
ROCKAWAY BEACH BOULEVARD/BEACH 50TH STREET, FAR ROCKAWAY, NY

Analyte	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	NYSDEC Class GA Ambient Water Quality Standard
	3/29/2016						
Volatile Organic Compounds in micrograms per liter							
Acetone	ND	4.9 J	ND	ND	2.4 J	3.4 J	50
Benzene	ND	ND	ND	ND	0.46 J	ND	1

Notes:

Only analytes detected in one or more samples are included herein. See laboratory report for a complete list of analytes.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
ND = Not detected at or above the Method Detection Limit.

TABLE 3
SOIL VAPOR ANALYTICAL DATA
ROCKAWAY BEACH BOULEVARD/BEACH 50TH STREET, FAR ROCKAWAY, NY

Analyte	SV-1 3/29/2016	SV-2 3/29/2016	SV-3 3/29/2016	SV-4 3/29/2016	Indoor Air Background Levels, Commercial*
Volatile Organic Compounds in micrograms per cubic meter					
1,2,4-Trimethylbenzene	6.0	5.9	5.9	3.9	1.7 - 13.7
1,3,5-Trimethylbenzene	1.7	1.5	1.8	1.2	<1.3 - 4.6
2,2,4-Trimethylpentane	3.0	ND	ND	ND	-
4-Ethyltoluene	3.3	3.1	3.4	2.3	<1.5 - 5.9
Acetone	170	300	190	120	32.4 - 120.2
Benzene	23	15	18	6.6	2.1 - 12.5
Bromodichloromethane	ND	ND	ND	0.67 J	-
Carbon disulfide	32	13	27	9.3	<0.8 - 6.4
Carbon tetrachloride	ND	ND	ND	0.88 J	<0.8 - 0.7
Chloroethane	26	13	18	1.5	<0.8 - <1.3
Chloroform	3.6	0.78	ND	0.68 J	<0.4 - 1.4
Cyclohexane	55	40	300	19	-
Ethylbenzene	4.3	5.7	6.9	3.9	<1.6 - 7.6
Freon 11	1.7	1.5	1.0	1.7	<3.7 - 54.0
Freon 113	ND	ND	ND	0.92 J	<1.0 - <1.6
Freon 12	4.2	5.3	ND	3.2	-
Heptane	48	27	77	ND	-
m&p-xylene	16	20	23	11	4.1 - 28.5
Methyl Butyl Ketone	19	81	43	26	-
Methyl Ethyl Ketone	150	370	250	130	3.3 - 13.5
Methyl Isobutyl Ketone	2.3	ND	ND	ND	<1.2 - 8.1
Methylene chloride	1.0	0.80	1.2	1.1	<1.7 - 16.0
o-Xylene	3.8	4.1	6.6	2.9	<2.4 - 11.2
Tetrachloroethene	1.3	ND	ND	0.75 J	<1.9 - 25.4
Toluene	90	26	20	12	10.7 - 70.8
Trichloroethene	1.6	ND	ND	0.70 J	<1.2 - 6.5

Notes:

All samples analyzed using Method TO-15
Only analytes detected in one or more samples are reported herein. See laboratory report for complete data.
NYSDOH guidance is provided for shaded compounds.
* = US EPA BASE Study 2001
ug/m^3 = micrograms per cubic meter
- = Indoor air background levels not established.
J = Estimated concentration.

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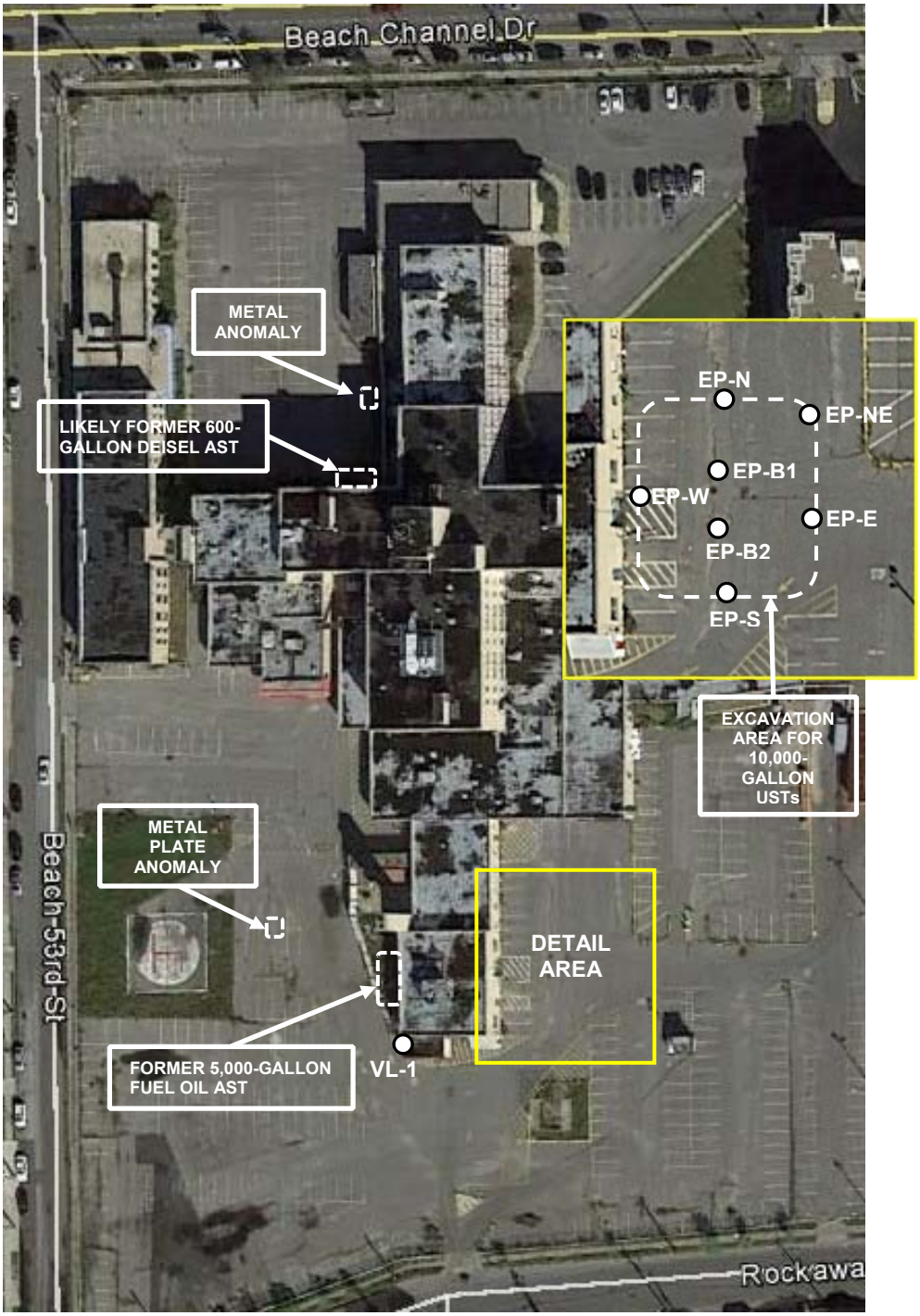
Tank Area Data (August 29, 2016)



○ **ENDPOINT SOIL SAMPLE**

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FIGURE 1
SITE PLAN
51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK

Drawn by: JSB	Checked By: SOD	Date: 8/23/16

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TABLE 1
SOIL CHEMICAL ANALYTICAL RESULTS
51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK

Sample ID	VL-1	EP-S	EP-E	EP-W	EP-N	EP-NE	EP-B1	EP-B2	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (ft below grade)	**6**	**7**	**7**	**7**	**7**	**7**	**9**	**9**			
Sample Date	**8/15/2016**	**7/26/16**									
Volatile Organic Compounds in micrograms per kilogram											
1,2,4-Trimethylbenzene	NA	ND	ND	ND	ND	ND	ND	6.5	3,600	52,000	190,000
Isopropylbenzene	NA	ND	ND	380 J	ND	ND	ND	ND	2,300	-	-
Naphthalene	NA	ND	ND	ND	ND	ND	ND	5.1 J	12,000	100,000	500,000
n-Propylbenzene	NA	ND	ND	1,200	ND	ND	ND	3.9 J	3,900	100,000	500,000
p-Isopropyltoluene	NA	ND	ND	320 J	ND	ND	ND	ND	10,000	-	-
n-Butylbenzene	NA	ND	ND	1,300	ND	ND	ND	ND	12,000	100,000	500,000
sec-Butylbenzene	NA	ND	ND	790	ND	ND	ND	ND	11,000	100,000	500,000
Semivolatile Organic Compounds in micrograms per kilogram											
Anthracene	77 J	ND	ND	2,700	ND	170	ND	260	100,000	100,000	500,000
Acenaphthene	ND	ND	ND	3,800	150 J	ND	150 J	240	20,000	100,000	500,000
Acenaphthylene	79 J	ND	ND	1,300 J	ND	ND	ND	ND	100,000	100,000	500,000
Benzo[a]anthracene	190	ND	ND	ND	ND	ND	ND	230	1,000	1,000	5,600
Benzo[a]pyrene	120	ND	ND	ND	ND	ND	ND	ND	1,000	1,000	1,000
Benzo[b]fluoranthene	160	ND	ND	ND	ND	ND	ND	ND	1,000	1,000	5,600
Benzo[g,h,i]perylene	72 J	ND	ND	ND	ND	ND	ND	ND	100,000	100,000	500,000
Benzo[k]fluoranthene	100	ND	ND	ND	ND	ND	ND	ND	800	3,900	56,000
Chrysene	150	ND	ND	ND	ND	ND	ND	420	1,000	3,900	56,000
Fluoranthene	320	100 J	ND	1,500 J	320	260	220	610	100,000	100,000	500,000
Fluorene	ND	ND	ND	5,400	90 J	ND	160 J	ND	30,000	100,000	500,000
Ideno(1,2,3-cd)pyrene	68 J	ND	ND	ND	ND	ND	ND	ND	500	500	5,600
Naphthalene	ND	ND	ND	ND	210	ND	100 J	410	12,000	100,000	500,000
Phenanthrene	260	ND	ND	18,000	360	180	660	780	100,000	100,000	500,000
Pyrene	320	91 J	ND	5,700	190	150 J	110 J	590	100,000	100,000	500,000

Notes:

Only analytes detected in one or more samples are included herein.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
NA = Not analyzed
- = Not established
ND = Not detected at or above the method detection limit.

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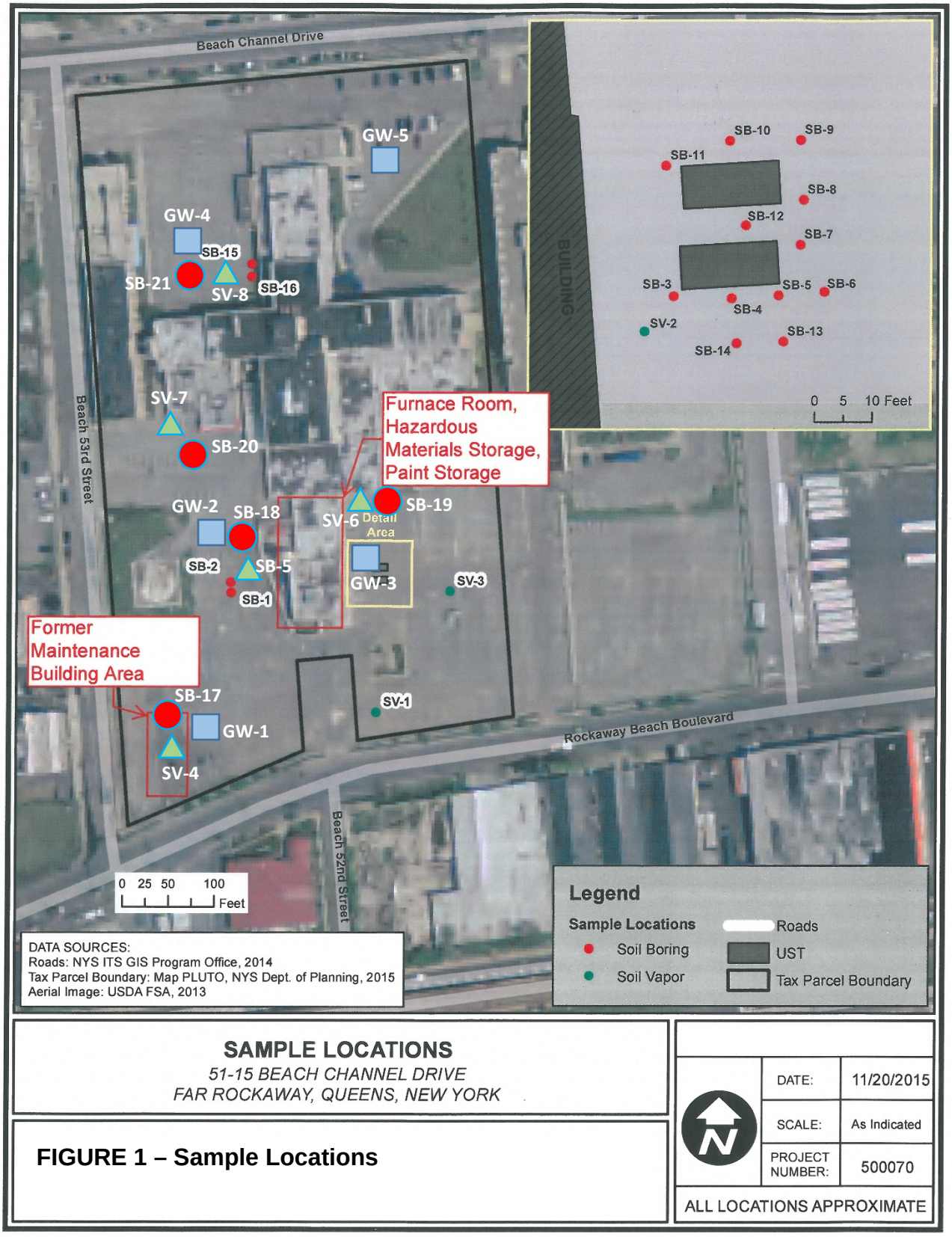
Phase II ESA Data (August 30, 2016)



SAMPLE LOCATIONS

51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, QUEENS, NEW YORK

DATE:	11/20/2015
SCALE:	As Indicated
PROJECT NUMBER:	500070

ALL LOCATIONS APPROXIMATE

FIGURE 1 – Sample Locations

Soil Vapor Soil Groundwater

TABLE 1
SOIL CHEMICAL ANALYTICAL RESULTS
51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK

Sample No.	SB-17	SB-18	SB-19	SB-20	SB-21	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	**0-2**	**1-3**	**1-2**	**1-3**	**0-2**			
Sample Date	**7/22/16**							
TCL Volatile Organic Compounds in micrograms per kilogram								
Acetone	16 SCAL-E	24 SCAL-E	ND	**98 SCAL-E**	8.5 SCAL-E, J	50	100,000	500,000
Carbon disulfide	ND	ND	ND	ND	5.8	-	-	-
Methyl Ethyl Ketone	3.0 J	4.0 J	ND	34	ND	120	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram								
2-Methylnaphthalene	2,000	ND	ND	110 J	ND	-	-	-
Acenaphthene	9,780	139	ND	ND	ND	20,000	100,000	500,000
Anthracene	19,600	433	73.7 J	ND	ND	100,000	100,000	500,000
Benzo[a]anthracene	**26,500**	**1,020 CCV-E**	334 CCV-E	ND	107 J, SCAL-E	1,000	1,000	5,600
Benzo[a]pyrene	**9,280 CCV-E**	707	224	ND	ND	1,000	1,000	1,000
Benzo[b]fluoranthene	**9,640**	815	301	ND	79.5	1,000	1,000	5,600
Benzo[g,h,i]perylene	2,320	363	121 J	ND	ND	100,000	100,000	500,000
Benzo[k]fluoranthene	**11,000**	684	225	ND	ND	800	3,900	56,000
Chrysene	**21,800**	883	302	ND	142	1,000	3,900	56,000
Dibenz(a,h)anthracene	**1,710 IS-06**	175	ND	ND	ND	330	330	560
Dibenzofuran	3,740	ND	ND	ND	ND	-	-	-
Fluoranthene	55,100	1,980	650	ND	617	100,000	100,000	500,000
Fluorene	6,120	141	ND	ND	ND	30,000	100,000	500,000
Indeno[1,2,3-cd]pyrene	**2,870 IS-06**	367	121 J	ND	ND	500	500	5,600
Naphthalene	3,840	ND	ND	ND	ND	12,000	100,000	500,000
Phenanthrene	49,600	1,440	332	ND	295	100,000	100,000	500,000
Pyrene	50,000	1,550	496	ND	481	100,000	100,000	500,000
TAL Metals in milligrams per kilogram								
Arsenic	3.64	3.04	8.55	2.97	1.84	13	16	16
Barium	52.0	52.3	30.1	16	17	350	400	400
Cadmium	0.482	0.370	ND	ND	ND	2.5	4.3	9.3
Chromium	12.6	9.01	24.3	9.41	5.70	30	180	1,500
Lead	**174**	**68.7**	55.4	33.6	23.3	63	400	1,000
Mercury	0.0956	0.0634	0.0577	0.0609	0.0548	0.18	0.81	2.80
Selenium	ND	1.75	**4.11**	ND	ND	3.9	180	1,500

Notes:

Only analytes detected in one or more samples are included herein.

J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.

ND = Not detected at or above the method detection limit.

- = Not established

Bold boxed values exceed NYSDEC Unrestricted Use Soil Cleanup Objectives

Bold shaded values exceed NYSDEC Restricted Residential Use Soil Cleanup Objectives

Bold shaded boxed values exceed NYSDEC Commercial Use Soil Cleanup Objectives

SCAL-E = The reported value is estimated due to its behavior during initial calibration.

CCV-E = The reported value is estimated due to its behavior during continued calibration.

IS-06 = Internal standard did not meet acceptance criteria.

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TABLE 2
GROUNDWATER CHEMICAL ANALYTICAL DATA
51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK

Analyte	GW-1	GW-2	GW-3	GW-4	GW-5	NYSDEC Class GA Ambient Water Quality Standards
	7/22/2016					
Volatile Organic Compounds in micrograms per liter						
2-Butanone	1.0 J,B	ND	ND	ND	ND	50
Acetone	4.6 B	3.6 B	5.1 B	7.8 B	3.7 B	50
Carbon disulfide	3.2	3.7	1.1	2.8	1.9	60
Ethylbenzene	0.24 J	ND	0.40 J	ND	ND	5
o-Xylene	ND	ND	0.25 CCV-E, J	ND	ND	-
Toluene	ND	ND	ND	0.21 J	ND	5

Notes:

Only analytes detected in one or more samples are included herein. See laboratory report for a complete list of analytes.
B = Analyte is found in the associated analysis batch blank.
CCV-E = Estimated concentration.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
ND = Not detected at or above the Method Detection Limit.

TABLE 3
SOIL VAPOR SAMPLING RESULTS
51-15 BEACH CHANNEL DRIVE, FAR ROCKAWAY, NEW YORK

Sample No.	SV-4	SV-5	SV-6	SV-7	SV-8	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	7/22/16						
Volatile Organic Compounds in ug/m^3							
1,1,1-Trichloroethane	6.7	0.93	ND	ND	ND	<0.25 - 6.9	2.6 - 33.0
1,1-Dichloroethane	1.1	1.1	ND	ND	ND	<0.25 - <0.25	<0.4 - <0.8
1,1-Dichloroethene	1.1	ND	ND	ND	ND	<0.25 - <0.25	<0.9 - <1.6
1,2,4-Trimethylbenzene	2.2	2.5	2.5	2.3	4	<0.25 - 6.3	1.7 - 13.7
1,3,5-Trimethylbenzene	2.0	2.0	2.3	1.7	2.5	0.3 - 6.5	<1.3 - 4.6
1,4-Dichlorobenzene	2.0	ND	ND	ND	ND	<0.25 - 2.6	<0.8 - 12.5
2,2,4-Trimethylpentane	1,400	51	26	11	ND	-	-
4-Ethyltoluene	0.59 J	0.69 J	0.69 J	0.59 J	0.93	-	<1.5 - 5.9
Acetone	1,600	930	770	2,400	440	9.9 - 140	32.4 - 120.2
Benzene	12	20	5.7	1.3	3.1	1.1 - 29	2.1 - 12.5
Carbon disulfide	16	30	14 J	2.7	29	-	<0.8 - 6.4
Carbon Tetrachloride	ND	0.82 J	0.38 J	0.31 J	ND	<0.25 - 1.1	<0.8 - 0.7
Chloroethane	ND	1.6	ND	1.5	0.42	<0.25 - 0.6	<0.8 - <1.3
Chloroform	ND	ND	2.9	ND	15	<0.25 - 4.6	<0.4 - 1.4
Chloromethane	ND	ND	ND	2.1	0.56	<0.25 - 5.2	2.1 - 4.4
cis-1,2-Dichloroethene	0.59	ND	ND	ND	ND	<0.25 - 1.2	<0.8 - <2.0
Cyclohexane	96	24	6.9	2.5	ND	<0.25 - 19	-
Ethyl Acetate	1.7	ND	1.5	3.8	ND	-	<1.0 - 9.5
Ethylbenzene	0.65	1.1	0.65	0.61 J	1.0	0.4 - 13	<1.6 - 7.6
Freon 11	0.67 J	0.90	1.3	0.62	1.1	-	<3.7 - 54.0
Freon 12	1.5	1.2	1.3	1.2	1.9	-	-
Heptane	180	34	5.9	ND	ND	1 - 33	-
Hexane	340	47	ND	ND	ND	0.6 - 35	1.6 - 15.2
Isopropyl alcohol	8.1	16	4.0	19	9.8	-	6.6 - 475.0
m&p-xylene	1.9	2.5	2.1	1.7	3.0	0.5 - 21	4.1 - 28.5
Methyl Butyl Ketone	35	26	32	53	120	-	-
Methyl Ethyl Ketone	600	86	170	290	960	1.4 - 39	3.3 - 13.5
Methyl Isobutyl Ketone	5.7	5.2	2.5	1.2	5.0	<0.25 - 5.3	<1.2 - 8.1
Methyl tert-butyl ether	ND	ND	ND	2.6	ND	<0.25 - 71	<1.5 - 16.1
Methylene chloride	1.2	2.5	2.2	2.9	0.90	0.3 - 45	<1.7 - 16.0
o-Xylene	0.69	1.0	0.87	0.74	1.4	0.4 - 13	<2.4 - 11.2
Styrene	0.51 J	0.55 J	0.47 J	0.77	0.51 J	<0.25 - 2.3	<1.6 - 4.3
Tetrachloroethene	340	3.1	11	ND	5.4	<0.25 - 4.1	<1.9 - 25.4
Toluene	4.9	11	5.0	2.8	4.3	3.5 - 110	10.7 - 70.8
Trichloroethene	38	0.70 J	0.32 J	0.21 J	0.21 J	<0.25 - 0.8	<1.2 - 6.5
Vinyl Chloride	0.28 J	ND	ND	ND	ND	<0.25 - <0.25	<0.8 - <2.2

Notes:

All samples analyzed using Method TO-15.
Only compounds detected in one or more samples are reported herein. See lab report for complete data.
ug/m^3 = micrograms per cubic meter
Shaded compounds are those for which the NYSDOH has provided guidance.
ND = Not detected
J = Analyte was detected at or below quantitation limit but above the method detection limit.
* = US EPA BASE Study 2001; 25th to 95th percentiles.

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Phase II ESA Data (January 26, 2017)

LEGEND:

GW-4	GROUNDWATER SAMPLE LOCATION
SB-21	SOIL BORING LOCATION
SV-8	SOIL VAPOR SAMPLE LOCATION

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FIGURE 1
SAMPLING PLAN
EAST SIDE OF PENINSULA NORTH SITE
51-15 BEACH CHANNEL DRIVE
QUEENS, NY

Drawn By: H.C.	Checked By: S.D.	Date: 1/25/17

Z:\PENINSULA ROCKAWAY\PHASE II\SAMPLING PLAN.dwg, 1/26/2017 9:23:34 AM

TABLE 1
SOIL CHEMICAL ANALYTICAL RESULTS
51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK

Sample No.	SB-1	SB-2	SB-3	SB-4	SB-5	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	**4-5**	**4-5**	**4-5**	**4-5**	**4-5**			
Sample Date	**1/6/17**							
TCL Volatile Organic Compounds in micrograms per kilogram								
Acetone	28 CCV-E, SCAL-E	ND	ND	ND	ND	50	100,000	500,000
Methyl acetate	3.1 J	ND	ND	ND	ND	-	-	-
Methyl Ethyl Ketone	6.8 CCV-E	ND	ND	ND	ND	120	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram								
Acenaphthylene	ND	ND	159	ND	ND	20,000	100,000	500,000
Benzo[a]anthracene	ND	68.7 J	ND	ND	ND	1,000	1,000	5,600
Benzo[a]pyrene	ND	76.3 J	54.7 J	ND	ND	1,000	1,000	1,000
Benzo[b]fluoranthene	ND	57.3 J	52.5 J	ND	ND	1,000	1,000	5,600
Benzo[k]fluoranthene	ND	71.8 J	74.1 J	ND	ND	800	3,900	56,000
Chrysene	ND	77.9 J	73.4 J	ND	ND	1,000	3,900	56,000
Fluoranthene	ND	127	ND	ND	ND	100,000	100,000	500,000
Phenanthrene	ND	82.5 J	ND	ND	ND	100,000	100,000	500,000
Pyrene	ND	147	83.4 J	ND	ND	100,000	100,000	500,000
TAL Metals in milligrams per kilogram								
Aluminum	1,540	1,220	1,770	1,260	1,140	-	-	-
Antimony	ND	ND	0.585	ND	ND	-	-	-
Arsenic	2.28	1.52	1.67	ND	ND	13	16	16
Barium	9.57	14.7	29.4	5.57	6.54	350	400	400
Calcium	536	421	3,710	830	293	-	-	-
Chromium	5.02	4.32	4.62	3.75	3.23	30	180	1,500
Cobalt	1.40	1.02	1.41	1.10	0.844	-	-	-
Copper	12.3	3.43	6.05	1.42	ND	50	270	270
Iron	3,280	2,590	3,490	2,190	2,190	-	-	-
Lead	5.85	12.1	15.8	3.31	0.528	63	400	1,000
Magnesium	545	426	1,230	410	377	-	-	-
Manganese	24.6	17.6	50.3	18.5	12.9	1,600	2,000	10,000
Mercury	ND	ND	0.0342	ND	ND	0.18	0.81	2.8
Nickel	4.99	3.82	4.6	3.90	3.13	30	310	310
Potassium	382	301	404	165	313	-	-	-
Sodium	126	105	370	129	117	-	-	-
Vanadium	11.9	5.30	7.31	4.36	5.49	-	-	-
Zinc	12.1	8.25	12.8	9.18	4.16	109	10,000	10,000

Notes:
Only analytes detected in one or more samples are included herein.
ND = Not detected at or above the method detection limit.
SCAL-E = The reported value is estimated due to its behavior during initial calibration.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
CCV-E = The reported value is estimated due to its behavior during continued calibration.

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TABLE 2
GROUNDWATER CHEMICAL ANALYTICAL DATA
51-15 BEACH CHANNEL DRIVE
FAR ROCKAWAY, NEW YORK

Analyte	GW-6	GW-7	GW-8	GW-9	GW-10	NYSDEC Class GA Ambient Water Quality Standards
	1/6/2017					
Volatile Organic Compounds in micrograms per liter						
2-Butanone	0.60 Cal-E, CCV-E	0.65 Cal-E, CCV-E	0.81 Cal-E, CCV-E	0.54 Cal-E, CCV-E	0.28 Cal-E, CCV-E, J	50
2-Hexanone	ND	ND	0.26 J	ND	ND	-
Acetone	1.8 CCV-E, ICV-E, SCAL-E, J	3.2 CCV-E, ICV-E, SCAL-E	2.4 CCV-E, ICV-E, SCAL-E	2.1 CCV-E, ICV-E, SCAL-E	ND	50
Carbon disulfide	0.96	0.76	1.2	1.1	0.70	60
Chloromethane	ND	ND	0.32 J	ND	ND	-

Notes:

Only analytes detected in one or more samples are included herein. See laboratory report for a complete list of analytes.
Cal-E = Estimated concentration.
CCV-E = The reported value is estimated due to its behavior during continuing calibration verification.
SCAL-E = The reported value is estimated due to its behavior during initial calibration.
ICV-E = The reported value is estimated due to its behavior during initial calibration verification.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
ND = Not detected at or above the Method Detection Limit.
- = Not established

TABLE 3
SOIL VAPOR SAMPLING RESULTS
51-15 BEACH CHANNEL DRIVE, FAR ROCKAWAY, NEW YORK

Sample No.	SV-1	SV-2	SV-3	SV-4	SV-5	Indoor Air Background Levels, Residential**	Indoor Air Background Levels, Commercial*
Sample Date	1/6/17						
Volatile Organic Compounds in ug/m^3							
1,2,4-Trimethylbenzene	NA	ND	4.0	1.9	0.69 J	<0.25 - 6.3	1.7 - 13.7
1,3,5-Trimethylbenzene	NA	ND	1.2	0.54 J	ND	0.3 - 6.5	<1.3 - 4.6
2,2,4-Trimethylpentane	NA	ND	3.0	1.4	ND	-	-
4-Ethyltoluene	NA	ND	0.93	ND	ND	-	<1.5 - 5.9
Acetone	NA	91	200	34	150	9.9 - 140	32.4 - 120.2
Benzene	NA	1.3	11	0.80	6.8	1.1 - 29	2.1 - 12.5
Carbon disulfide	NA	6.1	34	ND	37	-	<0.8 - 6.4
Carbon Tetrachloride	NA	ND	42	ND	ND	<0.25 - 1.1	<0.8 - 0.7
Chloroethane	NA	ND	0.61	ND	0.77	<0.25 - 0.6	<0.8 - <1.3
Chloroform	NA	ND	1.7	ND	ND	<0.25 - 4.6	<0.4 - 1.4
Chloromethane	NA	ND	ND	0.81	ND	<0.25 - 5.2	2.1 - 4.4
Cyclohexane	NA	2.6	12	1.3	7.2	<0.25 - 19	-
Ethyl Acetate	NA	1.3	0.61 J	0.50 J	ND	-	<1.0 - 9.5
Ethylbenzene	NA	1.6	2.0	0.48 J	1.9	0.4 - 13	<1.6 - 7.6
Freon 11	NA	1.1	0.62 J	0.96	0.67 J	-	<3.7 - 54.0
Freon 12	NA	1.9	1.5	2.2	1.4	-	-
Heptane	NA	3.0	11	ND	13	1 - 33	-
Hexane	NA	ND	25	ND	16	0.6 - 35	1.6 - 15.2
m&p-xylene	NA	4.0	5.3	1.6	4.8	0.5 - 21	4.1 - 28.5
Methyl Butyl Ketone	NA	ND	ND	0.86 J	ND	-	-
Methyl Ethyl Ketone	NA	6.4	35	7.4 J	15	1.4 - 39	3.3 - 13.5
Methyl Isobutyl Ketone	NA	2.6	3.3	ND	2.5	<0.25 - 5.3	<1.2 - 8.1
Methylene chloride	NA	0.38 J	0.45 J	0.59	ND	0.3 - 45	<1.7 - 16.0
o-Xylene	NA	1.1	2.5	0.78	1.4	0.4 - 13	<2.4 - 11.2
Styrene	NA	0.47 J	0.55 J	ND	0.47 J	<0.25 - 2.3	<1.6 - 4.3
Tetrachloroethene	NA	ND	0.81 J	ND	ND	<0.25 - 4.1	<1.9 - 25.4
Tetrahydrofuran	NA	0.53	ND	ND	ND	-	-
Toluene	NA	6.7	16	2.7	11	3.5 - 110	10.7 - 70.8

Notes:

All samples analyzed using Method TO-15.
Only compounds detected in one or more samples are reported herein. See lab report for complete data.
ug/m^3 = micrograms per cubic meter
Shaded compounds are those for which the NYSDOH has provided guidance.
NA = Not analyzed.
ND = Not detected.
J = Analyte was detected at or below quantitation limit but above the method detection limit.
* = US EPA BASE Study 2001; 25th to 95th percentiles.
** = NYSDOH Study 2003; 25th to 95th percentiles.

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Phase II ESA Data (June 26, 2017)

LEGEND:

- GW-3 GROUNDWATER SAMPLE LOCATION
- SB-19 SOIL BORING LOCATION
- SV-3 SOIL VAPOR SAMPLE LOCATION
- FORMER 10,000-GALLON #6 FO UST

0' 100' 200'

APPROXIMATE SCALE

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FIGURE 1
SITE PLAN

FORMER PENINSULA HOSPITAL SITE
51-15 BEACH CHANNEL DRIVE &
50-04 ROCKAWAY BEACH BOULEVARD
QUEENS, NY

Drawn By: H.C.	Checked By: S.D.	Date: 6/13/17

Z:\PENINSULA ROCKAWAY\BCP\SITE PLAN-FULL.dwg, 6/15/2017 11:49:02 AM, DWG To PDF.pc3

TABLE 1
SOIL CHEMICAL ANALYTICAL RESULTS
FORMER PENINSULA HOSPITAL SITE
FAR ROCKAWAY, NEW YORK

Sample No.	EB-1	EB-2	EB-3	EB-4	EB-5	EB-6	EB-7	EB-8	EB-9	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	**1.5-2.5**	**1-2**	**2.0-3.5**	**2.0-3.5**	**2.5-3.5**	**1.5-2.5**	**1-3**	**3.5-4.5**	**3.0-4.5**			
Sample Date	**5/9/17**				**5/10/2017**							
TCL Volatile Organic Compounds in micrograms per kilogram												
Acetone	ND	ND	6.8 CCV-E,SCAL-E, J	12 CCV-E,SCAL-E	9.1 CCV-E,SCAL-E, J	22 CCV-E,SCAL-E	9.8 CCV-E,SCAL-E,J	ND	ND	50	100,000	500,000
Carbon disulfide	ND	ND	ND	ND	ND	2.6 J	ND	ND	ND	-	-	-
Methyl Ethyl Ketone	ND	ND	ND	3.2 J	ND	7.5	ND	ND	ND	120	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram												
Benzo[a]anthracene	ND	117	ND	119	100	ND	ND	94.2	ND	1,000	1,000	5,600
Benzo[a]pyrene	ND	122	ND	74.0 J	85.4 J	ND	ND	105	ND	1,000	1,000	1,000
Benzo[b]fluoranthene	ND	114	ND	68.2 J	65.2 J	ND	ND	100	ND	1,000	1,000	5,600
Benzo[g,h,i]perylene	ND	75.6 J	ND	60.3 IS-06,J	50.4 J	ND	ND	55.7 J	ND	100,000	100,000	500,000
Benzo[k]fluoranthene	ND	111	ND	87.6 J	96.2 J	ND	ND	109	ND	800	3,900	56,000
Carbazole	ND	ND	ND	ND	59.0 J	ND	ND	ND	ND	-	-	-
Chrysene	ND	135	61.6 J	134	113	ND	ND	113	ND	1,000	3,900	56,000
Di-n-butyl phthalate	ND	ND	ND	95.5	ND	ND	ND	ND	ND	-	-	-
Fluoranthene	ND	261	80.5 J	182	234	ND	ND	168	46.5 J	100,000	100,000	500,000
Indeno[1,2,3-cd]pyrene	ND	67.0 J	ND	ND	ND	ND	ND	ND	ND	500	500	5,600
Phenanthrene	ND	168	ND	99.8	170	ND	ND	69.8 J	ND	100,000	100,000	500,000
Pyrene	ND	326	113	294	206	ND	ND	171	45.0 J	100,000	100,000	500,000
TAL Metals in milligrams per kilogram												
Aluminum	1,990	1,710	1,360	2,090	1,230	1,570	1,480	2,210	4,040	-	-	-
Arsenic	2.03	1.90	2.63	2.82	1.43	ND	2.85	3.31	8.36	13	16	16
Barium	14.9	9.62	29.7	32.0	11.4	19.0	22.2	39.0	63.6	350	400	400
Beryllium	ND	ND	ND	ND	ND	ND	ND	0.137	0.305	7.2	72	590
Cadmium	ND	0.330	0.370	0.398	ND	ND	ND	ND	ND	2.5	4.3	9.3
Calcium	6,030	290	16,400	38,100	730	439	464	ND	ND	-	-	-
Chromium	6.24	6.65	7.13	6.77	4.29	5.47	28.5	6.41	7.13	30	180	1,500
Cobalt	1.56	1.29	1.24	1.96	1.07	1.21	1.43	2.04	5.09	-	-	-
Copper	3.72	2.69	9.94	14.3	12.3	3.40	6.72	9.91	14.1	50	270	270
Iron	3,790	6,860	4,080	5,080	2,740	2,980	3,270	5,140	10,300	-	-	-
Lead	15.1	6.31	44.5	33.3	20.2	12.2	43.7	49.1	22.2	63	400	1,000
Magnesium	1,350	366	1,220	18,600	496	598	531	3,270	5,110	-	-	-
Manganese	46.5	39.7	83.0	72.1	27.7	22.8	27.8	121	247	1,600	2,000	10,000
Mercury	ND	ND	ND	0.0660	ND	ND	0.0369	0.0866	0.0926	0.18	0.81	2.80
Nickel	4.98	4.20	5.13	6.95	3.02	3.18	5.16	7.84	12.9	30	310	310
Potassium	264 B	136 B	318 B	376 B	288 B	384 B	314 B	569	1,050	-	-	-
Sodium	59.7 B	72.0 B	79.8 B	206 B	98.0	98.6	105	112	170	-	-	-
Vanadium	9.84	6.93	8.35	11.1	5.36	6.61	6.29	9.13	10.0	-	-	-
Zinc	17.6	11.3	**522**	44.5	14.3	12.8	31.1	48.0	46.4	109	10,000	10,000

Notes:
Only analytes detected in one or more samples are included herein.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
ND = Not detected at or above the method detection limit.
- = Not established
Bold yellow-shaded values exceed NYSDEC Unrestricted Use Soil Cleanup Objectives
SCAL-E = The reported value is estimated due to its behavior during initial calibration.
CCV-E = The reported value is estimated due to its behavior during continued calibration.
B = Analyte is found in associated analysis batch blank.
IS-06 = Internal standard did not meet acceptance criteria due to matrix interference.

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TABLE 1 (CONTINUED)
SOIL CHEMICAL ANALYTICAL RESULTS
FORMER PENINSULA HOSPITAL SITE
FAR ROCKAWAY, NEW YORK

Sample No.	NB-1	NB-2	NB-3	NB-4	NB-5	NB-6	NB-7	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	**1-3**	**1-3**	**5-6**	**1-3**	**1-3**	**3-4**	**1-3**			
Sample Date	**5/10/17**									
TCL Volatile Organic Compounds in micrograms per kilogram										
Acetone	11	27	14	31	25	ND	17	50	100,000	500,000
Carbon disulfide	5.9	3.2 J	8.7	ND	3.8 J	4.8 J	ND	-	-	-
Methyl Ethyl Ketone	ND	ND	ND	8.2	7.0	ND	ND	120	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram										
1,1-Biphenyl	ND	ND	53.5 J	ND	ND	ND	ND	-	-	-
2-Methylnaphthalene	ND	ND	201	ND	ND	ND	ND	-	-	-
Acenaphthene	ND	ND	419	ND	ND	ND	ND	20,000	100,000	500,000
Anthracene	ND	ND	296	ND	ND	ND	ND	100,000	100,000	500,000
Benzo[a]anthracene	ND	ND	83.9 J	ND	ND	ND	ND	1,000	1,000	5,600
Carbazole	ND	ND	204	ND	ND	ND	ND	-	-	-
Chrysene	ND	ND	107	ND	ND	ND	ND	1,000	3,900	56,000
Dibenzofuran	ND	ND	277	ND	ND	ND	ND	-	-	-
Fluoranthene	ND	ND	450	ND	ND	ND	ND	100,000	100,000	500,000
Fluorene	ND	ND	390	ND	ND	ND	ND	30,000	100,000	500,000
Naphthalene	ND	ND	91.9 J	ND	ND	ND	ND	12,000	100,000	500,000
Phenanthrene	ND	ND	1,080	ND	ND	ND	ND	100,000	100,000	500,000
Pyrene	ND	ND	462	ND	ND	ND	ND	100,000	100,000	500,000
TAL Metals in milligrams per kilogram										
Aluminum	1,670 B	1,830	2,260	1,710	1,100	1,950	2,450	-	-	-
Arsenic	ND	1.70	2.07	1.38	ND	ND	1.50	13	16	16
Barium	7.67	18.2	20.2	8.70	11.7	10.7	11.1	350	400	400
Beryllium	ND	0.266	ND	ND	ND	ND	ND	7	14	590
Calcium	364 B	404 B	6,900 B	4.42 B	195 B	499 B	664 B	-	-	-
Chromium	5.03	7.19	13.2	5.66	3.89	5.36	7.88	30	180	1,500
Cobalt	1.75	4.22	1.60	1.48	ND	1.93	1.83	-	-	-
Copper	1.42	28.2	8.58	4.84	1.22	2.47	2.16	50	270	270
Iron	2,650	4,760 B	6,940 B	4,620 B	1,110 B	4,140 B	5,230 B	-	-	-
Lead	1.14	44.4	14.6	10.4	1.27	1.77	2.04	63	400	1,000
Magnesium	505	484	1,650	597	294	785	1,040	-	-	-
Manganese	27.1	42.4	36.1	25.3	10.9	47.8	34.2	1,600	2,000	10,000
Mercury	ND	0.117	ND	ND	ND	ND	ND	0.18	0.81	2.80
Nickel	4.49	5.30	4.49	3.87	1.50	3.89	4.76	30	310	310
Potassium	311 B	298	455	350	182	469	637	-	-	-
Sodium	115	85.0	91.5	38.1	ND	101	21.0	-	-	-
Vanadium	5.07	7.72	11.2	6.47	2.68	6.35	10.2	-	-	-
Zinc	ND	90.9	21.3	6.47	ND	3.46	3.98	109	10,000	10,000

Notes:

Only analytes detected in one or more samples are included herein.

J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.

ND = Not detected at or above the method detection limit.

- = Not established

SCAL-E = The reported value is estimated due to its behavior during initial calibration.

CCV-E = The reported value is estimated due to its behavior during continued calibration.

B = Analyte is found in associated analysis batch blank.

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TABLE 1 (CONTINUED)
SOIL CHEMICAL ANALYTICAL RESULTS
FORMER PENINSULA HOSPITAL SITE
FAR ROCKAWAY, NEW YORK

Sample No.	WB-1	WB-2		WB-3	WB-4	WB-5	WB-6	WB-7	WB-8	6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives	6 NYCRR Part 375 Restricted Residential Use Soil Cleanup Objectives	6 NYCRR Part 375 Commercial Use Soil Cleanup Objectives
Sample Depth (feet)	1-3	1-3	5-6	1-3	1-3	3-4	1-3	3-4	1-3			
Sample Date	5/9/17											
TCL Volatile Organic Compounds in micrograms per kilogram												
Acetone	5.0 CCV-E,SCAL-E,J	11 CCV-E,SCAL-E	12 CCV-E,SCAL-E	ND	26 CCV-E,SCAL-E	8.2 CCV-E,SCAL-E,J	11 CCV-E,SCAL-E	10 CCV-E,SCAL-E,J	18 CCV-E,SCAL-E	50	100,000	500,000
Carbon disulfide	ND	ND	3.4 J	ND	ND	ND	ND	ND	ND	-	-	-
Ethylbenzene	ND	ND	**21**	ND	ND	ND	ND	ND	ND	1	41	390
Methyl Ethyl Ketone	ND	2.9 J	3.0 J	ND	12	2.6 J	3.8 J	ND	6.4	120	100,000	500,000
Total Xylenes	ND	ND	**110**	ND	ND	ND	ND	ND	ND	0.26	100,000	500,000
TCL Semivolatile Organic Compounds in micrograms per kilogram												
1,1-Biphenyl	ND	ND	ND	225	ND	ND	ND	ND	ND	-	-	-
2-Methylnaphthalene	ND	66.1 J	ND	ND	ND	ND	55.4 J	ND	ND	-	-	-
Acenaphthene	ND	436	ND	51.3 J	97.6	ND	ND	ND	ND	20,000	100,000	500,000
Acenaphthylene	ND	62.2 J	ND	454	ND	197	167	85.7 J	ND	20,000	100,000	500,00
Anthracene	67.3 J	826	ND	335	232	123	ND	ND	82.3 J	100,000	100,000	500,000
Benzo[a]anthracene	ND	**1,610**	ND	243	546	169	98.9 J	ND	266	1,000	1,000	5,600
Benzo[a]pyrene	81.4 J	**1,710**	ND	405	590	193	245 CCV-E	74.3 CCV-E,J	287 CCV-E	1,000	1,000	1,000
Benzo[b]fluoranthene	69.5 J	**1,420**	ND	301	515	203	217	80.0 J	233	1,000	1,000	5,600
Benzo[g,h,i]perylene	135	900	ND	286	234	133	319 CCV-E	97.9 CCV-E,J	186 CCV-E	100,000	100,000	500,000
Benzo[k]fluoranthene	61.4 J	**1,470**	ND	351	544	240	226	97.1 J	266	800	3,900	56,000
Bis(2-ethylhexyl)phthalate	48.1 CCV-E,J	ND	ND	49.1 CCV-E,J	**75.0 CCV-E,J**	ND	ND	ND	ND	-	50	-
Carbazole	ND	676	ND	75.9 J	154	ND	ND	ND	54.8 J	-	-	-
Chrysene	76.9 J	**1,820**	ND	292	660	247	199	57.1 J	291	1,000	3,900	56,000
Dibenz(a,h)anthracene	ND	**421**	ND	122	108	ND	118 CCV-E	ND	61.9 CCV-E,J	330	330	560
Dibenzofuran	ND	138	ND	ND	ND	ND	ND	ND	ND	-	-	-
Fluoranthene	80.6 J	3,660	ND	402	1,150	216	155	60.4 J	656	100,000	100,000	500,000
Fluorene	ND	351	ND	79.6 J	96.8	ND	ND	ND	ND	30,000	100,000	500,000
Indeno[1,2,3-cd]pyrene	82.8 J	**843**	ND	249	216	132	268 CCV-E	107 CCV-E	185 CCV-E	500	500	5,600
Naphthalene	ND	123	ND	80.3 J	69.2 J	ND	62.5 J	ND	ND	12,000	100,000	500,000
Phenanthrene	71.0 J	3,110	ND	350	900	132	68.1 J	ND	433	100,000	100,000	500,000
Pyrene	136	5,630	ND	643	1,630	484	411	80.0 J	554	100,000	100,000	500,000
TAL Metals in milligrams per kilogram												
Aluminum	1,610	4,620	1,270	2,770	2,750	1,520	2,700	1,890	6,320	-	-	-
Arsenic	2.37	**16.7**	ND	**24.0**	7.64	3.04	1.66	ND	7.88	13	16	16
Barium	31.9	61.9	9.72	30.5	79.9	21.2	24.0	16.1	152	350	400	400
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	1.98	7	72	590
Cadmium	ND	0.916	ND	0.491	0.844	ND	ND	**3.06**	1.05	2.5	4.3	9.3
Calcium	31,800	29,100	354	27,700	7,330	568	651	679	6,210	-	-	-
Chromium	5.81	13.8	4.64	13.1	10.7	6.35	11.1	16.7	28.1	30	180	1,500
Cobalt	1.45	3.53	1.14	3.12	2.44	1.44	1.71	2.02	14.9	-	-	-
Copper	16.5	23.9	1.56	33.8	16.9	6.43	13.8	22.1	**199**	50	270	270
Iron	3,360	11,700	2,110	10,600	6,870	3,450	4,260	5,740	19,600	-	-	-
Lead	**115**	**143**	2.06	**74.0**	**207**	20.8	20.8	17.5	**348**	63	400	1,000
Magnesium	1,040	4,500	530	4,780	2,060	578	1,010	804	1,710	-	-	-
Manganese	70.6	225	19.5	87.6	78.2	21.0	33.5	40.5	158	1,600	2,000	10,000
Mercury	ND	0.179	ND	0.111	0.176	ND	0.0737	0.0547	ND	0.18	0.81	2.80
Nickel	5.51	12.8	3.62	12.3	9.99	5.19	6.53	16.4	**34.4**	30	310	310
Potassium	261 B	377 B	277 B	427 B	375 B	283 B	550 B	441 B	592 B	-	-	-
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	3.07	3.9	180	1,500
Sodium	125 B	171 B	335 B	119 B	108 B	138 B	89.1 B	88.6	279 B	-	-	-
Vanadium	12.3	27.5	5.30	14.0	15.0	6.52	12.2	7.79	19.0	-	-	-
Zinc	76.5	**119**	18.8	**156**	**120**	26.3	23.4	**128**	**1,920**	109	10,000	10,000

Notes:
Only analytes detected in one or more samples are included herein.
J = Estimated concentration below the Reporting Limit but exceeding the Method Detection Limit.
ND = Not detected at or above the method detection limit.
- = Not established
Bold yellow values exceed NYSDEC Unrestricted Use Soil Cleanup Objectives
Bold orange values exceed NYSDEC Restricted Residential Use Soil Cleanup Objectives
Bold red values exceed NYSDEC Commercial Use Soil Cleanup Objectives
SCAL-E = The reported value is estimated due to its behavior during initial calibration.
CCV-E = The reported value is estimated due to its behavior during continued calibration.
B = Analyte is found in associated analysis batch blank.

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TABLE 2
GROUNDWATER CHEMICAL ANALYTICAL RESULTS
FORMER PENINSULA HOSPITAL SITE, FAR ROCKAWAY, NEW YORK

Sample No.	EG-1	EG-2	EG-3	EG-4	EG-5	NYSDEC Class GA Ambient Water Quality Standards
Sample Depth (feet below grade)	8-13	8-13	8-13	8-13	8-13	
Sample Date	5/10/17					
Volatile Organic Compounds in ug/l						
Acetone	2.2 SCAL-E	2.2 SCAL-E	ND	4.2 SCAL-E	6.0 SCAL-E	50
2-Butanone (Methyl ethyl ketone)	ND	ND	ND	1.3 J	2.0 J	50
Carbon disulfide	1.1 SCAL-E	0.75 SCAL-E	0.78 SCAL-E, J	0.24 SCAL-E,J	0.38 SCAL-E,J	5
Chloroform	ND	ND	ND	ND	2.4	5
cis-1,2-Dichloroethene	0.24 J	ND	ND	ND	ND	5

Notes:

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

ND = Not detected

ug/l = micrograms per liter

J = Estimated concentration above the method detection limit and below the reporting limit.

SCAL-E = The reported value is estimated due to its behavior during initial calibration.

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TABLE 2 (CONTINUED)
GROUNDWATER CHEMICAL ANALYTICAL RESULTS
FORMER PENINSULA HOSPITAL SITE, FAR ROCKAWAY, NEW YORK

Sample No.	NG-1	NG-2	NG-3	NYSDEC Class GA Ambient Water Quality Standards
Sample Depth (feet below grade)	8-13	8-13	8-13	
Sample Date	5/10/17			
Volatile Organic Compounds in ug/l				
Acetone	3.7 CCV-E,SCAL-E	3.5 CCV-E,SCAL-E	8.3 CCV-E,SCAL-E	50
2-Butanone (Methyl ethyl ketone)	ND	ND	1.9 J	50
Carbon disulfide	0.34 SCAL-E,J	1.2 SCAL-E	2.2 SCAL-E	5
Ethylbenzene	ND	0.21 SCAL-E,J	ND	5
1,2,4-Trichlorobenzene	0.20 J,B	ND	ND	5

Notes:

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

ND = Not detected

ug/l = micrograms per liter

J = Estimated concentration above the method detection limit and below the reporting limit.

CCV-E = The reported value is estimated due to its behavior during continued calibration.

SCAL-E = The reported value is estimated due to its behavior during initial calibration.

TABLE 2 (CONTINUED)
GROUNDWATER CHEMICAL ANALYTICAL RESULTS
FORMER PENINSULA HOSPITAL SITE, FAR ROCKAWAY, NEW YORK

Sample No.	WG-1	WG-2	WG-3	WG-4	NYSDEC Class GA Ambient Water Quality Standards
Sample Depth (feet below grade)	7-12	7-12	7-12	7-12	
Sample Date	5/9/17				
Volatile Organic Compounds in ug/l					
Acetone	3.9 SCAL-E	3.6 SCAL-E	13 SCAL-E	2.3 SCAL-E	50
Benzene	0.24 J	ND	ND	ND	0.7
Carbon disulfide	0.78	0.43 J	0.62	0.75	5
Chloroform	ND	ND	ND	ND	5
Isopropylbenzene	0.26 J	0.23 J	ND	ND	5

Notes:

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

ND = Not detected

ug/l = micrograms per liter

J = Estimated concentration above the method detection limit and below the reporting limit.

SCAL-E = The reported value is estimated due to its behavior during initial calibration.

FPM

TABLE 3
SOIL VAPOR SAMPLING RESULTS
FORMER PENINSULA HOSPITAL SITE, FAR ROCKAWAY, NEW YORK

Sample No.	EV-1	EV-2	EV-3	EV-4	EV-5	EV-6	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	5/9/17							
Volatile Organic Compounds in ug/m^3								
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	0.60 J	<0.25 - 6.9	2.6 - 33.0
1,2,4-Trimethylbenzene	2.2	4.8	6.2	16	14	19	<0.25 - 6.3	1.7 - 13.7
1,3,5-Trimethylbenzene	0.93	2.3	2.3	4.3	4.0	4.4	0.3 - 6.5	<1.3 - 4.6
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	2.8	<0.25 - 0.9	<0.7 - <2.5
1,4-Dichlorobenzene	4.6	50	7.1	42	12	8.0	<0.25 - 2.6	<0.8 - 12.5
2,2,4-Trimethylpentane	2.8	9.4	1.3	3.4	2.4	2.9	-	-
4-Ethyltoluene	0.59 J	1.4	1.6	5.1	5.0	5.6	-	<1.5 - 5.9
Acetone	150	410	24	180	400	410	9.9 - 140	32.4 - 120.2
Benzene	8.6	19	1.5	4.6	3.2	3.7	1.1 - 29	2.1 - 12.5
Carbon disulfide	3.1	6.2	ND	0.34 J	ND	ND	-	<0.8 - 6.4
Chloroethane	0.32 J	ND	ND	ND	ND	ND	<0.25 - 0.6	<0.8 - <1.3
Chloroform	ND	ND	ND	ND	ND	17	<0.25 - 4.6	<0.4 - 1.4
Chloromethane	ND	ND	0.70	0.95	0.60	0.78	<0.25 - 5.2	2.1 - 4.4
Cyclohexane	5.7	6.0	0.34 J	1.7	1.3	1.6	<0.25 - 19	-
Ethylbenzene	3.0	100	4.1	15	13	18	0.4 - 13	<1.6 - 7.6
Freon 11	1.2	0.73 J	1.2	1.1	1.1	1.2	-	<3.7 - 54.0
Freon 12	2.0	1.8	2.0	2.0	1.9	2.0	-	-
Heptane	4.4	18	1.3	6.2	4.6	5.4	1 - 33	-
Hexane	12	48	ND	5.5	4.7	5.8	0.6 - 35	1.6 - 15.2
Isopropyl alcohol	ND	20	1.4	2.8	2.8	1.4	-	6.6 - 475.0
m&p-xylene	8.6	150	16	55	50	64	0.5 - 21	4.1 - 28.5
Methyl Ethyl Ketone	23	33	2.0	5.7	5.3	5.6	1.4 - 39	3.3 - 13.5
Methyl Isobutyl Ketone	ND	7.1	ND	ND	ND	ND	<0.25 - 5.3	<1.2 - 8.1
Methylene chloride	ND	ND	0.59	0.59	0.63	0.80	0.3 - 45	<1.7 - 16.0
o-Xylene	3.3	48	6.0	19	17	22	0.4 - 13	<2.4 - 11.2
Styrene	0.55 J	1.6	1.9	6.3	5.6	6.8	<0.25 - 2.3	<1.6 - 4.3
Tetrachloroethene	1.0	3.5	1.5	5.0	4.6	5.6	<0.25 - 4.1	<1.9 - 25.4
Tetrahydrofuran	ND	ND	ND	7.4	7.2	10	<0.25 - 9.4	-
Toluene	16	59	11	52	43	60	3.5 - 110	10.7 - 70.8

Notes:

All samples analyzed using Method TO-15.
Only compounds detected in one or more samples are reported herein. See lab report for complete data.
ug/m^3 = micrograms per cubic meter
Shaded compounds are those for which the NYSDOH has provided guidance.
ND = Not detected
J = Analyte was detected at or below quantitation limit but above the method detection limit.
* = US EPA BASE Study 2001; 25th to 95th percentiles.

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TABLE 3 (CONTINUED)
SOIL VAPOR SAMPLING RESULTS
FORMER PENINSULA HOSPITAL SITE, FAR ROCKAWAY, NEW YORK

Sample No.	NV-1	NV-2	NV-3	NV-4	NV-5	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	5/10/17						
Volatile Organic Compounds in ug/m^3							
1,2,4-Trimethylbenzene	7.9	4.9	8.1	9.3	9.0	<0.25 - 6.3	1.7 - 13.7
1,3,5-Trimethylbenzene	2.9	1.5	1.8	3.9	2.9	0.3 - 6.5	<1.3 - 4.6
1,3-Dichlorobenzene	3.1	ND	1.9	1.9	1.5	<0.25 - 0.9	<0.7 - <2.5
1,4-Dichlorobenzene	ND	7.5	5.2	8.9	13	<0.25 - 2.6	<0.8 - 12.5
2,2,4-Trimethylpentane	ND	0.56 J	ND	2.8	1.9	-	-
4-Ethyltoluene	3.9	1.8	2.1	4.8	3.7	-	<1.5 - 5.9
Acetone	56	66	34	2,500	830	9.9 - 140	32.4 - 120.2
Benzene	0.64	0.96	0.42 J	3.5	2.7	1.1 - 29	2.1 - 12.5
Carbon disulfide	ND	ND	ND	1.0	0.81	-	<0.8 - 6.4
Chloroform	ND	ND	ND	0.49 J	ND	<0.25 - 4.6	<0.4 - 1.4
Chloromethane	ND	0.60	2.5	ND	0.74	<0.25 - 5.2	2.1 - 4.4
Cyclohexane	0.41 J	0.45 J	ND	1.7	1.1	<0.25 - 19	-
Ethyl Acetate	ND	ND	0.54	ND	ND	-	<1.0 - 9.5
Ethylbenzene	3.9	3.5	1.8	12	13 J	0.4 - 13	<1.6 - 7.6
Freon 11	1.3	1.2	1.2	1.2	1.5	-	<3.7 - 54.0
Freon 12	2.0	2.0	2.1	2.0	2.1	-	-
Heptane	0.90	1.2	0.49 J	6.2	4.8	1 - 33	-
Hexane	0.81	0.99	0.42 J	5.3	3.4	0.6 - 35	1.6 - 15.2
Isopropyl alcohol	1.5	3.6	1.1	7.9	13	-	6.6 - 475.0
m&p-xylene	18	14	8.5	43	43	0.5 - 21	4.1 - 28.5
Methyl Ethyl Ketone	1.7	2.8	1.3	11	13 J	1.4 - 39	3.3 - 13.5
Methyl Isobutyl Ketone	ND	0.45 J	ND	ND	ND	<0.25 - 5.3	<1.2 - 8.1
Methylene chloride	0.73	1.1	1.0	0.97	0.80	0.3 - 45	<1.7 - 16.0
o-Xylene	5.9	4.6	2.8	14	15 J	0.4 - 13	<2.4 - 11.2
Styrene	3.1	2.0	1.4	6.1	4.6	<0.25 - 2.3	<1.6 - 4.3
Tetrachloroethene	1.4	1.3	0.81 J	5.2	4.1	<0.25 - 4.1	<1.9 - 25.4
Tetrahydrofuran	0.88	1.1	0.35 J	5.0	4.4	<0.25 - 9.4	-
Toluene	7.2	7.9	4.6	43	38	3.5 - 110	10.7 - 70.8

Notes:

All samples analyzed using Method TO-15.
Only compounds detected in one or more samples are reported herein. See lab report for complete data.
ug/m^3 = micrograms per cubic meter
Shaded compounds are those for which the NYSDOH has provided guidance.
ND = Not detected
J = Analyte was detected at or below quantitation limit but above the method detection limit.
* = US EPA BASE Study 2001; 25th to 95th percentiles.

TABLE 3 (CONTINUED)
SOIL VAPOR SAMPLING RESULTS
FORMER PENINSULA HOSPITAL SITE, FAR ROCKAWAY, NEW YORK

Sample No.	WV-1	WV-2	WV-3	WV-4	Indoor Air Background Levels, Residential*	Indoor Air Background Levels, Commercial*
Sample Date	5/9/17					
Volatile Organic Compounds in ug/m^3						
1,1,1-Trichloroethane	2.8	ND	1.8	3.4	<0.25 - 6.9	2.6 - 33.0
1,2,4-Trimethylbenzene	8.7	7.2	4.1	7.0	<0.25 - 6.3	1.7 - 13.7
1,3,5-Trimethylbenzene	3.4	3.0	2.1	3.0	0.3 - 6.5	<1.3 - 4.6
1,4-Dichlorobenzene	47	84	47	60	<0.25 - 2.6	<0.8 - 12.5
2,2,4-Trimethylpentane	14	5.7	10	32	-	-
4-Ethyltoluene	2.1	1.8	1.4	1.8	-	<1.5 - 5.9
Acetone	640	110	580	2,300	9.9 - 140	32.4 - 120.2
Benzene	14	23	15	37	1.1 - 29	2.1 - 12.5
Carbon disulfide	68	47	34	40	-	<0.8 - 6.4
Chloroethane	ND	0.98	ND	170	<0.25 - 0.6	<0.8 - <1.3
Chloroform	ND	ND	1.1	ND	<0.25 - 4.6	<0.4 - 1.4
Chloromethane	ND	7.6	0.78	39	<0.25 - 5.2	2.1 - 4.4
cis-1,2-Dichloroethene	0.87	ND	ND	ND	<0.25 - 1.2	<0.8 - <2.0
Cyclohexane	44	24	4.5	21	<0.25 - 19	-
Ethyl Acetate	ND	7.5	ND	ND	-	<1.0 - 9.5
Ethylbenzene	33	720	190	140	0.4 - 13	<1.6 - 7.6
Freon 11	0.73 J	1.1	1.3	1.5	-	<3.7 - 54.0
Freon 12	1.8	2.0	2.0	2.0	-	-
Heptane	23	15	7.7	53	1 - 33	-
Hexane	49	27	11	86	0.6 - 35	1.6 - 15.2
Isopropyl alcohol	11	ND	32	91	-	6.6 - 475.0
m&p-xylene	81	1,800	530	290	0.5 - 21	4.1 - 28.5
Methyl Ethyl Ketone	76	56 J	60	200	1.4 - 39	3.3 - 13.5
Methyl Isobutyl Ketone	ND	9.8	8.6	18	<0.25 - 5.3	<1.2 - 8.1
Methylene chloride	ND	0.52	0.66	ND	0.3 - 45	<1.7 - 16.0
o-Xylene	29	500	230	90	0.4 - 13	<2.4 - 11.2
Styrene	1.9	1.8	1.8	1.9	<0.25 - 2.3	<1.6 - 4.3
Tetrachloroethene	2.6	2.2	23	3.5	<0.25 - 4.1	<1.9 - 25.4
Tetrahydrofuran	ND	1.4	4.6	ND	<0.25 - 9.4	-
Toluene	32	63	33	50	3.5 - 110	10.7 - 70.8
Vinyl Chloride	ND	ND	ND	0.36 J	<0.25 - <0.25	<0.8 - <2.2

Notes:

All samples analyzed using Method TO-15.
Only compounds detected in one or more samples are reported herein. See lab report for complete data.
ug/m^3 = micrograms per cubic meter
Shaded compounds are those for which the NYSDOH has provided guidance.
ND = Not detected
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APPENDIX B

PROJECT PERSONNEL RESUMES

Stephanie O. Davis, PG, RG, CPG

FPM group — Engineering and Environmental Science

Ms. Davis has diversified experience in geology and hydrogeology. Her professional technical experience includes groundwater, soil, and soil vapor investigations, design and management of soil and groundwater remediation projects, design and installation of groundwater containment systems, design and evaluation of soil vapor intrusion mitigation systems, groundwater flow modeling, aquifer testing and interpretation, evaluation of site compliance with environmental regulations, and personnel training. Ms. Davis presently manages several large-scale investigation and remedial programs, including program scopes, budgets, staffing, and schedules.

Functional Role	Title	Years of Experience
Senior Project Manager	**Corporate Vice President**	**30+**

Personal Data

Education

M.S./1984/Geology/University of Southern California
B.S./1981/Geology/Bucknell University

Registration and Certifications

Certified Professional Geologist #9487, (AIPG) 1995

New York Professional Geologist #000247, 2017

California Registered Geologist #5192, 1991

Pennsylvania Professional Geologist #PG-000529-G,1994

OSHA-approved 40-hour Health and Safety Training Course (1990)

OSHA-approved 8-hour Health and Safety Training Refresher Courses (1991-Present)

OSHA-approved 8-hour Site Safety Supervisor Training Course (2008)

National Ground Water Association

Long Island Association of Professional Geologists

USEPA Triad Training for Practitioners

NYC OER Gold Certified Professional

Employment History

1993-Present	FPM Group
1992-1993	Chevron Research and Technology Co.
1990-1992	Chevron Manufacturing Co.,
1984-1990	Chevron Exploration, Land, and Production Company

Continuing Education

- Treatment of Contaminated Soil and Rock
- Groundwater Pollution and Hydrology
- Environmental Law and Regulation
- Remedial Engineering
- Soil and Foundation Engineering
- Environmental Geochemistry
- Project Management Professional (PMP) training

Detailed Experience

Site Investigations

- **Program Manager** for ongoing investigation and remedial projects at several New York State Inactive Hazardous Waste Disposal sites, Voluntary Cleanup Program (VCP) sites, and Brownfield Cleanup Program (BCP) sites, and NYCOER e-designated sites. Investigations have included site characterization, Remedial Investigation/Feasibility Studies (RI/FS), and Resource Conservation and Recovery Act (RCRA) facility investigations and closures. Remedial services have included contaminated soil removal, in-situ chemical treatment, design, installation, and operation of air sparge/soil vapor extraction (AS/SVE) systems and sub-slab depressurization systems (SSDSs), capping, and other remedial measures.
- **Program Manager, NYS Inactive Hazardous Waste Disposal Site, Greenpoint, NY.** Responsible for project scoping, cost estimation, subcontracting, field services, report preparation, and agency negotiations for a former manufacturing facility. Services included an RI, an FS, implementation of an Interim Remedial Measure (IRM), and an underground utility survey. A Remedial Action Work Plan (RAWP) was also prepared for an associated petroleum spill.
- **Program Manager, NYS BCP Site, Far Rockaway, NY.** Managed all aspects of pre-application investigation, BCP application, RI Work Plan development and implementation, and Citizen Participation Plan (CPP) for a chlorinated solvent site. Responsible for scope development, NYSDEC and NYSDOH coordination, budget, schedule, staffing, and report management.
- **Program Manager, Site Characterization (SC) for NYS Inactive Hazardous Waste Disposal Site, Flushing, NY.** Responsible for SC scope development, budget, schedule, SC Work Plan and report review, staffing, and agency negotiations for a chlorinated solvent site undergoing residential redevelopment.

- **Program Manager, Investigation and Remedial Services, NYS BCP Sites, Far Rockaway, NY.** Managed scope, budget, schedule, staffing and quality assurance for pre-application investigations of several associated BCP sites. Prepared the BCP applications and supporting documentation for the environmental issues, including chlorinated solvents, a petroleum spill, petroleum tanks, and historic fill.
- **Program Manager, Environmental Services for Senior Living Developer, Long Island, NY.** Performs environmental analyses and directs investigation and remedial activities for property acquisition and redevelopment for senior residential facilities. Services included Phase I ESAs, investigation and remediation cost estimation, Phase II investigations, Site Management Plans, and transaction and regulatory agency negotiations.
- **Program Manager for Phase I ESA, Phase II investigations, and remediation projects for a major commercial real estate developer on Long Island, New York.** Projects have included environmental services associated with purchase and redevelopment of office buildings, aerospace facilities, former research and development facilities, and large manufacturing plants. Remedial services have included RCRA closures, UIC closures, tank removals, and large excavations.
- **Program Manager, RI/FS, RAWP, and Remedial Services, Levittown, NY.** Managed all aspects of RI/FS for a Class 2 Inactive Hazardous Waste Disposal (Superfund) site involving chlorinated solvents. Responsibilities included RI/FS scope, budget and schedule development, RI/FS work plan, HASP, CAMP, and QAPP, coordination with client, tenants, and regulatory agencies, report review, remedial approach development, conceptual design, and cost estimation. Developed RAWP and negotiated the remedial scope with the NYSDEC. Remedial services included implementation of AS/SVE, SSDS, and site management.
- **Program Manager, Environmental Investigation and Remediation, Communication Facility, Long Island, NY.** Responsible for all aspects of investigation and remediation of a former communications facility during property acquisition and redevelopment for a medical facility use. Services included Phase I ESA, facility investigation scope, budget, staffing, and reporting, and remediation cost estimation. Environmental issues included obsolete communications and facility equipment, USTs, underground injection control systems, asbestos and other hazardous materials, and transaction and regulatory agency negotiations.
- **Project Manager, RCRA Facilities Investigation (RFI), Barksdale AFB, LA.** Responsible for all aspects of field program planning, solicitation and selection of subcontractors, mobilization and establishment of a field office, supervising multiple field crews, installation and sampling of monitoring wells, collection and soil samples, data tracking and management and preparation of an RFI report. The scope of work included characterization of the nature and extent of groundwater and soil contamination at thirteen Solid Waste Management Units (SWMUs), performing a Base-wide evaluation of background contaminant concentrations, and developing a long-term monitoring (LTM) program for the Base.
- **Field Services Manager, UST Investigation, Plattsburgh AFB, NY, AFCEE.** Responsible for field crew training, coordination of sampling crews at multiple sites, sample labeling, handling, tracking, and shipping, field data management and remote field office management. The scope of work included collection of over 450 groundwater samples to characterize groundwater conditions in the vicinity of 150 USTs using a Geoprobe sampling rig, well points, and rapid turnaround-time analysis.
- **Project Manager Environmental Investigation and Property Transaction Support, Long Island, NY.** Conducted site investigations, including soil vapor sampling, soil sampling and analysis, groundwater sampling and analysis, and geotechnical evaluation for numerous sites in Suffolk County, New York. The resulting data were utilized by a major supermarket company in the negotiations for the purchase of the properties and in the property remediation prior to development.
- **Project Manager, Site Investigation, Bronx, NY.** Managed field sampling and data analysis activities, including soil vapor analysis, soil sample analysis, and groundwater sampling and analysis at an active commercial bus terminal. Made recommendations for site remediation, including UST removal, soil excavation and disposal, and free-phase product extraction.
- **Project Manager, RCRA Facilities Investigation, City of Richmond, CA.** Prepared RFI work plan, incorporating existing geologic, chemical, and historical data, evaluating newly-acquired site data, and developing recommendations for further investigation and remedial action at a former municipal landfill.
- **Project Manager, Site Investigation, Bay Shore, NY, Manufacturing facility.** Managed onsite and offsite soil and groundwater sampling program. Compiled and evaluated data and prepared a comprehensive report of the investigation results for

approval by the SCDHS and NYSDEC. Proposed remediation technologies for onsite soil contamination and onsite and offsite groundwater contamination.

- **Project Manager, Site Investigation, Newark Airport, NJ.** Managed and conducted a soil and groundwater sampling program adjacent to Runway 29. Analyzed chemical analytical data and developed recommendations.
- **Project Manager, Remedial Investigation, Richmond Refinery, CA.** Supervised and conducted drilling, soil sampling, cone penetrometer testing, and well installation at a refinery process water effluent treatment system and former municipal landfill.
- **Program Manager, multiple sites, major New York Metro area automobile dealer.** Managed all investigation and remedial activities for a major automobile retailer with multiple facilities. Sites included tanks, petroleum spills, underground injection control (UIC) systems, soil vapor intrusion issues, and hazardous waste management. Responsible for work scope and budget preparation, staffing and oversight, client and regulatory agency interactions, addressing insurance issues, reporting and certification, and project closeouts.
- **Program Manager, SWTP groundwater monitoring program, Town of East Hampton.** Managed groundwater monitoring and reporting for the Scavenger Waste Treatment Plant (SWTP). Responsibilities included oversight of well installation, purging and sampling the SWTP groundwater monitoring wells, and providing data to the Town for reporting purposes.
- **Program Manager, Site Assessments for Transportation Hub development, Suffolk County, NY.** Manages Phase I ESAs, Phase II investigations, and remediation required for client acquisition of multiple parcels for redevelopment. Coordinates and oversees each project, interfaces with counsel and regulatory agency representatives, and develops comprehensive cost estimates.
- **Expert Environmental Review Services, Nationwide Sites for Real Estate Developers.** Reviews environmental investigation and remediation reports for several major real estate developers, advises clients regarding environmental concerns for property acquisition and redevelopment, develops comprehensive cost estimates, coordinates with construction contractors, architects, regulators and attorneys regarding environmental concerns.
- **Expert Environmental Consulting Services, Multiple Sites, Town of Brookhaven, NY.** Performed site inspections, investigations, and remedial cost estimation in response to Town Attorney requests. Assisted with Town Code revision and litigation. Coordinated with Town personnel, outside counsel, regulatory agency representatives, and law enforcement officers regarding environmental concerns.

Remediation

- **Program Manager, NYSDEC BCP site, NY City, major real estate developer.** In responsible charge of all investigation and remedial activities at a NYSDEC BCP site in New York City. Prepared the RI and Remedial Work Plan; coordinated with the owner, contractors, and NYSDEC; prepared for and conducted citizen participation activities; supervised all waste characterization, profile preparation, and waste management; developed the Final Engineering Report (FER) and Site Management Plan (SMP) for NYSDEC approval; and ensured that all remedial requirements were met such that the Certificate of Completion (COC) was issued. Continuing activities include coordination of the ongoing site management, communications with the NYSDEC and NYSDOH, and preparation of the Periodic Review Reports (PRRs).
- **Program Manager, Major Oil Storage Facility (MOSF) closure, Glen Harbor, NY.** Responsibilities included coordination of the work scope with the NYSDEC and NCDOH, development of work plans for tanks, UIC, and petroleum spill closure, budget and schedule development, staffing and oversight, reporting and certification, and closeout of all environmental issues such that residential redevelopment could proceed.
- **Program Manager, Delineation and Remedial Services, NYS Spill Site, St. James, NY.** Responsible for client and agency coordination, budget, schedule, staffing, remedial design and reporting for a petroleum release at a service station property with offsite impacts.
- **Program Manager, RCRA Closure Site, Freeport, NY.** Successfully managed all aspects of RCRA Closure of a former printing facility, including scope, budget and schedule development, Closure Plan, NYSDEC interactions, QAPP, specifications for contractor services, remediation, and Closure Report.
- **Program Manager, Sub-slab depressurization system (SSDS), Brooklyn, NY.** Managed all aspects of SSDS implementation, including delineation sampling, remedial design, budget and schedule, construction services testing, reporting, and O&M manual development for a former dry cleaner site in an active shopping center.
- **Program Manager, SSDS, Bronx, NY.** Responsible for all aspects of SSDS implementation for a former dry cleaner site in a mixed-use building, including delineation sampling, SSDS design, construction

contractor services, testing, reporting, and O&M manual development.

- **Program Manager, Investigation and Remediation for Nassau County, NY Subdivision Approval.** Coordinated investigation and remediation of a former school facility for redevelopment with multi-family housing. Services included Phase I ESA, Phase II investigation, NCDOH Remedial Work Plan development and implementation, and Remedial Action Reports. Issues addressed included soil, USTs, UICs, transformer areas, and water supply well closure.
- **Project Manager, Soil Remediation of metal plating facility, Hauppauge, NY.** Planned remedial project and managed contractor support for soil remediation. Project was completed and approved by SCDHS.
- **Program Manager, Investigation and Remediation of Former Agricultural Properties.** Responsible for all aspects of investigation and remedial plans required for redevelopment of former agricultural properties in Suffolk County, NY. Prepared Soil Management Plans (SMPs) and received regulatory agency approvals.
- **Remedial Design, AS/SVE projects.** Developed pilot test plans, evaluated pilot test results, and prepared conceptual designs for several air sparge/soil vapor extraction (AS/SVE) systems to treat petroleum and/or chlorinated solvent VOCs. These systems were subsequently installed and operated. Provides ongoing review of system operations and remedial monitoring results.
- **Program Manager, Waste soil management, Brooklyn, NY.** In responsible charge of several task orders for waste characterization of a 90,000-cy construction soil stockpile at a municipal sewer facility. Responsibilities included development and implementation of Sampling and Analysis Plan (SAP), coordination of staffing, review of lab data, preparation of Field Sampling Summary Reports, coordination with disposal facilities, and preparation of waste profiles.
- **Program Manager, NYS Inactive Hazardous Waste Disposal (Superfund) site, Hicksville, NY.** Responsibilities included developing and implementing pre-demolition investigations, developing and implementing remedial actions (source removal) in conjunction with retail redevelopment, conceptual design and installation of sub-slab depressurization systems (SSDSs), and maintaining the ongoing OM&M program.
- **Project Manager, Remedial project, Patchogue, NY.** Designed and performed indoor underground storage tank abandonment program and leaching pool remediation plan, and managed contractor support for closure activities at a metal tape manufacturing facility. SCDHS provided oversight and approval.
- **Senior Hydrogeologist, Groundwater Containment System, Richmond, CA.** Contributed to the design of a groundwater containment and remediation system for a former municipal landfill, including subsurface groundwater barrier walls and extraction wells. Coordinated technical aspects of groundwater barrier wall construction, including routing, permitting, material selection, and field activities.
- **Project Manager, Soil remediation, Carle Place, NY.** Designed remedial plan and supervised soil remediation activities at an active construction site involving excavation and disposal of 5,000 tons of PCB-, metal-, and petroleum-contaminated soil. NYSDEC oversaw and approved the completed remediation.
- **Project Manager, Multiple UIC investigations and closures, Suffolk and Nassau Counties, NY**. Responsible for investigation and remediation of contaminated cesspool and stormwater drain pool systems. Fully conversant with SCDHS SOP 9-95 and USEPA UIC regulations for investigation and cleanup of leaching pool systems, including Action Levels and Cleanup Standards, groundwater monitoring criteria, and remedial requirements.
- **Project Coordinator, UIC Closure, Hempstead, NY.** Coordinated and supervised all aspects of waste management for a UIC closure, including disposal facility review, waste sampling and classification, manifesting, project closeout, and taxation issues.

Hydrogeologic Evaluations

- **Project Manager, Well Permitting, East Hampton, NY.** Prepared Engineer's Report for Long Island Well Permit for a 230-gpm irrigation supply well. Responsible for evaluation of well interference, salt water upconing, impacts from contaminants, and other factors affecting the proposed well. Performed well design (gravel pack size, screen size, etc.). Familiar with sieve analyses, well construction and development methods.
- **Senior Hydrogeologist, groundwater modeling, East Hampton, NY.** Utilized Visual Modflow to evaluate impact from a contaminant plume on a proposed SCWA wellfield. Model development included evaluation of recharge, aquifer properties, subsurface stratigraphy, boundary conditions, plume source and concentration, and wellfield locations and pumping rates.
- **Hydrogeologist, aquifer testing, Manhattan, NY.** NYCT. Participated in a multi-day, multi-well aquifer pumping test for NYCT subway extension. Responsible for operating and maintaining data

logging equipment, coordinating manual water level measurements, and analyzing resulting drawdown data.

- **Hydrogeologist, aquifer evaluation, Brooklyn, NY.** Evaluated subsurface geologic conditions for subway site utilizing existing boring logs, topographic, and historic map data.
- **Hydrogeologist, aquifer testing, Queens, NY.** Performed slug tests on monitoring wells at an East Side Access site, and evaluated hydrologic properties using the HYDROLOGIC ISOAQX computer program.
- **Hydrogeologist, Remedial well installation, USEPA Superfund site, Deer Park, NY.** Supervised drilling, installation and development of groundwater extraction, injection, and monitoring wells at a USEPA Superfund site. Interpreted aquifer and well performance from development data and recommended modification of drilling and development procedures.
- **Hydrogeologist, Aquifer testing, Manhattan, NY.** Performed aquifer pumping and slug tests and evaluated hydrologic properties using the AQTESOLV computer program. Results were used to address dewatering and construction concerns for subway tunnels.
- **Hydrogeologist, Aquifer evaluation, Mattituck Airport, Mattituck, NY.** Performed water level and water quality monitoring at a NYSDEC Superfund site. Constructed groundwater elevation contour maps and utilized chemical analytical data to predict contaminant plume migration.
- **Senior Hydrogeologist, DEIS services, Lazy Point, NY.** Prepared detailed evaluations of groundwater conditions and potential impacts for a water main extension to Lazy Point for a draft Environmental Impact Statement (DEIS). Evaluated current and historic groundwater data and analytical models to determine potential impacts for both Lazy Point and the drinking water source area and prepared associated portions of the DEIS.

Landfills

- **Program Manager, Greenhouse gas monitoring program, Town of Islip, NY.** Responsibilities include scope and budget management, staffing, client and USEPA coordination, reporting review, and troubleshooting.
- **Project Manager, Landfill Closure Investigations, Town of East Hampton, NY.** Prepared Closure Investigation work plans, including Hydrogeologic investigations, methane investigations, surface leachate investigations, and vector investigations. Prepared final Closure Investigation Reports, approved by the NYSDEC.
- **Project Manager, Landfill monitoring networks, Town of East Hampton, NY.** Supervised installation of groundwater and methane monitoring wells at the landfills, including hollow-stem auger and mud-rotary well installations, split-spoon soil sampling and boring log preparation, oversight and interpretation of wireline electric logging, and completion of initial baseline monitoring events.
- **Hydrogeologist, Landfill groundwater monitoring, NJ.** Performed groundwater sampling at a radio tower facility constructed on a landfill. Analyzed results and made recommendations.
- **Program Manager, Landfill monitoring programs, Town of East Hampton, NY.** Supervises ongoing groundwater and methane monitoring programs, including field team coordination, communications with the Town, report scheduling, data review, and report review prior to distribution to the client and NYSDEC. Negotiated with NYSDEC for reduced monitoring frequencies based on historic monitoring results.
- **Senior Hydrogeologist, Landfill plume modeling, Town of East Hampton, NY.** Conducted groundwater flow modeling to evaluate the nature and extent of a landfill plume and its fate. Findings were presented at public meetings and were used to determine the configuration of the landfill's groundwater monitoring network.
- **Hydrogeologist, Septage lagoon Superfund site, Town of East Hampton, NY.** Conducted sampling of former septage lagoons at a landfill. Evaluated the resulting data and prepared a delisting petition for this NYSDEC Superfund site.
- **Hydrogeologist, containment system modeling, Richmond, CA.** Used FLOWPATH modeling program to predict groundwater flow directions and evaluate extraction well locations and pumping rates for a groundwater containment and remediation system at a former municipal landfill.
- **Program Manager, Landfill gas monitoring program, Town of Islip, NY.** Manages monthly methane monitoring for all landfills, including onsite and offsite monitoring wells, methane collection systems, and flare systems. Data is recorded electronically and downloaded to computer for formatting prior to expedited delivery to Town.
- **Program Manager, Landfill monitoring reporting program, Town of Smithtown, NY.** Supervised and reviewed quarterly and annual monitoring reports for all monitoring programs at the landfills for Town compliance with NYSDEC requirements, including tabulation and reporting of groundwater and methane monitoring data, solid waste and recycling collection data, yard waste composting operations, and landfill leachate collection and disposal data.

- **Program Manager, Landfill remediation, Town of Huntington, NY.** An historic landfill was removed from parkland under the NYSDEC's ERP. Responsibilities included work scope development, schedule and budget management, staffing, client and regulatory agency coordination and reporting, and report review and certification.
- **Program Manager, Landfill Financial Assurance Reporting, Town of Smithtown, NY.** Prepares annual Financial Assurance Reports as per Town landfill closure requirements. Services include summarizing landfill closure and monitoring costs, calculating total costs over a 30-year period, evaluating available Town funds using Comptroller's financial reports, assessing available funds using NYSDEC-required procedures, and preparing annual reports.

Environmental Data Analysis

Ms. Davis has participated in multiple sessions of environmental geochemistry training provided by environmental geochemists, including physical chemistry, thermodynamics, ionic interactions, complexation, biologic effects, and other basic principles. Training also included field sampling procedures and effects on chemical data, chemical analytical methods and equipment, and QA/QC procedures and interpretation. Attended periodic environmental chemistry training sessions hosted by environmental laboratories and participated in hands-on training in data and QA/QC evaluation.

- **Data Evaluation, multiple projects.** Reviewed and evaluated numerous soil, groundwater, product, indoor/ambient air, and soil vapor chemical analytical datasets, including evaluation of batch and site-specific QA/QC samples, laboratory narratives, comparison to regulatory agency criteria, historic data, and background data.
- **Quality Assurance Project Plans (QAPPs), multiple projects.** Developed and implemented numerous QAPPs, including QAPP design, sample delivery group (SDG) evaluations, sampling procedures and sequences, and QA/QC sample preparation/collection.
- **Data Usability Summary Reports (DUSRs), multiple projects.** Prepared DUSRs for numerous chemical analytical datasets for projects overseen by USEPA, NYSDEC and other regulatory agencies, including soil, groundwater, soil vapor, indoor air, and ambient air datasets.
- **DUSR Preparation for Major RCRA Closure, Great Neck, NY.** Prepared DUSRs for over 90 sites during RCRA closure of a major manufacturing facility. Coordinated with sampling personnel, laboratories and regulatory agency chemists to resolve QA/QC issues. Completed work under tight schedules to meet client deadlines.
- **Electronic Data Deliverables (EDDs), multiple projects.** Implemented protocols and procedures for all FPM sites for which NYSDEC EDDs are required. Responsibilities included staff training, data package QA/QC, client interactions, budget and schedule impact assessments, and dissemination of EDD training information.
- **Data Evaluation, multiple sites.** Performed forensic assessments of historic environmental chemical analytical data to resolve apparent discrepancies with modern data and other inconsistencies.
- **Leachate test assessments.** Assessed leachate test protocols and results to determine the most applicable methods to evaluate and develop soil cleanup objectives for non-regulated compounds.
- **Organic parameter breakdown assessments.** Interpreted numerous organic parameter datasets to evaluate breakdown sequences, likely original parameters, and rates of degradation.
- **Insitu remediation assessments, multiple sites.** Formulated chemical treatment plans for insitu remediation, including assessment of contaminant concentrations and distribution, chemical processes and indicators, natural attenuation indicators, additional stociometric demands, and hydrogeologic factors.

Community Impacts

- **Community Monitoring Plans, multiple hazardous waste sites.** Developed Community Air Monitoring Plans (CAMPs) for investigation and remediation projects, including monitoring procedures, action levels, and mitigation measures for odors, traffic, noise, dust, and/or vapors with the potential to affect surrounding communities. Each CAMP was approved by the NYSDEC and NYSDOH and was implemented under agency oversight. Presented CAMP findings at numerous community meetings. Addressed community and agency questions and issues.
- **Odor Abatement, NYSDEC BCP site, NYC, NY.** Developed and implemented an odor abatement plan for highly-odorous soil discovered during a remedial project. The site was surrounded by three public schools; complaints following discovery of odorous soil resulted in a job shutdown until the nuisance was abated. The odor abatement plan was prepared and implemented within 24 hours and involved immediate covering of the odorous soil followed by spot excavation and removal during non-school hours (night work) and the use of odor-controlling foam. The removal was completed within one week without further incident. The NYSDEC and NYSDOH

approved the completed work, allowing the job to recommence.

- **Vector Assessment, transfer station, Town of East Hampton, NY.** Conducted inspections of intense fly infestations at a Town transfer station building to identify the locations and migration pathways of flies inside the building and to develop an abatement plan. This plan was successfully implemented and abated the nuisance flies.
- **Soil Vapor Intrusion Assessments, multiple sites.** Developed and implemented air and soil vapor investigations of residential and commercial properties, as approved by the NYSDEC/NYSDOH, to evaluate potential air quality impacts and determine if mitigation or monitoring was necessary. Monitoring/mitigation designs were developed for NYSDEC/NYSDOH approval.
- **CAMP Monitoring, multiple sites.** Conducted odor, dust, noise, and organic vapor monitoring in communities surrounding environmental sites. Data were collected and interpreted in accordance with NYSDEC and/or NYSDOH guidance and the results were submitted to these agencies together with recommendations for mitigation, if appropriate.
- **Project Manager, Environmental data assessment, Windmill Village, Town of East Hampton, NY.** Evaluated environmental data obtained during due diligence testing for a proposed housing development. Recommended additional sampling and confirmed the absence of impacts.

Expert Witness/Technical Services

- **Expert Witness/Technical Services, residential project, Glen Harbor, NY.** Provided expert witness and technical services regarding environmental conditions and remedial procedures for residential redevelopment of a former oil terminal, including preparing and obtaining NYSDEC and NCDOH approval of remedial work plans, preparing remedial cost estimates and schedules, and providing testimony at a public hearing before the Town Board from which a change of zone was requested. The proposed change of zone, although subject to considerable public opposition, was approved, allowing redevelopment and associated remediation of the property to move forward.
- **Expert Witness/Technical Services, petroleum spill site, Westbury, NY.** Provided expert witness and technical services to a petroleum company defending NYSDEC cost recovery claims for a petroleum spill. The spill site involved two very large petroleum releases at gasoline stations adjoining the defendant's property. Services provided included evaluating tank tests, groundwater, soil and soil vapor chemical analytical data, petroleum fingerprint data, remediation activities and costs. Prepared numerous detailed timelines of activities, large displays of site information and subsurface conditions, and cost allocation calculations. Conducted a detailed subsurface investigation to evaluate stratigraphic conditions.
- **Expert Witness/Technical Services, petroleum spill site, Brooklyn, NY.** Provided expert witness and technical services to a petroleum company for investigation and remediation cost allocation for a petroleum spill. The spill site included two releases: an historic release related to the client's operations and a recent release related to a contractor's faulty spill bucket installation. Services provided included evaluating groundwater and soil chemical analytical data, assessment of free-phase product migration and removal, and a review of remediation activities. Prepared detailed timelines of plume growth and migration, displays of site information and subsurface conditions, and assessments of future remedial scopes and costs. Provided technical support and presentations during mediation.
- **Expert Technical Services, chlorinated solvent site, Far Rockaway, NY.** Provided expert witness services for federal court litigation, including Expert Reports, Affidavits, depositions, and counsel support. Oversaw supporting technical services, including conducting an RI and additional investigations and developing remedial approaches and cost estimates.
- **Expert Technical Services, solvent plume site, Nassau County, NY.** Provided technical support to a property owner subject to a USEPA investigation as the potential source of a large chlorinated solvent plume, including evaluation of a plume-wide RI/FS, detailed review of property historic information, multiple meetings with the USEPA, client and counsel, and identification of additional potential source areas.
- **Expert Technical Services, solvent plume site, Nassau County, NY.** Provided technical support to a property owner subject to litigation as a potential source of chlorinated solvent impacts to a public supply well, including evaluation of a plume-wide RI/FS and related investigation reports, detailed review of property historic information, meetings with the plaintiff, client and counsel, and identification of more likely chlorinated solvent sources.
- **Expert Technical Services, contaminated fill sites, Town of Brookhaven, NY.** Provided expert technical and witness services for several Town sites where illegal disposal of contaminated fill was suspected. Services provided included site inspections, preparation of investigation scopes and budgets, preparation of technical reports, Expert Reports, and Affidavits, participating in depositions and

negotiations, and counsel support. Oversaw supporting technical services, including conducting investigations and developing remedial approaches and cost estimates.

- **Expert Technical Services, development site, Village of Larchmont, NY.** Assisted the Village in successfully opposing the construction of a very large superstore in the adjoining community, including evaluating previous environmental investigations, developing cost estimates and scopes of work for a full environmental site assessment, preparing scoping cost estimates for likely remediation scenarios, preparing technical documents in support of the Village's position, and making a presentation at a public hearing. The proposed project was subsequently withdrawn.
- **Expert Hydrogeologist Services, development site, Town of Carmel, NY.** Provided technical evaluation of a proposed water district. The proposed water district would impact existing residents due to limited available water supplies and likely impact on existing wells. The work included evaluation of aquifer pumping tests, determining impacts on nearby wells, assessment of likely increased water demand, preparation of supporting documents, and presentations at project hearings. The proposed project was subsequently conditionally approved by the NYSDEC with significant modifications to protect the water rights of existing residents.
- **Expert Technical Services, development site, Village of Laurel Hollow, NY.** Provided technical evaluations of potential impacts from a proposed development site, including soil and drainage conditions, loss of protected vegetation, and slope issues.
- **Expert Technical Services, development site, Village of North Haven, NY.** Provided technical evaluations of a proposed development site, including soil and drainage conditions, geomorphic features, and slope issues.
- **Expert Technical Services, road construction projects, Westchester County, NY.** Provided technical services to assess impacts from proposed road construction projects on the Kensico Reservoir and other New York City water supply system facilities. This work included evaluating stormwater pollutant loading calculations, assessing impacts to wetlands, promoting application of more accurate stormwater runoff calculation methods, assessing proposed stormwater management techniques, presenting at public meetings, preparing technical statements for submittal to regulatory agencies, and participating in the NYSDOT SWPPP Guidance committee.
- **Expert Witness Affidavits, multiple projects.** Prepared affidavits regarding environmental conditions at client properties in support of pending legal actions, including landfill issues, wetlands and navigatable waterway issues, and petroleum spills.

Health and Safety

- **Health and safety monitoring, multiple sites.** Implemented HASP monitoring at investigation and remediation sites during intrusive activities, including calibration and operation of photoionization detector (PID) and flame ionization detector (FID) for organic vapors, combustible gas indicator (CGI) for methane, dust meter for particulates, and noise monitor. Compared results to applicable action levels and implemented protective measures as necessary.
- **CAMP monitoring, multiple sites.** Performed community monitoring, including monitoring for noise, particulates (dust), and organic vapors. Recorded observations and compared to applicable action levels. Calibrated and operated noise meters, particulate monitors, and PID/FID. Prepared CAMP monitoring reports and presented results to regulatory agencies and the public.
- **Radiation screening, multiple sites.** Performed screening for radiation at select sites, including operating Geiger counter in different radiation modes and obtaining background readings.

Miscellaneous Projects

- **Phase I Environmental Site Assessments (ESAs).** Performed numerous Phase I ESAs for industrial, commercial, and residential sites in the metropolitan New York area. Presently supervises the Phase I ESA program, including budgets, staffing, quality control and report preparation.
- **Environmental Trainer.** Conducted aquifer pumping and soil vapor extraction test training. Instructed classes for site investigation methods, aquifer pumping test analysis, soil classifications, and risk assessment.
- **Project Management.** Performs a wide range of project management functions, including development and management of project budgets and schedules, coordination of field and office staffing, document preparation, review, editing, and interaction with clients, regulatory, legal, real estate, consultant, and compliance personnel.
- **Field Mapping Studies.** Organized, supervised, and conducted field mapping studies in Alaska.
- **Downhole Logging.** Directed petroleum well site geophysical logging operations and interpreted geophysical well logs.

- **Geophysical Data Interpretation.** Processed and interpreted seismic reflection data and constructed seismic velocity models.
- **Regulatory Evaluations.** Assisted and reviewed regulator's revision of proposed risk assessment-based UST cleanup guidelines. Reviewed proposed USEPA NPDES permits for remediation system effluent.
- **Geologic Mapping.** Constructed and interpreted structural and stratigraphic cross sections, and structure contour, fault surface, isochore, and isopach maps.

Regulatory Compliance

- **RCRA compliance audits.** Conducted inspections and reporting regarding underground and aboveground storage tanks (USTs and ASTs), hazardous waste storage facilities, waste management and reporting requirements, and hazardous waste storage area closures in compliance with RCRA.
- **CERCLA Compliance.** Oversees and coordinates Phase I ESAs for compliance with CERCLA requirements for a wide variety of facilities, including operating and historic industrial sites, manufacturing plants, abandoned facilities, and multi-property Brownfield sites.
- **Superfund Sites.** Managed multiple investigation and remedial projects at state and federal Superfund sites. Is very familiar with all phases of CERCLA projects, including PA/SI, RI, FS, RD and RA. Has supervised and directed activities at many Superfund sites from investigation through closure.
- **Clean Water Act Projects.** Conducted investigation and remediation of Class V underground injection control (UIC) systems, investigation and acquisition of UIC discharge permits, and discharges into surface water bodies.
- **Clean Air Act Compliance Projects.** Conducted facility investigations for emissions sources, including paint booths, fume hoods, process discharges and other point sources. Sampled and evaluated remediation system discharges for CAA compliance, and recommended emissions treatment when required.

Representative DOD Projects

- **Barksdale RFI, Barksdale AFB, LA, $520K** - Lead Geologist for RFI for multiple Base-wide sites at Barksdale AFB, including landfills, petroleum spills, fire training areas, sewage treatment plans, and chemical spills. Managed field crews and sampling of soil, groundwater, and waste, performed sample and waste management, and coordinated with Base representatives. Prepared RFI Report, including analytical data reports, CS, and recommendations.
- **Barksdale LTM Program, Barksdale AFB, LA, $1.7M** - Lead Geologist for LTM Program for Base-wide Barksdale groundwater, including landfills, petroleum spills, fire training areas, sewage treatment plants, and chemical spills. Supervised field crews, managed samples and waste, prepared LTM Reports and made recommendations for LTM optimization.
- **Site Characterization, Plattsburgh AFB, NY, $720K** - Field Team Leader for SC investigation of fuel oil USTs and petroleum spills at Base housing, officers' quarters, and support building prior to transition of these areas to other uses. Working for AFCEE, developed and conducted an SC for over 200 USTs, including soil and groundwater sampling to identify petroleum contamination. Supervised several field crews in an accelerated sampling program to complete the SC prior to winter conditions. Prepared SC Report submitted to and approved by the NYSDEC.

MGP Site Experience

- **Field Sampling Services.** Soil Investigation, Brooklyn Union Greenpoint MGP site. Conducted soil sampling and screening activities during tank removal activities at this former MGP facility. Tasks included visual observations, screening with a calibrated PID, soil sampling, interfacing with the client, subcontractors and NYSDEC personnel, and report preparation.
- **Program Manager.** Soil Vapor Intrusion Investigation and Mitigation, Brooklyn MGP site. Developed and implemented a soil vapor intrusion (SVI) investigation following the discovery of chlorinated solvents in soil vapor beneath a shopping center constructed on an MGP site. Managed all scheduling, budget and contract issues. Reviewed results and developed an SVI mitigation plan to address the chlorinated solvent vapors. Oversaw design and installation of a sub-slab depressurization system (SSDS) to address SVI. This work was completed on time and within budget.

Field Team Supervisor. Soil Remediation, Brooklyn Union Coney Island MGP site. Responsible for coordinating all field activities associated with segregation and removal of lead-paint impacted soil from MGP waste at this NYSDEC-listed MGP site. Conducted pre-excavation waste characterization, implemented HASP, oversaw subcontractor and FPM staff, coordinated with client and NYSDEC, managed waste manifesting, conducted community air monitoring, and prepared remediation report.

Ben T. Cancemi, CPG

FPM group — Engineering and Environmental Science

Mr. Cancemi has diversified experience in geology and hydrogeology. His professional experience includes groundwater and soil investigations, design and management of soil remediation projects, installation and maintenance of groundwater containment and remediation systems, aquifer testing and interpretation, geotechnical studies, evaluation of site compliance with environmental regulations and environmental permitting.

Functional Role	Title	Years of Experience
Senior Hydrogeologist	**Department Manager - Hydrogeology**	**21**

Personal Data

Education

M.S./2001/Hydrogeology/SUNY Stony Brook
B.S./1995/Geology/SUNY Stony Brook

Registration and Certifications

New York State Professional Geologist (Pending)
Certified Professional Geologist – American Institute of Professional Geologists
NYC Office of Environmental Remediation – Gold Certified Professional
OSHA 40-hour HAZWOPER and Current 8-hour Health and Safety Training and Current Annual Physical
OSHA 8-hour HAZWOPER Supervisor
OSHA 10-hour Construction Safety and Health
OSHA Permit-Required Confined Space Training
Long Island Geologists
National Groundwater Association
MTA NYC Transit Track Safety Certification

Employment History

2001-Present	FPM Group
1998-2001	Burns & McDonnell Engineering Company
1997-1998	Groundwater and Environmental Services
1996-1997	Advanced Cleanup Technologies

Detailed Experience

Hydrogeologic Evaluations

- **Project Manager, Lower Manhattan, NY. NYCT.** Coordinated and performed constant head hydraulic conductivity (packer) testing in boreholes located in fractured bedrock in lower Manhattan, NY to evaluate fracture connectivity with the nearby Hudson and East Rivers and determine hydraulic conductivity and related parameters such that water management procedures could be implemented for redevelopment of the New South Ferry Subway Station.
- **Project Manager, Manhattan, NY. NYCT** Coordinated and performed a hydrogeologic investigation, including utility clearing, soil borings, rock coring, packer testing, aquifer pumping testing, data collection, and interpretation, to evaluate subsurface conditions and determine geologic parameters for a proposed subway extension of the NYC Transit No.7 Subway Line.
- **Project Manager, Various Sites Long Island, NYC, and Westchester County, NY** Performed aquifer pumping and slug tests and evaluated hydrologic properties using the computer program AQTESOLV.

Site Investigations

- **Program Manager** for ongoing investigation and remedial projects at several New York State Inactive Hazardous Waste Disposal sites, Voluntary Cleanup Program (VCP) sites, and NYC OER e-designated sites. Investigations have included site characterization, Remedial Investigations/Feasibility Studies (RI/FS), and Resource Conservation and Recovery Act (RCRA) facility investigations and closures. Remedial services have included contaminated soil removal; design, installation, and operation of air sparge/soil vapor extraction (AS/SVE) systems and sub-slab depressurization systems (SSDS), capping, and other remedial services.
- **Program Manager NYSDEC BCP Site, Brooklyn, NY** Coordinated and performed an investigation, implemented remedial measures and regulatory reporting at a former dry-cleaning facility in Brooklyn, NY, including soil, groundwater and soil vapor sampling to assess onsite chlorinated solvent impacts. Remedial actions included conducting pilot testing for installation of a sub-slab depressurization system (SSDS), coordinating the installation of vapor barrier and SSDS. Prepared a Final Engineering Report documenting remedial activities and a Site Management Plan for continued site monitoring.

- **Program Manager NYSDEC Inactive Hazardous Waste Site, Garden City, NY** Coordinated and performed an investigation, implemented remedial measures and regulatory reporting for a former printing facility in Garden City, NY, including soil, groundwater and soil vapor sampling to assess onsite chlorinated solvent impacts. Remedial actions included pilot testing and installation of an air sparge/soil vapor extraction (AS/SVE) system and SSDS, coordinating the installation of an SSDS, removal of contaminated soils from two areas and removal of impacted sediments from twelve leaching structures. Prepared a Final Engineering Report documenting remedial activities.
- **Program Manager, NYC Redevelopment Site, Queens NY.** Program Manager for environmental activities at a NYC Voluntary Cleanup Program Site. Environmental activities included preparation of a Phase I report, completion of a remedial investigation, preparation of associated work plans, implementation of a community air monitoring program for site activities, excavation and disposal of impacted soils, management and disposal of clean soils, and regulatory reporting.
- **Project Manager Remedial Investigation NYSDEC BCP Site, Queens, NY** Coordinated and performed an investigation at a vacant commercial property Far Rockaway, NY, including soil, groundwater and soil vapor sampling to assess onsite chlorinated solvent impacts from an adjoining offsite source. Prepared Remedial Work Plan and Report and provided monthly updates.
- **Project Manager, Site Investigation, Former Aerospace Facilities, Long Island, NY** Coordinated and performed soil and groundwater sampling and soil vapor studies at several aerospace manufacturing facilities on Long Island, NY. Assessments included an evaluation of past manufacturing and facility operations, storage and use of solvents, petroleum and manufacturing-derived wastes, and impacts to soils, soil vapor, and groundwater. Areas of concern were identified for further evaluation and/or corrective action.
- **Project Manager, Municipal Landfill Monitoring, Town of East Hampton, NY** Coordinated and performed long term groundwater monitoring at two closed Town of East Hampton, NY municipal landfills, including the sampling a multi-depth monitoring well network, analysis and interpretation of analytical and hydrogeologic data, and regulatory reporting in accordance with NYSDEC Part 360 requirements.
- **Project Manager, Site Investigation, Former agricultural facilities, Long Island, NY** Coordinated and performed soil and groundwater investigations at various agricultural and horticultural properties to evaluate impacts of past herbicide and pesticide usage on the underlying soil and groundwater.
- **Project Manager, Municipal Landfill Gas Monitoring, Town of East Hampton, NY** Managed and performed routine methane monitoring at two Town of East Hampton landfills for compliance with NYSDEC requirements and to evaluate potential offsite migration to the surrounding community. Monitored indoor air with a flame ionization detector (FID) to evaluate impacts to buildings.
- **Hydrogeologist, Groundwater Modeling, Town of East Hampton, NY** Assisted with groundwater flow modeling for the Springs-Fireplace Road Landfill to evaluate the nature and extent of the landfill plume, its likely downgradient extent, and its fate.
- **Project Manager, Petroleum Release Sites, Various NYC, Long Island and Westchester County** Coordinated and performed onsite and offsite monitoring at petroleum release sites on Long Island, the New York metropolitan area, and in Westchester County in accordance with NYSDEC Spill program requirements. The monitoring programs generally included sampling multi-depth monitoring well networks utilizing low-flow sampling techniques, analysis/interpretation of analytical and hydrogeologic data, and regulatory reporting.
- **Project Manager, Site Investigation, Logan International Airport, Boston, MA.** Coordinated a soil and groundwater sampling program to evaluate environmental conditions at Terminal A, Logan International Airport, East Boston, Massachusetts. The program included an assessment of the current fuel hydrant system and other locations of potential environmental concern using non-destructive air vacuum extraction-clearing techniques combined with direct-push sampling.
- **Project Manager, Site Investigation, Pyrotechnics Facility, Suffolk County, NY.** Managed and performed a soil and groundwater investigation, a remedial soil excavation, and groundwater monitoring at a pyrotechnics manufacturing facility in Suffolk County, NY. The work was performed under the direction of the Suffolk County Department of Health Services

(SCDHS) to investigate and remediate contamination from historic use of perchlorate-containing materials at the facility.

- **Project Manager, Site Investigation, Automobile Franchise, Westchester County, NY.** Coordinated and performed soil, groundwater and soil vapor investigations at several automobile dealerships in Westchester County, NY to evaluate potential impacts from petroleum and chemical solvent storage and usage and onsite waste water disposal systems.

Phase I Environmental Site Assessments

- **Project Manager, Various Northeastern and Mid-Atlantic States.** Performed numerous Phase I Environmental Site Assessments (ESAs) for commercial and industrial properties throughout the Northeastern and Mid-Atlantic States for various clients including trucking companies, major airlines, telecommunication companies, chemical/ petroleum storage facilities, aerospace manufacturing facilities, machine shops, retail shopping centers, auto dealerships and service stations.

Remediation

- **Project Manager, Remediation, Former Landfill, Suffolk County, NY.** Managed remedial activities at a NY State Environmental Restoration Program (ERP) Site situated at a former hospital landfill in Northport, NY. Responsibilities contractor management and oversight, soil disposal management, confirmatory testing, data review, and preparation of remedial work plan and final engineering report for remedial activities.
- **Project Manager, Remediation - AS/SVE, Various Sites, NYC and Long Island.** Performed pilot testing, design, installation and procurement of numerous multi-depth soil vapor extraction (SVE) and air sparge (AS) remediation systems on Long Island and in the NYC metropolitan area to remediate chlorinated solvents and petroleum. Conducted remediation system operation and maintenance, and evaluations of system performance.
- **Project Manager, Remediation – UIC Structures, Nassau and Suffolk County, NY.** Performed numerous storm water and sanitary leaching structure (UIC) cleanouts utilizing excavation and/or vacuum assisted equipment to remove contaminated sediments and liquids. Conducted waste characterization and profiling, pipe camera surveys, and structure locating utilizing water-soluble dyes and electronic locating equipment.
- **Project Manager, Remediation Sub-Slab Depressurization Systems, Bronx, NY** Conceptually designed and oversaw the installation of a sub- slab depressurization system (SSDS) at several commercial properties in the NYC to mitigate chlorinated solvent impacts. SSDS monitoring was conducted to ensure proper operation and emissions compliance of with NYSDEC air discharge guidelines.
- **Project Manager, Remediation System O & M, NYC and Long Island.** Operated and maintained remediation systems, including SVE, groundwater pump and treat, AS, dual-phase extraction, SSDS and free-phase petroleum recovery systems.
- **Project Manager, Remediation. White Plains, NY.** Managed and coordinated a petroleum spill investigation to evaluate the nature and extent of a fuel oil release at an office building in White Plains, NY. The investigation included excavation and removal of a 5,000-gallon UST situated over 20 feet below grade, tightness testing of the UST and associated piping, a soil and groundwater investigation, free product recovery utilizing vacuum-enhanced fluid recovery techniques, and coordination and reporting to the NYSDEC and Westchester County Department of Health.

Health and Safety

- **HASP and CAMP Plan Preparation, Various Sites.** Prepared community air monitoring and health and safety plans for several NYSDEC inactive hazardous waste, brownfield cleanup program, volunteer cleanup program, petroleum spill, and NYC e-designation program sites
- **HASP Monitoring, Various Sites.** Performed health and safety monitoring at investigation and remediation sites during intrusive activities. Calibrated and operated photoionization detectors (PID) and flame-ionization detectors (FID) for organic vapors and combustible gas indicators (CGI) for methane. Compared results to applicable action levels and took preventative/protective measures as necessary.
- **CAMP Monitoring, Various Sites.** Performed community monitoring, including monitoring for noise, particulates (dust), and organic vapors. Recorded observations and compared to applicable action levels. Calibrated and operated noise meters, particulate monitors, and PID/FID.

- **Radiation Screening, Various Sites.** Performed screening for radiation at select sites. Operated Geiger counter in different radiation modes and obtained and evaluated background readings.

Expert Witness/Technical Services

- **Expert Witness Services, Glen Cove Waterfront Redevelopment.** Provided expert witness services regarding environmental conditions and remedial procedures for redevelopment of a former industrial and commercial area in Glen Cove, NY.
- **Technical Services, multiple sites, Town of Brookhaven.** Provided technical services regarding environmental conditions at various commercial and residential sites within the municipality to evaluate potential compliance issues with Town code. Services included sampling of various media, methane surveys and technical oversight of investigation activities.
- **Technical Services, multiple site, Town of Huntington.** Provide technical review of environmental investigations and soil management plans prepared for proposed development for the Planning Division to asses if the proposed development has been properly evaluated in accordance with town requirements.

MGP Site Experience

- **Field Team Leader, Property Transfer of MGP sites**. Conducted soil and groundwater sampling at several Nicor MGP sites in Illinois prior to property transfer to Con Edison. Coordinated sampling crews, oversaw sampling and sample management, and implemented HASP monitoring.
- **Project Manager, Geophysical Investigation at Brooklyn Union Greenpoint MGP site.** Developed and implemented a geophysical investigation at an MGP site that was subject to differential settlement. Coordinated with client and subcontractors, oversaw survey activities, implemented HASP, interpreted results, and prepared a report to document the completed work.

Other

- **Project Manager, RCRA Closure, Nassau County, NY** Coordinated RCRA closure activities and performed confirmatory sampling at a former package manufacturing and printing facility in Nassau County, NY. Project duties included preparation of a closure work plan, contractor procurement, a subsurface site investigation, rinseate sampling, and regulatory agency reporting and coordination, and preparation of a closure report.
- **Project Manager, Former Landfill, Suffolk County, NY.** Prepared a remedial design (RD) work plan for a former hospital landfill on Long Island. The RD work plan included a summary of past investigations, a materials management plan for the excavation and disposal of contaminated soils and debris, a post-excavation sampling plan, a site restoration plan, community air monitoring plan (CAMP), health and safety plan (HASP) and a quality assurance and quality control (QA/QC) plan.
- **Project Manager, Air Monitoring, Nassau County, NY.** Managed and performed monthly soil gas sampling and quarterly indoor air quality sampling at an elementary school in southwestern Nassau County, NY. The monitoring and associated NYSDEC reporting were performed to ensure that a gasoline groundwater plume migrating through the school property was not impacting the school occupants.
- **Project Manager, Environmental Compliance, Multiple Sites.** Performed compliance inspections to assess issues of potential environmental concern at manufacturing, aviation, trucking, retail, and not-for-profit facilities.

John S. Bukoski, PG

FPM group — Engineering and Environmental Science

Mr. Bukoski is an Environmental Scientist with diversified experience in both the Federal and private sector, including groundwater and soil investigations and evaluation, soil remediation projects, soil vapor intrusion evaluation, aquifer testing and interpretation, design and management of soil and groundwater remediation projects, groundwater flow modeling, evaluation of site compliance with environmental regulations, air quality evaluations, and environmental permitting.

Functional Role	Title	Years of Experience
Environmental Scientist	Project Manager	27

Personal Data

Education

B.S./1998/Environmental Science/SUNY Buffalo

Registration and Certifications

Professional Geologist, NY #438
OSHA 40-hr and current 8-hr Health and Safety Training Course (1999-present)
OSHA-Approved 8-hr Health and Safety Training Refresher Courses (2000-Present)
OSHA-Approved 8-hr Site Safety Supervisor Training Course (2008)
MTA NYC Transit Track Safety Certification
National Groundwater Association
Long Island Association of Professional Geologists
Advanced Technologies for Natural Attenuation Certification

Employment History

1999-present	FPM Group
1991-1998	Sutherland's Office Centre
1985-1991	United States Marine Corps

Detailed Experience

Site Investigations

- Performed Phase I Environmental Site Assessments and Phase II Investigations for numerous sites in New York State, including commercial buildings, aerospace facilities, former research and development facilities, and large manufacturing plants.
- Provided oversight and coordination for ongoing investigation and remedial projects at numerous New York State Inactive Hazardous Waste Disposal (Superfund) Sites, Voluntary Cleanup Program (VCP) Sites, and Brownfield Cleanup Program (BCP) Sites. Investigations included Site Characterization (SC), Remedial Investigation/ Feasibility Studies (RI/FS), and RCRA Facility Investigations. Remedial services have included contaminated soil removals; UIC closures, ORC and HRC injections; design, installation and operation of air sparge/soil vapor extraction (AS/SVE) systems; sub-slab depressurization systems (SSDS) and, capping.
- Managed site investigation activities, including soil vapor and air sampling, soil sampling and analysis, groundwater sampling and analysis, and geotechnical evaluation for numerous sites in New York State in support of negotiations for property purchases and redevelopment.
- Investigated several petroleum-contaminated spill sites at Griffiss AFB, Rome, NY. Performed soil and groundwater sampling via Geoprobe, installed groundwater wells for monitoring and assessment of attenuation. Proposed remediation technologies for soil and groundwater contamination. Analyzed chemical data and prepared Site Investigation (SI) Reports and closure reports.
- Investigated several chlorinated solvent-contaminated sites at Griffiss AFB, Rome, NY. Performed aquifer testing to establish direction of groundwater flow. Collected groundwater samples and analyzed the chemical data to identify the constituents of concern. Proposed remediation technologies for groundwater contamination.
- Supervised drilling installation, development, and sampling of monitoring wells at numerous sites throughout New York State. Utilized resulting stratigraphic, hydrologic, and chemical analytical data to evaluate site conditions. Prepared investigation reports identifying site history, contaminant characteristics, sampling methods, and site-specific lithology.
- Managed landfill monitoring projects at several landfills in Suffolk County. Collected and evaluated methane and groundwater monitoring data. Prepared reports documenting monitoring results and provided recommendations regarding methane collection, stormwater runoff, capping, and other landfill management strategies.
- Performed long-term monitoring projects at several landfills at Griffiss AFB. Collected groundwater, leachate, and surface water samples. Evaluated resulting data and prepared monitoring reports for state and federal agency review.

John S. Bukoski

FPM group — Engineering and Environmental Science

Remediation

- Performed investigation and remedial activities at several NYSDEC BCP sites in New York City. Prepared Remedial Investigation and Remedial Work Plans; coordinated with the owner, contractors, and the NYSDEC; conducted citizen participation activities; performed waste characterization, waste profiles, and waste management; developed Site Management Plans for NYSDEC approval.
- Performed waste characterization of a 90,000-cy construction soil stockpile at a municipal sewer facility. Responsibilities included development and implementation of Sampling and Analysis Plan (SAP), evaluation of lab data, preparation of Field Sampling Summary Reports (FSSR), coordination with disposal facilities, and preparation of waste profiles.
- Developed pilot test plans, evaluated pilot test results, and prepared conceptual designs for several air sparge/soil vapor extraction (AS/SVE) systems to treat petroleum and/or chlorinated solvent VOCs. Provided construction oversight for system installation. Performed routine system operation monitoring and evaluated system performance. Prepared system installation and monitoring reports.
- Assisted in the design of a soil remediation plan and performed construction and soil remediation oversight for a metal parts plating and manufacturing facility in Suffolk County, New York. Remediated numerous leaching pools impacted with petroleum compounds and metals. Prepared a UIC Closure Report for USEPA approval.
- Assisted in the design and oversight of indoor underground storage tank abandonment program, leaching pool remediation plan, and managed contractor support for several manufacturing facilities in Suffolk County, New York.

Hydrogeologic Evaluations

- Performed well design (gravel pack size, screen size, etc.) for numerous groundwater wells and variable depths on Long Island. Experience includes sieve analyses, well construction and development methods.
- Performed aquifer pumping and slug tests and evaluated hydrologic properties using the computer program AQTESOLV for several sites in New York City and Long Island.
- Participated in multi-day, multi-well aquifer pumping test for New York City Transit (NYCT). Responsible for operating and maintaining data logging equipment, coordinating manual water level measurements, and analyzing resulting drawdown data.
- Performed water level and water quality monitoring at several sites in Nassau and Suffolk Counties. Constructed groundwater elevation contour maps and utilized chemical analytical data to predict contaminant plume migration.
- Supervised drilling, installation and development of groundwater monitoring wells at three sites within Griffiss AFB, NY and numerous sites in New York City and Long Island. Performed aquifer testing and constructed groundwater elevation contour maps to delineate plumes and predict contaminant plume migration.

Landfills

- Managed ongoing groundwater and methane monitoring programs for Town of East Hampton landfills. Responsibilities included field team coordination, communications with the Town, report scheduling, data package review, and report preparation for distribution to the client and NYSDEC.
- Managed and conducted quarterly methane monitoring at Springs-Fireplace Road and Montauk Landfills for the Town of East Hampton. Tabulated resulting data, evaluated historic methane monitoring results, and recommended appropriate actions including methane monitoring well installations and a methane extraction system. Performed off-site methane monitoring on private property confirm methane containment. Prepared quarterly monitoring reports for submittal to the Town and NYSDEC.
- Performed monthly methane monitoring and prepared monitoring reports for all Town of Islip Landfills. Monitoring program included onsite and offsite methane wells, methane collection systems, and flare systems. Data was recorded electronically and downloaded to computer for formatting prior to delivery to Town. Prepared monthly monitoring reports for submittal to the Town and NYSDEC.
- Produced quarterly and annual monitoring reports for all monitoring programs at Town of Smithtown landfill. Project included tabulation and reporting of groundwater and methane monitoring data, solid waste and recycling collection data, yard waste composting operations, and landfill leachate collection and disposal data.

Water Quality Monitoring

- Conducted groundwater monitoring for the Town of Riverhead, including sampling a multi-depth monitoring well network, analysis and interpretation of analytical and hydrogeologic data, and monitoring reporting in accordance with NYSDEC requirements. Responsibilities including sampling, communications with the Town, laboratory data package review, and report preparation for distribution to the client and NYSDEC.
- Conducted investigation and remedial projects at several New York State BCP Sites. Tasks included contaminated soil removal, groundwater remediation and long-term monitoring, groundwater plume evaluation, and preparation and submittal of annual reports to the NYSDEC.
- Coordinated and performed onsite and offsite groundwater monitoring at various petroleum release sites on Long Island, the New York metropolitan area and in Westchester County in accordance with NYSDEC requirements. Utilized resulting stratigraphic, hydrologic, and chemical analytical data to evaluate site conditions. Prepared work plans identifying site history, contaminant characteristics, sampling methods, and site-specific lithology. Monitoring programs generally included installation and sampling of a multi-depth monitoring well network utilizing standard or low flow sampling techniques, analysis and interpretation of analytical and hydrogeologic data, and reporting.
- Performed water level and water quality monitoring at an industrial site in Mattituck, NY. Constructed groundwater elevation contour maps and utilized chemical analytical data to predict contaminant plume migration. Prepared reports, coordinated with the property owner and NYSDEC, and developed a closure plan.
- Conducted numerous investigations and remediation of contaminated cesspool and stormwater drain pool systems in Nassau and Suffolk County. Fully conversant with County regulations for investigation and cleanup of leaching pool systems, including Action Levels and Cleanup Standards, groundwater monitoring criteria, and remedial requirements.

Griffiss Air Force Base

- Conducted several Site Investigations for AFCEE. Performed soil and groundwater sampling, aquifer testing, and recommended cleanup procedures necessary for the closure and conversion of the Base. Responsible for compliance with all applicable laws including CERCLA, SARA, RCRA, and NCP.

- **Roslyn Air National Guard Station**
  - Conducted several Site Investigations for Roslyn ANGS base closure work. Performed soil and groundwater sampling, aquifer testing, and mold evaluations. Prepared reports documenting recommended cleanup procedures necessary for the closure and conversion of the Base. Responsible for compliance with all applicable laws including CERCLA, SARA, RCRA, and NCP.

Health and Safety

- Prepared numerous health and safety plans for remediation and construction sites and served as health and safety officer at a variety of work sites.
- Performed health and safety monitoring at investigation and remediation sites during intrusive activities. Monitoring included calibration and operation of photoionization detectors (PIDs), flame-ionization detectors (FIDs), dust monitors, and combustible gas indicators (CGI). Compared results to applicable action levels and undertook preventative/protective measures as necessary.
- Performed community monitoring, including monitoring for noise, particulates (dust), and organic vapors at several sites throughout New York State. Recorded observations and compared to applicable action levels. Implemented calibration and operation programs and training for noise meters, particulate monitors, PIDs, and FIDs.
- Performed screening for radiation at several sites. Operated Geiger counters in different radiation modes and compared data to background readings.

Miscellaneous Projects

- Performed unexploded ordnance evaluations and mapping for the United States Marine Corps at several munitions ranges in 29 Palms, California, and Camp Lejeune, North Carolina.
- Conducted land survey and mapping for the United States Marine Corps at several artillery ranges in 29 Palms, California and Camp LeJeune, North Carolina.

RICHARD BALDWIN, CPG, PG

Principal Consultant

Richard Baldwin has nearly 30 years of environmental experience, with particular expertise in storm recovery and remedial actions, resiliency, flood-event evaluation, environmental investigations, waterway studies, building material surveys and indoor air quality (IAQ) investigation at industrial, private, federal and publicly-owned facilities. He is well versed in collecting and analyzing soil, soil vapor, groundwater, bottom sediment and water column samples. He has designed and implemented Remedial Investigations (RIs), remediation work plans, evasive species identification and eradication, bathymetric surveys, geotechnical evaluations, regulatory permit evaluation/acquisition, contractor evaluation/oversight, and public awareness and education. Rich has experience in evaluating potential environmental impacts of projects including golf courses, housing developments, senior housing, schools and retail shopping centers. Mr. Baldwin has extensive experience in evaluating complex laboratory data packages to ensure that they are precise, accurate, repeatable and comparable.

He earned a BA in geology from San Francisco State University, and is a licensed Professional Geologist in New York and in Pennsylvania, and an American Institute of Professional Geologists Certified Professional Geologist. He is an Adjunct Professor in the Earth Sciences Department at State University of New York at Stony Brook.

CONTACT INFORMATION
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EDUCATION

Graduate Course Work, San Jose State University, 1985-1988
BA, Geology, San Francisco State University, 1982

ENVIRONMENTAL DATA ANALYSES

Mr. Baldwin has received multiple sessions of environmental geochemistry training provided by environmental geochemists, including physical chemistry, thermodynamics, ionic interactions, complexation, biologic effects, and other basic principles. Training also included field sampling procedures and effects on chemical data chemical analytical methods and equipment, and QA/QC procedures and interpretation.

Mr. Baldwin has reviewed and evaluated numerous soil, groundwater, product, indoor/ambient air and soil vapor chemical analytical datasets, including evaluation of batch and site-specific QA/QC samples, laboratory narratives, comparison to regulatory agency criteria, historic data, and background data.

Mr. Baldwin has been responsible for the development and implementation of numerous Quality Assurance Project Plans (QAPP), including QAPP design, sample delivery group (SDG) evaluations, sampling procedures and sequences, and QA/QC sample preparation/collection.

Mr. Baldwin has attended periodic environmental chemistry training sessions hosted by environmental laboratories and participated in hands-on training in data and QA/QC evaluation.

Mr. Baldwin has prepared Data Usability Summary Reports (DUSRs) for numerous chemical analytical datasets for projects overseen by the USEPA, NYSDEC and other regulatory agencies. Datasets evaluated have included soil, groundwater, soil vapor, indoor air and ambient air.

Mr. Baldwin has performed forensic assessments of historic environmental chemical analytical data to resolve apparent discrepancies with modern data and other dataset inconsistencies.
Mr. Baldwin has interpreted numerous organic parameter datasets to evaluate breakdown sequences, likely original parameters and rates of degradation.

Mr. Baldwin has formulated numerous chemical treatment plans for in-situ remediation of environment contaminants, including assessment of contaminant concentrations and distribution, chemical processes and indicators, natural attenuation indicators, additional stociometric demands and hydrogeologic factors.

GENERAL EXPERIENCE

Mr. Baldwin has extensive experience in the selection, design, installation and maintenance or a wide range of soil and groundwater remediation systems. Remedial systems have included both active and passive free-product recovery, traditional groundwater pump and treat, soil-vapor extraction, air sparging, bioventing, bioremediation, excavation impacted-soil management and natural attenuation.

Mr. Baldwin has been responsible for conducting and supervising many permit-acquisition and compliance projects associated with sewage discharges, State Pollutant Discharge Elimination System (SPDES) discharges, wetlands, etc. He has conducted these services in a wide-range of venues including New York City, Town of Southold, City of Glen Cove, Cape Cod, Suffolk County, etc.

Mr. Baldwin has been involved in hundreds of subsurface soil and groundwater investigations ranging from Phase I & II Environmental Site Assessments (ESAs) to Remedial Investigations. Investigation and delineation techniques have included soil borings, groundwater monitoring well networks, hydropunch/GeoProbe sampling, surface and bore-hole geophysical methods, soil-gas surveys, aquifer testing, surface water and sediment sampling, waste characterization (soils piles, drums, USTs, ASTs, landfills, etc.), test pits, and computer fate and transport modeling. Materials investigated have included petroleum products (heating/fuel oil and gasoline), PCB oils, coal tar, heavy metals, chlorinated solvents, explosives, pesticides, herbicides and buried medical waste.

Mr. Baldwin has also been the principal-in-charge of many building materials investigations associated with the potential presence of asbestos-containing materials (ACM), lead-based paint (LBP), fugitive dusts, volatile organic compounds (VOCs), etc. Many of these project lead to the design and implementation of abatement projects.

PROJECT EXPERIENCE

ConEd, New York City, NY: Participated in a long-term stormwater monitoring project at several ConEd facilities. The work included the collection and analyses of quarterly composite samples of liquids from on-site stormwater abatement systems per each facility's New York City Department of Environmental Protection (NYCDEP) discharge permit.

Living with the Water Competition, Boston, MA: Mr. Baldwin was a key player in this resiliency design competition for Hundred Acre Wharf design team. In this design, resilient flood protection and climate change adaptation measures were blended into an urban waterfront. The Harbour Walk levee's human-scaled descent into the water encouraged a culture to "live with water" while protecting the 100 Acres and Gillette against the 100- and 500-year return period floods. Design decisions were based on an accurate characterization of flood risk, developed using state-of-the-art, high resolution, multi-dimensional hydrodynamic models (ADCIRC) and sea level rise projections adopted by NOAA and the Army Corps of Engineers. Simulations were performed to define coastal flooding in time and space due to the full range of tides and the 100 and 500-year return period floods for current conditions and the years 2050 and 2100 and three different sea level rise scenarios. An analysis of flooding due to precipitation was performed with an assessment of conditions (e.g., high wind and snow) that could occur coincident with flooding and the effects of sea level rise on groundwater elevations.

HUD Rebuild by Design Stages 1, 2 and 3 for Nassau County, NY: Mr. Baldwin was a key player of the recently completed HUD RBD Stages 1, 2 and 3 resiliency design competitions as part of the Interboro Team. RBD, an initiative of the Hurricane Sandy Rebuilding Task Force and HUD, was aimed at addressing structural and environmental vulnerabilities that Hurricane Sandy exposed in communities throughout the region and developing fundable solutions to better protect residents from future climate events. Because of the enormity of this challenge, the RBD process was developed to find better ways of implementing designs and informing policy. As part of RBD, the Interboro Team was responsible for developing a multi-layer hurricane defense for the southern coast line of Nassau County. The Interboro Team which developed a five-part resilience strategy, that when fully implemented, would protect the south shore, back bay and tributary stream areas of Nassau County from major meteorological events.

Super Storm Sandy Recovery, Long Island and New York Metro Area: Conducted Super Storm Sandy recovery operations for a major financial institution, many of whose facilities suffered damage during the storm. Within a few days of Sandy, Mr. Baldwin took part in several facility damage assessments in which the level of flooding and related damage (e.g., mold, building materials damage, etc.) were assessed. Many of these inspections were conducted in areas where power had not yet been re-established.

Industrial Project, Glen Cove, NY: Conduct of a large-scale New York State Department of Environmental Conservation (NYSDEC) Resource and Recovery Act (RCRA) Closure project conducted at a large, former industrial site located in Glen Cove, NY. Mr. Baldwin was responsible for preparing, submitting and receiving NYSDEC approval for all project-related work plans, and implementing the soil and groundwater investigation phases of the project. Based upon these data, the NYSDEC approved and oversaw to conduct a remedial action plan to address impacted soils across the 16-acre site. The project has been completed and the Closure Certification Report and Site Management Plan have been submitted to the NYSDEC.

Commercial Properties, Syosset, NY (Nassau County): Evaluation of several commercial / industrial facilities wherein Phase I / II ESA services were provided. Further, the project included the evaluation and reporting to the USEPA of evaluations of several of the facilities stormwater mitigation system in accordance with EPA UIC Well Program regulations. Mr. Baldwin was a critical evaluator of potential impacts to the subject properties associated with a VOC-impacted groundwater plume emanating from an upgradient, out-of-service landfill facility owned by a local municipality. He assisted the project attorneys in developing an acceptable indemnification agreement which protected his client from any future liability of pre-existing environmental conditions and laid the reasonability on the former property owner.

Ferry Terminal Project, Glen Cove, NY: The City of Glen Cove Industrial Development Agency (IDA) had acquired Federal Stimulus Funding to develop a ferry terminal along their waterfront area in order to provide passenger ferry service from the North Shore of Long Island to the New York Metropolitan Area, and potentially to selected Connecticut locations. The selected site was part of the former Li Tungsten and Captains Cove Federal and New York State Department of Environmental Conservation (NYSDEC) Superfund Sites. Both sites were subject to remedial actions and were "closed" by both the United States Environmental Protection Agency (USEPA) and NYSDEC circa 2000. A wide range of contaminant types were potentially associated with both sites including solvents, petroleum, oils, heavy metals and radiation. The NYSDEC and IDA required the preparation of a Soil Management Plan (SMP) as potentially-impacted soils and bottom sediments were potentially going to be encountered as part of the project. Mr. Baldwin successfully prepared and executed a Dredging / Excavation (D / E) Work Plan which detailed the requirements to field screen all excavated soils and dredge spoils with a radiation detector, photo-ionization detector (PID) and by visual / olfactory inspection.
Based upon the results of the field screening, excavated soils and dredge spoils were to be addressed by one of the following: 1) cleared for use as on-site backfill materials; 2) disposed of as non-hazardous, regulated materials; or, 3) as hazardous waste. Mr. Baldwin was also responsible for designing and implementing a sediment sampling and analyses program to: 1) evaluate ambient creek bottom conditions with respect to a wide-range of contaminant types; and, 2) confirm the chemical conditions of the "new sea floor" prior of dredging and excavation activities. Mr. Baldwin also successfully applied for a received a NYSDEC Case-specific Beneficial Use Determination (BUD) finding as part of a cost-effective materials disposal option, as well as successfully applying for a NYSEC Long Island Well permit required as part of continuing project support activities.

Marina Property Assessment, Hampton Bays, NY: The owner of this active marina facility was served with a Notice of Violation (NOV) by the NYSDEC for various environmental issues, mostly related to on-site petroleum storage / delivery systems, as well as impacts potentially associated with marine-activity uses such as vessel bottom paint removal and application, use of preserved woods, vessel maintenance activities, housing-keeping issues, etc. Mr. Baldwin was responsible, with input from the NYSDEC, for developing and implementing a Site Investigation Program to investigate potential soil and groundwater impacts associated with the aforementioned on-site practices.
Based upon the results of the investigation, it was concluded that the fuel distribution system was not leaking and that groundwater was not deleteriously impacted. Minor areas of impacted soil, likely from vessel bottom cleaning activities, were identified. Mr. Baldwin prepared and implemented a NYSDEC-approved Remedial Action Plan which included the following: 1) targeted removal of metals-impacted soils; 2) conversion of the existing gasoline/diesel UST/sub-grade distribution system to non-regulated biofuel use; 3) confirmation of facility use of aboveground storage tanks (ASTs) equipped with double-walled containment, 4) permitting a vessel-washing rinsate containment/treatment system; and, 5) use of asphaltic/concrete paving as engineering controls to minimize future potential user contact with remaining impacted soils.

Landfill Gas Evaluation, Shopping Center, Uniondale, NY: Mr. Baldwin provided environmental consulting services to the owner of a property improved with a strip mall including two large big box-type stores. Due to the presence of historic landfill materials, the on-site buildings were equipped with a sub-slab depressurization system (SSDS) to address methane vapors. The methane vapors required mitigation measures due to building occupants complaints of strong odors, and to address the potential build-up of methane within the building envelopes which could potentially result in an explosion hazard. The Client received correspondence from the Nassau County Department of Health (NCDH) inquiring why the methane SSDS was apparently not operating, if landfill-related vapors were still present requiring the operation of a SSDS and/or what remedial measures were to be implemented, if warranted. The services include the review of available historic documentation, inspection of the then non-operating methane SSDS, measuring sub-slab vapor and indoor air conditions, providing guidance to the client regarding appropriate remedial measures and support with respect to regulatory communications.

Expedited Due Diligence of Shopping Center, Centereach, NY: A private developer/REIT was considering the purchase of a shopping center and, due to contract restraints, the client required the acquisition of due diligence information on an expedited basis. Based upon review of existing environmental reports, there had formerly been a dry cleaner at the facility. Additionally, the overall facility was improved with several on-site sanitary waste disposal systems and a stormwater abatement system consisting of several dozen dry wells. Due to the facility's location on Long Islands flow divide, a site-specific groundwater flow direction could not be determined. Therefore, several multi-depth monitoring wells were installed, surveyed and sampled to determine a site-specific groundwater flow direction. Additional monitoring wells were then installed and sampled to confirm groundwater quality conditions downgradient of on-site infrastructure of concern.
An expedited Phase II sampling program was designed and implemented to assess the highest-risk issues including potential impacts to groundwater and soil vapor associated with the former dry cleaning uses and potential remediation costs associated with on-site cesspools and drywells. The results of the investigation indicated a high risk associated with potential soil vapor intrusion issues and the initial remedial costs to address the on-site leaching structures was higher than originally anticipated.

Day Care Facility, Due Diligence, Soil Management and Soil Vapor Mitigation: Based upon the results of previous Phase I/II ESA activities which identified the presence of impacted fill at the facility slated for development by a non-for-profit day care facility, designed and implemented a Soil Management Plan which allowed for the re-development of the site. Additionally, design, installed and operated a large-scale sub-slab depressurization system (SSDS) to address soil vapor intrusion concerns.

Multiple Agricultural Properties, Suffolk County, NY: These projects were typically related to the former legal application of pesticides to support agricultural operations on projects slated for residential re-development. Project work-flow components included the following: 1) Design and conduct of soil sampling and analyses programs designed to support residential re-use in accordance with SCDHS guidelines; 2) Conduct of pilot testing to evaluate various pesticide-impacted soil management techniques, including various vertical soil mixing options; 3) Preparation of SCDHS-compliant SMPs to be conducted during the re-development of the properties; and, 4) Oversight of execution of SMPs including air monitoring, collection/analyses of confirmatory soil samples and preparation of project close-out packages.

Private Developer, Due Diligence and Soil Remediation of a Former Landfill Facility, Central Islip, NY: This project included the conduct of Phase I/II activities for a nation-wide developer at this site which was the improved with infrastructure associated with a sewage treatment plant and landfill associated with a former psychiatric facility. The data indicated the presence of fill materials which were impacted by lead in contravention of regulatory guidance values. A SMP was designed and implemented in which on-site landfill materials were screened and tested. Screened materials containing acceptable levels of lead were used as on-site backfill while lead-impacted materials were disposed of off-site. The design and implementation of the SMP allowed the developer to deal with impacts in a cost-effective fashion and resulted in a profitable residential-use project.

UIC Well Evaluation/Remediation, Multiple Clients, Nassau and Suffolk Counties, NY: These projects included environmental investigation and remediation of multiple facilities located in both Suffolk County and Nassau County associated literally thousands of cesspool and stormwater drywell Underground Injection Control Wells (UIC). This Long Island-specific issue is due to the presence of a Federally-designated Sole Source Drinking Water aquifer underlying Long Island, and the long-standing practice of discharging liquid wastes and stormwater through UIC structures. Worked closely with property owners and appropriate regulatory agencies to successfully remediate impacted UIC structures all across Long Island with regulatory oversight provided with the SCDHS, Nassau County Department of Health and/or the USEPA.

Cemetery Groundwater Study, Suffolk and Nassau Counties, NY: A religious organization petitioned a western Long Island municipality to increase the size of an existing Nassau County cemetery facility. As part of their SEQRA review, the municipality raised the concern of the potential impacts of embalming fluids and other chemicals associated with interred bodies may have on the underlying aquifer system. The project included evaluating the typical types of embalming materials formerly and currently in use (e.g., formaldehyde, arsenic, lead, etc.), as well as radioactive materials typically utilized for hospital diagnostics and therapy purposes. Conduct of groundwater evaluations at two in-service facilities owned by the Client and collection of groundwater samples for analyses of VOCs, metals, alpha/beta/gamma emitters and typical radio-therapy/diagnostic drugs. Prepared a report summarizing the results of the two groundwater investigations for inclusion into the SEQRA-required DEIS.

New York State Owned Educational Facility, Wassaic, NY: The focus of this project was to evaluate the source area of methyl tertiary butyl ether (MTBE) which was detected the facility's potable water system (the source of the potable water was high-capacity wells completed in the local valley-fill aquifer). An additional project component was to design and implement an effective water treatment system in event that the MTBE exceeded NYSDEC standards in the future. Project work-flow components included the following: 1) Conduct of a surface geophysical survey utilizing seismic techniques between the identified source area and the potable water-supply well field to evaluate the depth and geometry of the unconsolidated materials/bedrock interface; 2) Conduct of a multi-depth groundwater investigation between the source area (gasoline service station) and the well field to confirm the nature and extent of contamination utilizing the direct-push sampling technique; 3) Design and installation of a multi-depth monitoring well network in the vicinity of the facility's potable water wells for aquifer testing purposes; 4) Conduct of a long-term aquifer pumping test, the data which were utilized to calculate the capture zone of the pumping, potable-water wells under operational conditions; 5) As an IRM, one impacted potable water well was converted to a remediation well to provide hydraulic capture of the MTBE plume prior to its impacting the remaining downgradient wells. The effluent was treated via a large-scale granulated-activated carbon (GAC) system for treatment of MTBE prior to its permitted discharge to a nearby stream; 6) A 40,000-pound GAC unit was also installed in standby mode to address the facility's drinking water should the concentrations of MTBE ever warrant treatment; and 7) Conduct of an AS/SVE pilot test at the source area (upgradient gasoline service station) to support the design of an effective, source area remediation program.

Multiple NYCDDC Fire Department / Police Precinct Facilities, New York City, NY: These projects were related to the letting of multiple contracts for site remedial activities associated with New York City fire department facilities and police precinct facilities by the New York City Department of Design and Construction (NYCDDC). Project work-flow components included the following: 1) Evaluating the geologies of several sites to evaluate and implement successful oxygen-releasing compound (ORC) projects; 2) Review of quarterly groundwater quality and potentiometric surface data to confirm existing conditions; 3) Assessing the best methodologies to implementing enhanced natural attenuation remedial techniques by addition of nutrients and non-native, engineered bacterial populations; and, 4) Conduct of hi-vac extractions to remove light, nonaqueous-phase liquids as a remedial measure.

Rite Off RI/FS, IRM and Remedial System: This was a NYSDEC Class II Inactive Hazardous Waste Site. Project work-flow components included the following: 1) Design and conduct of an on-site and off-site RI which including installation of several multi-depth wells, collecting and reviewing chemical analytical data, preparing potentiometric surface maps and conducting computer groundwater modeling (i.e., MODFLOW, MODPATH, AQTESOLVE and MT3D); 2) Design and conduct of an IRM which consisted of removing the contaminated bottom sediments (e.g., source area materials) from impacted EPA-designated Class V injection wells; and, 3) Design and installation of the NYSDEC-approved remedy of an air sparge/soil vapor extraction (AS/SVE) system. Specific tasks including conducting AS and SVE

pilot testing, overseeing installation of treatments wells, overseeing the design and installation of the treatment system, conduct of monthly operation and maintenance (O&M) activities and quarterly collection and analyses of groundwater samples from the on-site and off-site monitoring wells.

Saint George Ferry Terminal Redevelopment, Staten Island, NY: Provided environmental project support associated with the redevelopment of this ferry terminal related to the removal of out-of-service No. 6 fuel oil USTs, and associated impacted soil and groundwater. Project work-flow components included the following: 1) Design and installation of an on-site groundwater monitoring well network required to support the eventual de-watering of the area to allow for the removal of the USTs. Included soil logging, and evaluation of soils and groundwater for potential petroleum impacts; 2) Conduct of a tidal influence study to support groundwater modeling including the preparation of high-tide and low-tide potentiometric surface maps; 3) Design and conduct of an aquifer analyses program including a step-drawdown test (to evaluate appropriate aquifer testing flow rate) and conduct of a 72-hour aquifer pumping test to support the design of a de-watering system; 4) Conduct of computer modeling (VISUAL MODFLOW) utilizing the data associated with the aforementioned aquifer analyses to evaluate de-watering scenarios; and, 5) Design and installation of a coffer-dam-like system surrounding the USTs to minimize the amount of required de-watering to support their removal.

Mitchell Park Development, Greenport, NY: Managed one of the first NYSDEC Brownfield projects on Long Island which was funded utilizing NYS Environmental Bond Act funds. Project included the full evaluation of the geologic and environmental conditions of the property including the following work flow components: 1) Conduct of a geophysical survey including ground-penetrating radar (GPR) and electromagnetics to evaluate for the presence of out-of-service USTs and other subsurface infrastructure; 2) Conduct of soil borings and associated soil logging to confirm subsurface lithologic conditions of potential environmental impacts; 3) Installation and sampling of several on-site groundwater monitoring wells with preparation of associated potentiometric surface maps; 4) Conduct of a tidal influence study to evaluate potential effects that tides may have had on the migration of contaminants; 5) Oversaw the removal of several, on-site, out-of-service USTs with associated collection and analyses of confirmatory, end-point soil samples; and, 6)Evaluated the nature and extent of imported soils which contained arsenic associated with agricultural uses and developed a Soil Management Plan to address same.

Blydenburgh Landfill Routine Groundwater Monitoring, Islip, NY: Supervised quarterly groundwater sampling, data tabulation, statistical analyses and reporting for a Long Island landfill under NYSDEC Part 360 regulations. Project work-flow components included the following: 1) Oversaw and conducted QA/QC checks of field crews collecting the groundwater samples; 2) Tabulated and conducted statistical evaluation of existing groundwater quality data to evaluate pre-operational groundwater quality conditions to establish “trigger contaminant levels” to determine if the in-service landfill leachate collection system was failing; 3) Tabulated and evaluated validated quarterly groundwater quality data against pre-operational groundwater quality statistics; and, 4) Conducted annual statistical evaluations of all operational groundwater quality data to confirm landfill was in compliance with NYSDEC landfill protocols.

Lockheed Martin Lake Success Site, **Lake Success, NY**: Managed large-scale site activities at this major aerospace facility which included ongoing IRMs (soil vapor extraction and groundwater pump and treat systems), citizen participation activities, design and implementation of on-site remedies, an off-site RI/FS, regulatory compliance activities, client interactions, multi-task and multi-contractor scheduling, coordination of staff and tasks, and general program management.

Project work-flow components included the following: 1) Oversaw collection and analyses of samples from an extensive on-site and off-site groundwater monitoring well network; 2) Managed the existing groundwater IRM treatment system which consisted of large granulated-activated carbon (GAC) filters; 3) Evaluated nature and extent of groundwater contaminant plume via the preparation of iso-

concentration contaminant maps; 3) Prepared potentiometric surface maps to confirm hydraulic capture analyses of in-service pump and treat system; 4) designed and implemented an off-site groundwater investigation which included the conduct of bore-hole geophysical surveys to establish subsurface lithologies and water-bearing zones, installation of several clusters of multi-depth monitoring wells, collection and analyses of groundwater samples, preparation of potentiometric surface maps and preparation of groundwater plume maps; 5) Design and implementation of an NYSEC-approved IRM which consisted of the removal of impacted materials (e.g., source materials) associated with the EPA Class V injection wells associated with a former solvent still; 6) Utilized a computer groundwater modeling program (VISUAL MODFLOW) to evaluate aquifer properties, contaminant fate and transport, and evaluate potential groundwater extraction and injection scenarios; and, 7) Evaluated data acquired from multiple nearby public water districts to evaluate spatial and time-related groundwater extraction practices for public consumption uses from the vicinity of the site.

U.S. Military Bases, Landfill Services, California and Nevada
Mr. Baldwin was the Project Manager/Field Team Leader (FTL) for several large-scale investigations associated with mostly inactive landfill facilities located at Fort Ord, George Air Force Base and Concord Naval Weapons Station, all of which are located and California; and at Nellis Air Force Base which is located in Nevada. The scopes of service including evaluating the extent of landfilled materials via geophysical techniques and conduct of test pits, evaluating downgradient groundwater quality investigation and evaluating for the presence of unexploded ordinance.

CONTINUING EDUCATION

- Princeton Groundwater Hydrogeology and Pollution course
- Environmental Law and Regulations Course, U.C. Berkeley Extension
- NGWA MODFLOW and MODPATH Modeling Course
- NGWA Visual MODFLOW Modeling Course

PROFESSIONAL REGISTRATIONS/CERTIFICATION/TRAINING

- Professional Geologist, License No. 000255, New York State
- Professional Geologist, PG-000552-G, Commonwealth of Pennsylvania
- Certified Professional Geologist, CPG #9158, Amer. Inst. of Prof. Geologists
- OSHA Certification, 40-hour Health and Safety Training at Hazardous Waste Sites
- OSHA Certification, 8-hou Refresher Health and Safety Training at Hazardous Waste Sites
- OSHA Certification, 8-hour Management Training
- OSHA Certification, 8-hour Radiation Safety Training

APPENDIX C

HEALTH AND SAFETY PLAN
INCLUDING
COMMUNITY AIR MONITORING PLAN

APPENDIX C
HEALTH AND SAFETY PLAN

This worker Health and Safety Plan (HASP) has been prepared by FPM Group (FPM) for New York State Department of Environmental Conservation (NYSDEC) Brownfield Program Site #C241200, identified as the Former Peninsula Hospital Site located at 51-15 Beach Channel Drive and 50-04 Rockaway Beach Boulevard, Far Rockaway, Queens, New York (Site). This HASP is part of the Remedial Investigation (RI) Work Plan and includes measures for the protection of worker health and safety during RI activities. A Community Air Monitoring Plan (CAMP) is also included to address potential issues that may affect the Site community during onsite activities.

C.1 Worker Health and Safety Plan

C.1.1 Introduction

This HASP has been written for compliance with "OSHA Hazardous Waste Operations Standards (29 CFR 1910.120)", the guidance documents, "Standard Operating Safety Guidelines (Office of Solid Waste and Emergency Response, 1992)" and the "Occupational Safety and Health Guidance Manual for Hazardous Waste Activities" (U.S. Department of Health and Human Services, 1985).

C.1.2 Scope and Applicability of the HASP

This HASP is designed to be applicable to locations where soil borings, soil vapor implant installation and sampling, and groundwater monitoring well installation and sampling are performed at the Site by all parties that either perform or witness the activities. This HASP may also be modified or amended to meet specific needs of the proposed work.

This HASP will detail the Site safety procedures, Site background, and safety monitoring. Contractors will be required to adopt this HASP in full or to follow an FPM-approved HASP. The Health and Safety Officer (HSO) will be present at the Site to inspect the implementation of the HASP; however, it is the sole responsibility of the contractor(s) to comply with the HASP.

The HASP has been formulated as a guide to complement professional judgment and experience. The appropriateness of the information presented should always be evaluated with respect to unforeseen Site conditions that may arise.

C.1.3 Site Work Zone and Visitors

The Site work zone (a.k.a. exclusion zone) during the performance of the boring, well installation, vapor implant installation, and sampling activities will be a 30-foot radius about the work location. This work zone may be extended if, in the judgment of the HSO, Site conditions warrant a larger work zone.

No visitors will be permitted within the work zone without the consent of the HSO. All visitors will be required to be familiar with, and comply with, the HASP. The HSO will deny access to those whose presence within the work zone is unnecessary or those who are deemed by the HSO to be in non-compliance with the HASP.

All Site workers, including the contractors, will be required to have 40-hour hazardous material training (eight-hour refresher courses annually), respirator fit test certification, and current medical surveillance as stated in 29 CFR 1910.120.

The HSO will also give an on-Site health and safety discussion to all Site personnel, including the contractors, prior to initiating the Site work. Workers not in attendance during the health and safety talk will be required to have the discussion with the HSO prior to entering the work zone.

Emergency telephone numbers and directions to the nearest hospital are shown in Table C.1.3.1 and will be kept at the Site in the possession of the HSO and will be available to all Site workers and visitors.

C.1.4 Key Personnel/Alternates

The Senior Manager (project coordinator) for this project is Stephanie Davis, PG. The Quality Assurance Officer (QAO) will be Ben Cancemi, PG. The Project Manager will be John Bukoski, PG, who will also act as the HSO. An Assistant Project Manager and Assistant HSO may be designated for the field activities.

C.1.5 Site Background

Based on the Site history and previous analyses of samples, the known chemicals present at the Site include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. VOCs are present in soil vapor at the Site and SVOCs and metals are present in soil at the Site. Subsurface investigation activities will include collection of soil, soil vapor, and groundwater samples.

C.1.6 Task/Operation Health and Safety Analysis

This section presents health and safety analyses for the boring, well installation, vapor implant installation, and sampling tasks. In general, FPM will employ one to two persons at the Site. No soil borings or other intrusive Site operations will be conducted by contractors without the presence of an FPM representative onsite. In the event that the HSO is not present on the Site, the Assistant HSO will implement the HASP. Levels of personal protection mentioned in this section are defined in Section C.1.9.

Soil Boring/Soil Vapor Implant/Well Installation and Intrusive Sampling Safety Analysis

Intrusive activities, including performing soil borings and installing wells and soil vapor implants, will be performed by a direct-push contractor and FPM personnel. The soil borings and well and vapor implant installations will be performed by a direct-push contractor advancing tooling into unconsolidated deposits consisting primarily of sand. The depth to groundwater is approximately 4 to 8 feet below grade at the Site and will not be contacted during intrusive activities except during soil borings, well installation, and sampling. FPM personnel will be present to coordinate, oversee, and monitor intrusive activities.

To minimize the potential for dust inhalation during intrusive activities, the HSO will assess wind and soil moisture conditions and, if it is deemed necessary by the HSO, the affected area will be wetted with potable water. If this measure is determined to be ineffective, the HSO may decide to upgrade personal protection to Level C respiratory protection to include respirators with dust cartridges. If extremely dusty conditions exist that cannot be successfully controlled by dust suppression with potable water, then the HSO may choose to postpone intrusive activities until such time as conditions improve.

TABLE C.1.3.1
EMERGENCY TELEPHONE NUMBERS AND
DIRECTIONS TO ST. JOHN'S EPISCOPAL HOSPITAL

Police..... 911
Ambulance..... 911
Poison Control Center..... 212-689-9014
St. John's Episcopal Hospital (Emergency Room) 718-869-7000

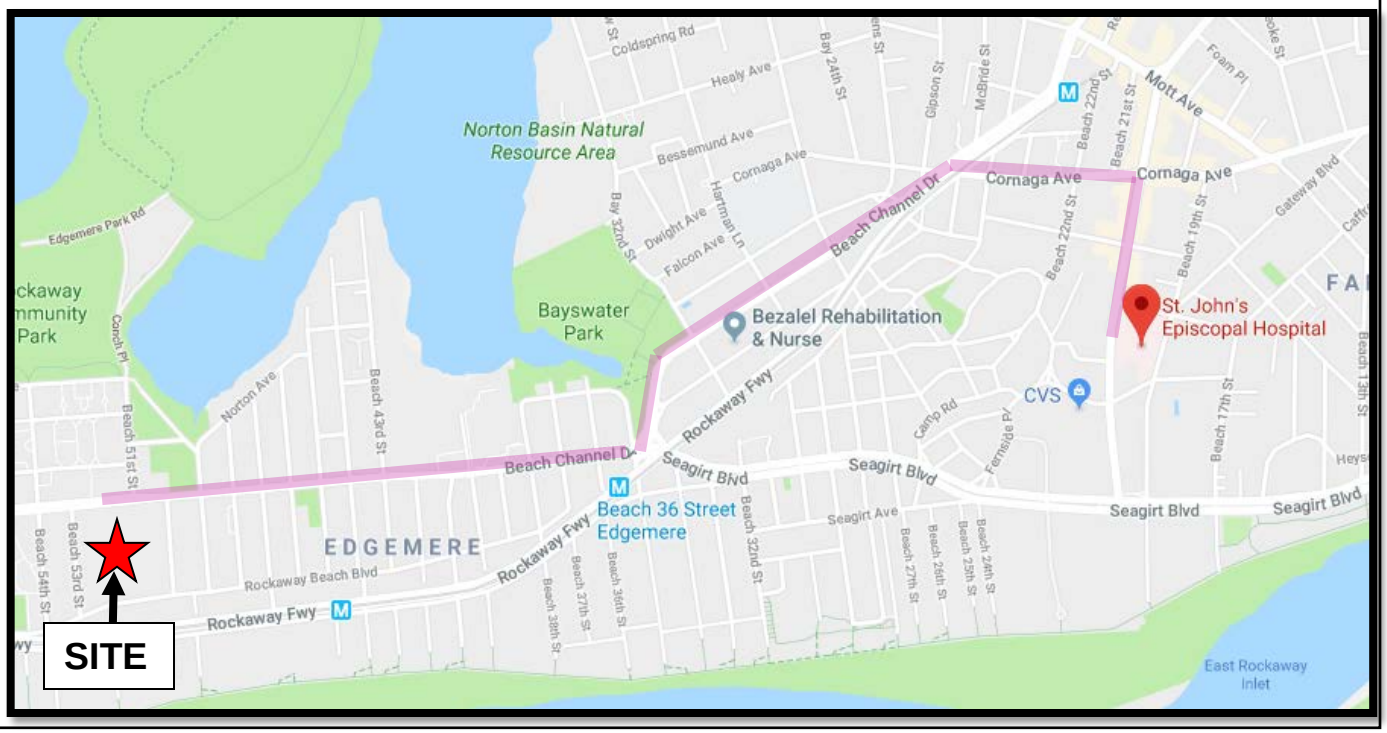
FPM Contact Personnel (631-737-6200)

Dr. Kevin J. Phillips, P.E. ..... Cell # 631-374-6066
Stephanie Davis, PG Senior Project Manager ..... Cell # 516-381-3400
John Bukoski, PG, Project Manager ..... Cell #516-381-3535
Ben Cancemi, PG, QAO ..... Cell # 516-383-7106

Directions to the St John's Episcopal Hospital Emergency Room

327 Beach 19th Street (entrance is on Beach 20th Street)
Far Rockaway, NY 11691
Tel: 718-869-7000

Exit the north side of the Site and turn right onto Beach Channel Drive. Travel east on Beach Channel Drive for about 16 blocks to the intersection with Seagirt Boulevard. Stay to the left and continue on Beach Channel Drive for about seven blocks to Cornaga Avenue. Turn right onto Cornaga Avenue and continue about four blocks to Beach 20th Street. Turn right onto Beach 20th Street and continue for about two blocks. The Hospital is on east (left) side of the street and the Emergency Room entrance is next to the main entrance; follow the signs to the Emergency Room.



FPM

Organic vapor concentrations will be monitored in the work zone by utilizing a Photovac MicroTIP PID or equivalent. The PID will be "zeroed" by exposing the PID to ambient (outdoor) air prior to intrusive activities and the upper range of calibration will be established by calibrating at 98 to 100 parts per million (ppm) of isobutylene. Background organic vapor concentrations will then be established in the work zone prior to intrusive activities and recorded in the HSO field book. Upon commencement of intrusive activities, PID readings will be obtained in the workers' breathing zone. Readings will be obtained following the initial advance into the ground and every five feet thereafter. At the discretion of the HSO, PID readings may be obtained more frequently. All readings and observations will be recorded in the HSO field book. PID air monitoring will be conducted by FPM personnel. Steady-state PID readings greater than five ppm in the worker's breathing zone will require upgrading to Level C personal protective equipment. Steady-state readings, for this purpose, will be defined as readings exceeding five ppm above background for a minimum of ten seconds at points approximately one foot above and then around the borehole opening. These points will define the worker's breathing zone. Level C personal protection will be implemented including full-face air-purifying respirators with dust and organic vapor cartridges (personal protective equipment will be described in greater detail in Section C.1.9). All FPM personnel and contractors must be properly trained and fit tested prior to donning respirators.

If PID readings exceed steady-state levels greater than 50 ppm above background or any conditions exist for which the HSO determines require Level B personal protective equipment, all work at the Site will cease immediately and all personnel will evacuate the work zone. Evacuation will occur in the upwind direction if discernible. Specific evacuation routes will be discussed prior to commencement of work at each location based on work location and wind direction and an evacuation meeting place will be determined. Level B conditions are not anticipated to be encountered; however, if level B conditions arise, no Site work will be performed by FPM or contractors and a complete evaluation of the operation will be performed and this HASP will be modified.

All personnel will be required to wear chemical-resistant nitrile gloves when the potential for dermal contact with the soil or groundwater is possible. This will include handling equipment retrieved from the borehole or wells. Dermal contact with soil or groundwater and equipment that has been in contact with soil or groundwater will be avoided.

Other Safety Considerations

- Noise

During operations that may generate potentially harmful levels of noise, the HSO will monitor noise levels with a Realistic^{tm} hand-held sound level meter. Noise levels will be monitored in decibels (dBs) in the A-weighted, slow-response mode. Noise level readings which exceed the 29 CFR 1910.95 permissible noise exposure limits will require hearing protection (see Table C.1.6.1 for Permissible Noise Exposures).

Hearing protection will be available to all Site workers and will be required for exceedances of noise exposure limits. The hearing protection will consist of foam, expansion-fit earplugs (or other approved hearing protection) with a noise reduction rating of at least 29 dB. Hearing protection must alleviate worker exposure to noise to an eight-hour time-weighted average of 85 dB or below. In the event that the hearing protection is inadequate, work will cease until a higher level of hearing protection can be incorporated.

TABLE C.1.6.1
PERMISSIBLE NOISE EXPOSURES*

Duration Per Day Hours	Sound Level dBA Slow Response
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
½	110

Notes:

When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1+C_2/T_2+.....C_n/T_n$ exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of exposure permitted at that level.

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

*Standards derived from 29 CFR 1910.95

- Heavy Equipment Operations

Intrusive investigation activities may involve the use of heavy equipment. Demolition or construction activities that may be occurring onsite during the investigation may also involve the use of heavy equipment. Heavy equipment operations for investigation activities will be performed by a qualified contractor with oversight by FPM.

Safety concerns during heavy equipment operations include risk of injury due to being struck by equipment, being trapped between moving equipment parts, being struck by dropped materials, and hearing damage due to equipment noise. All investigation personnel will take precautions against these risks when working in the vicinity of heavy equipment by being aware of equipment locations and movement, by wearing steel-toed boots and hard hats, and by using hearing protection, if necessary. Investigation personnel who have not previously worked in the vicinity of heavy equipment will be paired with an experienced person for at least one day to familiarize themselves with heavy equipment operations and safety procedures. All mobile equipment will be equipped with audible alarms to indicate when the equipment is being operated in reverse. All investigation personnel will be advised to stay away from demolition or construction areas if these activities are ongoing.

Demolition or construction activities may result in open excavations at the Site. If demolition or construction activities are ongoing during the investigation, all investigation personnel will be alerted to the possibility of open excavations and advised to stay out of construction and demolition areas.

- Slip/Trip/Fall Preventative Measures

To reduce the potential for slipping, tripping, or falling, the work zone will be kept clear of unnecessary equipment. In addition, all investigation workers will be required to wear work boots with adequate tread to reduce the potential for slipping (work boots must be leather or chemical-resistant and contain steel toes and steel shanks).

- Insects

Potential insect problems include, but are not limited to stinging insects such as bees, wasps, and hornets, and ticks. Prior to commencement of work, each work area will be surveyed for nests and hives to reduce the possibility of disturbing stinging insects. In addition, each Site worker will be asked to disclose any allergies related to insect stings or bites. The worker will be requested to keep his or her anti-allergy medicine onsite.

Tick species native to Long Island consist of the pinhead-sized deer tick and the much-larger dog tick. Ticks are unlikely to exist at the Site due to a paucity of suitable habitat. All Site workers will be advised to avoid walking through vegetated areas and will be advised to check for ticks on clothing periodically.

- Potential Electrical and Other Utility Hazards

Potential electric hazards consist mainly of overhead and underground power lines. Other utilities that may present hazards include telephone lines, gas lines, sewer lines, water lines, and other overhead or underground utilities. Prior to commencement of work at the Site, all locations will be inspected with respect to overhead lines. Intrusive work involving heavy equipment will not be performed when the horizontal distance between the equipment and overhead wires is less than 30 feet.

Underground potential utility hazards will be minimized by contacting the One-Call service to provide markouts of the utilities beneath adjoining public streets.

- Heat/Cold Stress

Heat stress may become a concern especially if protective clothing is donned that will decrease natural ventilation. To assist in reducing heat stress, an adequate supply of water or other liquids will be staged on the Site and personnel will be encouraged to rehydrate at least every two hours even if not thirsty. In addition, a shady rest area will be designated to provide shelter during sunny or warm days and Site workers will break for at least 10 minutes every two hours in the rest area, and, in very hot weather, workers wearing protective clothing may be rotated.

Indications of heat stress range from mild (fatigue, irritability, anxiety, decreased concentration, dexterity or movement) to fatal. Medical help will be obtained for serious conditions.

Heat-related problems are:

- Heat rash: caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat.

- Heat cramps: caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.

- Heat exhaustion: caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

- Heat stroke: the most severe form of heat stress. Can be fatal. Medical help must be obtained immediately. Body must be cooled immediately to prevent severe injury and/or death. Signs: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Cold exposure is a concern if work is conducted during cold weather, marginally cold weather during precipitation periods, or moderate to high wind periods. To assist in reducing cold exposure the following measures will be taken when cold exposure concerns are present:

- All personnel will be required to wear adequate and appropriate clothing. This will include head gear to prevent the high percentage loss of heat that occurs in this area (thermal liners for hard hats if hard hats are required).

- A readily-available warm shelter will be identified near the work zone.

- Work and rest periods will be scheduled to account for the current temperature and wind velocity conditions.

- Work patterns and the physical condition of workers will be monitored and personnel will be rotated, as necessary.

- Indications of cold exposure include shivering, dizziness, numbness, confusion, weakness, impaired judgment, impaired vision, and drowsiness. Medical help will be obtained for serious conditions if they occur.

Cold exposure-related problems are:

- Frost bite: Ice crystal formation in body tissues. The restricted blood flow to the injured part results in local tissue destruction.

- Hypothermia: Severe exposure to cold temperature resulting in the body losing heat at a rate faster than the body can generate heat. The stages of hypothermia are shivering, apathy, loss of consciousness, decreasing pulse and breathing rate, and death.

The Buddy System

All activities in contaminated or potentially contaminated areas will be conducted by pairing off the Site workers in groups of two (or three if necessary). Each person (buddy) will be able to provide his or her partner with assistance, observe his or her partner for signs of chemical, cold, or heat exposure, periodically check the integrity of his or her partner's protective clothing, and notify the HSO or others if emergency help is needed. The buddy system will be instituted at the beginning of each work day. If new workers arrive on Site, a buddy will be chosen prior to the new worker entering the work zone.

Site Communications

Two sets of communication systems will be established at the Site: internal communication among personnel onsite, and external communication between onsite and offsite personnel. Internal communication will be used to alert team members to emergencies, pass along safety information such

as heat stress check, protective clothing check, etc, communicate changes in the work to be accomplished, and maintain Site control. Due to ambient noise, verbal communications may be difficult at times. The HSO will carry a whistle (and compressed air horn if respirators are donned) to signal Site workers. A single whistle blast will be the signal to immediately evacuate the work zone through the access control point. This signal will be discussed with all Site workers prior to commencement of work.

An external communication system between onsite and offsite personnel will be established to coordinate emergency response, report to the Project Manager, and maintain contact with essential off-Site personnel. A field cellphone will be available at all times to the HSO. In addition, onsite workers' cellphones will be identified prior to the commencement of onsite operations.

General Safe Work Practices

Standing orders applicable during Site operations are as follows:

- No smoking, eating, drinking, or application of cosmetics in the work zone.
- No matches or lighters in the work zone.
- All Site workers will enter/exit work zone through the Site access point.
- Any signs of contamination, radioactivity, explosivity, or unusual conditions will require evacuating the Site immediately and reporting the information to the HSO.
- Loose-fitting clothing and loose long hair will be prohibited in the work zone during heavy equipment operations.
- A signal person will direct the backing of work vehicles.
- Equipment operators will be instructed to check equipment for abnormalities such as oozing liquids, frayed cables, unusual odors, etc.

C.1.7 Personnel Training Requirements

All FPM personnel and contractor personnel will receive adequate training prior to entering the Site. FPM and contractor personnel will, at a minimum, have completed OSHA-approved, 40-hour hazardous materials Site safety training and OSHA-approved, eight-hour safety refresher course within one year prior to commencing field work. In addition, each worker must have a minimum of three days field experience under the direct supervision of a trained, experienced supervisor.

Prior to Site field work, the HSO will conduct an in-house review of the project with respect to health and safety with all FPM personnel who will be involved with field work at the Site. The review will include discussions of signs and symptoms of chemical exposure and heat/cold stress that indicate potential medical emergencies. In addition, review of PPE will be conducted to include the proper use of air-purifying respirators.

C.1.8 Medical Surveillance Program

All workers at the Site must participate in a medical surveillance program in accordance with 29 CFR 1910.120. A medical examination and consultation must have been performed within the last twelve months to be eligible for field work.

The content of the examination and consultation will include a medical and work history with special emphasis on symptoms related to the handling of hazardous substances, health hazards, and fitness for duty including the ability to wear required personal protective equipment under conditions (i.e., temperature extremes) that may be expected at the work Site.

All medical examinations and procedures shall be performed by, or under the supervision of, a licensed physician. The Physician shall furnish a written opinion containing:

- The results of the medical examination and tests;
- The physician's opinion as to whether the employee has any detected medical conditions which would place the worker at increased risk of material impairment of the employee's health from work in hazardous waste operations;
- The physician's recommended limitations upon the worker assigned to the work; and
- A statement that the worker has been informed by the physician of the results of the medical examination and any further examination or treatment.
- An accurate record of the medical surveillance will be retained. The record will consist of at least the following information:
- The name and social security number of the employee;
- The physician's written opinions, recommended limitations, and results of examinations and tests; and
- Any worker medical complaints related to exposure to hazardous substances.

C.1.9 Personal Protective Equipment

General Considerations

The two basic objectives of the personal protective equipment (PPE) are to protect the wearer from safety and health hazards, and to prevent the wearer from incorrect use and/or malfunction of the PPE.

Potential Site hazards have been discussed previously in Section C.1.6. The duration of Site activities is estimated to be periods of several days. All work is expected to be performed during daylight hours and workdays, in general, are expected to be eight to ten hours in duration. Any work performed beyond daylight hours will require the permission of the HSO. This decision will be based on the adequacy of artificial illumination and the type and necessity of the task being performed.

Personal protection levels for the Site activities, based on past investigations at the Site, are anticipated to be Level D with the possibility of upgrading to Level C. The equipment included for each level of protection is provided as follows:

Level C Protection

Level C personnel protective equipment includes:

- Air-purifying respirator, full-face
- Chemical-resistant clothing includes: Tyvek^{tm} (spunbonded olefin fibers) for particulate and limited splash protection or Saranex^{tm} (plastic film-laminated Tyvek) for permeation resistance to solvents.
- Coveralls*, or
- Long cotton underwear*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), leather or chemical-resistant, steel toe and shank
- Boot covers (outer), chemical-resistant (disposable)*
- Hard hat (face shield)*
- Escape mask*
- 2-way radio communications (inherently safe)*

(*) optional

Meeting all of these criteria permits use of Level C protection:

- Oxygen concentrations are not less than 19.5% by volume.
- Measured air concentrations of identified substances will be reduced by the respirator below the substance's threshold limit value (TLV).
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.
- Job functions do not require self-contained breathing apparatus.
- Direct readings are below 50 ppm on the PID.

Level D Protection

Personnel protective equipment:

- Coveralls
- Gloves*
- Boots/shoes, leather or chemical-resistant, steel toe and shank
- Safety glasses or chemical splash goggles*
- Hard hat (face shield*)
- Escape mask*

(*) optional

Meeting any of these criteria allows use of Level D protection:

- No contaminant levels above 5 ppm organic vapors or dusty conditions are present.
- Work functions preclude splashes, immersion, or the reasonable potential for unexpected inhalation of any chemicals above the TLV.

Additional Considerations for Selecting Levels of Protection

Other factors that will be considered in selecting the appropriate level of protection are heat and physical stress. The use of protective clothing and respirators increases physical stress, in particular, heat stress on the wearer. Chemical protective clothing greatly reduces natural ventilation and diminishes the body's ability to regulate its temperature. Even in moderate ambient temperatures, the diminished capacity of the body to dissipate heat can result in one or more heat-related problems.

All chemical protective garments can be a contributing factor to heat stress. Greater susceptibility to heat stress occurs when protective clothing requires the use of a tightly-fitted hood against the respirator face piece, or when gloves or boots are taped to the suit. As more body area is covered, less cooling takes place, increasing the probability of heat stress.

Wearing protective equipment also increases the risk of accidents. It is heavy, cumbersome, decreases dexterity, agility, interferes with vision, and is fatiguing to wear. These factors all increase physical stress and the potential for accidents. In particular, the necessity of selecting a level of protection will be balanced against the increased probability of heat stress and accidents.

Donning and Doffing Ensembles

- Donning an Ensemble

A routine will be established and practiced periodically for donning a Level C ensemble. Assistance may be provided for donning and doffing since these operations are difficult to perform alone. Table C.1.9.1 lists sample procedures for donning a Level C ensemble. These procedures should be modified depending on the particular type of suit and/or when extra gloves and/or boots are used.

TABLE C.1.9.1
SAMPLE LEVEL C DONNING PROCEDURES

1. Inspect the clothing and respiratory equipment before donning (see Inspection in subsection C.1.7).

2. Adjust hard hat or headpiece if worn, to fit user's head.

3. Standing or sitting, step into the legs of the suit; ensure proper placement of the feet within the suit; then gather the suit around the waist.

4. Put on chemical-resistant safety boots over the feet of the suit. Tape the leg cuff over the tops of the boots.

5. Don the respirator and adjust it to be secure, but comfortable.

6. Perform negative and positive respirator facepiece seal test procedures.

   – To conduct a negative pressure test, close the inlet part with the palm of the hand or squeeze the breathing tube so it does not pass air, and gently inhale for about 10 seconds. Any inward rushing of air indicates a poor fit. Note that a leaking facepiece may be drawn tightly to the face to form a good seal, giving a false indication of adequate fit.

   – To conduct a positive pressure test, gently exhale while covering the exhalation valve to ensure that a positive pressure can be built up. Failure to build a positive pressure indicates a poor fit.

7. Depending on type of suit:

   – Put on inner gloves (surgical gloves).

   – Additional overgloves, worn over attached suit gloves, may be donned later.

8. Put on hard hat

9. Have assistant observe the wearer for a period of time to ensure that the wearer is comfortable, psychologically stable, and that the equipment is functioning properly.

- <u>Doffing an Ensemble</u>

Exact procedures for removing Level C ensembles must be established and followed to prevent contaminant migration from the work area and transfer of contaminants to the wearer's body, the doffing assistant, and others. Doffing procedures are provided in Table C.1.9.2. These procedures should be performed only after decontamination of the suited worker. They require a suitably attired assistant. Throughout the procedures, both worker and assistant should avoid any direct contact with the outside surface of the suit.

TABLE C.1.9.2
DOFFING PROCEDURES

1. Remove any extraneous or disposable clothing, boot covers, outer gloves, and tape.

2. Remove respirator by loosening straps and pulling straps over the top of the head and move mask away from head. Do not pull mask over the top of the head.

3. Remove arms, one at a time, from suit, avoiding any contact between the outside surface of the suit and wearer's body and lay the suit out flat behind the wearer. Leave internal gloves on, if any.

4. Sitting, if possible, remove both legs from the suit.

5. After suit is removed, remove internal gloves by rolling them off the hand, inside out.

Respirator Fit Testing

The fit or integrity of the facepiece-to-face seal of a respirator affects its performance. Most facepieces fit only a certain percentage of the population; thus, each facepiece must be tested on the potential wearer in order to ensure a tight seal. Facial features such as scars, hollow temples, very prominent cheekbones, deep skin creases, dentures or missing teeth, and the chewing of gum and tobacco may interfere with the respirator-to-face seal. A respirator shall not be worn when such conditions prevent a good seal. The worker's diligence in observing these factors shall be evaluated by periodic checks. Fit testing will comply with 29 CFR 1910.1025 regulations.

Inspection

The PPE inspection program will entail five different inspections:

- Inspection and operational testing of equipment received from the factory or distributor;
- Inspection of equipment as it is issued to workers;
- Inspection after use;
- Periodic inspection of stored equipment; and
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

The inspection checklist is provided in Table C.1.9.3. Records will be kept of all inspection procedures. Individual identification numbers will be assigned to all reusable pieces of equipment and records should be maintained by that number. At a minimum, each inspection should record the ID number, date, inspector, and any unusual conditions or findings. Periodic review of these records may indicate an item or type of item with excessive maintenance costs or a particularly high level of down-time.

TABLE C.1.9.3
PPE INSPECTION CHECKLIST

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for imperfect seams, non-uniform coatings, tears, and/or malfunctioning closures.
- Hold up to light and check for pinholes.
- Flex product and observe for cracks or other signs of deterioration.
- If the product has been used previously, inspect inside and out for signs of chemical attack, including discoloration, swelling, and/or stiffness.

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- Indication of physical damage, including closure failure, tears, punctures, and/or seam discontinuities.

GLOVES

Before use:

- Pressurize glove to check for pinholes. Either blow into glove, then roll gauntlet toward fingers, or inflate glove and hold under water. In either case, no air should escape.

AIR-PURIFYING RESPIRATORS

- Inspect air-purifying respirators before each use to be sure they have been adequately cleaned.
- Check material conditions for signs of pliability, deterioration, and/or distortion.
- Examine cartridges to ensure that they are the proper type for the intended use, the expiration date has not been passed, and they have not been opened or used previously.
- Check faceshields and lenses for cracks, crazing, and/or fogginess.
- Air-purifying respirators will be stored individually in resealable plastic bags.

Storage

Clothing and respirators will be stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact. Storage procedures are as follows:

- Clothing: Potentially-contaminated clothing will be stored in a well-ventilated area separate from street clothing, with good air flow around each item, if possible. Different types and materials of clothing and gloves will be stored separately to prevent issuing the wrong materials by mistake, and protective clothing will be folded or hung in accordance with manufacturer's recommendations.

- Respirators: After each use air-purifying respirators will be dismantled, washed, and placed in sealed plastic bags.

PPE Maintenance

Specialized PPE maintenance will be performed only by the factory or an authorized repair person. Routine maintenance, such as cleaning, will be performed by the personnel to whom the equipment is assigned. Respirators will be cleaned at the end of each day with alcohol pads or, preferably, by washing with warm soapy water.

Decontamination Methods

All personnel, clothing, equipment, and samples leaving the work zone area of the Site must be decontaminated to remove any harmful chemicals that may have adhered to them. Decontamination methods either (1) physically remove contaminants (2) inactivate contaminants by chemical detoxification or disinfection/sterilization, or (3) remove contaminants by a combination of both physical and chemical means. In many cases, gross contamination can be removed by physical means involving dislodging/displacement, rinsing, wiping off, and evaporation. Contaminants that can be removed by physical means include dust, vapors, and volatile liquids. All reusable equipment will be decontaminated by rinsing in a bath of detergent and water (respirators, gloves to be reused). Monitoring equipment will be decontaminated by wiping with paper towels and water. All used PPE to be discarded will be disposed offsite as solid waste.

The effectiveness of the decontamination will be evaluated near the beginning of Site activities and will be modified if determined to be ineffective. Visual observation will be used for this purpose. The HSO will inspect decontaminated materials for discoloration, stains, corrosive effects, visible dirt, or other signs of possible residual contamination.

C.2 Community Air Monitoring Plan

This Community Air Monitoring Plan (CAMP) will be implemented at the Site by FPM during the intrusive investigation activities, including soil borings, well installation, vapor implant installation, and sampling. Due to the nature of the VOCs in soil vapor at the Site, there is a potential for organic vapor emissions as these activities occur. In addition, there is the potential for dust to be associated with intrusive activities. To address these concerns, organic vapor monitoring and dust monitoring will be performed.

Any CAMP monitoring results that exceed the action levels described below will be reported (or notice provided by another arrangement acceptable to the NYSDEC) when identified if a NYSDEC

representative is present at the Site or within two hours by phone call or email to the NYSDEC Project manager when no NYSDEC representative is onsite. Exceedances of the CAMP action levels will also be summarized in the monthly progress reports, including the duration of the exceedance(s) and any response actions taken.

C.2.1 Organic Vapor Monitoring

Under the CAMP, organic vapor concentrations will be monitored at the boundaries of the work zone. It will be the responsibility of the HSO to implement the plan and to ensure that proper action is taken in the event that any of the established action levels are exceeded.

To monitor organic vapors, a PID capable of calculating 15-minute running average concentrations will be used and maintained in good operating condition. Calibration of the PID will be performed according to manufacturer's instructions. Background levels of organic vapors will be measured at the work zone boundary prior to beginning work and upwind of the work area periodically using a PID. Monitoring may be performed more frequently at the discretion of the HSO. Organic vapors will be monitored continuously at the downwind perimeter of the work area during ground intrusive activities.

PID readings will be recorded in the field logbook for both background and work area perimeter. Logbook recordings will include the time, location, and PID readings observed. Downwind perimeter levels will be recorded in the log whenever the level reaches 5 ppm above the background along with the action(s) taken to mitigate the level. If the level of organic vapors exceeds 5 ppm above the background at the downwind perimeter of the work area, work activities will be halted and monitoring continued. The vapor emission response plan will then be implemented.

C.2.1.1 Vapor Emission Response Plan

The vapor emission response plan includes the following trigger levels and responses:

- Greater than 5 ppm at perimeter:

  In the event the level of organic vapors exceeds 5 ppm above the background at the downwind perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level then decreases to below 5 ppm above background, work activities can resume but organic vapor readings will be obtained more frequently as directed by the HSO.

- 5 ppm to 25 ppm at perimeter and less than 5 ppm at the work zone boundary:

  If the level of organic vapors is greater than 5 ppm but less than 25 ppm over background at the downwind perimeter of the work area, activities will be halted, the source of the vapors will be identified and corrective actions will be taken. Monitoring will be continued and activities will resume if the organic vapor concentration at half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background. More frequent intervals of monitoring will be performed as directed by the HSO.

- Above 25 ppm at perimeter:

  If the level of organic vapors is above 25 ppm at the perimeter of the work area, activities will be shut down. Should such a shutdown be necessary, downwind air monitoring will continue as directed by the HSO to confirm that organic vapor concentrations decrease. Actions will be taken to abate the source of vapor emissions and activities will not resume until the source is controlled.

C.2.1.2 Major Vapor Emission Response Plan

The Major Vapor Emission Response Plan shall automatically be placed into effect if:

- Efforts to abate the emission source are unsuccessful and levels above 5 ppm persist for more than 30 minutes in the 20-foot zone; or
- The vapor levels are greater than 10 ppm above background in the 20-foot zone.

Upon activation of the Major Vapor Emission Response Plan, the following activities will be undertaken:

- All emergency response contacts as listed in the HASP will be notified;
- Air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring will be halted or modified as directed by the HSO; or
- If air monitoring readings remain above action levels, work will be halted and further measures taken to reduce organic vapors.

If a Major Vapor Emission Response Plan is implemented, the NYSDEC and NYSDOH will be contacted within 24 hours.

C.2.2 Dust Monitoring

Dust (particulate) monitoring will be performed during intrusive activities with the potential to create dust by using a Miniram personal monitor calibrated according to the manufacturer's instructions. The Miniram will be capable of calculating 15-minute running average concentrations and operated continuously at the downwind perimeter of the work zone during ground intrusive activities. To ensure the validity of the fugitive dust measurements, appropriate QA/QC measures will be employed, including periodic instrument calibration, operator training, daily instrument performance (span) checks, and record-keeping on daily log sheets. If measurable dust levels are noted, then readings will also be obtained upwind of the work zone. If the downwind particulate level exceeds the upwind level by more than 100 micrograms per cubic meter (ug/m^3), then dust suppression techniques will be employed or work will be halted or controlled such that dust levels are reduced at the downwind perimeter to within 150 ug/m^3 of the upwind level.

If dust is generated during boring or installation activities, then dust suppression will be performed, as discussed in Section C.1.6 of this HASP. Corrective measures may include increasing the level of PPE for onsite personnel and implementing additional dust suppression techniques. Should the action level of 150 $\mu g/m^3$ continue to be exceeded, work will stop and the NYSDEC will be notified as described in Section C.2 above. The notification will include a description of the control measures implemented to prevent further exceedances.

Reasonable fugitive dust suppression techniques will be employed during all intrusive Site activities that may generate fugitive dust. Particulate (fugitive dust) monitoring will be employed during the handling of contaminated soil or when onsite activities may generate fugitive dust from exposed contaminated soil.

Fugitive dust from contaminated soil that migrates offsite has the potential for transporting contaminants offsite. Although there may be situations when the monitoring equipment does not

measure dust at or above the action level, visual observation may indicate that dust is leaving the Site. If dust is observed leaving the working area, additional dust suppression techniques will be employed.

The following techniques have been shown to be effective for controlling the generation and migration of dust during intrusive investigation activities and will be used as needed during investigation activities at the Site:

- Wetting equipment and exposed soil;
- Restricting vehicle speeds to 10 mph;
- Covering areas of exposed soil after investigation activity ceases; and
- Reducing the size and/or number of areas of exposed soil.

When techniques involving water application are used, care will be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will be considered to prevent overly wet conditions, conserve water, and provide an effective means of suppressing fugitive dust.

Evaluation of weather conditions is also necessary for proper fugitive dust control. When extreme wind conditions may make dust control ineffective, investigation actions may be suspended until wind speeds are reduced.

C.2.3 Noise Monitoring

Due to the use of heavy equipment, there is a potential for noise to impact the surrounding community. Work will be performed only during normal working hours when ambient noise levels are elevated due to ongoing activities in the surrounding community, which is primarily urban and commercial. Therefore, the potential for noise impacts on the surrounding community is low.

However, if pedestrians are present in the Site vicinity, it is possible for noise impacts to occur. To address these concerns and other safety concerns, pedestrians will be barred from entering the work zone. In addition, the HSO will periodically monitor noise levels at the work zone boundary and the closest property boundary with a Realistic^{tm} hand-held sound level meter. Noise levels will be monitored in dBs in the A-weighted, slow-response mode. If noise level readings exceed an eight-hour time-weighted average of 85 dB at the work zone boundary or at the closest property boundary, the HSO will take appropriate measures to reduce noise exposure beyond these boundaries. These measures may include extension of the work zone boundary, issuing appropriate hearing protection devices as discussed in Section C.1.6 of this work plan, or other measures, as appropriate. In the event that the noise exposure measures are inadequate, work will cease until noise levels can be reduced to below 85 dB at the work zone boundary and/or at the closest property boundary.