REMEDIAL ACTION WORK PLAN

FOR

AMERICAN DRIVE-IN CLEANERS SITE
418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

NYSDEC SITE # 130186

PREPARED FOR

JOSAM ASSOCIATES, LLC

PREPARED BY

FPM group™

909 MARCONI AVENUE
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DECEMBER 2016

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REMEDIAL ACTION WORK PLAN

Prepared for

Facility: American Drive-In Cleaners Site
418 South Oyster Bay Road
Hicksville, New York
NYSDEC Site # 130186

FPM File No: 878-15-11

CERTIFICATION

I Kevin F. Loyst, PE certify that I am currently a NYS registered Professional Engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

NYS Registered Professional Engineer

Signature

Prepared by

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
ASP	Analytical Services Protocol
bgs	below grade surface
CAMP	Community Air Monitoring Plan
CoC	chain-of-custody
DUSR	Data Usability Summary Report
EC	Engineering Control
EDD	Electronic Data Deliverable
EIMS	Environmental Information Management System
ELAP	Environmental Laboratory Approval Program
FER	Final Engineering Report
FPM	FPM Engineering Group, P.C.
GPS	Global Positioning System
HASP	Health and Safety Plan
IC	Institutional Control
MS/MSD	Matrix spike/matrix spike duplicate
MSL	mean sea level
NYCRR	New York Code of Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
OM&M	Operation, Monitoring and Maintenance
Objective	Soil Cleanup Objective
OSHA	Occupational Safety and Health Administration
PCE	Tetrachloroethylene
PE	Professional Engineer
PID	Photoionization detector
PRR	Periodic Review Report
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCA	Recycled concrete aggregate
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS (CONTINUED)

RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROI	Radius of Influence
SC	Site Characterization
SCGs	Standards, criteria and guidance
SMP	Site Management Plan
Standards	Class GA Ambient Water Quality Standards
SVE	Soil vapor extraction
SVI	Soil vapor intrusion
SVOCs	semivolatile organic compounds
TCL	Target Compound List
ug/l	micrograms per liter
UIC	Underground Injection Control
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
VOC	volatile organic compound

SECTION 1.0
INTRODUCTION AND PURPOSE

This Remedial Action Work Plan (RAWP) has been prepared by FPM Group (FPM) for New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Disposal Site #130186, identified as the American Drive-In Cleaners Site located at 418 South Oyster Bay Road, Hicksville, New York 11801 (Site) in the Town of Oyster Bay in Nassau County. This RAWP was prepared to describe the remedial actions and provide the associated procedures to be implemented for the Site. The selected remedial actions are documented in the Record of Decision (ROD) for the Site, a copy of which is included in Appendix A.

The subject Site is located in a shopping plaza at the southwest intersection of South Oyster Bay Road and Woodbury Road and has been operated as a dry cleaner since 1956. The Site used tetrachloroethene (PCE) for dry cleaning until recently. The Site was identified in 2007 as a possible source of PCE that impacted Hicksville Water District well 11-1, located approximately one mile to the south. The NYSDEC subsequently conducted a Site Characterization (SC) study in 2008 and concluded that the Site was not the source of the PCE found in the Hicksville Water District well 11-1. During the SC study soil vapor and groundwater impacts were identified on and around the Site and the Site was subsequently listed by the NYSDEC as an Inactive Hazardous Waste Disposal Site (#130186). The NYSDEC, in its Inactive Hazardous Waste Disposal Report listing the Site, stated "American Drive-In Cleaners is not the source of the Hicksville well 11-1 contamination". A Remedial Investigation and Feasibility Study (RI/FS), which included additional site assessment activities, was completed in 2014; the previous site assessment, UIC closure, and investigation activities are documented in the RI/FS Report and are summarized in Section 2 herein. The RI also determined that the Site is not the source of contamination for Hicksville Water District well 11-1.

Detailed descriptions of the selected remedial actions are provided in Section 3. This section also includes information about the remedial action schedule, sampling activities, reporting, site management, and the institutional control (IC).

Supporting documents are included in the appendices. In addition to the ROD (Appendix A), these documents include a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) in Appendix B, a Quality Assurance Project Plan (QAPP) in Appendix C, and equipment and materials specifications in Appendix D.

SECTION 2.0
SITE BACKGROUND AND SELECTED REMEDIAL MEASURES

The Site description and environmental setting were described in the RI/FS Report and are presented below in summary form for reference. Investigations and floor drain closures conducted at the Site were documented in the RI/FS Report. A summary of the remaining identified impacts, together with the approved remedial measures, is provided below. The standards, criteria, and guidance (SCGs) applicable to remedial activities at this Site are also summarized in this section. A summary of green remediation principles applicable to remedial activities at this Site is also presented.

2.1 Site Description

The subject Site is owned by Josam Associates LLC and is located in the northern-most retail unit within a shopping plaza at the southwest intersection of South Oyster Bay Road and Woodbury Road. The Site retail unit occupies approximately 4,023 square feet, was initially developed in 1956, and has operated as a dry cleaner since that time. The Site used PCE for dry cleaning until recently, when the dry cleaning operation was converted to use DF-2000, a synthetic hydrocarbon fluid.

The Site is bounded to the west by a driveway associated with the shopping plaza. A residential area is present further to the west. Additional retail units associated with the shopping plaza adjoin the Site to the south. A residential area is present to the south of the shopping plaza. The parking lot of the shopping plaza adjoins the Site to the east. Further to the east, across South Oyster Bay Road, another retail shopping plaza is present. Retail uses are also present further to the northeast, across Woodbury Road. A parking area and driveway associated with the shopping plaza are present to the north of the Site. A residential area is present further to the north, across Woodbury Road. A Site area map showing the Site and vicinity is presented in Figure 2.1.1. A plan of the Site and surrounding vicinity is included as Figure 2.1.2.

In 1995 two floor drains (Class V Underground Injection Control, or UIC, structures) inside of the Site unit underwent closure overseen by the Nassau County Department of Health (NCDOH) and US Environmental Protection Agency (USEPA). Impacted materials were removed from both drains and a soil boring was subsequently performed through one drain. PCE levels in soil were found to significantly decrease by 12 feet below grade and the USEPA subsequently approved the completed closure. Additional information concerning the UIC closure is presented in Section 2.1 of the RI/FS for the Site.

The Site was designated as a “P” Site, or potential Inactive Hazardous Waste Disposal site (site no. 130186) on December 27, 2007 after its identification through a records search as a possible source of PCE that impacted Hicksville Water District well 11-1, located approximately one mile to the south. The NYSDEC subsequently conducted an SC study in 2008 that included soil, soil vapor, and groundwater sampling on the Site and surrounding property. Based on the results of this study it was concluded by the NYSDEC that the Site was not the source of the PCE found in the Hicksville Water District well 11-1. This conclusion was confirmed in the RI for the Site.

During the SC study soil vapor and groundwater impacts were identified on and around the Site. The Site was subsequently listed by the NYSDEC as an Inactive Hazardous Waste Disposal Site (#130186) on November 23, 2009. An RI/FS, which included additional site assessment activities, was completed in 2014 under Order on Consent Index # A1-0616-01-09. The previous site assessment, UIC closure, and investigation activities are documented in the RI/FS Report and are summarized below.

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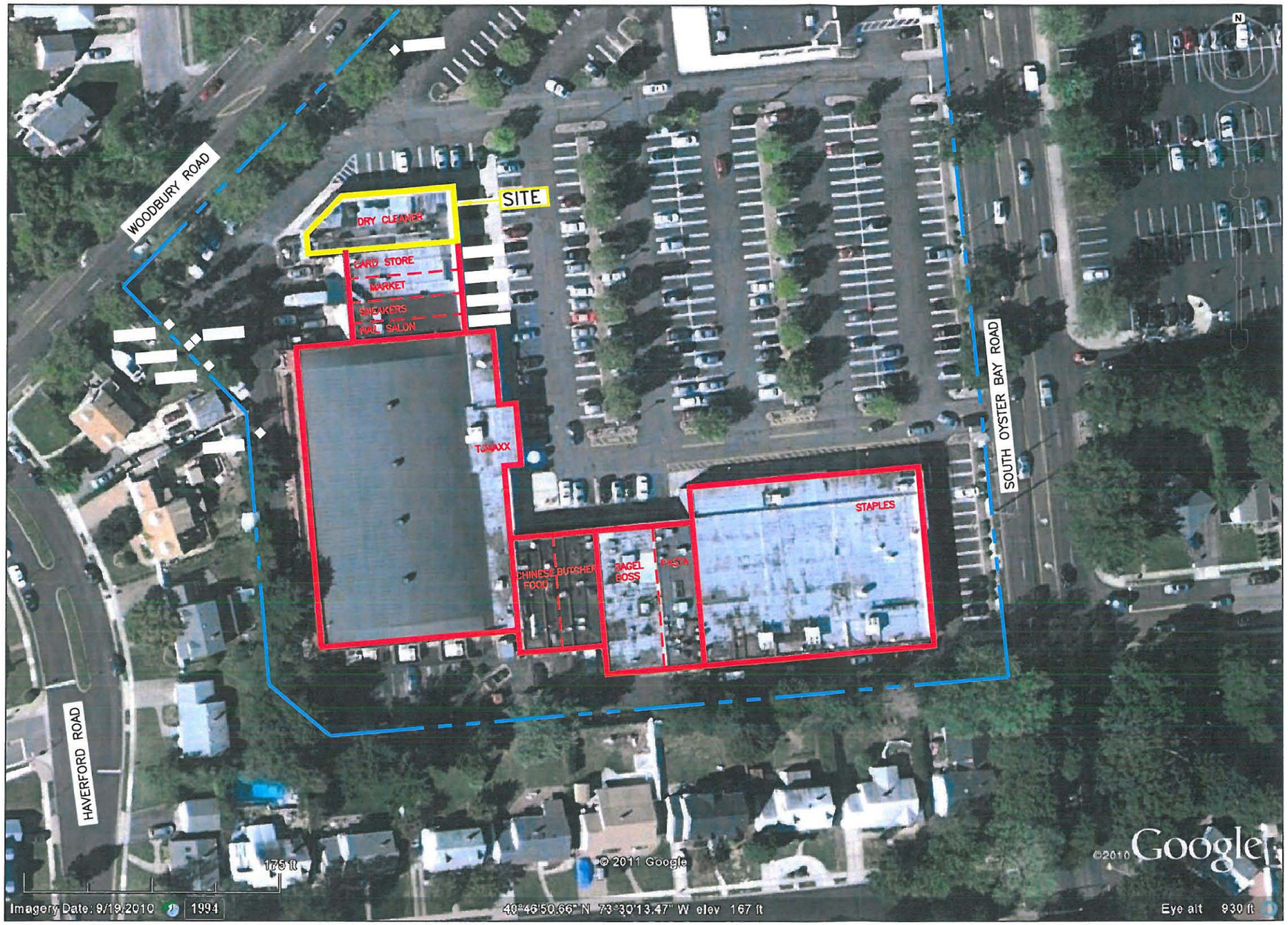
FIGURE 2.1.1

SITE AREA MAP
AMERICAN DRIVE-IN CLEANERS SITE
418 SOUTH OYSTER BAY ROAD,
HICKSVILLE, NEW YORK

Drawn by: TAC	Checked By: SOD	Date: 6/24/15



APPROXIMATE SCALE: 0 25' 50' 100'

LEGEND:

- SHOPPING CENTER BOUNDARY
- FOUNDATION
- PARTITION WALL
- SITE

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FIGURE 2.1.2
SITE & SURROUNDING VICINITY PLAN

418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

Drawn By: H.C.	Checked By: S.D.	Date: 12/8/15

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2.2 Environmental Setting

The surface topography of the Site and surrounding vicinity was obtained from the USGS Hicksville, New York Quadrangle (1967, photorevised 1979) and is approximately 170 feet above mean sea level (MSL), as shown in Figure 2.1.1. The regional water table elevation in the Site vicinity is somewhat greater than 80 feet above mean sea level (MSL) and the regional groundwater flow direction beneath the Site is to the south-southeast (U.S. Geological Survey, 2001). Therefore, the depth to groundwater beneath the Site is approximately 90 feet. This is generally consistent with information obtained during the SC and RI. Based on the RI data, groundwater in the Site vicinity flows primarily in a southerly direction, with the shallow groundwater primarily flowing in a south-southwest direction and the deeper groundwater flowing in a more southeasterly direction.

No natural surface water bodies are present within one-half mile of the Site. Several stormwater recharge basins are located within one-half mile of the Site. The topographic contours in the Site vicinity do not suggest that overland stormwater flow occurs from the Site to any of the recharge basins.

The Site is underlain by Upper Glacial Formation sand and gravel outwash plain deposits (USGS, 1966). The Magothy Formation, consisting of interbedded sands and clays, is present below the Upper Glacial Formation. Groundwater is found within the lower part of the Upper Glacial Formation and within the Magothy Formation in the Site vicinity.

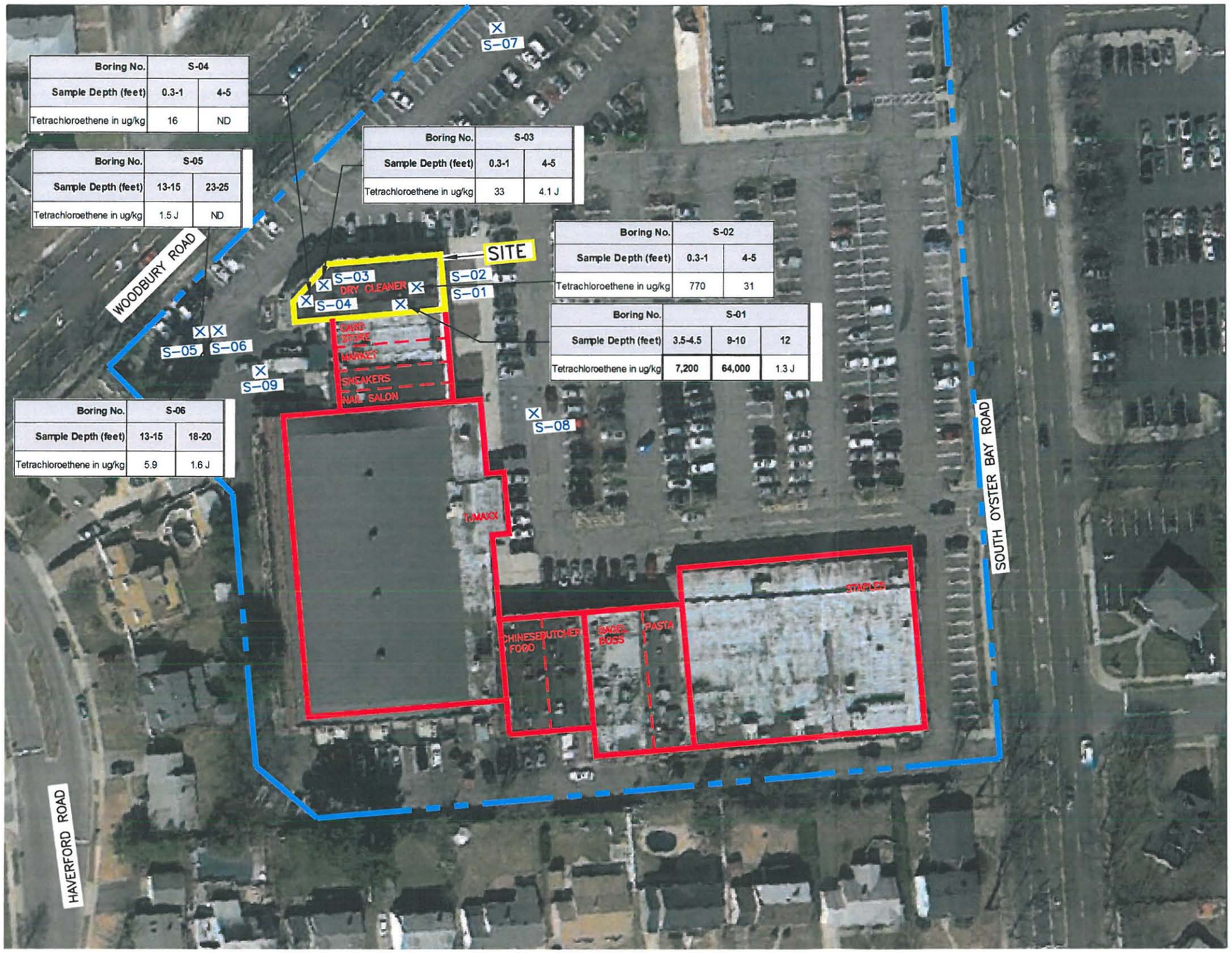
2.3 Summary of Identified Impacts and Selected Remedial Measures

The Site has been investigated on several occasions and closure has been performed on two interior floor drains (UICs). The investigations and closures have been documented in detail elsewhere, including the RI/FS Report where the nature and extent of remaining impacts were defined such that potential remedial measures could be evaluated. The following summarizes the identified impacts and the remedial measures, as articulated in the ROD.

2.3.1 Soil

Floor drains FD-3 and FD-4 were formerly present in the dry cleaning tenant space (Site); these drains were previously remediated, although residual impacts remained present. As shown in Figure 2.3.1.1, one VOC, PCE, was identified in soil at boring S-01 in the former FD-3/FD-4 area at concentrations above its NYSDEC Soil Cleanup Objective (Objective) for unrestricted use in the interval between 3.5 and 10 feet below grade surface (bgs). These detections did not exceed the NYSDEC Objective for commercial use. No other exceedances of the NYSDEC Objectives were noted either below this depth or in samples from any of the other boring locations within the Site. These results are consistent with previous soil sampling results, which showed impacts only in the FD-3/FD-4 area. It was concluded that PCE-impacted soil is present only at the former FD-3/FD-4 area at the Site and extends from just below grade to a depth of between 10 and 12 feet below grade. This area is completely covered by the concrete slab of the Site.

Soil vapor extraction (SVE) has been selected as the remedy for the PCE-impacted soil in the FD-3/FD-4 area. SVE will physically remove the VOCs from the soil and will also provide protection from soil vapor intrusion (see below) for the Site and a portion of the adjoining shopping center. Operation of the SVE system is also anticipated to result in an improvement in groundwater quality as the source of the groundwater contamination will be remediated. SVE operation is also likely to result in improved soil vapor conditions over time at more distant portions of the shopping center. The existing Site cover (building slab) will be maintained as an engineering control (EC). The cover may be required to be continued following completion of other selected remedial measures, if soils exceeding levels that allow for commercial use are found to be present.



APPROXIMATE SCALE: 0 25' 50' 100'

LEGEND:

- S-2 — SOIL SAMPLING LOCATION
- PROPERTY BOUNDARY
- FOUNDATION
- PARTITION WALL
- SITE

NOTE: SOIL RESULTS SHOWN EXCEED NYSDEC OBJECTIVES FOR UNRESTRICTED USE

ALL VALUES SHOWN FOR TETRACHLOROETHENE

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FIGURE 2.3.1.1
SOIL SAMPLING LOCATIONS AND RESULTS
418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

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2.3.2 Groundwater

Chlorinated VOCs found to be associated with the Site include PCE, cis- and trans-1,2-dichloroethylene (1,2-DCE), and trichloroethylene (TCE). Collectively these are referenced as Site-related CVOCs. Site-related CVOCs exceeding NYSDEC Class GA Ambient Water Quality Standards (Standards) are present in shallow monitoring wells MW-4, MW-5 and MW-7, piezometers PZ-2 and PZ-4, and deep wells MW-4D and MW-5D, as shown on Figure 2.3.2.1. The highest concentrations of CVOCs during the RI (highest CVOC was PCE at 130 ug/l in MW-4) were noted at the shallow wells in closest proximity to the Site. These impacts appear to be limited to the area immediately surrounding and downgradient of the Site. Lower CVOC concentrations were observed at wells MW-7, PZ-2 and PZ-4, which are located somewhat further from the Site. Groundwater further downgradient and crossgradient at wells MW-1, MW-3, and MW-6 and piezometer PZ-1 (located on the perimeter of the shopping center property) is not impacted with chlorinated VOCs. Upgradient groundwater at MW-2, MW-2D and PZ-3 is not impacted.

The groundwater data from the deeper wells showed similar CVOC detections as the shallow wells at the same location, but at lower levels than the shallow wells. Specifically, there were no VOC detections at either MW-2 or MW-2D; PCE and 1,2-DCE were found in wells MW-4 and MW-4D, with lower levels in MW-4D; and PCE, 1,2-DCE, and TCE were found in wells MW-5 and MW-5D, with lower levels in MW-5D. These data demonstrate that the CVOC concentrations decrease downward in the groundwater, which is consistent with the relatively low levels of CVOCs detected in the shallow groundwater. These data are also consistent with the soil data, which show PCE-impacted soil (above unrestricted use and groundwater protection Objectives, but not above the Commercial Use Objectives) limited to one location beneath the Site, and the absence of source soil at depth.

Overall, the impacted groundwater associated with the Site is limited to the proximity of the Site at wells MW-4/4D and MW-5/5D and extends at lower concentrations to the vicinity of well MW-7 and piezometers PZ-2 and PZ-4. The CVOC impacts decrease downward within the saturated zone. No CVOC impacts exceeding NYSDEC Standards are found near the perimeter of the shopping center property at the MW-1, MW-2, MW-2D, MW-3, MW-6, or PZ-1 locations and no migration away from the shopping center property is apparent. Groundwater receptors are not present in the Site vicinity and the depth to groundwater is about 90 feet, well below a depth at may be contacted during normal Site use or potential construction operations.

The remedial measures include a provision to restrict the use of groundwater at the Site unless it is treated to render it suitable for the proposed use. This restriction will be implemented via the institutional control (IC) of an environmental easement and compliance will be confirmed through periodic inspection and reporting under the Site Management Plan (SMP). Groundwater monitoring will also be performed to document remedial progress.

2.3.3 Soil Vapor, Sub-Slab Soil Vapor and Indoor Air

Soil vapor, indoor air, and sub-slab vapor sampling were performed in proximity to the Site and in tenant spaces in the shopping plaza during the RI. The RI sampling results for chlorinated VOCs, which are the constituents of concern for the Site, are summarized on Figure 2.3.3.1. In general, CVOCs were present in sub-slab soil vapor beneath all of the shopping center units sampled at concentrations for which NYSDOH guidance indicates that mitigation is an appropriate response due to the potential for soil vapor intrusion (SVI). In general, the concentrations of CVOCs decreased with distance from the Site, with the highest concentrations generally found beneath the four shopping center units in closest proximity to the Site.

Well Number	MW-5	
Screen Interval	85-100 ft bg	
Sample Date	7/23/08	7/22/10
cis-1,2-Dichloroethene	82.0	85
Tetrachloroethene	99.0	74
Trichloroethene	17.0	23
trans-1,2-Dichloroethene	ND	7.3

Well Number	MW-5D
Screen Interval	98-100 ft bg
Sample Date	7/22/10
cis-1,2-Dichloroethene	25
Tetrachloroethene	42
Trichloroethene	12

Well Number	MW-2D
Screen Interval	95-100 ft bg
Sample Date	7/21/10
Tetrachloroethene	ND

Well Number	MW-2
Screen Interval	85-100 ft bg
Sample Date	7/23/08 and 7/22/10
Tetrachloroethene	ND

Well Number	PZ-4
Screen Interval	85-95 ft bg
Sample Date	8/2/10
cis-1,2-Dichloroethene	28
Tetrachloroethene	32
Trichloroethene	11

Well Number	MW-4	
Screen Interval	85-100 ft bg	
Sample Date	7/22/08	8/2/10
cis-1,2-Dichloroethene	18.0	7.6
Tetrachloroethene	160	130
Trichloroethene	12.0	8.8

Well Number	MW-4D
Screen Interval	98-100 ft bg
Sample Date	7/21/10
cis-1,2-Dichloroethene	6.0
Tetrachloroethene	52

Well Number	PZ-1
Screen Interval	90-100 ft bg
Sample Date	8/2/10
Tetrachloroethene	1.5 J

Well Number	MW-7
Screen Interval	80-90 ft bg
Sample Date	7/21/10
Tetrachloroethene	23

Well Number	MW-6
Screen Interval	85-100 ft bg
Sample Date	7/22/08 and 7/21/10
Tetrachloroethene	ND

Well Number	PZ-2
Screen Interval	85-95 ft bg
Sample Date	7/22/10
cis-1,2-Dichloroethene	6.6
Tetrachloroethene	7.3

Well Number	MW-1
Screen Interval	85-100 ft bg
Sample Date	7/23/08 and 7/22/10
Tetrachloroethene	ND

Well Number	MW-3	
Screen Interval	85-100 ft bg	
Sample Date	7/23/08	8/2/10
Methylene chloride	ND	13 JB
Tetrachloroethene	ND	ND
Toluene	ND	640

LEGEND:

PZ-01 PIEZOMETER LOCATION

MW-01 MONITORING WELL LOCATION

SITE

NOTE: VALUES SHOWN EXCEED NYSDEC CLASS GA AMBIENT WATER QUALITY STANDARDS.

ALL VALUES SHOWN FOR TETRACHLOROETHENE

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FIGURE 2.3.2.1
GROUNDWATER SAMPLE LOCATIONS AND RESULTS
AMERICAN DRIVE-IN CLEANERS
HICKSVILLE, NEW YORK

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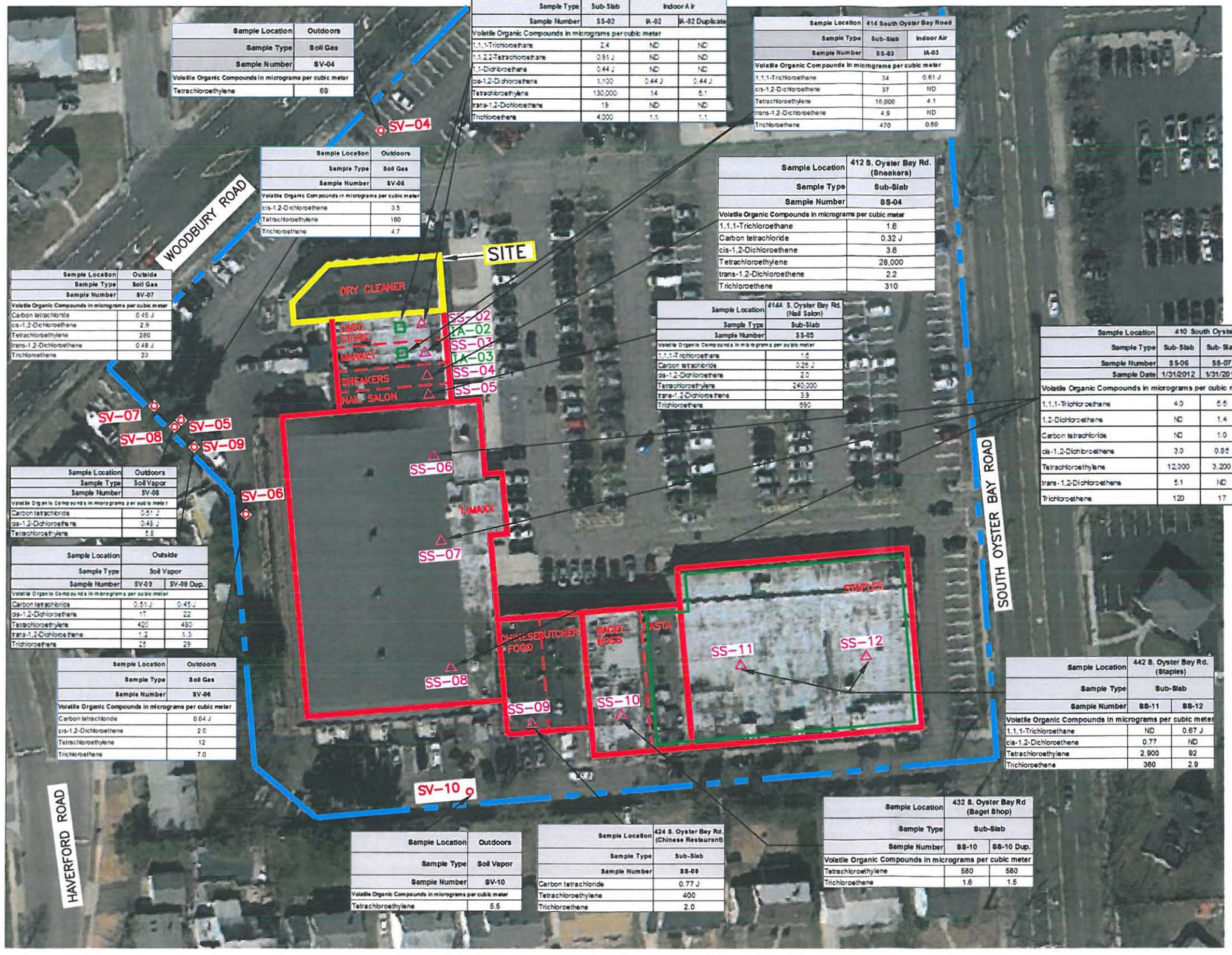

Sample Location	Outdoors
Sample Type	Soil Gas
Sample Number	SV-04
Volatile Organic Compounds in micrograms per cubic meter	
Tetrachloroethylene	69

Sample Location	Outdoors
Sample Type	Soil Gas
Sample Number	SV-05
Volatile Organic Compounds in micrograms per cubic meter	
cis-1,2-Dichloroethene	3.5
Tetrachloroethylene	160
Trichloroethene	4.7

Sample Location	Outside
Sample Type	Soil Gas
Sample Number	SV-07
Volatile Organic Compounds in micrograms per cubic meter	
Carbon tetrachloride	0.45 J
cis-1,2-Dichloroethene	2.9
Tetrachloroethylene	280
trans-1,2-Dichloroethene	0.48 J
Trichloroethene	23

Sample Location	Outdoors
Sample Type	Soil Vapor
Sample Number	SV-08
Volatile Organic Compounds in micrograms per cubic meter	
Carbon tetrachloride	0.51 J
cis-1,2-Dichloroethene	0.48 J
Tetrachloroethylene	5.8

Sample Location	Outside	
Sample Type	Soil Vapor	
Sample Number	SV-09	SV-09 Dup.
Volatile Organic Compounds in micrograms per cubic meter		
Carbon tetrachloride	0.51 J	0.45 J
cis-1,2-Dichloroethene	17	22
Tetrachloroethylene	420	480
trans-1,2-Dichloroethene	1.2	1.3
Trichloroethene	25	29

Sample Location	Outdoors
Sample Type	Soil Gas
Sample Number	SV-06
Volatile Organic Compounds in micrograms per cubic meter	
Carbon tetrachloride	0.64 J
cis-1,2-Dichloroethene	2.0
Tetrachloroethylene	12
Trichloroethene	7.0

Sample Location	Outdoors
Sample Type	Soil Vapor
Sample Number	SV-10
Volatile Organic Compounds in micrograms per cubic meter	
Tetrachloroethylene	5.5

Sample Location	416 South Oyster Bay Road		
Sample Type	Sub-Slab	Indoor Air	
Sample Number	SS-02	IA-02	IA-02 Duplicate
Volatile Organic Compounds in micrograms per cubic meter			
1,1,1-Trichloroethane	2.4	ND	ND
1,1,2,2-Tetrachloroethane	0.91 J	ND	ND
1,1-Dichloroethene	0.44 J	ND	ND
cis-1,2-Dichloroethene	1,100	0.44 J	0.44 J
Tetrachloroethylene	130,000	14	8.1
trans-1,2-Dichloroethene	19	ND	ND
Trichloroethene	4,000	1.1	1.1

Sample Location	414 South Oyster Bay Road	
Sample Type	Sub-Slab	Indoor Air
Sample Number	SS-03	IA-03
Volatile Organic Compounds in micrograms per cubic meter		
1,1,1-Trichloroethane	34	0.61 J
cis-1,2-Dichloroethene	37	ND
Tetrachloroethylene	16,000	4.1
trans-1,2-Dichloroethene	4.9	ND
Trichloroethene	470	0.60

Sample Location	412 S. Oyster Bay Rd. (Sneakers)
Sample Type	Sub-Slab
Sample Number	SS-04
Volatile Organic Compounds in micrograms per cubic meter	
1,1,1-Trichloroethane	1.6
Carbon tetrachloride	0.32 J
cis-1,2-Dichloroethene	3.6
Tetrachloroethylene	28,000
trans-1,2-Dichloroethene	2.2
Trichloroethene	310

Sample Location	414A S. Oyster Bay Rd. (Nail Salon)
Sample Type	Sub-Slab
Sample Number	SS-05
Volatile Organic Compounds in micrograms per cubic meter	
1,1,1-Trichloroethane	1.6
Carbon tetrachloride	0.26 J
cis-1,2-Dichloroethene	2.0
Tetrachloroethylene	240,000
trans-1,2-Dichloroethene	3.5
Trichloroethene	690

Sample Location	410 South Oyster Bay Road (TJ Maxx)			
Sample Type	Sub-Slab	Sub-Slab	Sub-Slab	
Sample Number	SS-06	SS-07	SS-08	SS-08 Dup.
Sample Date	1/31/2012	1/31/2012	1/31/2012	1/31/2012
Volatile Organic Compounds in micrograms per cubic meter				
1,1,1-Trichloroethane	4.0	5.5	4.7	5.1
1,2-Dichloroethane	ND	1.4	ND	ND
Carbon tetrachloride	ND	1.0	ND	ND
cis-1,2-Dichloroethene	3.0	0.85	ND	ND
Tetrachloroethylene	12,000	3,200	2,000	2,500
trans-1,2-Dichloroethene	5.1	ND	ND	ND
Trichloroethene	120	17	1.1	ND

Sample Location	442 S. Oyster Bay Rd. (Staples)	
Sample Type	Sub-Slab	
Sample Number	SS-11	SS-12
Volatile Organic Compounds in micrograms per cubic meter		
1,1,1-Trichloroethane	ND	0.67 J
cis-1,2-Dichloroethene	0.77	ND
Tetrachloroethylene	2,900	92
Trichloroethene	360	2.9

Sample Location	424 S. Oyster Bay Rd. (Chinese Restaurant)
Sample Type	Sub-Slab
Sample Number	SS-09
Carbon tetrachloride	0.77 J
Tetrachloroethylene	400
Trichloroethene	2.0

Sample Location	432 S. Oyster Bay Rd (Bagel Shop)	
Sample Type	Sub-Slab	
Sample Number	SS-10	SS-10 Dup.
Volatile Organic Compounds in micrograms per cubic meter		
Tetrachloroethylene	580	580
Trichloroethene	1.6	1.5

LEGEND:

- SV-06 — SOIL VAPOR POINT LOCATION
- SS-02 — SUB-SLAB VAPOR POINT LOCATION
- IA-02 — INDOOR AIR SAMPLE
- PROPERTY BOUNDARY
- FOUNDATION
- PARTITION WALL
- SITE
- UNDERLAIN BY BASEMENT

NOTE: RESULTS ARE SHOWN FOR CHLORINATED VOCs.

APPROXIMATE SCALE: 0 25' 50' 100'

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FIGURE 2.3.3.1
AIR/VAPOR SAMPLING LOCATIONS AND CHLORINATED VOC RESULTS
418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

Drawn By: H.C. | Checked By: S.D. | Date: 4/16/15

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Soil vapor sampling was also performed at several locations in proximity and downgradient of the Site during the RI. In general, PCE levels in soil vapor were generally observed to decrease significantly away from the Site. Soil vapor sampling to the south of the shopping center building and generally downgradient of the Site showed little potential for impacting sub-slab vapor and indoor air beyond the southern edge of the shopping center property. Testing along the northwest shopping center perimeter near the Site indicated that somewhat higher levels of PCE are present in soil vapor in this area and have a greater potential for impacting sub-slab vapor and indoor air beyond the northwest edge of the property. The NYSDEC requested that offsite soil vapor sampling be conducted at the residence to the southwest of this area; however, the owner of this residence refused access for sampling in 2012. The selected remedy for the Site includes a SMP that will include a provision for conducting SVI sampling at this residence in the future if sampling is requested by the residence owner and the NYSDEC and NYSDOH concur that SVI testing is warranted.

Additional SVI testing was conducted in the shopping center units in November 2014 and February 2015 after the RI was completed; the results are documented in two data transmittals (April 30 and May 4, 2015). Building slab maintenance, including sealing of slab cracks and/or penetrations in several of the units, was performed between the two testing events to reduce the potential for SVI. The results from the additional testing indicate a continual improvement in sub-slab soil vapor conditions at the shopping center between 2010 and 2014/2015. Monitoring and/or mitigation were indicated for the three shopping center units in closest proximity to the site (416, 414 and 412 South Oyster Bay Road); these units are anticipated to be within the radius of influence of the SVE system to be implemented at this Site, which is anticipated to mitigate SVI concerns for these units. For the TJ Maxx unit the indicated responses range from “no further action” to “monitor/mitigate” and there were no exceedances of the NYSDOH Air Guideline Values. The samples from two units in the southern portion of the shopping center building indicated a “monitor” and/or “mitigate” response. Neither the sub-slab vapor nor indoor air levels of PCE or TCE were highly elevated in these units and there were no exceedances of the NYSDOH Air Guideline Values. The operation of the SVE system is anticipated to reduce sub-slab vapor levels beneath the shopping center property, including the area beneath TJ Maxx and the southern portion of the shopping center.

The selected remedy for this Site includes SVE, as described above, which is anticipated to provide protection from SVI for the shopping center units in closest proximity to the Site. Confirmation monitoring will be performed for the SVE system to confirm that the ROI includes the units near the Site for which mitigation is indicated. A cover system consisting of the building slab will be maintained as an EC to provide for protection from SVI. Building slab maintenance has been performed and will be continued, including inspections to confirm the continued integrity of the slab and identify additional maintenance needs. SVI monitoring will also be implemented under the SMP to provide for continued evaluation of soil vapor and indoor air conditions and to assist in documenting the progress of soil remediation.

2.3.4 Additional Controls

In addition to the above-described remedial measures, the Site will be subject to controls, including an institutional control (IC) in the form of an environmental easement and a Site Management Plan (SMP). These controls are summarized below and described in greater detail in Section 3.2.4.

- Environmental Easement

The ROD for the Site specifies that an IC in the form of an environmental easement will be imposed on the Site. The environmental easement will require periodic certification of the Site’s engineering controls (ECs) and IC, restrict the use of the property to commercial and industrial uses (subject to local

zoning laws), restrict the use of Site groundwater, and require compliance with a NYSDEC-approved SMP. This RAWP includes a description of the environmental easement to be implemented for this Site. The environmental easement will be implemented in conjunction with the Final Engineering Report (FER) to be submitted following implementation of the selected remedial measures.

- Site Management Plan

The ROD for the Site requires that an SMP be implemented for the Site. The SMP will include an Excavation Plan (in the event that future excavations are conducted in the area of remaining soil contamination), an Institutional and Engineering Control Plan, a Monitoring Plan, and an Operation and Maintenance (O&M) Plan. This RAWP includes a description of the SMP to be prepared for this Site (see Section 3.2.5). The SMP will be prepared during the implementation of the remedial measures and will be submitted to the NYSDEC together with the FER.

2.4 Remedial Goals

Chemical-specific remediation goals have been developed to define the area and volume of the impacted media to be addressed to meet the Remedial Action Objectives discussed in the section below. These remediation goals are based on the evaluation of Standards, Criteria and Guidance (SCGs), which are standards and criteria that are generally applicable, consistently applied, and officially promulgated. SCGs incorporate both the CERCLA concept of "applicable or relevant and appropriate requirements" (ARARs) and the EPA's "to be considered" category of non-enforceable criteria and guidance. These evaluations are used to determine contaminant levels that will not endanger human health or the environment.

The term "SCGs" as defined by the NYSDEC encompasses the terms "ARARs" and "criteria and guidelines". The term "ARARs" refers to a promulgated and legally enforceable rule or regulation. "Criteria and guidelines" refer to policy documents that are not promulgated and not legally enforceable. However, "criteria and guidelines" become enforceable if they are incorporated into an accepted Record of Decision (ROD). The NYSDEC term "SCGs" is used in this FS.

There are three types of SCGs that remedial actions may have to comply with:

- Chemical-specific SCGs set concentrations for the chemicals of concern (e.g., drinking water standards);
- Location-specific SCGs may restrict remedial actions based on the characteristics of the site or its environs (remedial activities proposed for wetlands may be restricted by regulations protecting these areas); and
- Action-specific SCGs may affect remediation activities based on the type of technology selected.

The following chemical-specific SCGs and guidelines have been identified for soil at the Site:

- Federal Resource Conservation and Recovery Act (RCRA) regulations establish regulatory levels for various contaminants to be utilized in the evaluation of whether a solid waste is a hazardous waste;

- The NYSDEC Part 375 Environmental Remediation Program and the associated CP-51 Soil Cleanup Guidance Policy provide guidance (Soil Cleanup Objectives) concerning remediation levels for contaminants in soil at the Site.

The following chemical-specific SCGs have been identified for groundwater at the Site:

- Federal Maximum Contaminant Levels (MCLs) established for groundwater protection (equivalent to the MCLs established pursuant to the Safe Drinking Water Act);

- NYSDEC Water Quality Regulations for Surface Waters and Groundwaters (6NYCRR Parts 700-705, revised January 17, 2008), established water quality standards for surface waters, groundwater, and effluent discharges.

The following chemical-specific guidelines have been identified for soil vapor/indoor air at the Site:

- The NYSDOH Guidance Document for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) provides guidance concerning remediation levels for various contaminants that may be present in indoor air and soil vapor at the Site;

- The NYSDEC's DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants establishes criteria used to evaluate air emissions associated with the remedial system to be installed at the Site.

One location-specific SCG was identified for the Site:

- The Safe Drinking Water Act is applicable due to the Site's location over a sole-source drinking water aquifer.

Several action-specific SCGs were identified for remedial activities at this Site:

- New York State regulations governing the transportation of non-hazardous and hazardous waste (6 NYCRR Part 374 – Waste Transporters), which govern how wastes that may be generated from the Site will be transported to the selected disposal facilities;

- NYSDEC regulations concerning discharge of emissions to the atmosphere (6 NYCRR Part 257 – Air Quality Standards and Division of Air Resources Air Guide 1), which will govern emissions from the SVE system;

- NYSDEC Division of Water Analytical Services Protocol (ASP), which includes chemical analytical procedures for media samples;

- The Occupational Safety and Health Administration (OSHA) regulations concerning hazardous waste operations and emergency response (29 CFR Part 1910.120) will govern health and safety measures during remedy implementation; and

- Town of Oyster Bay regulations concerning construction activities will impact the implementation of the remedial system, including construction materials and methods, electrical service, connections and controls.

Remedial Action Objectives (RAOs) are media-specific goals for protecting human health and the environment. RAOs provide overall remedial goals for addressing the Site-related contamination within the context of the contemplated use of the Site and potential impacts to the surrounding community and environment. The RAOs were developed based on the continued commercial use of the Site and on potential impacts to the surrounding community and environment as evaluated during the exposure assessment included in the RI/FS. The selected RAOs are to mitigate, to the extent necessary and practical, the following:

- Soil – Public Health Protection

  - Prevent ingestion/direct contact with soils contaminated with PCE in the former FD-3/FD-4 area beneath the Site building slab; and

  - Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

- Soil – Environmental Protection

  - Prevent migration of contaminants from PCE-impacted soils in the former FD-3/FD-4 area beneath the Site building slab that could result in groundwater contamination.

- Groundwater – Public Health Protection

  - Prevent ingestion of groundwater contaminated with chlorinated VOCs in excess of drinking water standards; and

  - Prevent contact with, or inhalation of chlorinated VOCs from, impacted groundwater.

- Groundwater – Environmental Protection

  - Restore groundwater to pre-release conditions to the extent practicable; and

  - Remove the source of groundwater contamination by chlorinated VOCs.

- Soil Vapor – Public Health Protection

  - Mitigate potential impacts to public health resulting from the potential for soil vapor intrusion at the Site.

It should be recognized that it may be economically and technically impractical to actively remediate the media of concern to the levels dictated by the SCGs. Because of the Site's location in a commercial area, the location of the impacted materials beneath cover materials (building slab and/or pavement) and/or at depths where no human contact is reasonably anticipated with the use of appropriate controls, and the lack of use of the groundwater in immediate proximity of the Site for water supply purposes, remediation to levels proscribed by the SCGs may not be practicable. Therefore, the implementation of engineering controls (ECs) and institutional controls (ICs) is part of the remedy for this Site.

2.5 Green Remediation Principles

The NYSDEC has adopted an approach to remediating sites in the context of the larger environment; this approach is articulated in the NYSDEC's DER-31 program policy. This green remediation policy is

defined as “the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions”. The major green remediation principles articulated in DER-31 include:

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

As per the ROD for this Site, green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy. Green remediation techniques to be applied at this Site are described in Section 3.6. Cost concerns will be respected and implementing a remedy that is protective of public health and the environment will remain the primary remedial priority.

SECTION 3.0
REMEDIAL ACTIONS

3.1 Introduction

The following sections present the detailed descriptions of the remedial actions and technologies to be implemented at the Site. Information is also provided regarding the remedial action schedule, sampling, short-term monitoring during the SVE startup period, reporting, the SMP, and the IC (environmental easement). It should be noted that the SMP to be submitted with the FER will include detailed information regarding long-term operation, monitoring, and maintenance of the implemented remedy; this information is not included herein.

3.1.1 General Provisions

All onsite remedial work will be overseen by a qualified environmental professional (QEP), as defined in DER-10, and will be supervised by a New York State licensed professional engineer (PE). Field decisions will be made by the QEP, who may consult with the PE, as needed. During remedial activities the QEP will be onsite to observe and direct the activities, to collect samples, to interface with agency representatives, and to conduct monitoring.

The designated NYSDEC representative will be notified at least 7 calendar days in advance of any onsite remedial activities and the NYSDEC will be provided with access to the Site throughout the remedial process.

All onsite remedial activities will be conducted in accordance with a site-specific HASP. All onsite intrusive activities will be conducted in accordance with a CAMP. The HASP and CAMP for this remedial program are included in Appendix B.

All media sampling and chemical analyses will be performed in accordance with the site-specific QAPP, a copy of which is included in Appendix C. All analyses will be performed by NYSDOH ELAP-certified laboratories. All data will be reported in a suitable format for uploading to the NYSDEC's Electronic Information Management System (EIMS) as electronic data deliverables (EDDs).

Prior to any onsite intrusive activities, a utility markout will be performed on the adjoining public streets to identify all subsurface utilities that enter the Site. In addition, Site documents regarding the locations of onsite utilities will also be reviewed. If necessary, an onsite utility markout will be performed to confirm the absence of utilities in the areas where intrusive remedial activities will be performed.

The Site structure is occupied by a tenant that uses the space for dry cleaning purposes. The Site structure is accessed by dry cleaner employees and customers during normal business hours. A limited portion of the Site structure is accessed by the customers. Site remedial activities will be coordinated such that dry cleaning operations may continue during remedial activities.

All Site access will be via the existing Site entrances. The existing Site walls and entrances will remain in place during remedial activities and construction fencing or similar security measures will be used, as needed, to secure work areas as needed. All open excavations will be secured when remedial personnel are not present until they can be backfilled. Fencing or other appropriate devices will be used to protect monitoring wells or other remedial/monitoring components in proximity to remedial work areas.

The Site is equipped with onsite stormwater management facilities (leaching pools); these facilities manage all onsite stormwater, in accordance with Town of Oyster Bay requirements. In accordance with the permit requirements for the State Pollutant Discharge Elimination System (SPDES) General Permit (GP-02-01) for stormwater discharges for construction activities, construction activities that discharge to onsite stormwater management facilities do not require coverage under GP-02-01. The excavations to be conducted in conjunction with construction of the SVE system will be in paved areas of the Site; stormwater runoff will not be generated from the excavation areas.

In the event that dust suppression becomes necessary during remedial construction, suppression will be accomplished by spraying potable water onto the affected areas, limiting the areas of open excavations, using gravel in trafficked areas, and/or limiting equipment speeds and movement as feasible to reduce the potential for dust generation.

Odors are not anticipated to present a significant concern during remedial construction since the soil to be exposed during construction was not noted to be odorous during the RI and previous sampling events. Odor control measures will be implemented if necessary to control emissions of nuisance odors to offsite. If nuisance odors are identified that have the potential to impact offsite, then the work will be halted and the source of the odor will be identified and corrected. Work will not resume until the nuisance odors have been abated. Odor control measures may include limiting the area of open excavations, shrouding open excavations with covers, and/or use of foam to cover odorous soils. The NYSDEC will be notified of all odor events and odor complaints.

3.1.2 Regulated Materials Management

The remedial program for this Site does not include excavation and offsite disposal of regulated materials as a remedial measure. However, it is possible that impacted soil may be encountered and removed during construction of the subsurface portions of the SVE system. Any impacted soil removed during remedial construction will be managed as a regulated material.

Regulated materials management and waste transport/disposal operations will be overseen by an FPM QEP. Any excavated regulated material will be temporarily staged onsite on the pavement or in containers. Hay bale and silt fence barriers will be installed around stockpiles and inspected at least once a week and after every storm event. Necessary repairs of these facilities shall be made immediately.

Waste disposal will be at licensed waste disposal facilities that are approved to accept the regulated materials to be disposed. The QEP will direct the sampling of stockpiled regulated material for the waste characterization parameters required by the disposal facility, in accordance with the procedures in the QAPP, the facility requirements, and state and federal regulations. Once disposal facility approval is obtained, the materials will be loaded and transported by a licensed waste transporter for offsite disposal at the approved facility. Waste manifests will be used to document regulated materials disposal; copies of the waste manifests will be provided in the FER.

Any offsite transport of regulated material, if needed, will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded. Material transported by trucks exiting the Site will be secured with tight-fitting covers. If loads contain wet material capable of producing free liquid, truck liners will be used. All trucks will be cleaned of adhering materials prior to leaving the Site vicinity. The Site access point will be kept clean during Site remediation.

All truck transport of regulated materials will be via existing roads in primarily commercial/industrial areas. Trucks will avoid residential areas. Trucks will exit the Site via South Oyster Bay Road and travel northward to the Long Island Expressway, approximately one mile north of the Site. This truck route is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites, (b) limiting total distance to major highways, (c) promoting safety in access to highways and overall safety in transport, and (d) green and sustainable remedial practices. All trucks loaded with regulated materials will exit the vicinity of the Site using only this approved truck route. Trucks will not queue or idle in the neighborhood near the Site; all queuing will occur onsite. Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

The management of regulated material will be fully documented in the FER to be prepared following the completion of remedial construction. Reporting is detailed in Section 3.4.

3.1.3 Quality Assurance/Quality Control

QA/QC procedures will be implemented throughout the remedial activities and will include visual observations by the QEP and field screening for organic vapors using a calibrated PID. In the event that sampling is conducted, QA/QC procedures will also include decontamination of non-disposable sampling equipment, use of dedicated disposable sampling equipment when feasible, use of chains of custody to document the sequence of sample possession, and collection and analysis of QA/QC samples. Field-collected QA/QC samples may include blind duplicate samples, trip blank samples, equipment blank samples, and/or matrix spike/matrix spike duplicate (MS/MSD) samples, as necessary and as described in the QAPP. In addition, the selected analytical laboratory will use internal QA/QC procedures and samples (including laboratory control samples or LCSs, method blanks or MBs, surrogates, and MS/MSDs) to confirm that the laboratory data are of sufficient accuracy and precision. QA/QC procedures are detailed in the QAPP.

Following receipt of chemical analytical data for in-situ media samples, the data packages and associated QA/QC sample results will be evaluated and a Data Usability Summary Report (DUSR) will be prepared for each data package. The DUSRs will be included in the FER.

3.2 Descriptions of Remedial Measures

3.2.1 SVE System

An SVE system will be implemented to remediate soil impacted with VOCs in the former FD-3/FD-4 area. SVE will remove VOCs from the soil to directly remediate CVOC-impacted soil. SVE will also reduce the amount of VOCs in Site soil that have the potential to migrate to groundwater or soil vapor and would also directly remove soil vapors in the system's area of influence, thus providing SVI mitigation in the system area. Over time, operation of the SVE system is anticipated to reduce soil vapors over a larger area, thus providing for SVI mitigation beyond the measured ROI of the system.

The system will be constructed by a remediation construction contractor firm that is familiar with SVE system construction in the local area. Contractor selection will be conducted following NYSDEC approval of this RAWP. The contractor will install the SVE wells and monitoring points, as discussed below, and will conduct a pilot test to determine the SVE system operating parameters. The final SVE system design will be based on the pilot test results and will be documented in a supplemental RAWP to be submitted to the NYSDEC. System construction will be overseen by an FPM QEP and supervised by an FPM PE. The layout of the SVE system is shown on Figure 3.2.1.1. Specifications for key system components are included in Appendix D.

LEGEND:

- SV-06 — SOIL VAPOR POINT
- SS-02 — SUB-SLAB VAPOR POINT
- PROPERTY BOUNDARY
- FOUNDATION
- PARTITION WALL
- SITE
- SVE WELL LOCATION SHOWING ANTICIPATED RADIUS OF INFLUENCE
- SVE PIPING
- SVE COMPOUND

APPROXIMATE SCALE: 0 25' 50' 100'

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FIGURE 3.2.1.1
SITE PLAN WITH SVE SYSTEM LAYOUT

418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

Drawn By: H.C.	Checked By: S.D.	Date: 4/16/15

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➢ SVE Well and Monitoring Point Installation

SVE system installation will be performed by a contractor with local remediation system and well installation experience. All system and monitoring point installation will be observed by a QEP, who will document the construction details.

The SVE wells are anticipated to be installed using direct-push equipment due to overhead clearance limitations inside the Site building, the absence of fine-grained materials in the interval targeted for remediation, and previous successful installation of all of the other Site wells using direct-push techniques. At each SVE well location, the direct-push rig will advance rods and cut core continuously so as to advance a borehole. Following completion of each borehole, each SVE well will be installed. The SVE wells will be constructed of two-inch diameter Schedule 40 PVC casing and 0.02-inch slotted screen. The screened interval for the SVE well beneath the Site will extend from approximately 4 to 14 feet below grade (across the impacted soil interval). The screened interval for the SVE well located to the south of the Site and behind the shopping center building will also extend from approximately 4 to 14 feet below grade. The screened intervals will be backfilled with Morie #2 well gravel to approximately one foot above the top of the screen. The remaining annulus of each SVE well will be backfilled with bentonite grout to grade.

As shown on Figure 3.2.1.1, sub-slab vapor monitoring points already exist within the SVE system's anticipated ROI (SS-02A, SS-03A, SS-15 and SS-17). Additional sub-slab monitoring points also exist to the south and southeast of the SVE system area. Each monitoring point is constructed in accordance with NYSDOH guidance and consists of inert sampling tubing equipped with a stainless steel screen installed within a borehole advance approximately 6 inches below the base of the slab. The top of the tubing is capped and equipped with a valve for monitoring purposes. The annular space around the tubing and screen is backfilled with porous inert granular backfill and a cement-bentonite surface seal is present above the porous backfill. Each monitoring point is completed with a flush-mounted steel protective cover encased in concrete (manhole) to allow future sampling. The base of the protective cover is layered with poly sheeting to further reduce the potential for short-circuiting to the monitoring point screen. Implant construction was completed in November 2014 and was documented in FPM's April 13, 2015 data transmittal.

➢ SVE System Pilot Testing and Construction

Subsurface SVE system piping will be installed from each individual SVE well to the remediation system enclosure, which will be located outdoors just to the west of the Site, as shown on Figure 3.2.1.1. The piping will be two-inch diameter Schedule 40 PVC. The piping will be installed in trenches below the Site building slab (as feasible) and below the exterior pavement. Some piping within the building interior may require above-grade installation. In this case, the two-inch diameter PVC piping will be installed within a larger-diameter sleeve pipe for protection. Following piping placement, each trench will be backfilled with appropriate granular fill, which will be field-compacted in a manner to reduce the potential for settlement while not damaging the installed piping. Any fill brought to the Site will meet the requirements for the identified Site use (commercial) as set forth in 6 NYCRR Part 375-6.7(d). The surface above each trench will be restored in kind with the surrounding materials (concrete or asphalt).

Based on FPM's previous experience with SVE systems in the Site vicinity, we anticipate an SVE radius of influence (ROI) of about 45 feet with a flow rate of about 40 standard cubic feet per minute (SCFM) per leg under a vacuum of between 15 and 20 inches of water. A blower capable of a total flow of 80 to 100 SCFM at the targeted vacuum is indicated and a 2-horsepower, regenerative blower (EG&G Rotron model EN505) meets these specifications. However, to confirm the system operating

parameters and ROI, pilot testing will be performed following well and piping installation to confirm the blower specifications. An appropriate blower to meet the minimum ROI requirement will be selected based on the results of a pilot test, the results of which will be submitted to the NYSDEC in a supplemental RAWP.

The pilot test will be performed to determine the SVE system operating parameters for optimum performance, confirm the ROI of the SVE wells, and to evaluate the vapor emission concentrations. Prior to start-up of the pilot test, the ambient pressure will be recorded at each of the wells and monitoring points to confirm background subsurface pressures. To perform the pilot test, vacuum will be applied to the SVE-1 well in increasing steps range from 10 to 40 inches of water column using a two-horse power (HP) regenerative blower (EG&G Rotron Model EN 505 or equivalent) and the observed vacuum will be recorded at the monitoring points in proximity to this well. Vacuum ranging from 10 to 40 inches of water column will then be applied stepwise to the SVE-2 well and the observed vacuum will be recorded at the monitoring points in proximity to this well. During the tests, the air flow rate at each applied vacuum will be recorded using a portable anemometer installed in the PVC piping on the pressure side of the system. The flow rate will be determined by multiplying the recorded flow velocity by the area of the PVC discharge pipe to yield a discharge rate. These data will then be plotted to evaluate the ROI at each SVE well. The ROI for SVE will be determined as the distance at which the observed vacuum is equal to at least 0.1 inches of water.

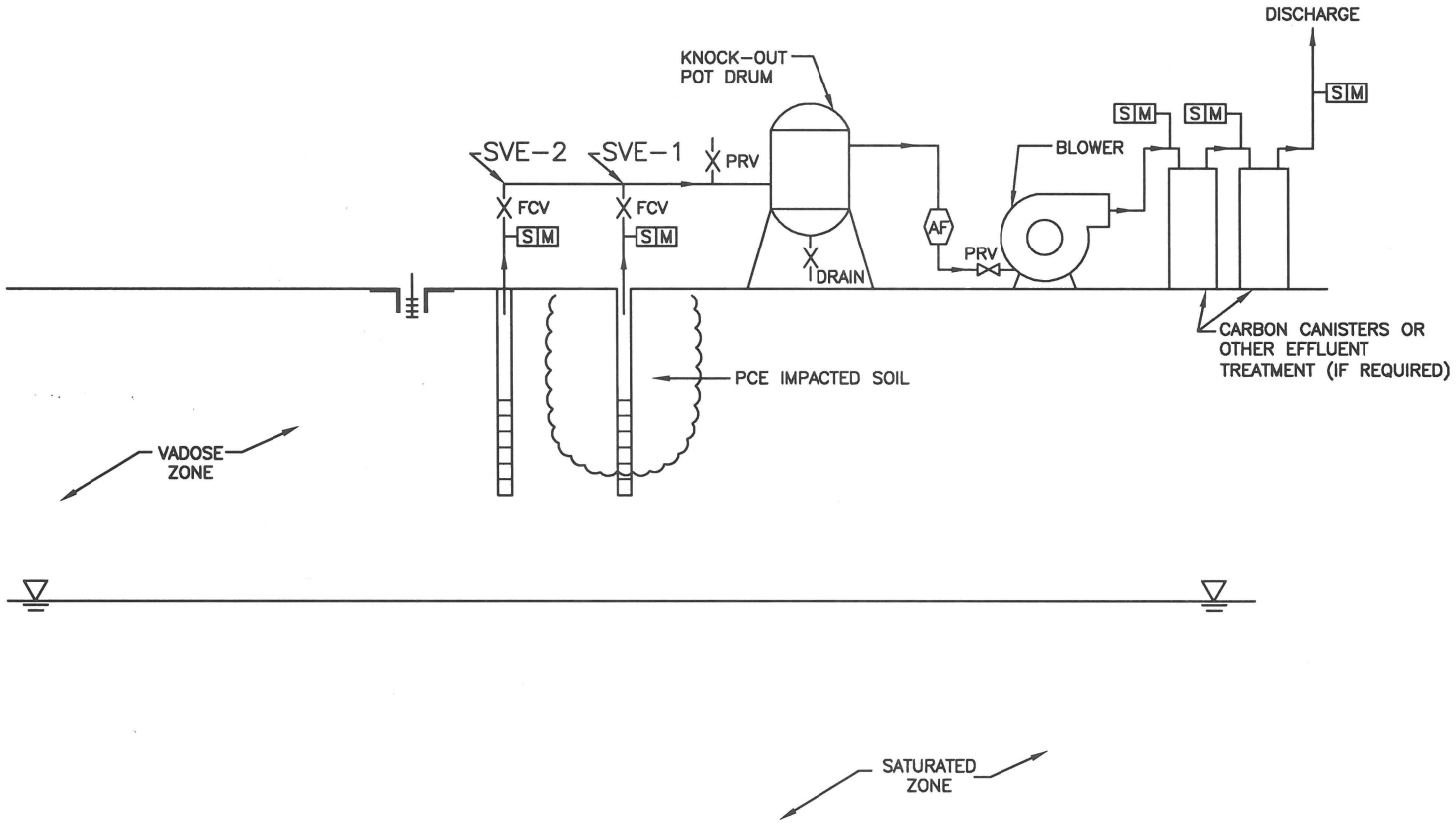
Effluent VOC concentrations will also be monitored during the tests from a sampling port located on the pressure side of the blower. VOC concentrations will be evaluated using a calibrated PID and also by obtaining and analyzing air samples in Tedlar bags. Collectively, these data will be used to evaluate the radius of influence of the SVE system, the anticipated vapor concentrations for compliance with NYSDEC Division of Air Resources DAR-1 criteria, and to confirm that the system will induce a vacuum beneath the Site and nearby shopping center units sufficient for sub-slab depressurization over the affected area in accordance with NYSDOH guidance. During the pilot test an activated carbon unit will be used to treat the SVE effluent prior to discharge.

Following the completion of the pilot test, the results will be evaluated and an appropriate blower will be selected for the SVE system. The procedures and results of the pilot test will be documented in a supplemental RAWP to be submitted to the NYSDEC. The reported information will include calculations for sizing the blower and any treatment equipment and evaluations of the SVE ROI.

Following completion of pilot testing and selection of an appropriate blower installation of the above-grade portions of the system will commence. The information presented in this section may be modified based on the results of the pilot test; the proposed modifications will be presented in the supplemental RAWP and any further modification will be documented in the FER.

The operating equipment will be housed in an enclosed compound that will be insulated to reduce noise. The compound will be located to the west of the Site building, as shown in Figure 3.2.1.1. A schematic plan showing the AS/SVE process flow and the operating equipment to be installed in the compound is presented in Figure 3.2.1.2.

The selected blower will be equipped with a moisture separator with an explosion-proof high water safety switch, an air filter, a manifold, an air flow meter, vacuum gauges, an effluent stack, and an associated control panel. The system's effluent stack will be extended to an estimated height of approximately 10 feet above the top of the Site building. The stack height will be determined based on the results of the system emissions testing performed during the pilot test. Stack discharge limits will conform to the NYSDEC's DAR-1 guidance. The stack will be outfitted to allow the use of carbon or other effluent treatment, if required based on the results of the pilot test.



LEGEND:

- PROCESS LINE
- WATER SURFACE
- AF — INLINE AIR FILTER
- PRV — PRESSURE RELIEF VALVE
- FRV — FLOW CONTROL VALVE
- S|M — SAMPLE/MONITOR POINT
- SUB-SLAB MONITORING POINT

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FIGURE 3.2.1.2
SCHEMATIC OF SVE SYSTEM PROCESS FLOW

418 SOUTH OYSTER BAY RD.
HICKSVILLE, NEW YORK

Drawn By: H.C.	Checked By: S.D.	Date: 4/16/15

- SVE System Startup

Following the completion of construction, the SVE system will be placed online by the system construction contractor with oversight by the FPM QEP. The system will be monitored daily until system vacuums and airflow are stabilized. Modifications (valve adjustments) may be made to the SVE operating equipment to optimize system performance. Additional monitoring will be conducted on a weekly basis during the one-month startup period.

A calibrated photoionization detector (PID) will be utilized to monitor initial effluent emissions. Effluent samples will also be collected to evaluate SVE emissions compliance following system startup. If effluent treatment is required, then an influent sample will also be collected to document the VOC levels in soil vapor pulled into the system and the contamination reduction from effluent treatment. During the startup period effluent samples will be collected on a weekly basis from the effluent sampling port located between the blower and the effluent stack pipe utilizing a Tedlar air sampling bag. In the event that effluent treatment is required (carbon canisters or other), then sampling will be performed between the blower and the effluent treatment (influent sample) to monitor system performance and also downstream of the effluent treatment to monitor emissions compliance. Each sample will be transported via overnight courier to a NYSDOH ELAP-certified laboratory for analysis of VOCs by EPA Method T0-15. The analytical results will be compared to NYSDEC's DAR-1 guidance to evaluate system emissions and determine emissions treatment requirements.

All SVE system observations will be recorded in a system logbook that will be kept at the Site for operator reference. The logbook will include operating logs for recording system parameters from the various gauges and figures showing the system wells and equipment configuration. System performance observations to be recorded will include obtaining pressure readings and other observations at the designated monitoring points to evaluate the SVE well ROIs.

- Groundwater Monitoring

Pre-remediation groundwater monitoring will be performed to document the groundwater conditions prior to startup of the SVE system, as described in this section. Groundwater monitoring will also be performed approximately three months following SVE system startup to evaluate the initial groundwater response to SVE operation. Groundwater monitoring will be performed semiannually during SVE system operation to document the progress of remediation, and following termination of the system operation to confirm the post-remedial condition.

Pre-remediation groundwater monitoring will be conducted at each of the Site monitoring wells approximately one month prior to the startup of the SVE system. The wells to be sampled include those wells that contain CVOCs as well as the downgradient wells. The resulting data will be reviewed to evaluate the nature and extent of Site-related CVOCs prior to initiating SVE system operations.

At each well to be sampled, the depth to the static water level and depth of the well will be measured. Weather conditions will be noted, including the amount of elapsed time since the most recent significant rainfall. Then a decontaminated pump will be used to purge the well using low-flow procedures. 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 and the turbidity is less than 50 NTU, the wells will be sampled. Well sampling forms will be completed to document the well purging and sampling procedures.

Following purging, sampling will be performed. Samples will be obtained directly from the low-flow pump. The retrieved samples will be decanted into laboratory-supplied sample containers. Each sample container will be labeled, and the labeled containers will be placed in a cooler with ice to depress the sample temperature to four degrees Celsius. A chain of custody form will be completed and kept with the cooler to document the sequence of sample possession. At the end of each day, the filled cooler will be transported by FPM or overnight courier to the selected NYSDOH ELAP-certified laboratory. The groundwater samples will be analyzed for TCL VOCs as per NYS ASP with Category B deliverables. A groundwater monitoring sampling matrix is presented on Table 3.2.1.1.

The procedures and results of the initial (pre-remediation) groundwater monitoring event will be documented in the FER to be prepared following the implementation of remedial measures. The FER will include an SMP, which will contain a Monitoring Plan that includes procedures for ongoing groundwater monitoring and reporting. The Monitoring Plan will also include the procedures for properly abandoning the monitoring wells following the completion of the monitoring program. Additional information concerning the FER and SMP is included in Section 3.4 herein.

- Monitoring of Sub-Slab Depressurization

The SVE system is intended, in part, to result in sub-slab depressurization to prevent SVI into the Site and nearby units in the shopping center building. Following SVE system startup, the function of the SVE system with respect to sub-slab depressurization (mitigation) will be verified by monitoring the pressure at the monitoring points in proximity to the system to confirm that a downward pressure gradient is established in the area targeted for mitigation. Monitoring will be performed during the startup period.

Monitoring will be performed using magnahelic gauges and/or a calibrated Landtec gas monitor with a sensitivity of 0.01 inches of water. Monitoring will be performed outside of the units (ambient), inside of the affected building units, and at each monitoring point to evaluate the relative pressure at each location. The SVE system operating parameters may be adjusted during the startup period as needed to ensure that a downward pressure gradient is established across the building slab in the targeted mitigation area. The results of the startup period sub-slab depressurization monitoring will be reported in the FER.

Periodic sub-slab depressurization monitoring will be continued following the startup of the SVE system to confirm that a downward pressure gradient remains established in the mitigation area while the SVE system is running. Additional SVI monitoring will be conducted following termination of the system operation to confirm the post-remedial condition. Procedures for sub-slab depressurization and SVI monitoring during and following SVE system operation will be provided in the Monitoring Plan in the SMP.

- SVE System Operation, Monitoring and Maintenance

SVE system operation, monitoring and maintenance (OM&M) will be performed on an ongoing periodic basis to ensure proper system operation and emissions compliance and to assess performance. OM&M activities following the startup period will be performed monthly for the first six months and then reduced to a quarterly basis (once every three months) thereafter, unless observations or system operations indicate that a greater OM&M frequency is necessary.

OM&M tasks to be performed are anticipated to include periodic system checks and servicing, recording of all system airflow rates, temperature, pressures, vacuums and other parameters indicative

TABLE 3.2.1.1
GROUNDWATER MONITORING SAMPLING MATRIX
AMERICAN DRIVE-IN CLEANERS SITE #130186
418 SOUTH OYSTER BAY ROAD, HICKSVILLE, NEW YORK

Sample Location/ Type	Matrix	Number/ Frequency	Analysis	Sample Bottles Preservation	Holding Time
Monitoring Wells	Groundwater	Thirteen/semiannual	TCL VOCs	Two Glass VOA vials with HCL	14 days
Equipment blanks	Lab water	One per day	TCL VOCs	Two glass VOA vials with HCL	14 days
Trip blanks	Lab water	One per cooler	TCL VOCs	Two glass VOA vials with HCL	14 days
Blind duplicates	Groundwater	One per 10 environmental samples	TCL VOCs	Same as Primary Samples	Same as Primary Samples
MS/MSD	Groundwater	One per 20 groundwater samples	TCL VOCs	Same as Primary Samples	Same as Primary Samples

Notes:

MS/MSD = Matrix spike/matrix spike duplicate.
TCL = Target Compound List
VOCs = Volatile organic compounds
HCL = hydrochloric acid

of system operations, adjustment of system operating parameters as necessary to ensure optimal system performance, collection of effluent samples and screening of emissions to ensure compliance with regulations, evaluation of the SVE mass removal rate, and other tasks necessary for proper system operation and documentation.

SVE system OM&M procedures will be presented in an O&M Plan to be included in the SMP. Remediation system performance and progress will be evaluated on the basis of the SVE system emissions data, the periodic groundwater sampling results, SVI monitoring results, and other factors. This information will be provided in an annual Periodic Review Report (PRR), together with other monitoring results. The OM&M Plan will also include procedures for dismantling and removing the SVE system following the completion of remediation.

- Reporting

The layout, operation, and maintenance of the SVE system will be documented in an SVE Operation, Monitoring and Maintenance (OM&M) Manual. This Manual will include process instrumentation diagrams, equipment specifications, and as-built system drawings showing the equipment layout in the compound, the piping layout from the wells to the compound, and the SVE wells and appurtenances. This Manual will be prepared immediately following system construction such that it is available to system operating personnel by the end of the startup period.

The SVE system construction and startup will also be documented in the FER to be prepared following the implementation of remedial measures. The FER will include an SMP, which will contain the SVE OM&M Manual, as well as the O&M Plan described above. Additional information concerning the FER and SMP is included in Section 3.4 herein.

3.2.2 Cover System

A cover system (concrete slab) presently exists at the Site and serves as an engineering control (EC) to provide protection for onsite workers and visitors from residual impacts that remain present beneath portions of the Site. This cover system also provides protection from SVI, as further discussed below. This cover system fully covers the Site surface. This cover system will be maintained to allow for continued commercial use of the Site. The continued use of the cover system will be enforced via the environmental easement, as discussed in Section 3.2.4 below.

It should be noted that the SVE system, described in Section 3.2.1 above, will be implemented to remediate VOCs in soil. The operation of the SVE system is also anticipated to address SVI concerns. The operation of the SVE system may eventually result in the remediation of impacted soil and soil vapor to the extent that the cover system is no longer required. In this event, testing may be conducted to evaluate whether the cover system EC may be terminated. This testing program will be included in the SMP for the Site.

Although Site redevelopment is not contemplated, it is possible that site redevelopment may occur at some time in the future. In the event that Site redevelopment occurs and the cover system continues to be necessary to protect public health and the environment, then a cover system will be maintained. The cover system will consist of structures, such as buildings, pavement, or sidewalks, or a soil cover in areas where the upper one foot of soil will exceed the applicable SCOs for the use of the Site. Where a soil cover is required, it will be a minimum of one foot of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for the use of the Site. The soil cover will be placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain vegetation.

In the event that redevelopment is contemplated, the NYSDEC will be notified in advance and a work plan will be submitted that describes the proposed redevelopment and associated cover system. The SMP for this Site will include measures for monitoring and reporting for the cover system.

3.2.3 SVI Mitigation

As described in Section 3.2.1 above, an SVE system will be installed at and in proximity to the Site to remediate soil. This SVE system will also provide mitigation for potential SVI for the shopping center tenants of 414 and 416 South Oyster Bay Road. SVI mitigation is also anticipated to extend to the 412 and 410 South Oyster Bay Road Shopping Center tenants

Building slab maintenance will be conducted as an SVI mitigation measure for the remaining portion of the shopping center building. Building slab maintenance will be used in conjunction with SVI monitoring, which will provide information to assess potential SVI concerns and to document any changes in indoor air quality due to building slab maintenance measures.

Building slab maintenance will include inspections to identify potential SVI points (i.e. cracks, utility penetrations) followed by crack and utility penetration sealing, as needed. During the inspection the visible portions of the building slab in each tenant space in the shopping center will be observed by an environmental professional (EP) with the objective of identifying any slab penetrations, cracks, or other potential pathways by which sub-slab soil vapors may enter the building. This work will be conducted with assistance from the shopping center owner such that access may be obtained to the building slab throughout each tenant unit. In areas where cracks, utility penetrations, or other potential pathways for SVI are noted the penetrations will be sealed using non-shrinking grout, low-VOC expanding foam, or other suitable materials. The sealing materials will be confirmed to not contain any chlorinated solvents. Representative photos of the building slab conditions will be taken to document the work completed and a site plan, stamped by a New York State-licensed professional engineer (PE) will be prepared to document the locations where slab sealing activities were conducted.

Building slab maintenance and periodic inspections will be continued until SVI data clearly indicate that monitoring or mitigation are not needed and the NYSDEC approves termination of maintenance and inspections.

Initial building slab maintenance inspections and sealing activities were conducted in February 2015 and SVI testing was performed in March 2015, the results of which were summarized in a May 4, 2015 data transmittal. These activities will be documented in the FER, with subsequent activities documented as described in the SMP for this Site.

3.2.4 Institutional Control

An Institutional Control (IC) will be implemented for the Site (controlled property) in the form of an environmental easement. The environmental easement process will be initiated by the NYSDEC in conjunction with the approval of this RAWP. The environmental easement will:

- Require the remedial party or Site owner to complete and submit to the NYSDEC a periodic certification of ECs and ICs in accordance with Part 375-1.8(h)(3);
- Allow the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), subject to land use restrictions under local zoning laws;

- Restrict the use of Site groundwater as a source of potable or process water without necessary water quality treatment as determined by the NYSDOH or Nassau County Department of Health; and

- Require compliance with the NYSDEC-approved SMP.

3.2.5 Site Management Plan

A Site Management Plan (SMP) will be prepared and implemented for the Site. The SMP will include an Institutional and Engineering Control (IC/EC) Plan, a Monitoring Plan, and an Operation and Maintenance (O&M) Plan. The SMP will be prepared following implementation of the remedy and in conjunction with FER preparation.

➢ IC/EC Plan

The IC/EC Plan will identify all use restrictions and ECs for the Site and detail the steps and media-specific requirements necessary to ensure that the ICs (environmental easement) and ECs (SVE system, cover system, SVI mitigation) for the Site remain in place and effective. The IC/EC Plan will include an Excavation Plan that will include the provisions for management of future excavations that may be conducted in areas with the potential for remaining contamination on the Site. The IC/EC Plan will also include descriptions of the provisions of the environmental easement, including land use and groundwater use restrictions, provisions for management and inspection of the ECs, provisions for maintaining Site access controls and NYSDEC notifications, and provisions for periodic reviews and certifications of the ECs and ICs.

The IC/EC Plan will include a provision for evaluation of the potential for SVI if use of the COCs (PCE) within the existing onsite building ceases and for any buildings developed on the Site in the future, including providing for implementing actions required to address exposures related to SVI. Although the residential property owner to the west of the Site previously declined SVI testing, should the owner of this property request SVI sampling in the future, the NYSDEC, in consultation with the NYSDOH, will determine if SVI sampling is appropriate. If necessary, SVI testing will be conducted and actions required by the NYSDEC to address exposures due to SVI will be implemented.

➢ Monitoring Plan

The Monitoring Plan will include procedures to assess the performance and effectiveness of the remedy, including groundwater, indoor air and soil vapor monitoring. Procedures for conducting SVI monitoring, as described above, will be included. A schedule for monitoring that includes the frequency of submittals to the NYSDEC will also be included.

➢ Operation and Maintenance Plan

An Operation and Maintenance (O&M) Plan will be included in the SMP to provide the procedures to ensure continued operation, monitoring, optimization, maintenance, inspection, and reporting of the mechanical and physical components of the remedy. The O&M Plan will include procedures for compliance monitoring of the SVE system to ensure proper O&M of the system and effluent compliance with NYSDEC Air Guide 1 requirements for emissions, procedures for maintaining Site access controls and NYSDEC notification, and procedures for providing NYSDEC with access to the Site and O&M records.

3.3 Sampling Procedures

The procedures for soil sampling, groundwater sampling, sub-slab pressure monitoring, SVI monitoring, and SVE emissions monitoring during the implementation of remedial actions at the Site are described in the following sections. Additional or modified procedures may be included in the SMP for sampling activities to be conducted once the remedial activities are implemented.

All sample locations during remedial activities will be recorded and identified by unique latitude/longitude coordinates (decimal degrees), as required by the NYSDEC's environmental information management system (EIMS). Sample locations will be recorded by the QEP during field activities using a hand-held global positioning system (GPS). This information will be included in the electronic data deliverables (EDDs) to be uploaded to the EIMS.

QA/QC procedures will be implemented during the remedial actions in accordance with the QAPP included in Appendix C.

3.3.1 Soil Sampling Procedures

Soil sampling may be performed during several steps of remedial activities, as discussed in Section 3.2 above, including waste characterization sampling, sampling of fill to be imported to the Site, and/or sampling of stockpiled soil targeted for reuse onsite. Soil sampling will generally be performed using decontaminated hand-held stainless steel hand augers or dedicated disposable hand trowels. The samples will be obtained by the QEP, screened with a calibrated PID, and classified using the Unified Soil Classification System (USCS). All sample observations will be recorded in the QEP's dedicated field logbook.

Waste characterization samples will be collected as grabs and/or composite samples, as required by the targeted disposal facility. Samples of soil targeted for onsite reuse and fill to be imported will be collected as both grab and composite samples in accordance with DER-10 Section 5.4(e).

The Analytical Methods/Quality Assurance Summary table included in the QAPP shows the potential soil samples and analytes. The analytical methods for all imported fill and/or onsite reuse samples will be as per the NYS ASP with Category B deliverables and full QA/QC. The analytical methods and deliverables for waste classification samples will be in accordance with the selected disposal facility requirements.

3.3.2 Groundwater Sampling Procedures

As described in Section 3.2 above, pre-remedial groundwater sampling will be performed to document the groundwater conditions prior to startup of the SVE system. Pre-remediation groundwater monitoring will be conducted at each of the selected Site monitoring wells approximately one month prior to the startup of the SVE system.

At each well to be sampled, the depth to the static water level and depth of the well will be measured. A decontaminated pump will be used to purge the well/well screen using low-flow procedures. 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 and the turbidity is less than 50 NTU, the wells will be sampled. Well sampling forms documenting the well purging and sampling procedures will be completed.

Following purging, sampling will be performed. Samples will be obtained directly from the low-flow pump. The retrieved samples will be decanted into laboratory-supplied sample containers. Each sample container will be labeled, and the labeled containers will be placed in a cooler with ice to depress the sample temperature to four degrees Celsius. A chain of custody form will be completed and kept with the cooler to document the sequence of sample possession. At the end of each day, the filled cooler will be transported by FPM or overnight courier to the selected NYSDOH ELAP-certified laboratory. The groundwater samples will be analyzed for TCL VOCs as per NYS ASP with Category B deliverables.

The resulting groundwater chemical analytical data will be used to document groundwater quality prior to the startup of the SVE system. The associated water level data will be used to evaluate the site-specific groundwater flow direction.

3.3.3 Sub-Slab Pressure Monitoring Procedures

During pilot testing and startup of the SVE system, the function of the SVE system with respect to sub-slab depressurization will be verified by monitoring the pressure at the monitoring points in proximity to the system to confirm that a downward pressure gradient is established. The pressure data will also be used to evaluate the ROIs for the SVE system and for SVI mitigation.

Monitoring will be performed using magnahelic gauges and/or a calibrated Landtec gas monitor with a sensitivity of 0.01 inches of water. The Landtec monitor will be operated by the QEP and calibrated in accordance with the manufacturer's instructions prior to use. Monitoring will be performed outdoors (ambient), inside of the affected shopping center units, and at each monitoring point in proximity to the system to evaluate the relative pressure at each location. The resulting data will be recorded in the QEP's field log book and will be used to adjust the SVE system operating parameters as needed to ensure that a sufficient downward pressure gradient is established in the targeted areas. The results of the startup period sub-slab pressure monitoring will be reported in the FER.

3.3.4 SVI Monitoring Procedures

SVI monitoring will include collection of sub-slab soil vapor and co-located indoor air samples and an ambient air sample. During each monitoring event samples will be collected from the sub-slab monitoring points and corresponding indoor air sampling locations. The sub-slab points will be accessed and three to five volumes of soil vapor will be purged through the installed polyethylene tubing using an air pump so as to ensure that a representative sample is obtained and to confirm the integrity of the point's seal. The seal will be evaluated by confining a helium tracer gas over the surface seal and checking with a helium meter. Following purging and the seal integrity check, the sub-slab soil vapor samples will be collected into laboratory-supplied Summa canisters equipped with calibrated flow controllers. The flow controllers will be set so as not to exceed 0.2 liters per minute and so as to collect each sample over an approximate 8-hour period. Upon completion of sampling, the canisters will be sealed, labeled, managed, transported, and tracked as described in the QAPP.

Indoor air and outdoor (ambient) air sampling will be performed concurrently with sub-slab soil vapor sampling. The indoor air samples will be collected from the vicinity of the sub-slab sampling points at a height of approximately three feet above the existing building slab. One ambient (outdoor) air sample will also be collected concurrently with the indoor air and sub-slab soil vapor samples. This sample will be collected in the outdoor proximity to the Site and in the same manner as the indoor air samples. The laboratory-provided Summa canisters will be placed at a height of approximately three feet above grade and each canister shall be equipped with flow controller such that the canister is filled over an approximately eight-hour time period at a rate of less than 0.2 liters per minute. The QEP will observe

the flow controllers and shall seal the canisters while some vacuum remains. Upon completion of sampling, the canisters will be labeled, managed, transported, and tracked as described in the QAPP.

A NYSDOH building inventory form will also be completed for each sampled area to document the potential presence of VOC sources present within and in proximity to the retail units. The resulting data will be utilized to evaluate potential VOC concentrations in sub-slab soil vapor and indoor air in proximity to the Site and to assess potential contributions to indoor air quality from ambient air conditions.

3.3.5 SVE Effluent Sampling Procedures

Effluent sampling will be performed to evaluate SVE emissions during pilot testing and during the system startup period. If emissions treatment is conducted, then influent sampling will also be performed. During each sampling event an effluent sample will be collected from an effluent sampling port located between the SVE blower and the effluent stack pipe. In the event that effluent treatment is implemented, an additional sample of the treated effluent shall be obtained downstream of the effluent treatment equipment. All samples shall be obtained using a dedicated laboratory-supplied Tedlar air sampling bag. System operating parameters will be recorded by the QEP during each sampling event.

The samples in the filled Tedlar bags will be labeled and transported via overnight courier to a NYSDOH-ELAP-certified laboratory for analysis of VOCs by EPA Method T0-15. The analytical results will be integrated with the system operating parameters and compared to NYSDEC's DAR-1 guidance to evaluate system emissions, determine emissions treatment requirements, and confirm compliance with DAR-1.

3.3.6 Quality Assurance/Quality Control

QA/QC procedures will be implemented throughout the remedial activities and will include visual observations by the QEP, field screening for organic vapors using a calibrated PID, decontamination of non-disposable sampling equipment, use of dedicated disposable sampling equipment when feasible, use of chains of custody to document the sequence of sample possession, and collection and analysis of QA/QC samples. Field-collected QA/QC samples will include blind duplicate samples, trip blank samples, equipment blank samples, and matrix spike/matrix spike duplicate (MS/MSD) samples, as described in the QAPP. In addition, the selected analytical laboratory will use internal QA/QC procedures and samples (including laboratory control samples or LCSs, method blanks or MBs, surrogates, and MS/MSDs) to confirm that the laboratory data are of sufficient accuracy and precision. QA/QC procedures are detailed in the QAPP.

Following receipt of the chemical analytical data, the data packages and associated QA/QC sample results will be evaluated and a Data Usability Summary Report (DUSR) will be prepared for each data package. The DUSRs will be included in the FER.

3.4 Reporting

Reporting will be conducted in several formats during the remedial process, including emergency notifications (if needed), monthly progress reports, interim data submittals, and the Final Engineering Report (FER). All reporting will comply with NYSDEC electronic submittal requirements.

In the event of an emergency, the NYSDEC representative will be contacted via email or telephone within 24 hours of the occurrence and any necessary information about the nature of the emergency

and its resolution will be relayed. Emergency notifications will be documented, at a minimum, in the associated monthly progress report and the FER.

Daily field reports (DFRs) will be prepared for all onsite activities and will be submitted to the NYSDEC weekly during periods of active onsite work. DFR submittal to the NYSDEC will occur no later than close of business on the Wednesday of the week following the dates of the DFRs.

Monthly progress reports will be prepared during the remedial activities until such time as the FER is completed and approved. The progress reports will be submitted by the 10th day of each month documenting actions taken during the previous month (reporting period), anticipated activities for the upcoming month, approved modifications to work plans or schedules, results of sampling or other data generated during the reporting period, QA/QC information, unresolved delays encountered or anticipated, efforts made to mitigate delays, and any citizen complaints received. Monthly progress reports will present information in a summary manner and are not intended to be comprehensive.

Interim data submittals will be used to document major remedial milestones that are achieved prior to the completion onsite remedial construction activities. These major remedial milestones are anticipated to include completion of SVE pilot testing (to be documented in a supplemental RAWP) and may include additional milestones, as warranted. Interim data submittals will document the work completed to accomplish the milestone, present summary data and supporting lab reports, and include data interpretation and conclusions. If necessary, NYSDEC approval may be requested for proposed modifications of the remedial system, remedial program, and/or schedule.

An FER will be prepared to document the completed remedial program; the FER will adhere to the NYSDEC's most recent template for this document. The FER will include the certification for the remedial program, as provided in Section 1.5 of DER-10, by a professional engineer (PE) licensed to practice in New York State. The FER will include sufficient information and documentation to support the certification. The FER will document all activities completed in accordance with the approved RAWP and will include the data supporting the completed construction activities. The summary of the completed remedial actions will include a description of any problems encountered and their resolution, a description of any changes to the design and why the design changes were required, the quantities and concentrations of contaminants removed and/or treated, a full listing of all waste streams, quantities of materials disposed, and the disposal facilities, and restoration actions. The FER will also include a list of the RAOs applicable to the remedial action, tables and figures containing the pre- and post-remedial sampling data sufficient to document the remediation action, figures showing the residual contamination to be managed under the SMP, as-built drawings to document the remedial action, and identification of the IC (including the boundary of the real property subject to the environmental easement and a copy of the easement). The FER will also include a complete description of the ECs established at the Site, including the SVE system, cover system, and SVI mitigation.

An SMP will also be prepared following the NYSDEC's most recent template for this document and will be submitted separately from the FER. The SMP will include an EC/IC Plan, a Monitoring Plan, and an Operation and Maintenance (O&M) Plan. The SMP will also include provisions for NYSDEC access and notifications and will include a HASP and CAMP for all site management activities. Reporting under the SMP will be accomplished through the preparation and submittal of periodic review reports (PRRs) prepared in accordance with the provisions of DER-10.

The EC/IC Plan will identify all ICs (including use restrictions) and ECs for the Site and detail the steps and media-specific requirements necessary to ensure that the ECs and ICs remain in place and effective. The EC/IC Plan will include a description of the environmental easement IC, including land and groundwater use restrictions and the steps needed for periodic review and certification of the IC.

The EC/IC Plan will also include a description of the ECs, including provisions for their management and control, and provisions for future excavations and residual materials management (Excavation Plan) for areas of the Site where the soil exceeds commercial use SCGs (DER-10, Section 6.2.1(b)1.). The area of the site where residual contamination remains present and is subject to management under the SMP will be identified. The EC/IC Plan will also include provisions for property transfers, including notifications to the NYSDEC.

The Monitoring Plan will include provisions to assess the performance and effectiveness of the remedy. The Monitoring Plan is anticipated to include procedures for groundwater monitoring, SVE system emissions monitoring, sub-slab depressurization monitoring, and SVI monitoring. The Monitoring Plan will also include a schedule of monitoring frequencies and submittals to the NYSDEC and provisions for determining when monitoring is no longer necessary.

The O&M Plan will include provisions to ensure the continued operation, monitoring, maintenance, inspection, and reporting of the mechanical and physical components of the remedy (SVE system, cover system, and SVI mitigation). The O&M Plan will include procedures for compliance monitoring and O&M of the physical components of the remedy. The O&M Plan will also include procedures for evaluating the performance of the remedy relative to the remedial objectives.

3.5 Remedial Action Schedule

A schedule for remedial activities is provided on Figure 3.5.1. This schedule includes timeframes for construction contractor procurement, milestone activity dates, projected dates for submittal of deliverables to the NYSDEC, timeframes for submittal reviews, and projected approval dates. It should be noted that this schedule is based on a number of assumptions, including anticipated review times, laboratory analytical turnarounds, and other factors that may vary. The schedule may also be affected by weather conditions and other factors that are not controlled.

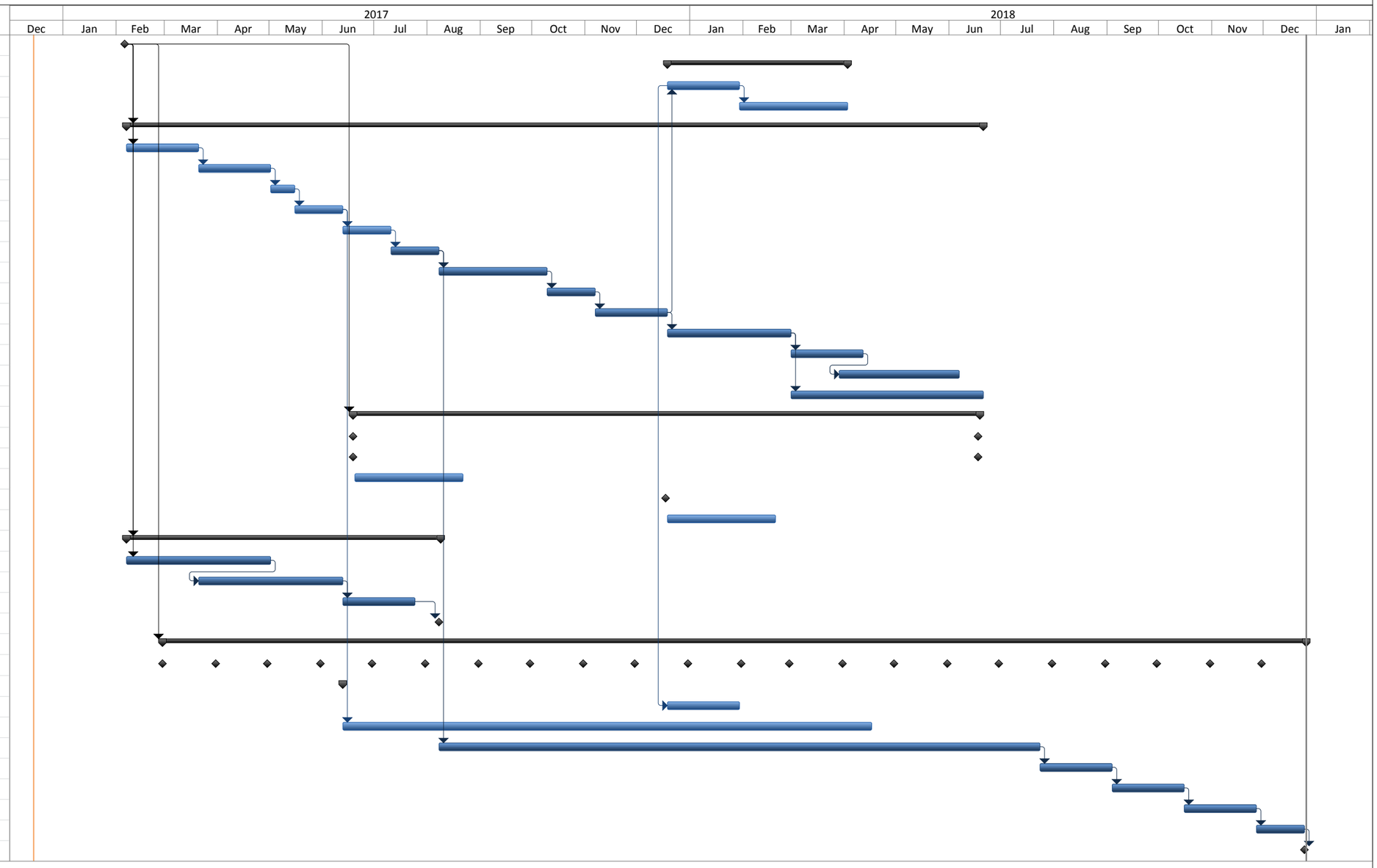
The remedial action schedule will be reviewed at least monthly in association with preparation of the monthly progress reports (discussed above) and the NYSDEC will be notified of any proposed modifications, the reason for the modifications, and the proposed actions to mitigate adverse schedule impacts. A revised remedial action schedule will be provided as necessary.

3.6 Green Remediation Principles and Techniques

Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy, as per DER-31. Green remediation components may include consideration of the long-term environmental impacts of remedial technologies and stewardship, reducing greenhouse gas and other emissions, increasing energy efficiency and minimizing use of non-renewable energy, conserving resources, reducing waste, conserving and maximizing natural habitat, fostering green communities and working landscapes, and integrating the remedy with the end-use. These components have been incorporated into the development of the remedial procedures presented in this work plan within the context of the selected remedial actions and technologies, the Site's location in a working commercial area, the absence of significant natural habitat on the Site, cost concerns, and the need for the implemented remedy to be protective of public health and the environment.

FIGURE 3.5.1
SCHEDULE FOR REMEDIAL ACTIVITIES
AMERICAN DRIVE-IN CLEANERS SITE, NYSDEC #130186
418 SOUTH OYSTER BAY ROAD, HICKSVILLE, NEW YORK

ID	Task Name
1	NYSDEC approval of RAWP (2/6/17)
2	**Groundwater Monitoring**
3	Pre-remediation groundwater monitoring
4	Lab analysis, data evaluation, data transmittal
5	**SVE System**
6	Prepare RFP
7	Solicit remedial construction contractor proposals
8	Negotiations and contractor selection
9	Mobilization
10	Install SVE wells
11	Pilot Test
12	Lab analysis, data evaluation, supplemental RAWP
13	Revise remedial construction contract as needed
14	Mobilization
15	Install SVE system
16	SVE system startup
17	Lab analysis and data evaluation
18	Prepare OM&M Manual
19	**SVI Inspections and Testing**
20	Building slab inspection and maintenance
23	**SVI testing - non-heating season**
26	Lab analysis and data evaluation - non-heating season
27	**SVI Testing - heating season**
29	Lab analysis and data evaluation - heating season
30	**Institutional Control**
31	Prepare Environmental Easement
32	Prepare Alta Survey
33	NYSDEC review/approval of Environmental Easement
34	Record Environmental Easement
35	**Reporting**
36	**Monthly Progress Reports**
59	**Daily Field Reports**
60	GW monitoring DFRs
61	SVE system DFRs
62	Prepare Draft FER and SMP
63	NYSDEC review of Draft FER and SMP
64	Revise Draft FER and SMP
65	NYSDEC review of Draft Final FER and SMP
66	Finalize FER and SMP
67	Submit Final FER and SMP for NYSDEC approval



Project: Figure351Schedulerev3
Date: Thu 12/15/16

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

FPM

Efforts will be made during all remedial operations to reduce the use of energy. These efforts, which will also reduce emissions, include:

- Not allowing trucks to idle while waiting for loading or unloading;
- Properly sizing operating remedial equipment (blowers);
- Coordination of trucking schedules to reduce partial loads of materials;
- Car-pooling when multiple personnel are needed onsite;
- Combining site visits with travel to other nearby locations;
- Coordination of monitoring and sampling events to reduce vehicle trips;
- Selection of local backfill sources, if needed and as feasible; and
- Encouraging subcontractors, through the contracting process, to use alternative fuels and diesel particulate filters.

Reducing waste is another cornerstone of green remediation; waste reduction will be accomplished by:

- Segregation and testing of apparently unimpacted soil for potential onsite reuse;
- Coordinating sampling events so as to minimize the number of QA/QC samples needed;
- Properly designing and locating the SVE emissions stack so as to minimize/eliminate the need for effluent treatment and associated waste generation; and
- Use of electronic submittals for reporting wherever possible.

Recycled materials will be used, where appropriate and feasible, to reduce the need for use of virgin materials. Recycled materials to be considered for use include:

- Recycled concrete aggregate (RCA) for use in trenches as backfill;
- Recycled materials for pavement restoration; and
- Recycled carbon for use in SVE effluent treatment, if needed.

The FER will include a discussion of the green remediation practices and technologies employed throughout the remedial program. The SMP will also include green remediation principles and practices, including remedial operation and monitoring optimization.

SECTION 4.0
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New York State Department of Environmental Conservation. March 2015. *Record of Decision, American Drive-In Cleaners State Superfund Project, Hicksville, Nassau County, Site No. 130186.*

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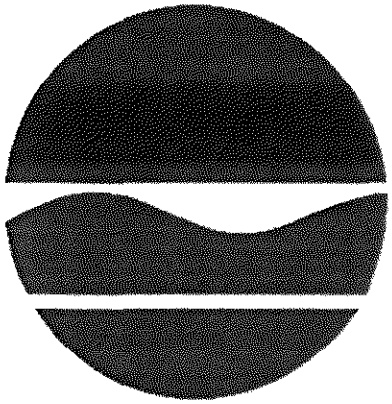
APPENDIX A

RECORD OF DECISION

RECORD OF DECISION

American Drive-In Cleaners
State Superfund Project
Hicksville, Nassau County
Site No. 130186
March 2015



Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

American Drive-In Cleaners
State Superfund Project
Hicksville, Nassau County
Site No. 130186
March 2015

Statement of Purpose and Basis

This document presents the remedy for the American Drive-In Cleaners site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the American Drive-In Cleaners site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

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

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

sustainable re-development.

2. Soil Vapor Extraction (SVE)

A soil vapor extraction (SVE) system will be installed to remove volatile organic compounds (VOCs) from the subsurface soil at the source area of the contamination (the former dry wells). VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells will be treated (see below) prior to being discharged to the atmosphere.
Two or more SVE wells will be installed in the vadose zone. The extracted air containing VOCs extracted from the SVE wells will be treated by passing the air stream through activated carbon, which removes the VOCs from the air prior to being discharged to the atmosphere. These SVE wells will be placed to treat the source area as well as to provide protection from soil vapor intrusion to tenants of units 414 and 416 S. Oyster Bay Road.

3. Cover System

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

4. Soil Vapor Intrusion Mitigation
As indicated in Paragraph 2, two or more SVE wells will be installed to provide protection from soil vapor intrusion to tenants of units 414 and 416 S. Oyster Bay Road. In the remaining portion of the building that is off-site but within the property boundary, a program of building slab maintenance will act as a mitigation measure for soil vapor intrusion. Building slab maintenance will require an initial inspection and sealing of any cracks or utility penetrations. A periodic inspection will be performed to confirm continued integrity of the slab and identify additional maintenance needs. If it appears that building slab maintenance is not addressing soil vapor intrusion then additional measures to address will be evaluated and implemented.

5. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

- allows the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

6. Site Management Plan

A Site Management Plan is required, which includes the following:

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

Institutional Controls: The Environmental Easement discussed in paragraph 5.

Engineering Controls: The soil vapor extraction system discussed in Paragraph 2 and 4, the cover system discussed in Paragraph 3, and the soil vapor intrusion mitigation discussed in Paragraph 4.

This plan includes, but may not be limited to:

o an Excavation Plan which details the provisions for management of future excavation in areas of remaining contamination;

o descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions;

o a provision for evaluation of the potential for soil vapor intrusion if use of the COCs within the existing on-site building ceases and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

o property owners to the west of the site declined soil vapor intrusion sampling (sub-slab vapor and indoor air) in 2012. Should the owners request to have their properties sampled in the future, the NYSDEC, in consultation with the NYSDOH, shall determine if soil vapor intrusion sampling is still appropriate. If necessary, soil vapor intrusion sampling will be completed and actions recommended to address exposures related to soil vapor intrusion will be implemented;

o provisions for the management and inspection of the identified engineering controls;

o maintaining site access controls and Department notification; and

o the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

o monitoring of groundwater, indoor air, and soil vapor to assess the performance and effectiveness of the remedy;

o installation of well in the Magothy aquifer downgradient of the site to add to the monitoring well network

o a schedule of monitoring and frequency of submittals to the Department;

o monitoring for vapor intrusion for the existing on-site building, any buildings developed

on the site, or as may be needed in buildings to the west of the site, as may be required by the Institutional and Engineering Control Plan discussed above;

c. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- compliance monitoring of soil vapor extraction system to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

New York State Department of Health Acceptance

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

Declaration

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

March 16, 2015
Date

Robert W. Schick, P.E., Director
Division of Environmental Remediation

RECORD OF DECISION

American Drive-In Cleaners
Hicksville, Nassau County
Site No. 130186
March 2015

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the reasons for selecting the remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repository:

Hicksville Public Library
169 Jeruselum Avenue
Hicksville, NY 11801
Phone: (516) 931-1417

A public meeting was also conducted. At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy.

After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The American Drive-In Cleaners site is located at 418 S. Oyster Bay Rd, Hicksville, Nassau County. It is the northernmost unit in the retail shopping plaza located at this address. It is located in a commercial and residential area. The property is bounded by Woodbury Road to the north and S. Oyster Bay Road to the east. Two commercial lots are located to the northeast and the property is bounded by residential lots to the south and west. Hicksville Elementary School is located approximately 1,600 feet to the northwest.

Site Features: This site is the northernmost tenant unit within a large L-shaped one-story retail shopping complex. It occupies 4,028 square feet of the total 30,437 sq ft of the structure. There is a basement underlying the two eastern-most tenant units.

Current Zoning/Use(s): The site is an active dry-cleaner that uses tetrachloroethene (PCE). The entire property is zoned commercial and comprises 30,437 sq ft of retail space on a 5.82 acre parcel, the remaining area of which is paved. Public Supply Well 11-1 is located approximately 4,400 feet to the south of the site.

Past Use(s) of the Site: The building was built in 1956 and the dry-cleaner has operated in that location since that time. In September 1995, two floor drains were investigated as EPA class V (shallow) Underground Injection Control Program (UIC) dry wells and closed. The floor drains were excavated to a depth of 5.5 ft and filled with sand and sealed with concrete.

In November 2006, the Hicksville Water District Well 11-1 (N-10555) detected PCE at 8.2 ppb exceeding the drinking water standards and the well was removed from service. A records search of known PCE-contaminated sites within the vicinity determined that the American Drive-In Cleaners Site was a possible source. In October 2008, a granular activated carbon (GAC) treatment system was installed on Well 11-1 and it was returned to service.

In 2009, a Site Characterization undertaken by the Department determined that groundwater on-site was contaminated with PCE, but no definitive determination could be made as to whether this was the source of the Hicksville Well 11-1 contamination.

The Remedial Investigation has determined that the American Drive-In Cleaners site is not the source of contamination for the Well 11-1.

Site Geology and Hydrogeology: The depth to water is approximately 90 feet below ground surface with flow to the south. This is the Upper Glacial Aquifer and the underlying soil is sand with some gravel.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the RI to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Josam Associates LLC

The Department and Josam Associates entered into a Consent Order on February 4, 2009. The Order obligates the responsible party to implement a full remedial program.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor
- indoor air
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

TETRACHLOROETHYLENE (PCE) cis-1,2-Dichloroethene
TRICHLOROETHENE (TCE)

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil
- soil vapor intrusion
- indoor air

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

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

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

Nature and Extent of Contamination: The primary contaminant of concern at the Site is tetrachloroethylene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (DCE).

Soils
An investigation in 1995 determined that the soil had been contaminated with PCE through floor drains located within the building. As part of an Underground Injection Control Program (UIC) closure, soil was excavated beneath the floor drains to 5.5 ft below ground surface (bgs) and endpoint samples indicated contamination, though reduced, was still present at maximum concentration of 3,600ppm for PCE and 540ppm for total petroleum hydrocarbons (TPH). A subsequent soil boring taken beneath the floor drain indicated that PCE was present, but below the applicable soil cleanup guidelines at that time). The cesspools and other areas were not investigated.

A Site Characterization by the Department was completed on-site in 2009. Subsurface soil immediately southeast (downgradient) of the dry cleaner exhibited PCE below the protection of groundwater soil cleanup objective (1.3 ppm).

A Remedial Investigation was implemented in 2009. Soil samples were collected and analyzed for VOCs around the former floor drains, cesspool, and the transition between the Upper Glacial and Magothy aquifers. During the Remedial Investigation, the area immediately surrounding the former floor drains (source area), was sampled down to 12 ft bgs. The sample at the 9-10 ft interval exhibited 64ppm PCE, exceeding the unresticted (1.3 ppm) and the residential soil

cleanup objectives (5.5 ppm). However at the 12 ft interval exhibited only 0.0013 ppm of PCE. TCE and DCE were also found within the interior floor drain samples, however the results were very low and did not exceed standards.

The off-site area around the cesspool was also sampled and PCE and TCE were found at low levels. They did not exceed the unrestricted standard. PCE was found in one soil sample at the aquifer transition at a very low level.

Groundwater
Groundwater in the immediate vicinity of the dry cleaner was found to be contaminated with up to 160 ppb of PCE, 17 ppb of TCE, and 82 ppb of cis-1,2-DCE during the Site Characterization. These contaminants exceeded their groundwater standard of 5 ppb. Samples collected from the deep aquifer, the Magothy, did not exhibit any results for PCE, TCE, or DCE.

During the Remedial Investigation, the groundwater was sampled and analyzed for VOCs from the existing wells as well as newly installed deep wells at the bottom of the Upper Glacial aquifer. The general trend of decreasing concentration of contaminants over time was observed. Also there was a decreasing trend of contaminant concentrations the further the well was from the source area (the floor drains). The highest observed concentrations were 130 ppb of PCE, 23 ppb of TCE, and 85 ppb of DCE.

Soil Vapor, Sub-slab vapor, and Indoor Air
During the Site Characterization the on-site sub-slab vapor exhibited 1,800,000 ug/m3 PCE. Since PCE is in use at the site, no indoor air sample was collected.
As part of Remedial Investigation, Soil Vapor Samples, sub-slab vapor, and indoor air samples were collected.
Soil vapor samples were collected at the perimeter of the property to assess the potential for soil vapor intrusion (SVI) at the residential properties at the boundaries of the property. At the western boundary, the highest soil vapor result was 480 ug/m3 PCE. At the southern boundary, the result was 5.5 ug/m3 PCE.

No on-site SVI sampling occured at the current dry cleaner (the site) due to the use of PCE. Sample results from tenant units located due south of the site all had sub-slab results greater than 1000 ug/m3 of PCE, indicating there is a high potential for soil vapor intrusion. Tenant units to the southeast exhibited PCE results that were generally less than 1000 ug/m3 but greater than 100 ug/m3 except for one sample point. These results indicate that further testing is needed to make a determination as to the need for mitigation. TCE was found exceeding 250 ug/m3 in the 3rd and 4th tenant units south of the site and one tenant unit southeast of the site indicating the high potential for soil vapor intrusion. DCE was found in low levels at multiple tenant units and vinyl chloride was not detected. Mitigation is recommended for the two tenant units south of the site due to the high sub-slab soil vapor results. Further testing is recommended for the rest of the building due to the need for indoor air sampling in conjunction with sub-slab vapor sampling.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

Direct contact with contaminants in the soil is unlikely because the site is covered with buildings and pavement. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not impacted by site-related contaminants. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Sampling identified the potential for impacts to indoor air quality in the on and off-site commercial spaces in the retail shopping plaza. Sampling indicates soil vapor intrusion is not a concern for properties beyond the shopping plaza.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Soil Vapor

RAOs for Public Health Protection

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

SECTION 7: SUMMARY OF THE SELECTED REMEDY

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study (FS) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's remedy is set forth at Exhibit D.

The selected remedy is referred to as the Soil Vapor Extraction, Soil Vapor Intrusion Mitigation, and Site Management Plan remedy.

The estimated present worth cost to implement the remedy is $609,000. The cost to construct the remedy is estimated to be $129,000 and the estimated average annual cost is $77,000.

The elements of the selected remedy are as follows:

1. Remedial Design

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

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;

- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Soil Vapor Extraction (SVE)

A soil vapor extraction (SVE) system will be installed to remove volatile organic compounds (VOCs) from the subsurface soil at the source area of the contamination (the former dry wells). VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells will be treated (see below) prior to being discharged to the atmosphere.
Two or more SVE wells will be installed in the vadose zone. The extracted air containing VOCs extracted from the SVE wells will be treated by passing the air stream through activated carbon, which removes the VOCs from the air prior to being discharged to the atmosphere. These SVE wells will be placed to treat the source area as well as to provide protection from soil vapor intrusion to tenants of units 414 and 416 S. Oyster Bay Road.

3. Cover System

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

4. Soil Vapor Intrusion Mitigation
As indicated in Paragraph 2, two or more SVE wells will be installed to provide protection from soil vapor intrusion to tenants of units 414 and 416 S. Oyster Bay Road. In the remaining portion of the building that is off-site but within the property boundary, a program of building slab maintenance will act as a mitigation measure for soil vapor intrusion. Building slab maintenance will require an initial inspection and sealing of any cracks or utility penetrations. A periodic inspection will be performed to confirm continued integrity of the slab and identify additional maintenance needs. If it appears that building slab maintenance is not addressing soil vapor intrusion then additional measures to address will be evaluated and implemented.

5. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

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

6. Site Management Plan

A Site Management Plan is required, which includes the following:

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

Institutional Controls: The Environmental Easement discussed in paragraph 5.

Engineering Controls: The soil vapor extraction system discussed in Paragraph 2 and 4, the cover system discussed in Paragraph 3, and the soil vapor intrusion mitigation discussed in Paragraph 4.

This plan includes, but may not be limited to:

o an Excavation Plan which details the provisions for management of future excavation in areas of remaining contamination;

o descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions;

o a provision for evaluation of the potential for soil vapor intrusion if use of the COCs within the existing on-site building ceases and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

o property owners to the west of the site declined soil vapor intrusion sampling (sub-slab vapor and indoor air) in 2012. Should the owners request to have their properties sampled in the future, the NYSDEC, in consultation with the NYSDOH, shall determine if soil vapor intrusion sampling is still appropriate. If necessary, soil vapor intrusion sampling will be completed and actions recommended to address exposures related to soil vapor intrusion will be implemented;

o provisions for the management and inspection of the identified engineering controls;

o maintaining site access controls and Department notification; and

o the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

o monitoring of groundwater, indoor air, and soil vapor to assess the performance and effectiveness of the remedy;

o installation of well in the Magothy aquifer downgradient of the site to add to the monitoring well network
o a schedule of monitoring and frequency of submittals to the Department;
o monitoring for vapor intrusion for the existing on-site building, any buildings developed on the site, or as may be needed in buildings to the west of the site, as may be required by the Institutional and Engineering Control Plan discussed above;

c. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
o compliance monitoring of soil vapor extraction system to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
o maintaining site access controls and Department notification; and
o providing the Department access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

The primary volatile organic compound (VOC) found to exceed applicable standards throughout the site is tetrachloroethene (PCE), a dry-cleaning chemical. Therefore, the analytical data from various media (soil vapor, groundwater, soil) are discussed with specific evaluation of this VOC and its daughter compounds trichloroethene (TCE) and cis-1,2-dichloroethene (DCE).

Groundwater

As part of the Site Characterization, several monitoring wells and hydropunch samples were installed around the strip mall property on which the dry cleaner is present. These groundwater samples indicated that there was PCE, TCE, and DCE contamination in the groundwater. Samples were collected from the deeper aquifer, the Magothy, and showed no contamination.

As part of the Remedial Investigation, Groundwater samples (locations shown in figure 2) were collected from groundwater table monitoring wells and deep monitoring wells screened at the bottom of the Upper Glacial aquifer. The results indicate that PCE, TCE, and DCE (chlorinated volatile organic compound (cVOCs)) exceed the SCGs in both the shallow and deep aquifer in the immediate vicinity of the site. The shallow wells exhibited concentrations of cVOCs that were greater than their deep counterpart. The wells located at the perimeters of the shopping center property had low concentrations or were non-detect for cVOCs. Comparing results over time, generally cVOC concentrations have decreased or remained approximately the same in wells that were sampled in 2008 and again in 2010.

The data collected on the Upper Glacial to the Magothy transition depth and the data collected during the Site Characterization in the Magothy groundwater to the southeast near site boundaries indicate that the CVOC contamination does not extend beyond the site or into the Magothy, therefore the public supply well is not being impacted.

The toluene exceedance in one well is suspected to be runoff contamination from a damaged monitoring well. The methylene chloride exceedance is suspected to be contamination from the laboratory.

Table 1 - Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
Tetrachloroethene	ND - 130	5	7/13
Trichloroethene	ND – 23	5	4/13
Cis-1,2-Dichloroethene	ND – 85	5	6/13
Toluene	ND – 640	5	1/13
Methylene Chloride	ND – 13JB	5	1/13

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
J – Estimated Concentration below Reporting Limit
B – Analyte detected in an associated blank sample

Based on the findings of the RI, the past disposal of hazardous waste associated with the operation of the dry-cleaners has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: PCE, TCE, and DCE.

Soil

Soil samples were collected from below the floor of the dry-cleaners and in the cesspool area as seen in Figure 3. Below the floor, just outside of the area that was previously excavated and is considered to be the source area, samples were collected from two locations. One location was sampled at three depths and another was sampled at two depths. These samples were all subsurface samples ranging from 0.3-1 ft to 12 ft bgs. The samples collected at 3.5 -4.5 ft and 9-10 ft bgs exceeded the unrestricted SCG for PCE. Samples were collected below the floor of the drycleaner in the eastern end of the building at depths of 0.3-1 ft and 4-5 ft bgs and did not exceed SCGs. Samples were collected from two locations with two depths each near the cesspool area. The sample results from the cesspool were well below the SCG for PCE and were non-detect or only slightly above the detection limit.

There were no surficial soils to collect from the site as it is completely covered by the building and the parking lot.

Table 2 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Protection of GW SCG[c] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
Tetrachloroethene	ND – 64.000	1.3	2/13	1.3	2/13
Trichloroethene	ND – 0.002 J	0.47	0/13	0.47	0/13
Cis-1,2,-dichloroethene	ND – 0.00083 J	0.25	0/13	0.25	0/13
Acetone	ND – 0.0079 JB	0.05	0/13	0.05	0/13

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Protection of GW SCG[c] (ppm)	Frequency Exceeding Restricted SCG
Methylene Chloride	ND – 0.010 JB	0.050	0/13	0.05	0/13
Toluene	ND – 0.00028 J	0.700	0/13	0.700	0/13

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater because groundwater contamination above the standard was detected.

The primary soil contaminants are cVOCs associated with operation of the dry-cleaners.

Acetone, and methylene chloride were also detected in the quality assurance samples (laboratory blanks) and are not considered site specific contaminants of concern. There is no information that toluene was used in the dry cleaning operation and given the low level (detected but below a level which it can be definitively quantified), it is not considered a site specific contaminant of concern. TCE and DCE were found at levels below the SCGs and therefore are not considered site specific contaminants of concern in soil.

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste in the dry wells has resulted in the contamination of soil. The site contaminant identified in soil which is considered to be the primary contaminant of concern, to be addressed by the remedy selection process is PCE.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor, sub-slab soil vapor under structures, and indoor air inside structures. At this site, due to the presence of buildings in the impacted area, a full suite of samples were collected to evaluate whether soil vapor intrusion was occurring.

Sub-slab vapor and indoor air samples were collected from the two tenant units immediately to the south of the dry cleaners (Site). The results of the sampling indicated that mitigation is recommended for the two units due to elevated levels of PCE and TCE. Figure 4 shows the results of soil vapor, sub-slab, and indoor air sampling.

Sub-slab vapors were collected in almost all the tenant units throughout the building to evaluate the potential for soil vapor intrusion. Sample results from tenant units located due south of the site all had sub-slab results greater than 1000 ug/m^3 of PCE, indicating there is a high potential for soil vapor intrusion. Tenant units to the southeast exhibited PCE results that were generally less than 1000 ug/m^3 but greater than 100 ug/m^3 except for one sample point. These results indicate that further testing is needed to make a determination as to the need for mitigation. TCE was found exceeding 250 ug/m3 in the 3rd and 4th tenant units south of the site and one tenant unit southeast of the site indicating the high potential for soil vapor intrusion. DCE was found in low levels at multiple tenant units and vinyl chloride was not detected.

Soil vapor samples were collected on the west perimeter of the property near the site. These sample results exhibited somewhat higher levels of PCE, which indicate the greater potential for impacting sub-slab vapor and indoor air beyond the northwest edge of the property. The property to the west did not grant access for sub-slab and indoor air sampling.

The soil vapor sample collected on the southern perimeter of the property, downgradient of the site, showed very low levels of PCE indicating little potential for sub-slab and indoor air to be impacted beyond the edge of the property.

Based on the concentration detected, and in comparison with the NYSDOH Soil Vapor Intrusion Guidance, the primary soil vapor contaminants are PCE and TCE which are associated with the dry-cleaning operations at the American Drive-In Cleaners. The primary soil vapor contamination is found downgradient of the site, to the south. Mitigation is recommended for the two tenant units south of the site due to the high sub-slab soil vapor results. Further testing is recommended for the rest of the building due to the need for indoor air sampling in conjunction with sub-slab vapor sampling.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are PCE and TCE.

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Alternative 2: Soil Vapor Extraction, Soil Vapor Intrusion Mitigation, and Site Management Plan

This alternative would include installation and operation of a soil vapor extraction (SVE) system to address the soil source area contamination from the dry wells and to remove soil vapor from beneath the slab in the area that warrants soil vapor mitigation, implementation of a Building Slab Maintenance program to reduce the potential for soil vapor intrusion, a Site Cover to prevent exposure of contaminated soils, and implementation of Engineering Controls and Institutional Controls in the form of an Environmental Easement and a Site Management Plan which includes groundwater monitoring and soil vapor intrusion monitoring throughout the building and SVI testing of the properties to the west if desired.

Present Worth: *$609,000*
Capital Cost: *$129,000*
Annual Costs: *$77,000*

Alternative 3: Excavation, Air Sparge/ Soil Vapor Extraction with Monitoring, Sub-slab Depressurization, and EC/ICs (Restoration to Pre-Disposal or Unrestricted Conditions)

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil meets the unrestricted soil cleanup objectives listed in Part 375-6.8 (a). This alternative would include: Excavation of the source area soil from around the dry wells, installation and operation of an air sparge/soil vapor extraction (AS/SVE) system to remove contamination from the groundwater, installation and operation of a sub-slab depressurization system with horizontal piping to mitigate the entire building of soil vapor intrusion, and implementation of Engineering Controls and Institutional Controls such as the Site Management Plan and the Environmental Easement.

Present Worth: *$1,400,000*
Capital Cost: *$1,342,000*
Annual Costs: *$116,000*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1: No Action	$0	$0	$0
Alternative 2: Soil Vapor Extraction, Building Slab Maintenance, Site Management Plan, and EC/ICs	$129,000	$77,000	$609,000
Alternative 3: Excavation, Air Sparge/ Soil Vapor Extraction with Monitoring, Sub-slab Depressurization, and EC/ICs (Restoration to Pre-Disposal or Unrestricted Conditions)	$1,342,000	$116,000	$1,400,000

Exhibit D

SUMMARY OF THE SELECTED REMEDY

The Department has selected Alternative 2, Soil Vapor Extraction, Soil Vapor Intrusion Mitigation, and Site Management Plan as the remedy for this site. The Site Management Plan includes Building Slab Maintenance, Soil Vapor Intrusion Monitoring, and Groundwater Monitoring. Alternative 2 would achieve the remediation goals for the site by extracting the soil gas through the newly installed SVE wells, which would be optimally placed to extract soil gas from the locations on the site that are most contaminated with PCE. The building slab will undergo periodic inspection and maintenance to ensure it is acting as mitigation measure for soil vapor intrusion. In addition, groundwater monitoring, soil vapor intrusion monitoring, and a site management plan will be implemented.

The elements of this remedy are described in Section 7. The selected remedy is depicted in Figures 5 and 6.

Basis for Selection

The selected remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The selected remedy Alternative 2 would satisfy this criterion by removing contaminants in unsaturated soil and soil vapor that could create human exposures, by restricting groundwater use, and by relying on natural attenuation processes to reduce contaminant levels in groundwater. Alternative 3, by removing all soil contaminated above the unrestricted soil cleanup objective in soil, meets the threshold criteria. Alternatives 2 and 3, by addressing the soils, address the source of the groundwater contamination. Alternative 2 relies on a restriction of groundwater use and soil vapor intrusion monitoring at the site to protect human health. Alternative 3 may require a short-term restriction on groundwater use; however, it is expected the restriction will be able to be removed in approximately four years following shutdown of the AS/SVE system. The potential for soil vapor intrusion will be significantly reduced by Alternative 3 and, to a somewhat lesser extent, Alternative 2. Alternative 1 (No Action) does not provide any additional protection to public health and the environment and will not be evaluated further.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 2 and 3 comply with the SCGs to the extent practicable. They both address the source area of contamination, although Alternative 2 will take more time. Alternative 3 will actively reduce the contamination in the groundwater while Alternative 2 will require Institutional and Engineering Controls and monitoring over several years until COC concentrations attenuate to SCGs. Alternative 2 and 3 will address SVI through

monitoring and mitigation, although alternative 2 only provides a means to assess SVI compliance with SCGs outside the SVE radius of influence.

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

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial Alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Long-term effectiveness is equally accomplished by Alternative 2 and 3. Both, SVE and excavation are considered reliable technologies and capable of achieving the RAOs in the long-term. Both would achieve the removal of the source area contamination and IC/ECs would be implemented for both remedies. Both reduce the potential for soil vapor intrusion through the implementation of mitigation methods, although Alternative 2 would require long-term SVI monitoring.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to Alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative 2 would reduce the volume of contamination in unsaturated soil, but would not reduce the toxicity, mobility or volume of groundwater contaminants. Alternative 3 treats the contaminated groundwater with Air Sparge, thereby reducing the toxicity, mobility, and volume of contamination in the treatment area. Both Alternatives remove the contaminants in the soil, although Alternative 3 removes to a somewhat greater degree by excavating the soil.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other Alternatives.

Alternative 2 does not have significant short-term impacts. However the soil removal required by Alternative 3 would have more short term impacts than Alternative 2 due to the excavation within the building. The excavation activities for Alternative 3 present a much greater potential for short-term risks to onsite workers and the community during implementation. Under Alternative 3, appropriate measures would be implemented to mitigate these risks including, but not limited to, implementing a HASP and includes air monitoring program, using PPE, and instituting engineering controls to suppress dust. The time needed to achieve the RAOs is the shortest for Alternative 3 and longer for Alternative 2.

6. Implementability. The technical and administrative feasibility of implementing each Alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternative 2 is the most favorable relative to implementability. Alternative 3 is implementable, however the removal of soils within the building and the installation of the SSDS within a building of this size and configuration make it much more difficult to implement.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each Alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more Alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The costs of the alternatives vary significantly. The projected cost of Alternative 2 is lower than Alternative 3. With the costs of excavation and soil disposal, installation of Air Sparge system, and SSD System, Alternative 3 has a much higher capital cost. The installation of the SVE, maintenance of the building slab, implementation of groundwater monitoring, and IC/ECs provide protection to the groundwater, soil and from SVI in the long-term, however the annual costs are still lower for Alternative 2 than for Alternative 3.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

The current and in the foreseeable future land use of the site is commercial. The site and surrounding property are covered by building or parking lot. Alternative 3 would remove the contaminated soil and Alternative 2 would treat the contaminated soil. Any remaining contamination with Alternative 2 and 3 would be compatible with commercial land use through the implementation of a Site Management Plan.

Alternatives 2 and 3 both require on-site groundwater use restrictions. Therefore all the Alternatives under consideration would have similar impact on the land use as the groundwater use restriction would be required to stay in place for at least the next four years.

The potential for SVI into the commercial buildings overlying any remaining contamination would be addressed by both Alternatives.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of Alternatives, and the PRAP are evaluated. A responsiveness summary has been prepared that describes public comments received and the manner in which the Department will address the concerns raised

Alternative 2 has been selected because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

American Drive-In Cleaners
State Superfund Project
Town of Oyster Bay, Nassau County, New York
Site No. 130186

The Proposed Remedial Action Plan (PRAP) for the American Drive-In Cleaners site was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on December 11, 2014. The PRAP outlined the remedial measure proposed for the contaminated soil, groundwater, and soil vapor intrusion at the American Drive-In Cleaners site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on December 17, 2014, which included a presentation of the remedial investigation /feasibility study (RI/FS) for the American Drive-In Cleaners as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on January 10, 2015.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Since the American Drive-In Cleaners site has been ruled out as a source will DEC investigate other sites to determine where the source of the plume impacting the Hicksville Water District is coming from?

RESPONSE 1: The Department's Division of Environmental Remediation (DER) has already investigated three additional current or former dry cleaner locations in the vicinity (Hicksville Area Drycleaner Study) and found that none of them were a likely source of this contamination either. The Department is not aware of any other potential sources in the area.

COMMENT 2: Our wells are contaminated. It seems based on this proposed remedy with its lack of monitoring that everybody is backing up and going home and leaving it to the water district and the public to deal with this contamination.

RESPONSE 2: The Hicksville Water District added a treatment system to well 11-1 when the contamination in the well was identified in November 2006. The results of the investigation of this site concluded that contamination from this site has not migrated offsite (or to the Hicksville Public Water supply Wells). Also see Response 1.

COMMENT 3: The water district feels that there should be a recognition that product may have gotten off site from the American Drive-In Cleaners site.

RESPONSE 3: While it is a possibility that PCE entered the ground at this site many years ago and moved downgradient from this site, the Department's investigation provided no evidence that this occurred.

COMMENT 4: If DEC's Division of Environmental Remediation (DER) is not the business of tracking down plumes, who is in charge of tracking down plumes at DEC if DER is not tracking down plumes? Who has the authority to do this?

RESPONSE 4: The Department's authority to utilize the State Superfund is limited to addressing inactive hazardous waste disposal sites (and the resulting contamination). When a potential source(s) of contamination can be identified, the Department will initially investigate them to determine if they are a source of contamination and if so, fully investigate and remediate them. Absent an identifiable class 2 site, further remediation is not authorized. Also see Response 1.

COMMENT 5: Since we don't have a source for the contamination that is impacting the Hicksville Water District well can we refer this to the EPA?

RESPONSE 5: EPA may be contacted to determine if the groundwater plume associated with the contamination at well 11-1 is eligible to be placed on the National Priorities List.

COMMENT 6: Would it be possible to extend the New Cassel Groundwater investigation site so that it incorporates this site as well?

RESPONSE 6: The New Cassel Industrial Area (NCIA) is a federal NPL site. EPA may be contacted to see if this area can be incorporated into the site definition, however, it is our view that the contamination is separate from what is considered the NCIA plume.

COMMENT 7: What would an EPA investigation involve? What would it look for?

RESPONSE 7: If the EPA were to consider the contamination impacting Hicksville Well 11-1 as part of the NCIA NPL site, we would expect them to undertake an investigation similar to what was done for this site in the area between Well 11-1 and the NCIA.

Richard Humann of H2M submitted a letter dated January 6, 2015, which included the following comments:

COMMENT 8: There has been a forty year discharge from this facility from 1956 – 1996. Does DEC consider this forty year discharge when it determines the mass of contamination from this discharge?

RESPONSE 8: The remedial investigation can only determine the nature and extent of contamination currently present at the site, that may have been released to the environment from past operation of the facility.

COMMENT 9: Did product (perc) get offsite since this discharge started in 1956?

RESPONSE 9: The Department sampled and analyzed the groundwater at the periphery of the strip mall property. This assessment did not detect any contamination in groundwater at this time and no data exists to document conditions from 1956. Based on available data, the Department concluded that contamination has not migrated from the site. However, in light of this concern, the remedy will include additional off-site groundwater monitoring well(s)to be determined during the remedial design between the site and the plume to confirm this position.

COMMENT 10: Is there a high probability that the discharge from this facility will impact a public supply well? DEC needs to look at the history of this site and its extended period of discharges.

RESPONSE 10: It does not appear as though contamination from the American Drive-In Cleaners Site will reach the Hicksville 11-1 public supply well. The Department has taken the time period of discharge into consideration. Also, see Response 9.

COMMENT 11: Did DEC do an offsite assessment of groundwater contamination from this site?

RESPONSE 11: Please refer to Response 9.

COMMENT 12: There was 40 years of discharge from this site. Do you truly believe it has been captured offsite? If that is your position, we will take a different position and we believe that offsite testing should be done.

RESPONSE 12: Please refer to Responses 9 and 10.

COMMENT 13: So you are saying that the mass of contamination has not moved in 40 years?

RESPONSE 13: Please refer to Responses 8 and 9.

COMMENT 14: Our supply well has the same contamination as this site and it is within the 50 year travel period of groundwater from this site to our supply well. Can you explain this?

RESPONSE 14: PCE is a commonly used solvent and degreaser used by many dry-cleaning and other commercial/industrial operations in the area. Based on our investigation, we have concluded that contamination from the American Dry Cleaners site has not migrated off-site. Also see Responses 5 and 8.

COMMENT 15: If you do not do any offsite monitoring we will have to come out aggressively against this plan. To not recognize that you don't know everything about this site is the wrong approach. We (environmental and health agencies) have missed things in the past and we should not do this again.

RESPONSE 15: Off-site monitoring will be completed as part of the remedy. See Response 9.

COMMENT16: If there has been a groundwater discharge of contamination over a 40 year period of time is there a way to calculate the mass that was discharged?

RESPONSE 16: The total amount discharged to the groundwater cannot be estimated with any certainty. While it may be possible to determine the amount of PCE used by the facility, there is no way to determine how much may have been released to the groundwater versus disposal in the sewer, disposed of as waste or released to the air from the operating machines or in dry cleaned clothes. Also see Response 8.

COMMENT 17: Would it be possible to calculate a standard discharge from a dry cleaner and then extrapolate what the mass of contamination may be based on that discharge?

RESPONSE 17: Please refer to Response 16.

COMMENT 18: Stephanie Davis of FPM submitted a letter dated January 9, 2015, in support of the conclusion that the site is not the source for contamination for well 11-1.

RESPONSE 18: Comment noted.

APPENDIX B

Administrative Record

Administrative Record

American Drive-In Cleaners
State Superfund Project
Town of Oyster Bay, Nassau County, New York
Site No. 130186

1. Proposed Remedial Action Plan for the American Drive-In Cleaners site, dated December 2014, prepared by the Department.

2. Order on Consent, Index No. A1-0616-01-09, between the Department and Michael Levin of Josam Associates, executed on February 24, 2009.

3. Site Characterization, April 2009, prepared by EA Engineering.

4. RI/FS Work Plan, November 2009, prepared by FPM Group.

5. Final RI/FS Report, October 2014, prepared by FPM Group.

6. Letter dated January 6, 2015 from Rich Humann of H2M.

7. Letter dated January 9, 2015 from Stephanie Davis of FPM.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

American Drive-In Cleaners
State Superfund Project
Town of Oyster Bay, Nassau County, New York
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This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Since the American Drive-In Cleaners site has been ruled out as a source will DEC investigate other sites to determine where the source of the plume impacting the Hicksville Water District is coming from?

RESPONSE 1: The Department's Division of Environmental Remediation (DER) has already investigated three additional current or former dry cleaner locations in the vicinity (Hicksville Area Drycleaner Study) and found that none of them were a likely source of this contamination either. The Department is not aware of any other potential sources in the area.

COMMENT 2: Our wells are contaminated. It seems based on this proposed remedy with its lack of monitoring that everybody is backing up and going home and leaving it to the water district and the public to deal with this contamination.

RESPONSE 2: The Hicksville Water District added a treatment system to well 11-1 when the contamination in the well was identified in November 2006. The results of the investigation of this site concluded that contamination from this site has not migrated offsite (or to the Hicksville Public Water supply Wells). Also see Response 1.

COMMENT 3: The water district feels that there should be a recognition that product may have gotten off site from the American Drive-In Cleaners site.

RESPONSE 3: While it is a possibility that PCE entered the ground at this site many years ago and moved downgradient from this site, the Department's investigation provided no evidence that this occurred.

COMMENT 4: If DEC's Division of Environmental Remediation (DER) is not the business of tracking down plumes, who is in charge of tracking down plumes at DEC if DER is not tracking down plumes? Who has the authority to do this?

RESPONSE 4: The Department's authority to utilize the State Superfund is limited to addressing inactive hazardous waste disposal sites (and the resulting contamination). When a potential source(s) of contamination can be identified, the Department will initially investigate them to determine if they are a source of contamination and if so, fully investigate and remediate them. Absent an identifiable class 2 site, further remediation is not authorized. Also see Response 1.

COMMENT 5: Since we don't have a source for the contamination that is impacting the Hicksville Water District well can we refer this to the EPA?

RESPONSE 5: EPA may be contacted to determine if the groundwater plume associated with the contamination at well 11-1 is eligible to be placed on the National Priorities List.

COMMENT 6: Would it be possible to extend the New Cassel Groundwater investigation site so that it incorporates this site as well?

RESPONSE 6: The New Cassel Industrial Area (NCIA) is a federal NPL site. EPA may be contacted to see if this area can be incorporated into the site definition, however, it is our view that the contamination is separate from what is considered the NCIA plume.

COMMENT 7: What would an EPA investigation involve? What would it look for?

RESPONSE 7: If the EPA were to consider the contamination impacting Hicksville Well 11-1 as part of the NCIA NPL site, we would expect them to undertake an investigation similar to what was done for this site in the area between Well 11-1 and the NCIA.

Richard Humann of H2M submitted a letter dated January 6, 2015, which included the following comments:

COMMENT 8: There has been a forty year discharge from this facility from 1956 – 1996. Does DEC consider this forty year discharge when it determines the mass of contamination from this discharge?

RESPONSE 8: The remedial investigation can only determine the nature and extent of contamination currently present at the site, that may have been released to the environment from past operation of the facility.

COMMENT 9: Did product (perc) get offsite since this discharge started in 1956?

RESPONSE 9: The Department sampled and analyzed the groundwater at the periphery of the strip mall property. This assessment did not detect any contamination in groundwater at this time and no data exists to document conditions from 1956. Based on available data, the Department concluded that contamination has not migrated from the site. However, in light of this concern, the remedy will include additional off-site groundwater monitoring well(s)to be determined during the remedial design between the site and the plume to confirm this position.

COMMENT 10: Is there a high probability that the discharge from this facility will impact a public supply well? DEC needs to look at the history of this site and its extended period of discharges.

RESPONSE 10: It does not appear as though contamination from the American Drive-In Cleaners Site will reach the Hicksville 11-1 public supply well. The Department has taken the time period of discharge into consideration. Also, see Response 9.

COMMENT 11: Did DEC do an offsite assessment of groundwater contamination from this site?

RESPONSE 11: Please refer to Response 9.

COMMENT 12: There was 40 years of discharge from this site. Do you truly believe it has been captured offsite? If that is your position, we will take a different position and we believe that offsite testing should be done.

RESPONSE 12: Please refer to Responses 9 and 10.

COMMENT 13: So you are saying that the mass of contamination has not moved in 40 years?

RESPONSE 13: Please refer to Responses 8 and 9.

COMMENT 14: Our supply well has the same contamination as this site and it is within the 50 year travel period of groundwater from this site to our supply well. Can you explain this?

RESPONSE 14: PCE is a commonly used solvent and degreaser used by many dry-cleaning and other commercial/industrial operations in the area. Based on our investigation, we have concluded that contamination from the American Dry Cleaners site has not migrated off-site. Also see Responses 5 and 8.

COMMENT 15: If you do not do any offsite monitoring we will have to come out aggressively against this plan. To not recognize that you don't know everything about this site is the wrong approach. We (environmental and health agencies) have missed things in the past and we should not do this again.

RESPONSE 15: Off-site monitoring will be completed as part of the remedy. See Response 9.

COMMENT16: If there has been a groundwater discharge of contamination over a 40 year period of time is there a way to calculate the mass that was discharged?

RESPONSE 16: The total amount discharged to the groundwater cannot be estimated with any certainty. While it may be possible to determine the amount of PCE used by the facility, there is no way to determine how much may have been released to the groundwater versus disposal in the sewer, disposed of as waste or released to the air from the operating machines or in dry cleaned clothes. Also see Response 8.

COMMENT 17: Would it be possible to calculate a standard discharge from a dry cleaner and then extrapolate what the mass of contamination may be based on that discharge?

RESPONSE 17: Please refer to Response 16.

COMMENT 18: Stephanie Davis of FPM submitted a letter dated January 9, 2015, in support of the conclusion that the site is not the source for contamination for well 11-1.

RESPONSE 18: Comment noted.

APPENDIX B

Administrative Record

Administrative Record

American Drive-In Cleaners
State Superfund Project
Town of Oyster Bay, Nassau County, New York
Site No. 130186

1. Proposed Remedial Action Plan for the American Drive-In Cleaners site, dated December 2014, prepared by the Department.

2. Order on Consent, Index No. A1-0616-01-09, between the Department and Michael Levin of Josam Associates, executed on February 24, 2009.

3. Site Characterization, April 2009, prepared by EA Engineering.

4. RI/FS Work Plan, November 2009, prepared by FPM Group.

5. Final RI/FS Report, October 2014, prepared by FPM Group.

6. Letter dated January 6, 2015 from Rich Humann of H2M.

7. Letter dated January 9, 2015 from Stephanie Davis of FPM.

APPENDIX B

HEALTH AND SAFETY PLAN, INCLUDING THE COMMUNITY AIR MONITORING PLAN

HEALTH AND SAFETY PLAN
INCLUDING
COMMUNITY AIR MONITORING PLAN
FOR
AMERICAN DRIVE-IN CLEANERS SITE
418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

NYSDEC SITE #130186

PREPARED BY

FPM group™

909 MARCONI AVENUE
RONKONKOMA, NEW YORK 11779

DECEMBER 2015

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SECTION 1.0
INTRODUCTION

This Health and Safety Plan (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, 1988)" and the "Occupational Safety and Health Guidance Manual for Hazardous Waste Activities" (U.S. Department of Health and Human Services, 1985).

1.1 Scope and Applicability of the HASP

This HASP is designed to be applicable to locations where remedial activities, including remedial construction and activities associated with groundwater, soil, soil vapor, and/or air sampling are performed at the Site. This HASP may also be modified or amended to meet specific needs of the work proposed. This HASP will detail the Site safety procedures, Site background, and safety monitoring. Contractors will be required to adopt this HASP in full.

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 which may arise.

1.2 Site Work Zone and Visitors

The Site work zone (a.k.a. exclusion zone) during remedial construction or sampling activities will be a 30-foot radius about the work location. This work zone may be extended if, in the judgment of the health and safety officer (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.

As the Site is an operating dry cleaner, remedial construction work inside of the dry cleaner space (none of which is in the retail area) will generally be conducted when the dry cleaner is closed. If work must be conducted during business hours, the work zone will be physically segregated from the dry cleaner operations, which will be coordinated such that dry cleaner activity is minimized in proximity to the work zone.

All Site workers, including remedial contractors, will be required to have 40-hour hazardous material training (eight-hour refresher courses annually), respirator fit test certification, and 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 remedial 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 found in Table 1.2.1.

TABLE 1.2.1
EMERGENCY TELEPHONE NUMBERS

Police 911

Ambulance 911

Poison Control Center 516-542-2323

N.Y.S. Department of Environmental Conservation (Region 1) 631-444-0202

Plainview Hospital 516-719-3000

FPM Contact Personnel (631-737-6200)

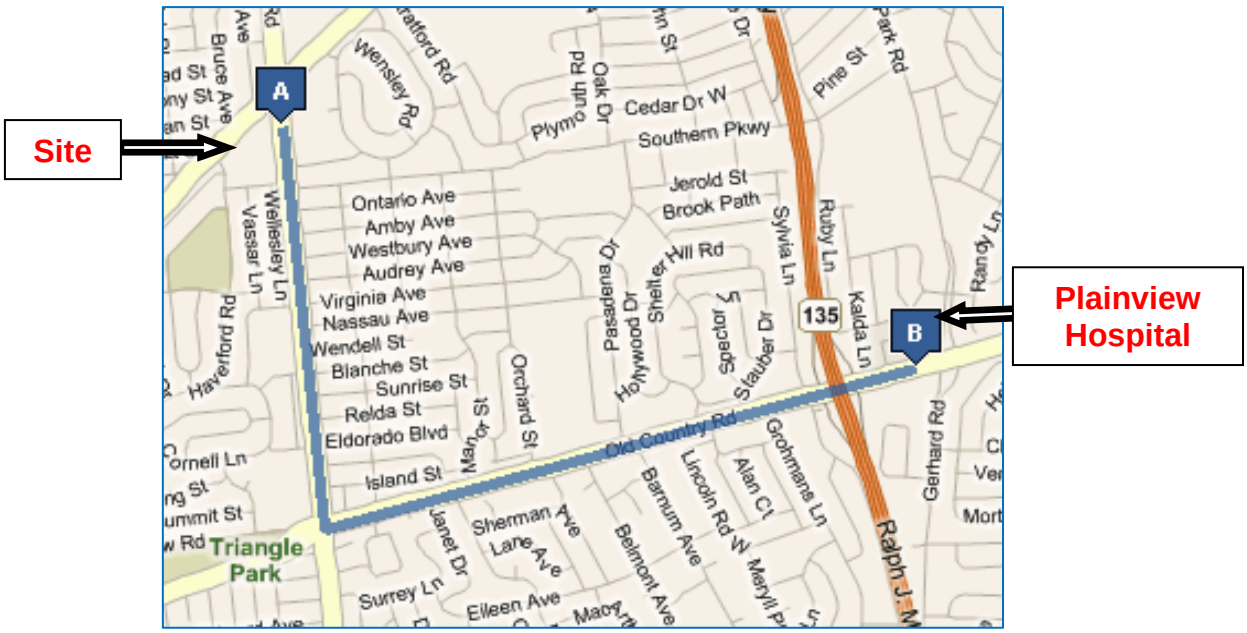
Dr. Kevin J. Phillips, P.E. ..... Cell # 631-374-6066

Ben Cancemi, Project Manager and Health and Safety Officer ..... Cell # 516-383-7106

Stephanie Davis, Project Coordinator, QA/QC Officer ..... Cell # 516-381-3400

Directions to Plainview Hospital (516-719-3000)

Turn right from the Site onto South Oyster Bay Road and head south about one mile to Old Country Road. Turn left onto Old Country Road and head east for approximately one mile. Cross over the Seaford-Oyster Bay Expressway (Route 135). Plainview Hospital is at 888 Old Country Road on the left just after the Seaford-Oyster Bay Expressway.



FPM

SECTION 2.0
KEY PERSONNEL AND RESPONSIBILITIES

The project manager and field activities manager for this project will be Ben Cancemi. Mr. Cancemi will also be the primary HSO. The project field staff may include Stephanie Davis, John Bukoski, George Holmes, and/or Christopher Linkletter. Contractor personnel may also be on Site. In the event that Mr. Cancemi is not onsite, the senior FPM staff member onsite will act as HSO and will report to the project manager. Contractor personnel will be provided with health and safety information by the HSO.

SECTION 3.0
SITE BACKGROUND

3.1 Site History and Potential Chemical Constituents at the Site

The Site is located at 418 South Oyster Bay Road in Hicksville, New York. The Site includes a one-story commercial unit within a larger shopping plaza building. Groundwater, soil, and/or soil vapor at the Site may be impacted with tetrachloroethylene and other chlorinated solvent volatile organic compounds (VOCs). The source of contamination is present beneath the Site slab. See Table 3.1.1 below for a list of the primary chemicals with threshold limit values.

TABLE 3.1.1
PRIMARY CHEMICALS WITH THRESHOLD LIMIT VALUES
AMERICAN DRIVE-IN CLEANERS SITE
HICKSVILLE, NEW YORK

Contaminant	Short Term Exposure Limit (STEL) 15 Minutes	Time-Weighted Average Eight-Hour Exposure Limit
Tetrachloroethylene (PCE)	100 ppm	25 ppm
Trichloroethylene (TCE)	100 ppm	50 ppm
1,2-Dichloroethylene	-	200 ppm

SECTION 4.0
TASK/OPERATION HEALTH AND SAFETY ANALYSIS

This section presents health and safety analyses for the remedial construction, sampling, and related activities at the Site.

4.1 Safety Analyses

- Remedial Measures Construction Safety Analysis

Remediation construction activities will occur during the installation of the SVE system and will generally be performed by contractors. FPM personnel are not anticipated to install remediation equipment. Remediation construction may involve the use of heavy equipment. Safety concerns will 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. Site 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. Site 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.

Remediation construction will likely result in open trenches at the Site. To minimize risks, an effort will be made to minimize the number of open trenches. Any trenches not undergoing active construction will either be closed or will be barricaded with construction fencing or other devices so as to minimize their hazards. At the close of each working day, any trenches that are not closed will be secured. Trenches will not be left open during weekends or following the completion of remediation construction.

During construction involving trench excavation, a photoionization detector (PID) will be utilized to screen vapors in the work zone. Level C personal protection will be donned if steady-state concentrations exceed five ppm above background. Steady-state readings, for this purpose, will be defined as readings exceeding five ppm above background for a minimum of ten seconds. Level C personal protection may 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 7). 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 which the HSO determines will 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 discernable. 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, 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 Site soil is possible. Dermal contact with Site soil and equipment that has been in contact with Site soils will be avoided.

- Water Level Measurement and Sampling Safety Analysis

Water level measurements and sampling activities will be performed by FPM personnel. In general, FPM will employ one to two persons at the Site. No water level measurements or sampling activities are anticipated to be performed by contractors.

Organic vapor concentrations will be monitored in the work zone during soil sampling by utilizing a PID. The PID will be "zeroed" by exposing the PID to ambient air prior to sampling and the upper range will be calibrated using 98 to 100 ppm isobutylene. Background concentrations will then be established in the work zone prior to initiating work and recorded in the HSO field book. Upon initiating work, PID readings will be obtained from the vicinity of the sampling areas. 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, as described above. Upon encountering PID levels greater than 50 ppm above background in the worker's breathing zone, all personnel will be excavated from the work zone in the upwind direction. Specific evacuation routes will be discussed prior to commencement of work at each location based on work location and wind direction, as discussed above. 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 gloves (such as butyl or nitrile) when the potential for dermal contact with soil or groundwater is possible. This will include cleaning and handling of retrieved sampling equipment, water level indicators, bailers, and/or rope from the boreholes or wells. Dermal contact with soil or groundwater and equipment that has been in contact with soil or groundwater will be avoided. For handling sample containers, thin nitrile gloves may be used if dexterity is required. In addition, eye protection will be worn by samplers during periods when the potential for splashing of groundwater is present (such as during well purging).

4.2 Other Safety Considerations

4.2.1 Noise

During sampling activities, operation of a direct push or drill rig, or other remedial construction operations potentially harmful levels of noise may be generated. Noise levels that exceed the 29 CFR 1910.95 permissible noise exposure limits require hearing protection (see Table 4.2.1.1 for permissible noise exposures).

Hearing protection will be available to all Site workers. The hearing protection will consist of foam, expansion-fit earplugs (or other approvable hearing protection) with an Environmental Protection Agency 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.

4.2.2 Slip/Trip/Fall Preventative Measures

To reduce the potential for slipping, tripping, or falling, the work zone will be kept clear of unnecessary equipment. All Site 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).

TABLE 4.2.1.1
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
0.5	110
0.25	115

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_6/T_6 exceeds unity, then, the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn 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

4.2.3 Insects and Ticks

Insect and tick problems are expected to be minimal. Potential insect problems include, but are not limited to, bees, wasps, and hornets. Prior to commencement of work, each work area will be surveyed for nests and hives to reduce the possibility of disturbing these 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 on Site.

Tick species native to Long Island consist of the pinhead-sized deer tick and the much-larger dog tick. Ticks are not anticipated at the Site due to the paucity of suitable habitat

4.2.4 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 the following measures will be taken:

- An adequate supply of water or other liquids will be brought on Site. To prevent dehydration, personnel will be encouraged to drink generous amounts of water even if not thirsty.

- A shady rest area will be designated to provide shelter during sunny days.
- In hot weather, workers wearing protective clothing may be rotated.

When the temperature is over 70 degrees Fahrenheit and personnel are wearing protective clothing heat stress monitoring may be implemented as follows:

- Heart rate may be measured by counting the radial pulse for 30 seconds at the beginning of the rest period. The heart rate should not exceed 110 beats per minute. If the rate is higher, the next work period will be shortened by ten minutes (or 33%). If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle will be shortened by 33%.

The HSO will decide on the length of work periods and rest periods based on Site conditions.

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 as well as being a nuisance.

- 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.

In the event that personnel exhibit indications of serious heat-related problems (heat cramps, heat exhaustion, and/or heat stroke), the HSO will immediately seek medical help for the affected personnel.

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

- 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).

- Provide a readily available warm shelter near each work zone.

- Carefully schedule work and rest periods to account for the current temperature and wind velocity conditions.

- Monitor work patterns and physical condition of workers and rotate personnel, as necessary.

Indications of cold exposure range from shivering, dizziness, numbness, confusion, weakness, impaired judgment, impaired vision to 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 rate and breathing rate and death.

In the event that personnel exhibit indications of serious cold-related conditions (frost bite and/or hypothermia), the HSO will immediately seek medical help for the affected personnel.

4.2.5 Potential Electrical Hazards

Potential electric hazards consist primarily of underground and overhead power lines. Potential underground electrical hazards will be minimized by having a utility markout performed prior to intrusive work. In addition, available as-built Site blueprints will be used to avoid contact with subsurface utility lines or structures. Overhead electrical hazards will be evaluated by visually observing the work location prior to performing operations which have the potential to contact overhead utilities. No work shall be performed in close proximity to overhead utilities.

4.2.6 The Buddy System

All activities in contaminated or potentially contaminated areas will be conducted by pairing off 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, heat, and/or cold exposure.

- Periodically check the integrity of his or her partner's protective clothing.

- Notify the HSO or others if emergency help is needed.

The buddy system will be instituted at the beginning of each workday. If new workers arrive on Site, a buddy will be chosen prior to the new worker entering the work zone.

4.2.7 Site Communications

Two sets of communication systems will be established at the Site: internal communication among personnel on-Site, and external communication between on-Site and off-Site 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.

- 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 on-Site and off-Site personnel will be established to:

- Coordinate emergency response.
- Report to the Project Manager.
- Maintain contact with essential offsite personnel.

A field telephone will be available at all times in the HSO's vehicle. In addition, the nearest stationary phone will be identified prior to the commencement of Site operations and this location will be relayed to all Site workers.

4.2.8 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 unusual conditions will require reporting the information to the HSO, who will take appropriate action.
- Loose-fitting clothing or loose long hair will be prohibited in the work zone during operations by heavy or rotating equipment.
- 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.

SECTION 5.0
PERSONNEL TRAINING REQUIREMENTS

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

Prior to Site fieldwork, 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 fieldwork at the Site. The review will include discussions of signs and symptoms of chemical exposure and heat/cold stress that indicate potential medical emergencies presented in Table 5.1. In addition, review of personal protective equipment will be conducted to include the proper use of air-purifying respirators.

TABLE 5.1
SIGNS AND SYMPTOMS OF CHEMICAL EXPOSURE AND HEAT STRESS

Type of Hazard	Signs and Symptoms
Chemical Hazard:	Behavioral changes, breathing difficulties, changes in complexion or skin color, confusion, coordination difficulties, coughing, depression, dermatitis, dilated pupils, dizziness, euphoria, fatigue and/or weakness, flushed face and/or neck, insomnia, irregular heartbeat, irritability, irritation of eyes, nose, respiratory tract, skin or throat, headache, tears in eyes, light-headedness, muscle fatigue, nausea, nervousness, numbness in limbs, sleepiness, tingling, tremors, vertigo, visual disturbance, vomiting
Heat Exhaustion:	Clammy skin, confusion, dizziness, fainting, fatigue, heat rash, light-headedness, nausea, profuse sweating, slurred speech, weak pulse
Heat Stroke (may be fatal):	Confusion, convulsions, hot skin, high temperature (yet may feel chilled), incoherent speech, staggering gait, sweating stops (yet residual sweat may be present), unconsciousness

SECTION 6.0
MEDICAL SURVEILLANCE PROGRAM

All workers at the Site with the potential to contact impacted Site media 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 fieldwork.

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 that 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.
- 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.
- Any worker medical complaints related to exposure to hazardous substances.

SECTION 7.0
PERSONAL PROTECTIVE EQUIPMENT

7.1 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 were discussed previously in Section 4.0. The duration of Site activities is estimated to be up to approximately one week on several occasions. All work is expected to be performed during daylight hours and workdays, in general, are expected to be eight hours in duration.

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

Level C Protection Personnel Protective Equipment (* = optional):

- Air-purifying respirator, full-face, equipped with dust and organic vapor cartridges.
- 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 and 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 (intrinsically safe*)

Criteria for Selection of Level C Protection

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 (* = optional):

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

Criteria for Selection of Level D Protection

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

- No organic vapors above 5 ppm and no 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 to 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.

7.2 Donning and Doffing PPE Ensembles

Donning an Ensemble

A routine will be established and practiced periodically for donning a Level C PPE ensemble. Assistance may be provided for donning and doffing since these operations are difficult to perform alone. Donning will be completed in the decontamination zone.

Table 7.2.1 lists sample procedures for donning a Level C PPE ensemble. These procedures should be modified depending on the particular type of suit and/or when extra gloves and/or boots are used.

Doffing an Ensemble

Exact procedures for removing Level C PPE 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 will be completed in the decontamination zone.

Doffing procedures are provided in Table 7.2.2. 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.

7.3 Respirator Fit Testing

The fit or integrity of the facepiece-to-face seal of a respirator affects its performance. As most facepieces fit only a certain percentage of the population, each facepiece must be tested on the potential wearer to ensure a tight seal. Irregular 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. Facial hair in the seal area may also interfere with the respirator-to-face seal and should be removed prior to entry into the work zone. 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.

7.4 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.
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

TABLE 7.2.1
PPE DONNING PROCEDURES

1. Inspect the clothing and respiratory equipment before donning (see Inspection in Section 7.4).

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 boots over the suit feet. 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 develops. Absence of positive pressure indicates poor fit.

7. Depending on type of suit:

   - Put on inner chemical-resistant gloves.

   - Additional outer gloves, 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.

TABLE 7.2.2
PPE 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.

The PPE inspection checklist is provided in Table 7.4.1. Records will be kept of all PPE 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 7.4.1
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 that chemical permeation can occur without any visible effects.
- Closure failure, tears, punctures, and/or seam discontinuities

GLOVES

Before use:

- Pressurize glove to check for pinholes. 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 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.

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

Respirators:

- Air-purifying respirators should be dismantled, washed, and placed in sealed plastic bags.

7.6 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.

7.7 Decontamination Methods

All personnel, clothing, equipment, and samples leaving the potentially-contaminated or work zone areas of the Site must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them. Decontamination methods physically remove contaminants, inactivate contaminants by chemical detoxification or disinfection/sterilization, or 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.

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.

All disposable PPE will be discarded following use. All used PPE to be discarded will be placed in an appropriate receptacle for disposal.

SECTION 8.0
DECONTAMINATION PROCEDURES FOR SAMPLING EQUIPMENT

All non-dedicated sampling equipment shall be decontaminated prior to and following use at each sampling location. Decontamination procedures shall consist of the following:

1. Scrub equipment in a bath of low-phosphate detergent and potable water.

2. Potable water rinse.

3. Air dry.

4. Aluminum foil wrap, shiny side out, for transport.

PPE decontamination has been discussed in Section 7.7.

All direct-push equipment and other equipment that has contacted Site soil, groundwater, or soil vapor will be decontaminated prior to leaving the Site. Decontamination of this equipment will consist of physically removing adhering soil using hand tools followed by rinsing the equipment with potable water. Decontamination will be performed in the immediate vicinity of the work area so that the removed soil and rinseate will be discharged in the area from which it originated.

SECTION 9.0
CALIBRATION PROCEDURES, FREQUENCIES, AND MAINTENANCE

This section summarizes the calibration procedures, frequencies, and maintenance for the health and safety field monitoring instruments. The manufacturer's owner's manuals for all monitoring equipment to be used will be present at the Site and will be followed.

The monitoring equipment will include a photoionization detector (PID), which measures the concentration of airborne ionizable gases and vapors. The PID does not distinguish between individual compounds and will not read methane. The PID calibration will be performed using ambient air to “zero” the instrument and a 95 to 100 ppm cylinder of isobutylene to calibrate the span. The calibration will be performed in accordance with the manufacturer’s instructions.

Additional monitoring instruments may include a dust monitor, a noise monitor, and other equipment, as necessary. All instruments will be calibrated prior to the commencement of each day's work in accordance with the manufacturer’s instructions. The instruments will also be charged overnight prior to each day's work. Maintenance will be performed periodically as needed and in accordance with the manufacturer’s instructions.

SECTION 10.0
EMERGENCY RESPONSE PLAN

This section includes the Emergency Response Plan for the Site. Pre-emergency planning will consist of reviewing the Emergency Response Plan with all workers at the Site prior to initiation of work.

Personnel Roles

It is anticipated that during remedial construction or sampling activities at the Site, in general, several persons will be on the Site: the HSO and contractors. Should an emergency situation arise at the Site, the HSO will assume control and decision-making. The HSO will also resolve all disputes concerning health and safety requirements and precautions. The HSO will also:

- Be authorized to seek and purchase supplies as necessary.
- Have control over activities of everyone entering the Site.

The HSO will communicate, by field telephone or other, with off-Site personnel to include the Project Manager to evaluate data and assist in the decision-making process. Phone numbers for the fire department, police, ambulance, poison control center, NYS Department of Environmental Conservation Spill Response Department, are listed in Table 1.2.1 of this document. The hospital which will be utilized during an emergency will be Plainview Hospital in Plainview. The directions to the hospital, along with the hospital's emergency room phone number are presented in Table 1.2.1. Copies of Table 1.2.1 will be available at the Site and will be placed in all vehicles of personnel involved in activities at the Site.

Internal communications will consist of a single whistle (or compressed air horn if Level C is donned) blast. This blast will signal all workers to evacuate the work zone by the nearest exit.

Response Follow-Up

Following an emergency, or incident, a detailed report will be generated by the HSO. All equipment will be restored to pre-emergency conditions. The HASP will be reviewed following an emergency to determine if it provides adequate information to assist in dealing with the emergency. The HASP may be revised to incorporate additional information as needed.

Emergency Recognition and Prevention

Before daily work assignments begin, each day a brief on-Site meeting will be held by the HSO which will address health and safety issues related to the day's work. Prior to initiation of work, a detailed on-Site health and safety meeting will be held to review all potential hazards, contingencies, and safety measures.

Safe Distances and Places of Refuge

The main potential cause of work zone evacuation is a significant vapor release. Vapor release evacuation will be discussed prior to subsurface activities at the Site and in general will be in the upwind direction. Wind direction will be monitored at each work location and all workers will be notified of the direction of evacuation prior to commencement of work. Safe distances will be discussed at each location and determined by the HSO. The PID will be used to determine if workers have evacuated a sufficient distance.

At all times, vehicles which may be utilized in an emergency for transport to the hospital (or other destination) will have clear access to leave the Site. The HSO will assure that an emergency vehicle does not become blocked-in by other vehicles.

Site Security and Control

The HSO will control entry of personnel into the work zone. No unnecessary persons shall be permitted in the work zone.

Decontamination Procedures During Emergencies

In the event of a medical emergency, decontamination will be performed if it does not interfere with essential treatment. Decontamination will be performed by washing, rinsing, and/or cutting off protective clothing and equipment.

If decontamination cannot be performed, the victim will be wrapped in plastic to reduce contamination to other personnel. Emergency and off-Site medical personnel will be alerted to the potential contamination.

Emergency Medical Treatment and First Aid

Medical emergencies will be treated, in general, by medical experts by transporting the victim to the nearby hospital. A first aid kit will be present on Site for minor medical treatment.

SECTION 11.0
COMMUNITY HEALTH AND SAFETY

This section includes procedures to address potential community health and safety issues associated with remedial construction and sampling activities at the Site.

11.1 Community Air Monitoring

A Community Air Monitoring Plan (CAMP) will be implemented at the Site by FPM during intrusive activities that have the potential to affect the surrounding community. These activities will include remedial construction, vertical profiling, and well installation. Due to the nature of the activities, there is the potential for organic vapor and/or dust emissions to occur as these activities are conducted. In addition, there is the potential for organic vapors and/or dust to be associated with the exhaust from powered equipment. To address these concerns, organic vapor and dust monitoring will be performed.

11.1.1 Organic Vapor Monitoring

Under the CAMP organic vapor concentrations will be monitored at the downwind perimeter of the work area while intrusive activities are occurring. To monitor organic vapors, a PID 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 Site prior to beginning work and upwind of the work area periodically using a PID. Organic vapors will be monitored at the downwind perimeter of the work area while intrusive activities are occurring and will be averaged on a 15-minute basis. PID readings will be recorded in the field logbook and will include the time, location, and PID readings observed. The action levels and required responses are as follows:

Organic Vapor Readings	
Action Level	**Response Action**
Less than 5 ppm above background.	Continue work.
More than 5 ppm but less than 25 ppm above background.	Implement Vapor Emission Response Plan.
More than 25 ppm above background.	Stop work. Perform downwind monitoring in accordance with Vapor Emission Response Plan.

- Vapor Emission Response Plan

The Vapor Emission Response Plan includes the following trigger levels and responses:

- In the event the level of organic vapors exceeds 5 ppm above the background at the downwind perimeter of the work area on a 15-minute average basis, activities will be halted and monitoring continued. Work may resume if the organic vapor level then decreases to below 5 ppm above background, or concentrations measured 200 feet downwind or at half of the distance to the nearest residential or commercial building, whichever is less, are below 5 ppm over background.

- If the level of organic vapors measured 200 feet downwind or at half of the distance to the nearest residential or commercial structure, whichever is less, is greater than 5 ppm above background then all work will be halted, the vapor source will be identified, and corrective actions taken. If the level at the downwind location persists above 5 ppm over background after work stops and corrective actions are taken, then monitoring will be performed within 20 feet of the nearest downward residential or commercial structure (20-foot zone).

- If efforts to abate the emission source are unsuccessful and the vapor levels are greater than 25 ppm above background in the 20-foot zone, then work will be halted.

11.1.2 Particulate Monitoring

Particulate (dust) monitoring will be performed with a Miniram personal monitor (or equivalent) calibrated according to the manufacturer's instructions. Monitoring will be performed within, upwind and downwind of the work area during activities involving soil movement. The HSO will record the readings in the field logbook.

If the downwind particulate level integrated over 15 minutes exceeds the upwind level by more than 100 micrograms per cubic meter (ug/m^3) or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Dust suppression techniques are anticipated to include reducing moving equipment rates and/or application of water to dry surfaces. Work may continue with dust suppression techniques providing that the downwind particulate level does not exceed the upwind particulate level by more than 150 ug/m^3.

If, after implementation of dust suppression techniques, downwind particulate levels are greater than 150 ug/m^3 above upwind levels, then work will stop and activities will be reevaluated. Work may resume providing that dust suppression techniques and other controls are successful in reducing the downwind particulate level to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

11.1.3 Noise Monitoring

Due to the use of powered equipment at the Site during remedial construction activities, there is the potential for noise to impact the surrounding community. However, since work will be performed only during normal working hours when ambient noise levels are elevated due to ongoing traffic on the adjoining South Oyster Bay and Woodbury Roads and commercial activities in the community, the potential for noise impacts on the surrounding community is low.

The HSO will monitor ambient noise levels at the property boundary prior to starting work each day. During activities that produce noise, the HSO will periodically monitor noise levels at 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 during work activities significantly exceed ambient noise levels at the closest property boundary, the HSO will take appropriate measures to reduce noise exposure beyond these boundaries. These measures may include relocation of equipment that generates noise, reducing equipment operations, 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 within a reasonable level of ambient conditions at the closest Site boundary.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) has been prepared by FPM Group (FPM) for New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Disposal Site #130186, identified as the American Drive-In Cleaners Site located at 418 South Oyster Bay Road, Hicksville, New York (Site). This QAPP is part of the Remedial Action Work Plan (RAWP) for remediation of the Site and includes the quality assurance and quality control (QA and QC) procedures for the remedial sampling activities.

The selected remedial actions are documented in the Record of Decision (ROD) for the Site and are described in detail in the RAWP. In general, soil vapor extraction (SVE) will be used to remediate soil impacted by tetrachloroethene (PCE) in a former floor drain area at the Site. SVE will also provide protection from soil vapor intrusion (SVI) for the Site and a portion of the adjoining shopping center. A cover system will also provide protection from SVI for the Site and SVI monitoring will be performed for the Site and shopping center units. An Institutional Control (IC) consisting of an environmental easement with provisions for restricting Site use and groundwater use and implementing a Site Management Plan (SMP) will also be implemented. A site plan showing the Site and the SVE remedial area is presented on Figure C.1.

C.1 Data Quality Objectives

The Data Quality Objectives (DQOs) will be applicable to all data-gathering activities for remedial activities at the Site. DQOs will be incorporated into sampling, analysis, and QA tasks associated with remedial activities.

The data users for this project are FPM Group (FPM), the New York State Department of Environmental Conservation (NYSDEC), the Nassau County Department of Health (NCDOH), and the New York State Department of Health (NYSDOH). The Site owner will also be provided with the data. No other data users are anticipated. The collected data are intended to be used to evaluate soil vapor, indoor air, outdoor air, groundwater, and SVE system emissions at the Site. If necessary, collected data will also be used for soil evaluation and/or waste characterization purposes.

C.2 Standards, Criteria, and Guidance

As discussed in detail in Section 2.4 of the RAWP, chemical-specific remediation goals have been developed for this Site based on the evaluation of standards, criteria, and guidance (SCGs). Location and action-specific SCGs are also applicable. The selected remedial measures for this Site are consistent with remedial action objectives (RAOs) developed based on the continued commercial use of the Site and on potential impacts to the surrounding community and environment.

For soils, the NYSDEC's 6 NYCRR Part 375-6.8 Soil Cleanup Objectives have been established as the applicable SCGs. These NYSDEC Objectives are applicable to soil and were formulated to be protective of human health and the environment.

For groundwater, the NYSDEC Class GA Ambient Water Quality Standards established in the NYSDEC Water Quality Regulations for Surface Waters and Groundwaters (6 NYCRR Parts 700-705, revised March 8, 1998) have been selected as the applicable SCGs. These standards are well-established water quality standards for fresh groundwater that has the potential to be utilized for water supply.

LEGEND:

- SV-06 — SOIL VAPOR POINT
- SS-02 — SUB-SLAB VAPOR POINT
- PROPERTY BOUNDARY
- FOUNDATION
- PARTITION WALL
- SITE
- SVE WELL LOCATION SHOWING ANTICIPATED RADIUS OF INFLUENCE
- SVE PIPING
- SVE COMPOUND

APPROXIMATE SCALE: 0 25' 50' 100'

FPM GROUP

FIGURE C.1
SITE PLAN WITH SVE SYSTEM LAYOUT

418 SOUTH OYSTER BAY ROAD
HICKSVILLE, NEW YORK

Drawn By:H.C.	Checked By:S.D.	Date:4/16/15

Z:\JOSAM\RAWP WORK PLAN\FIGURE C.1.dwg, 8/31/2015 1:32:34 PM

For soil vapor/indoor air the NYSDOH document "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" contains guidance concerning remediation levels for various contaminants that may be present in indoor air and/or soil vapor at the Site.

For SVE system emissions, NYSDEC regulations concerning discharge of emissions to the atmosphere (6 NYCRR Part 257 – Air Quality Standards and Division of Air Resources Air Guide 1) are applicable SCGs. These regulations will be used to determine whether SVE emissions will require treatment.

For waste characterization, the New York State regulations for hazardous waste management (6 NYCRR Parts 370, 371 and 372) establish requirements for hazardous waste characterization and disposal and are the applicable SCGs.

C.3 Sampling Procedures

Field screening will be performed during intrusive sampling activities, which are anticipated to include groundwater sampling and may include soil sampling. Field screening includes monitoring for organic vapors in the soil or groundwater samples as they are generated and in the air in the work zone using a Photovac MicroTIP photoionization detector (PID) or equivalent, and making visual observations of soil or groundwater characteristics. All readings and observations will be recorded by the Qualified Environmental Professional (QEP) or designated representative in his or her field notebook and on appropriate sampling logs.

Procedures for soil sampling, groundwater sampling, SVI monitoring, and SVE emissions monitoring during the implementation of remedial actions at the Site are described in Section 3.3 of the RAWP and are summarized below. Additional or modified sampling procedures may be included in the Site Management Plan (SMP) for sampling activities to be conducted once the remedial activities are implemented.

All sample locations during remedial activities will be recorded and identified by unique latitude/longitude coordinates (decimal degrees), as required by the NYSDEC's environmental information management system (EIMS). Sample locations will be recorded by the QEP during field activities using a hand-held global positioning system (GPS). This information will be included in the electronic data deliverables (EDDs) to be uploaded to the EIMS. EIMS uploads will be performed within approximately two weeks of EDD receipt and DUSR completion (see Section C.4).

An Analytical Methods/Quality Assurance Summary Table showing the number and types of primary samples by matrix, analytical parameters and methods, QA/QC samples, and sample containers, preservation, and holding times is shown on Table C.3.1.

C.3.1 Soil Sampling Procedures

Soil sampling may be performed during several steps of remedial activities, including waste characterization sampling, sampling of fill to be imported to the Site, and/or sampling of stockpiled soil targeted for reuse onsite. Soil sampling will generally be performed using decontaminated hand-held stainless steel hand augers or dedicated disposable hand trowels. The samples will be obtained by the QEP, screened with a calibrated PID, and classified using the Unified Soil Classification System (USCS). All sample observations will be recorded in the QEP's dedicated field logbook.

Soil samples will generally be collected as single-point grab samples from the surface (0 to 6 inches) that they are intended to characterize. Waste characterization samples will be collected as grabs

TABLE C.3.1
ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE
AMERICAN DRIVE-IN CLEANERS SITE #130186
418 SOUTH OYSTER BAY ROAD, HICKSVILLE, NEW YORK

Sample Location/ Type	Matrix	Number/ Frequency	Analysis	Sample Containers/Preservation	Holding Time
Sub-Slab/Soil Vapor	Vapor	13/one time	VOCs (Method TO-15)	Summa Canister	30 days
Indoor and Outdoor Air	Air	14/one time	VOCs (Method TO-15, low-level)	Summa Canister	30 days
SVE System/Effluent	Air	Eight/one time	VOCs by TO-15	Tedlar bag	72 hours
Site Monitoring Wells/Groundwater	Groundwater	13/one time	TCL VOCs	40 ml VOA vials with HCl	14 days
Vertical Profile/Groundwater	Groundwater	5/one time	TCL VOCs	40 ml VOA vials with HCl	14 days
Confirmatory Sample (if needed)	Soil	as needed/one time	TCL VOCs (Methods 5035/5035a and 8260B)	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.
Excavated Soil/Waste Classification (if needed)	Soil	as needed/one time	TCL VOCs (Methods 5035/5035a and 8260B)	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.
			RCRA Metals	8 oz CWM glass	28 days
			PAH SVOCs	8 oz CWM glass	7 days until extraction, 40 days after extraction
			PCBs	8 oz CWM glass	10 days until extraction, 40 days after extraction
			TCLP VOCs	4 oz CWM glass	14 days until extraction, 14 days after extraction
			TCLP Pesticides/Herbicides	8 oz CWM glass	14 days to prep leachate, 7 days until extraction, 40 days after extraction
			TCLP Metals	8 oz CWM glass	28 days until extraction, 28 days after extraction
			TCLP SVOCs	8 oz CWM glass	14 days to prep leachate, 7 days until extraction, 40 days after extraction
Onsite Soil or Fill/Reuse	Soil	As needed/ one time	TCL VOCs (Methods 5035/5035a and 8260B)	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.
			TAL Metals	8 oz CWM glass	28 days
			TCL BN SVOCs	8 oz CWM glass	7 days until extraction, 40 days after extraction
			PCBs/Pesticides/Herbicides	8 oz CWM glass	7 days until extraction, 40 days after extraction
Trip Blanks	Water	One per cooler containing VOC samples	TCL VOCs	40 ml VOA vials with HCl	14 days
	Air	One per air sample event	VOCs (Method TO-15)	Summa Canister	30 days
Equipment Blanks	Water	One per sampling day per matrix	TCL VOCs	40 ml VOA vials with HCl	14 days
Blind Duplicates/Groundwater	Water	5% of monitoring samples	TCL VOCs	40 ml VOA vials with HCl	14 days
Blind Duplicates/Confirmatory Samples	Soil	5% of confirmatory samples	TCL VOCs (Methods 5035/5035a and 8260B)	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.
MS/MSD/Groundwater	Water	One per 20 environmental samples	TCL VOCs	40 ml VOA vials with HCl	14 days
MS/MSD/Confirmatory Samples	Soil	One per 20 environmental samples	TCL VOCs (Methods 5035/5035a and 8260B)	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.

Notes:

(1) Waste classification analyses may vary, depending on the requirements of the disposal facility
TCL = Target Compound List
RCRA = Resource Conservation and Recovery Act
HCl = Hydrochloric acid
HNO_3 = Nitric acid
$H2SO_4$ = Sulfuric acid

and/or composite samples, as required by the targeted disposal facility. Samples of soil targeted for onsite reuse and fill to be imported will be collected as both grab and composite samples in accordance with DER-10 Section 5.4(e). In certain cases, such as if visible evidence of potential contamination is noted in an excavation, a soil boring may be advanced to evaluate the potential depth of visible impact. In these cases, one or more samples may be collected from the boring.

Table C.3.1 shows the potential soil samples and analytes. The analytical methods for all confirmatory and fill/reuse samples will be as per the NYS ASP with Category B deliverables and full QA/QC. The analytical methods and deliverables for waste classification samples will be in accordance with the selected disposal facility requirements.

C.3.2 Groundwater Sampling Procedures

Pre-remedial groundwater monitoring will be performed to document the groundwater conditions prior to remediation; this monitoring will be conducted at each of the Site monitoring wells approximately one month prior to the startup of the SVE system. The locations of the existing Site monitoring wells are shown on Figure C.3.2.1.

For groundwater monitoring, at each well to be sampled the depth to the static water level and depth of the well will be measured. A decontaminated pump will then be used to purge the well/borehole using low-flow procedures. Following the removal of each 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 volumes and the turbidity is less than 50 NTU, the well will be sampled. Well sampling forms documenting the well purging and sampling procedures will be completed.

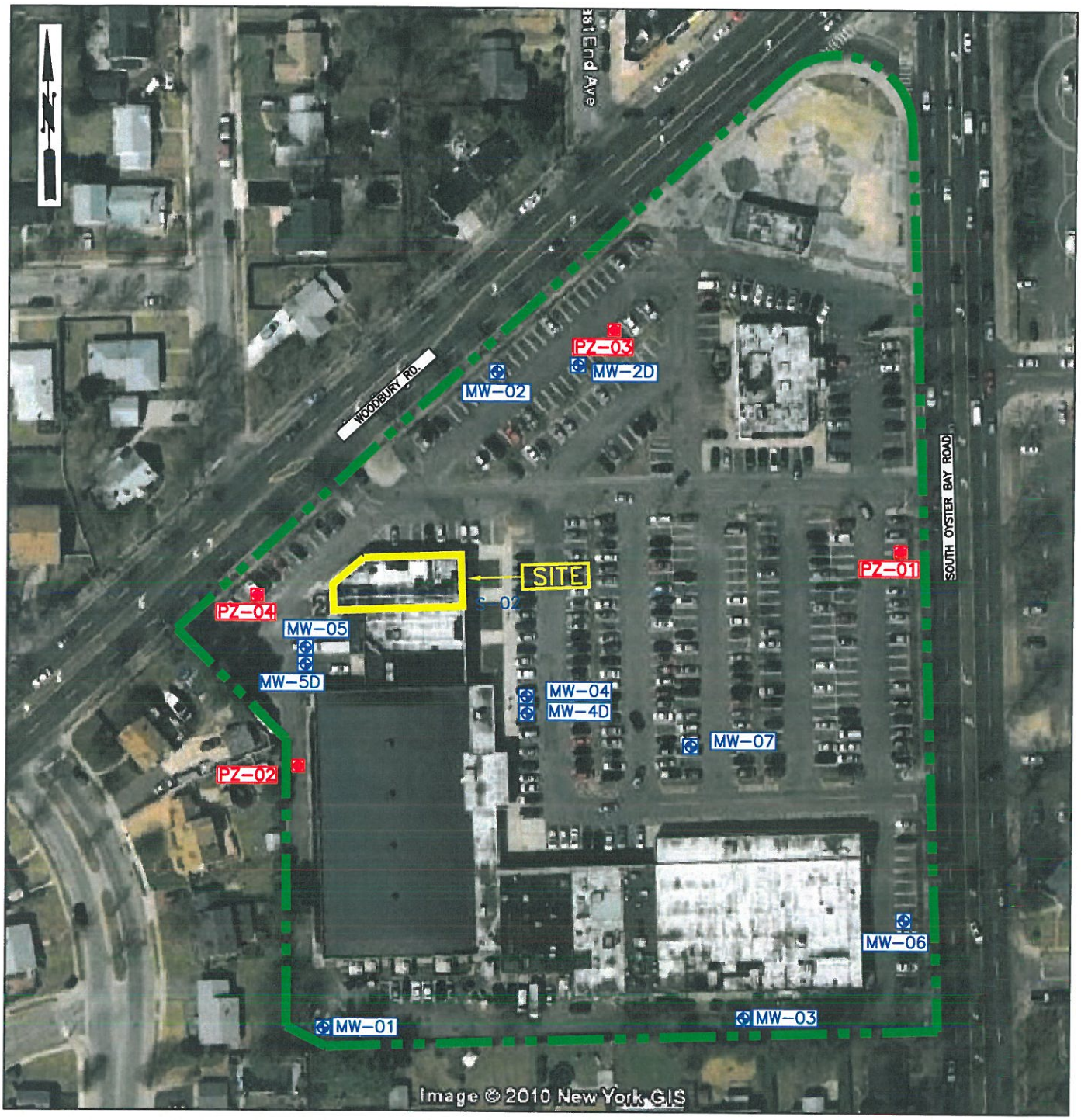
Following purging, sampling will be performed. Samples will be obtained directly from the low-flow pump. The retrieved samples will be decanted into laboratory-supplied sample containers. Each sample container will be labeled, and the labeled containers will be placed in a cooler with ice to depress the sample temperature to four degrees Celsius. A chain of custody form will be completed and kept with the cooler to document the sequence of sample possession. At the end of each day, the filled cooler will be transported by FPM or overnight courier to the selected NYSDOH ELAP-certified laboratory. The groundwater samples will be analyzed for TCL VOCs as per NYS ASP with Category B deliverables.

The groundwater chemical analytical data from the wells will be used to document groundwater quality prior to the startup of the SVE system. The associated water level data will be used to evaluate the site-specific groundwater flow direction.

Table C.3.1 shows the planned water samples and analytes. The analytical methods for all monitoring well/vertical profile samples will be as per the NYS ASP with Category B deliverables and full QA/QC.

C.3.3 SVE Effluent Sampling Procedures

Effluent sampling will be performed to evaluate SVE emissions during pilot testing and during the system startup period. During each sampling event an effluent sample will be collected from an effluent sampling port located between the SVE blower and the effluent stack pipe. In the event that effluent treatment is implemented, an additional sample of the treated effluent shall be obtained downstream of the effluent treatment equipment. All samples shall be obtained using a dedicated laboratory-supplied Tedlar air sampling bag. System operating parameters will be recorded by the QEP during each sampling event.



LEGEND:

PZ-01 PIEZOMETER LOCATION

MW-01 MONITORING WELL LOCATION

SITE

FPM GROUP

FIGURE C.3.2.1
PIEZOMETER & MONITORING WELL LOCATIONS
AMERICAN DRIVE-IN CLEANERS
HICKSVILLE, NEW YORK

Drawn By:H.C.	Checked By:A.M.	Date:8/26/15

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The samples in the filled Tedlar bags will be labeled and transported via overnight courier to a NYSDOH-ELAP-certified laboratory for analysis of VOCs by EPA Method T0-15. The analytical results will be integrated with the system operating parameters and compared to NYSDEC's DAR-1 guidance to evaluate system emissions, determine emissions treatment requirements, and confirm compliance with DAR-1.

Effluent VOC concentrations will also be monitored during the test from a sampling port located on the pressure side of the blower. VOC concentrations will be evaluated using a calibrated PID and also by obtaining and analyzing air samples in Tedlar bags. These data will be used to evaluate the radius of influence of the SVE system and the anticipated vapor concentrations and to confirm that the system will induce a vacuum beneath the Site and nearby shopping center units sufficient for SVI mitigation over the targeted area.

Table C.3.1 shows the planned SVE effluent samples and analytes.

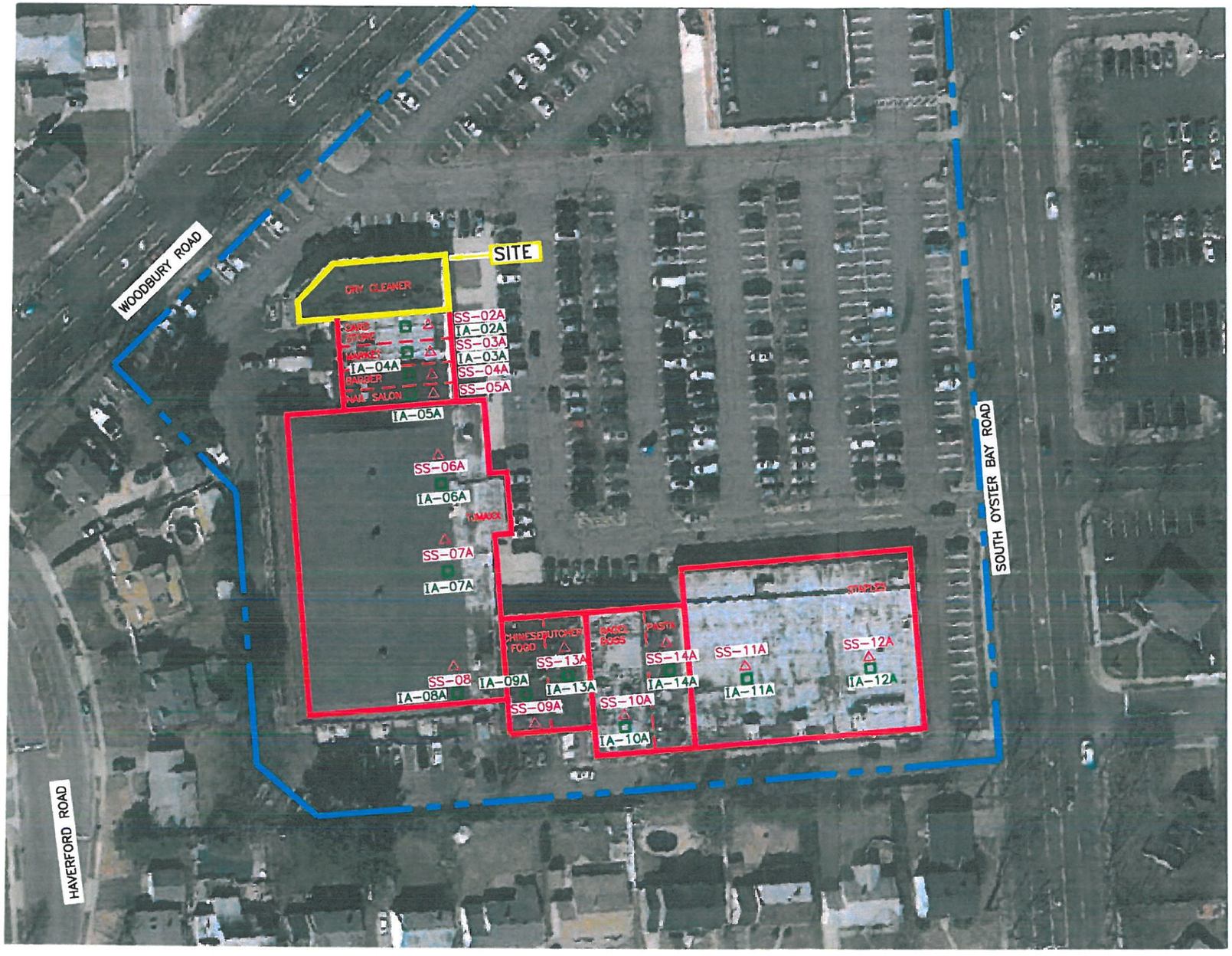
C.3.4 SVI Monitoring Procedures

SVI monitoring will include collection of sub-slab soil vapor and co-located indoor air samples and an ambient air sample. During each monitoring event samples will be collected from the sub-slab monitoring points and corresponding indoor air sampling locations. Figure C.3.4.1 shows the locations of the sub-slab monitoring points and indoor air sampling locations. The sub-slab points will be accessed and three to five volumes of soil vapor will be purged through the installed polyethylene tubing using an air pump so as to ensure that a representative sample is obtained and to confirm the integrity of the point's seal. The seal will be evaluated by confining a helium tracer gas over the surface seal and checking with a helium meter. Following purging and the seal integrity check, the sub-slab soil vapor samples will be collected into laboratory-supplied Summa canisters equipped with calibrated flow controllers. The flow controllers will be set so as not to exceed 0.2 liters per minute and so as to collect each sample over an approximate 8-hour period.

Indoor air and outdoor (ambient) air sampling will be performed concurrently with sub-slab soil vapor sampling. The indoor air samples will be collected from the vicinity of the sub-slab sampling points at a height of approximately three feet above the existing building slab. One ambient (outdoor) air sample will also be collected concurrently with the indoor air and sub-slab soil vapor samples. This sample will be collected in the outdoor proximity to the Site and in the same manner as the indoor air samples. The laboratory-provided Summa canisters will be placed at a height of approximately three feet above grade and each canister shall be equipped with flow controller such that the canister is filled over an approximately eight-hour time period at a rate of less than 0.2 liters per minute. The QEP will observe the flow controllers and shall seal the canisters while some vacuum remains.

Upon completion of sampling, the canisters will be sealed, labeled, and transported via overnight courier to a NYSDOH-ELAP-certified laboratory for analysis of VOCs by EPA Method T0-15. The TO-15 detection limits for the indoor air and outdoor air samples are presented on Table C.3.4.1 and the detection limits for the sub-slab soil vapor and soil vapor samples are presented on Table C.3.4.2. The analytical results will compared to criteria in the NYSDOH Soil Vapor Intrusion Guidance Document to evaluate potential VOC concentrations in sub-slab soil vapor and indoor air in proximity to the Site and to assess potential contributions to indoor air quality from ambient air conditions.

During each sampling event the QEP will also complete a NYSDOH building inventory form for each sampled area to document the potential presence of VOC sources within and in proximity to the shopping center units. This information will be used to assess possible contributions from such sources to indoor air quality.



APPROXIMATE SCALE: 0 25' 50' 100'

LEGEND:

- SS-02 SUB-SLAB VAPOR POINT LOCATION
- IA-02 INDOOR AIR SAMPLE
- PROPERTY BOUNDARY
- FOUNDATION
- PARTITION WALL
- SITE

FPM GROUP		
FIGURE C.3.4.1 AIR/VAPOR SAMPLING LOCATIONS 418 SOUTH OYSTER BAY ROAD HICKSVILLE, NEW YORK		
Drawn By: H.C.	Checked By: S.D.	Date: 7/8/15

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TABLE C.3.4.1
TO-15 DETECTION LIMTS FOR INDOOR AIR/OUTDOOR AIR SAMPLES

Method	Compound	Detection Limit	Units
TO15-LL	Dichlorodifluoromethane	0.989	ug/m3
TO15-LL	Chloromethane	0.413	ug/m3
TO15-LL	Freon-114	1.4	ug/m3
TO15-LL	1,3-Butadiene	0.442	ug/m3
TO15-LL	Bromomethane	0.777	ug/m3
TO15-LL	Chloroethane	0.528	ug/m3
TO15-LL	Ethanol	9.42	ug/m3
TO15-LL	Vinyl bromide	0.874	ug/m3
TO15-LL	Acetone	2.38	ug/m3
TO15-LL	Trichlorofluoromethane	1.12	ug/m3
TO15-LL	Isopropanol	1.23	ug/m3
TO15-LL	Tertiary butyl Alcohol	1.52	ug/m3
TO15-LL	Methylene chloride	1.74	ug/m3
TO15-LL	3-Chloropropene	0.626	ug/m3
TO15-LL	Carbon disulfide	0.623	ug/m3
TO15-LL	Freon-113	1.53	ug/m3
TO15-LL	trans-1,2-Dichloroethene	0.793	ug/m3
TO15-LL	1,1-Dichloroethane	0.809	ug/m3
TO15-LL	Methyl tert butyl ether	0.721	ug/m3
TO15-LL	2-Butanone	1.47	ug/m3
TO15-LL	Ethyl Acetate	1.8	ug/m3
TO15-LL	Chloroform	0.977	ug/m3
TO15-LL	Tetrahydrofuran	1.47	ug/m3
TO15-LL	1,2-Dichloroethane	0.809	ug/m3
TO15-LL	n-Hexane	0.705	ug/m3
TO15-LL	Benzene	0.639	ug/m3
TO15-LL	Cyclohexane	0.688	ug/m3
TO15-LL	1,2-Dichloropropane	0.924	ug/m3
TO15-LL	Bromodichloromethane	1.34	ug/m3
TO15-LL	1,4-Dioxane	0.721	ug/m3
TO15-LL	2,2,4-Trimethylpentane	0.934	ug/m3
TO15-LL	Heptane	0.82	ug/m3
TO15-LL	cis-1,3-Dichloropropene	0.908	ug/m3
TO15-LL	4-Methyl-2-pentanone	2.05	ug/m3
TO15-LL	trans-1,3-Dichloropropene	0.908	ug/m3
TO15-LL	1,1,2-Trichloroethane	1.09	ug/m3
TO15-LL	Toluene	0.754	ug/m3
TO15-LL	2-Hexanone	0.82	ug/m3
TO15-LL	Dibromochloromethane	1.7	ug/m3
TO15-LL	1,2-Dibromoethane	1.54	ug/m3
TO15-LL	Chlorobenzene	0.921	ug/m3
TO15-LL	Ethylbenzene	0.869	ug/m3
TO15-LL	p/m-Xylene	1.74	ug/m3
TO15-LL	Bromoform	2.07	ug/m3
TO15-LL	Styrene	0.852	ug/m3
TO15-LL	1,1,2,2-Tetrachloroethane	1.37	ug/m3
TO15-LL	o-Xylene	0.869	ug/m3
TO15-LL	4-Ethyltoluene	0.983	ug/m3
TO15-LL	1,3,5-Trimethylbenzene	0.983	ug/m3
TO15-LL	1,2,4-Trimethylbenzene	0.983	ug/m3
TO15-LL	Benzyl chloride	1.04	ug/m3
TO15-LL	1,3-Dichlorobenzene	1.2	ug/m3
TO15-LL	1,4-Dichlorobenzene	1.2	ug/m3
TO15-LL	1,2-Dichlorobenzene	1.2	ug/m3
TO15-LL	1,2,4-Trichlorobenzene	1.48	ug/m3
TO15-LL	Hexachlorobutadiene	2.13	ug/m3
TO15-SIM	Vinyl chloride	0.051	ug/m3
TO15-SIM	1,1-Dichloroethene	0.079	ug/m3
TO15-SIM	cis-1,2-Dichloroethene	0.079	ug/m3
TO15-SIM	1,1,1-Trichloroethane	0.109	ug/m3
TO15-SIM	Carbon tetrachloride	0.126	ug/m3
TO15-SIM	Trichloroethene	0.107	ug/m3
TO15-SIM	Tetrachloroethene	0.136	ug/m3

TABLE C.3.4.2
TO-15 DETECTION LIMITS FOR SUB-SLAB SOIL VAPOR/SOIL VAPOR SAMPLES

Method	Compound	Detection Limit	Units
TO15-LL	Dichlorodifluoromethane	0.989	ug/m3
TO15-LL	Chloromethane	0.413	ug/m3
TO15-LL	Freon-114	1.4	ug/m3
TO15-LL	1,3-Butadiene	0.442	ug/m3
TO15-LL	Bromomethane	0.777	ug/m3
TO15-LL	Chloroethane	0.528	ug/m3
TO15-LL	Ethanol	9.42	ug/m3
TO15-LL	Vinyl bromide	0.874	ug/m3
TO15-LL	Acetone	2.38	ug/m3
TO15-LL	Trichlorofluoromethane	1.12	ug/m3
TO15-LL	Isopropanol	1.23	ug/m3
TO15-LL	Tertiary butyl Alcohol	1.52	ug/m3
TO15-LL	Methylene chloride	1.74	ug/m3
TO15-LL	3-Chloropropene	0.626	ug/m3
TO15-LL	Carbon disulfide	0.623	ug/m3
TO15-LL	Freon-113	1.53	ug/m3
TO15-LL	trans-1,2-Dichloroethene	0.793	ug/m3
TO15-LL	1,1-Dichloroethane	0.809	ug/m3
TO15-LL	Methyl tert butyl ether	0.721	ug/m3
TO15-LL	2-Butanone	1.47	ug/m3
TO15-LL	Ethyl Acetate	1.8	ug/m3
TO15-LL	Chloroform	0.977	ug/m3
TO15-LL	Tetrahydrofuran	1.47	ug/m3
TO15-LL	1,2-Dichloroethane	0.809	ug/m3
TO15-LL	n-Hexane	0.705	ug/m3
TO15-LL	Benzene	0.639	ug/m3
TO15-LL	Cyclohexane	0.688	ug/m3
TO15-LL	1,2-Dichloropropane	0.924	ug/m3
TO15-LL	Bromodichloromethane	1.34	ug/m3
TO15-LL	1,4-Dioxane	0.721	ug/m3
TO15-LL	2,2,4-Trimethylpentane	0.934	ug/m3
TO15-LL	Heptane	0.82	ug/m3
TO15-LL	cis-1,3-Dichloropropene	0.908	ug/m3
TO15-LL	4-Methyl-2-pentanone	2.05	ug/m3
TO15-LL	trans-1,3-Dichloropropene	0.908	ug/m3
TO15-LL	1,1,2-Trichloroethane	1.09	ug/m3
TO15-LL	Toluene	0.754	ug/m3
TO15-LL	2-Hexanone	0.82	ug/m3
TO15-LL	Dibromochloromethane	1.7	ug/m3
TO15-LL	1,2-Dibromoethane	1.54	ug/m3
TO15-LL	Chlorobenzene	0.921	ug/m3
TO15-LL	Ethylbenzene	0.869	ug/m3
TO15-LL	p/m-Xylene	1.74	ug/m3
TO15-LL	Bromoform	2.07	ug/m3
TO15-LL	Styrene	0.852	ug/m3
TO15-LL	1,1,2,2-Tetrachloroethane	1.37	ug/m3
TO15-LL	o-Xylene	0.869	ug/m3
TO15-LL	4-Ethyltoluene	0.983	ug/m3
TO15-LL	1,3,5-Trimethylbenzene	0.983	ug/m3
TO15-LL	1,2,4-Trimethylbenzene	0.983	ug/m3
TO15-LL	Benzyl chloride	1.04	ug/m3
TO15-LL	1,3-Dichlorobenzene	1.2	ug/m3
TO15-LL	1,4-Dichlorobenzene	1.2	ug/m3
TO15-LL	1,2-Dichlorobenzene	1.2	ug/m3
TO15-LL	1,2,4-Trichlorobenzene	1.48	ug/m3
TO15-LL	Hexachlorobutadiene	2.13	ug/m3
TO15-LL	Vinyl chloride	0.51	ug/m3
TO15-LL	1,1-Dichloroethene	0.79	ug/m3
TO15-LL	cis-1,2-Dichloroethene	0.79	ug/m3
TO15-LL	1,1,1-Trichloroethane	1.09	ug/m3
TO15-LL	Carbon tetrachloride	1.26	ug/m3
TO15-LL	Trichloroethene	1.07	ug/m3
TO15-LL	Tetrachloroethene	1.36	ug/m3

C.4 Quality Assurance/Quality Control Procedures

QA/QC procedures will be utilized during the remedial work to ensure that the resulting chemical analytical data accurately represent conditions at the Site. The following sections include descriptions of the QA/QC procedures to be utilized.

Equipment Decontamination Procedures

All non-disposable equipment (i.e., pumps, 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 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, and wrapped in clean protective materials for storage and transportation.

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. The Analytical Methods/Quality Assurance Summary presented on Table C.3.1 shows the number and types of QA/QC samples by matrix, analytical parameters and methods, sample containers, preservation, and holding times. The specific types of QA/QC samples to be collected are described below.

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 the soil or groundwater matrix for each day that confirmatory or monitoring sampling is conducted at the Site and will be analyzed for the target constituents for that day. The equipment blanks will be labeled in a manner to prevent identification by the analytical laboratory.

Trip blank samples will be utilized to evaluate the potential for VOC cross-contamination between samples in the same cooler. Trip blank samples consist of laboratory-provided containers filled with laboratory water or zero-VOC air that are sealed in sample bottles or Summa canisters 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 confirmatory or monitoring samples that will be analyzed for VOCs 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 confirmatory or monitoring samples per matrix 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 if the results are similar.

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of one per 20 confirmatory or monitoring samples of the same matrix. 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 Data Usability Summary Reports (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 FPM 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 by the QA/QC officer (QAO) to verify that the analytical results are of sufficient quality to be relied upon to assess the concentrations of the targeted constituents in the environmental matrices at the Site. A DUSR shall be prepared for each data package following the “Guidance for the Development of Data Usability Summary Reports” provided by the NYSDEC. The resume of the anticipated QAO is included at the end of this QAPP.

C.5 Sample Analysis

All samples will be submitted to New York State Department of Health ELAP-certified laboratories. All samples will be analyzed for the targeted analytes as specified in Table C.3.1 and in accordance with the NYS Analytical Services Protocol (ASP). Category B deliverables will be provided for all samples except waste characterization and SVE effluent samples.

C.6 Data Evaluation

The data collected will be assembled, reviewed, and evaluated following each sampling round. The confirmatory samples will be used to assess the completion of remedial measures at the Site. The SVE effluent samples will be used to evaluate system emissions compliance with applicable SCGs. The waste characterization samples will be used to obtain acceptance of remedial wastes at the approved disposal facilities. The groundwater chemical analytical data from the wells will be used to document groundwater quality prior to the startup of the SVE system. The associated water level data will be used to evaluate the site-specific groundwater flow direction.

C.7 Project Organization

The project manager and field supervisor for this project will be Ben Cancemi. Mr. Cancemi will also serve as the health and safety officer. The overall project coordinator and QAO will be Stephanie Davis, Senior Project Manager. Resumes for these personnel are included at the end of this document. Subcontracted services will include remedial construction and pilot testing services, vertical profiling and well installation services, and laboratory services.

Attachments

Richard J. Baldwin, C.P.G., P.G.
Apex Companies, LLC, Project Director

Mr. Baldwin is a hydrogeologist with more than twenty five years of experience in the fields of environmental consulting, hydrogeology and geology with particular experience in conducting and supervising environmental investigations and remedial actions at industrial, private, Federal and publicly-owned facilities and sites. Additionally, Mr. Baldwin has experience in evaluating potential environmental impacts of projects including golf courses, housing developments, senior housing, schools and retail shopping centers. For the last several years, Mr. Baldwin's work has focused primarily on sites and facilities located in the Long Island, New York City and Upstate New York areas. He has extensive knowledge and experience pertaining to Long Island's federally-designated sole-source drinking water aquifer system. Mr. Baldwin has extensive experience in evaluating complex laboratory data packages to ensure that they are precise, accurate, repeatable and comparable.

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

Professional Registrations
- *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*

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*

Typical Project Experience

Mr. Baldwin has extensive experience in the selection, design, installation and maintenance of 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 the principal-in-charge and directly responsible for hundreds of projects related to the wireless telecommunications field. He has overseen the conduct of hundreds of Phase I Environmental Site Assessments (ESAs) and limited Phase II ESAs. He has developed and implemented Soil and Groundwater Management Work Plan to address environmental impairment issues. He has been instrumental in developing appropriate mitigation measures with various project team members including site acquisition, legal counsel and headquarters level staff.

Mr. Baldwin has evaluated the potential environmental impacts of proposed projects including golf courses, housing developments, senior housing, schools, automobile repair facilities and retail shopping centers. The potential impacts included those to groundwater quality from herbicide/pesticide application, disposal of sanitary waste and school laboratory waste and the impacts to soil quality from handling and disposal of hazardous materials, leaking underground storage tanks, historic disposal of hazardous waste and pesticide/herbicide application. These impacts were evaluated through a variety of means including the collection and analysis of soil and groundwater samples, geo- and organic-chemistry modeling, groundwater fate and transport modeling and basic research of materials, their uses and their potential migration pathways. Mr. Baldwin has provided expert witness services for various venues ranging from NYSDEC spill and hazardous waste sites to potential noise impacts.

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 been in the forefront of both evaluating and addressing shallow soils on Long Island which have been impacted by pesticides (particularly arsenic) and herbicides. This important issue is particularly of concern due to the re-development of agricultural lands for residential and educational end uses. Mr. Baldwin has work closely with the SCDHS and Town of Brookhaven to develop effective and easily implementable Soil Management Plans.

Mr. Baldwin works closely with the U.S. Environmental Protection Agency (EPA), New York State Department of Environmental Conservation (NYSDEC) Region 1, Region 2, Region 3 and Central Office, New York State Department of Health (NYSDOH), Suffolk County

APEX

Department of Health Services (SCDHS) and Nassau County Department of Health (NCDOH). Mr. Baldwin also works with local planning and review boards including the Town of East Hampton, Town of Southampton, Town of Babylon, Town of Brookhaven, Village of Patchogue, Village of Great Neck and New York City on issues ranging from groundwater quality to historic resources to noise impacts.

Mr. Baldwin's projects include supervising and performing Remedial Investigations/Feasibility Studies (RI/FSs), Interim Remedial Actions (IRMs), and implementation of selected remedies at NYSDEC Class 2 and 2a Inactive Hazardous Waste Disposal sites. Other work, conducted with the NYSDEC, includes evaluating and implementing large-scale groundwater and soil treatment systems to remediate MTBE.

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 insitu remediation of environment contaminants, including assessment of contaminant concentrations and distribution, chemical processes and indicators, natural attenuation indicators, additional stociometric demands and hydrogeologic factors.

Selected Project Experience

Project Director for Major NY Metro Airport Project

Mr. Baldwin is part of a large project team which has been tasked by a coalition of major airlines to evaluate the efficacy of re-instituting the delivery of jet fuel via a water-borne barge delivery system. As part of the project, Mr. Baldwin evaluated the requirements for permits from various agencies including the NYSDEC, USACE, NYSDOS and New York City. Mr. Baldwin has also been providing ongoing evaluations of potential project design scenarios which required the evaluation of existing data sets (e.g., bathymetric surveys, former permits, etc.), conducting cost-benefit analyses assuming various dredge spoil disposal options, etc. This is a major, on-going project with long-term ramifications at all of the major New York Metropolitan airport facilities.

Project Director for Ferry Terminal Project, Glen Cove, NY

The City of Glen Cove Industrial Development Agency (IDA) has 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 is 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.

Project Director for Marina Property, Glen Cove, NY

Mr. Baldwin was responsible for conducting turn-key environmental and engineering services for this active marina facility. The services included: 1) conducting a high-resolution bathymetric survey of the marina's basin in order to evaluate effective depths / vessel mooring and access restrictions; 2) successful acquisition of a United States Army Corps of Engineers (USACE) / NYSDEC Joint Application permit to repair a failed bulk head; 3) preparation of a full engineered design package to rebuild a failing dock-side water supply system; 4) conduct of a land-ward and marine geotechnical evaluation to determine the suitability of sub-surface materials for future construction projects; 5) collection and analyses of multiple bottom sediment samples to evaluate same for dredging issues; and, 6) participation in the marina design team. As part of this, Apex participated in multiple site meetings to discuss dock geometry, future infrastructure repair requirements, future regulatory permitting requirements, travel lift slip issues, potential future dredging protocols, etc.

Project Director for Marina Property, Patchogue, NY

Mr. Baldwin was responsible for providing turn-key environmental and engineering services for this active marina facility. These services included: 1) conduct of a high-resolution bathymetric survey of the marina's basin in order to evaluate effective depths / vessel mooring and access restrictions; 2) Preparation and submission of a USACE / NYSDEC Joint Application permit for maintenance dredging /marina infrastructure improvement; 3) preparation of a full engineered design package to rebuild a failing travel lift rail system; 4) contractor oversight; and, 5) Participation in the marina design team. As part of this, Apex has participated in multiple site meetings to discuss dock geometry, future infrastructure repair requirements, future regulatory permitting requirements, travel lift slip issues, potential future dredging protocols, etc.

Project Director for 10-Year Dredging and Beach Nourishment Program, Yarmouth, MA

Mr. Baldwin has been responsible for providing permit application preparation services for the Town of Yarmouth on Cape Cod. There are currently 37 Town-wide sites which are subject to multiple local, State and Federal permits for maintenance dredging and beach nourishment activities. The Town of Yarmouth's wetlands and waterways represent a highly-valuable, yet fragile ecosystem/resource. Current and historic dredging and beach nourishment practices on a site-by-site basis over the past decades have resulted in a confusing and difficult-to-manage situation with respect to this highly-complex system. Apex recommended that a 10-Year Town-wide Dredging and Beach Nourishment Program be approved and implemented wherein all 37 Yarmouth and Dennis dredge and beach nourishment sites are included/managed under one comprehensive management program. This will allow for effective use of Town resources, as well as ensuring that the dredge/nourishment sites are appropriately managed within appropriate regulatory guidelines. Again, the overall goal of this program is to allow the Town of Yarmouth to manage more effectively its waterways and beaches.

New York State Department of Environmental Conservation, Groundwater Evaluation and Treatment, Taconic Developmental Disabilities Services Office, Wassaic, NY

Worked on a public water supply site in New York conducting a full-scale groundwater investigation in the vicinity of the facility's supply wells which have been impacted by MTBE. Multiple well clusters were installed surrounding the high-capacity wells to evaluate subsurface conditions. One impacted well was converted to a remediation well to provide hydraulic capture of the MTBE plume prior to its impacting the remaining downgradient wells. A large-scale granulated-activated carbon (GAC) system was installed to treat the water extracted from the well. 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. Several rounds of groundwater investigation were also conducted to confirm the MTBE source area as a nearby gasoline service station. Pilot testing was conducted and an on-site groundwater treatment system was being designed to provide source area remediation.

New York State Department of Environmental Conservation, Potable Water Treatment System, Village of Brewster, NY

Designed and constructed a supplemental water treatment system at a public water supply plant to address MTBE contamination in the system prior to its distribution. The treatment system consisted of a large air stripping tower, installed in line with an existing air stripper to remove the MTBE to non-detectable concentrations. Additionally, a source area investigation was being conducted to determine the potential source(s) of the MTBE contamination.

New York State Department of Environmental Conservation, Potable Water Treatment System, Sullivan Correctional Facility, Fallsburg, NY

Worked with the NYSDEC to evaluate, design and install a supplemental water treatment system to address MTBE present in a New York State Correctional Facility's drinking water. All four of the facility's wells were impacted. Several remedial options including utilizing GAC or air strippers were evaluated. The selected alternative was a 20,000-pound GAC system which was installed inline and in standby mode.

New York State Department of Environmental Conservation, Large Scale Investigation / Remediation Project, Lake Success, New York

Managed large-scale site activities at a major Long Island aerospace facility. Activities included operations of on-going IRMs (soil vapor extraction and groundwater extraction and treatment systems); citizen participation activities; design and implementation of on-site remedies (drywell removal and soil excavation, installation of fencing and an 1,800 gallon per minute groundwater extraction and treatment system); on- and off-site RIs; regulatory compliance activities; client interactions; multi-task, multi-contractor scheduling and management; and general project management. As part of the RI, prepared a large three-dimensional groundwater flow and particle model utilizing Visual MODFLOW and MODPATH. The model was then utilized to design an optimum groundwater treatment system.

Prepared a scoping plan and RI report for an Inactive Hazardous Waste Disposal site in New York under the NYSDEC Superfund program. The work involved evaluating the nature and extent of halogenated solvents in soil and groundwater both on and off of the site. Was responsible for overseeing all phases of the report preparation, including communications with the NYSDEC and for implementing the citizen participation program. Also involved in the preparation of the FS report and selection of the final remedy which included the use of an innovative groundwater treatment technology, in-well air stripping.

Project Director for 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. Apex 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, Apex was able to conclude 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. Apex 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 underground storage tank (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.

Project Manager for Dredge Spoils Quality Investigation, New London, CT.

Mr. Baldwin was retained by a not-for-profit group concerned that the planned disposition of dredge spoils from the Thames River associated with the US Navy nuclear submarine base would negatively impact the lobster fishery of off Fishers Island in the Long Island Sound. Mr. Baldwin directed the field team which collected gravity cores from along the portion of the Thames River slated for dredging. Mr. Baldwin utilized the services of a nationally-recognized laboratory to analyze the bottom sediment samples for a wide-range of contaminants. Other than potentially elevated concentrations of dioxins, the bottom sediments proved to be relatively free of anthropogenic contaminants.

Project Director for Marina Property Assessment, Center Moriches, NY.
Mr. Baldwin was responsible for conducting an evaluation of environmental conditions at this active marina which was under consideration for re-development with residential housing. Issues evaluated included soil and groundwater conditions associated with on-site vessel repair, bottom paint application/removal, USTs and dredge spoils. Based upon the results of the investigation, impacted soils were excavated, transported to and disposed of at an appropriately-licensed facility. The dredge spoils were not impacted above regulatory criteria and required not special actions. Based upon the results of the investigation and remediation activities, the Suffolk County Department of Health Services approved the site for residential re-development.

Senior Project Manager for Former La Salle Military Academy, Oakdale, NY.
Mr. Baldwin was part of project team that conducted a feasibility study for the redevelopment of a portion of this former educational facility. A major component of the Feasibility Study was the evaluation of an on-site boat basin and associated building infrastructure (e.g., a team house) with respect to potential dredging requirements, permitting issues, bottom sediment conditions and marina design.

Former Hess Terminal, Patchogue River, Patchogue, NY.
Mr. Baldwin conducted a site investigation program at this former major fuel oil terminal site to evaluate the efficacy of same for residential re-development, which would have included a residence-use only marina. The site had been the subject of previous site remediation activities, and the NYSDEC had closed its spill file assuming that the site would only be utilized for commercial or industrial purposes. Soil, groundwater, soil vapor and outdoor ambient air samples were collected and analyzed as part of this evaluation. The results of the investigation indicated that additional soil remediation would have been required to make the property suitable for residential re-development. Additionally, the NYSDEC would have likely required the installation and operation of sub-slab depressurization systems for all on-site residential buildings prior to their approving the plans for the site.

Former Lumber Yard Facility, Arverne, NY.
Mr. Baldwin provided environmental consulting services associated with planned redevelopment of a six-acre parcel of land located on the Barbados Basin. The client proposed to construct and operate a boat marina with associated catering hall/shopping complex on this former lumber yard. An exhaustive site investigation including a geophysical survey, soil and groundwater testing and wetlands/permit evaluation was conducted in accordance with the New York City Environmental Quality Review (CEQR) regulations. Also conducted an exhaustive feasibility study regarding stormwater runoff /sanitary waste disposal options. The results of the investigation indicated that historic fill materials on the subject property contained actionable concentrations of lead. Prepared a site specific Soil Management Plan for submission to the New York City Department of Environmental Protection (NYCDEP). The NYCDEP agreed with the remedial option of capping the lead-impacted fill materials under two feet of clean fill to prevent future site users from coming into contact with same.

Dielectric Fluid Release, Village of Port Washington, NY.
During excavation activities being conducted for installing a team building at a Town-owned marina facility, Town of North Hempstead personnel encountered and broke a major, unmarked buried electric line. This rupture caused the immediate and catastrophic release of an estimated 30,000 gallons of dielectric fluid. Mr. Baldwin was retained by the Town of North Hempstead to oversee the cleanup of surface materials, as well as the evaluation of dielectric fluid floating on top of the water table. Adsorbent booms were placed and maintained along the associated wetlands and all identified areas of impacted soils were remediated. A series of monitoring wells were installed and evaluated to ensure the absence of dielectric fluid floating on the water table which would eventually discharge to the adjacent water way. Based upon the work conducted, the released dielectric fluid did not contain polychlorinated biphenyls (PCBs), and the NYSDEC was satisfied that the released had been adequately remediated.

Brownfield Re-development, Greenport, NY.
Mr. Baldwin managed one of the few active NYSDEC Brownfield sites on Long Island utilizing New York State Environmental Bond Act funding. The work included evaluating a large Village-owned undeveloped water-front property for the presence of undocumented USTs utilizing surface geophysical techniques, removing the USTs and associated impacted soils and preparing Site Investigation and Remedial Action reports. Responsible for all regulatory interactions, subcontractor management and Citizen Participation Plan implementation. The work was conducted concurrently with the redevelopment of the site for use as a public park including a water-front walk way, amphitheater and historic carousal.

Preliminary Site Assessment, Concord Naval Weapons Station, Concord, NY.
Mr. Baldwin was the Project Manager responsible for conducting an environmental investigation in the portion of the Concord Naval Weapons Station known as the Tidal Area. The investigation included collecting and analyzing soil, sediment and groundwater samples from adjacent to and within on-site wetlands. Mr. Baldwin also utilized an aerial

magnetic survey to identify anomalies on a nearby off-shore island which could potentially represent buried railcars full of munitions which were reportedly buried after a major WW II explosion which killed hundreds of people. Mr. Baldwin conducted the field investigation which evaluated the nine magnetic anomalies which turned out to be ship wrecks, a crane, gas well heads, miscellaneous debris, etc. No anomalies representative of buried rail cars were observed. Mr. Baldwin was responsible for conducting a geotechnical evaluation of the materials making up the island, known as Bay Muds, which due to their very poor shear strength, could not have been excavated sufficiently to allow for burial of the rail cars. Therefore, it was Mr. Baldwin's belief that the reported burial of the rail cars full of munitions was incorrect.

Site Investigation Activities, Saint George Ferry Terminal, Staten Island NY

Mr. Baldwin was responsible for implementing a groundwater evaluation of the major ferry terminal site to evaluate the most efficacious means of removing two, large out-of-service No. 6 fuel oil USTs. The work including setting up and conducting a tidal influence study, major aquifer pumping test and conducting three-dimensional groundwater modeling. Evaluated and recommended the use of sheet piling surrounding the two USTs to isolate same from the surrounding aquifer materials and protect the adjacent buildings. The recommended remedial approach was implemented and the USTs were successfully removed with minimal de-watering required and the adjacent buildings were successfully protected.

Bottom Sediment Evaluation, Lake Success, NY

As part of a major environmental investigation of a nearby New York State Superfund site, Mr. Baldwin was responsible for the collection and analysis of bottom sediment samples from Lake Success and two on-site stormwater recharge basins. The results of the investigation indicated that the bottom sediment conditions in the on-site recharge basins and Lake Success were very similar leading to the conclusion that the observed impacts to the basins were likely non-site related and typical of stormwater runoff. Further, a bathymetric survey and at-depth water quality investigation was conducted for Lake Success.

Stormwater Retention Basin Bottom Sediment Evaluation, Lake Success, NY

As part of a major environmental investigation of a New York State Superfund site, Mr. Baldwin was responsible for evaluating the thickness of potentially impacted bottom sediments in two on-site stormwater recharge basins. The basins had reportedly been subject to discharge on impacted non-contact cooling waters and other site process waters. As a cost-saving measure, and in order to collected as much data as quickly as possible, Apex utilized an innovative investigation approach of transecting the surfaces of both frozen basins with a ground-penetrating radar (GPR) units. The GPR data was then cross-correlated with direct field measurements collected utilizing more standard techniques (e.g., gravity coring, penetration tests, etc.) to confirm the accuracy of the geophysical technique. The final data set was utilized to evaluate potential remedial techniques and costs.

Terrestrial/Martian Analogue Evaluation, Dry Valley Lakes, Antarctica

While at the United States Geological Survey (USGS), Mr. Baldwin participated on a project team which evaluated the physical and biota conditions of ice-covered lakes in the Dry Valley Region of Antarctica. Such conditions (e.g., ice-covered lakes in an otherwise frozen, low-precipitation region) were believed to be a strong terrestrial analogue for potential lakes which may have formed in the distant past in the Valles Marineris Canyon System on Mars. The biota of the Dry Valley ice-covered lakes was dominated by primitive stromatolites mounds, with much of the sedimentary section dominated by sand and gravel which had migrated through the ice cover. The overall purpose of the work was to assist NASA in evaluating future Mars landing sites with the highest potential for providing fossilized evidence for life on Mars.

Riverine Sediment Evaluation, Thames River, New London, CT

Mr. Baldwin was retained by a not-for-profit group concerned that the planned disposition of dredge spoils from the Thames River associated with the US Navy nuclear submarine base would negatively impact the lobster fishery of off Fishers Island in the Long Island Sound. Mr. Baldwin directed the field team which collected gravity cores from along the portion of the Thames River slated for dredging. Mr. Baldwin utilized the services of a nationally-recognized laboratory to analyze the bottom sediment samples for a wide-range of contaminants. Other than potentially elevated concentrations of dioxins.

Additional information upon request

Stephanie O. Davis, PG, 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 mitigation systems, groundwater flow modeling, aquifer testing and interpretation, evaluation of site compliance with environmental regulations, environmental permitting, 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
California Registered Geologist #5192, 1991
Pennsylvania Registered 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

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. 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; ORC and HRC injections; 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, NYS BCP Site, Far Rockaway, NY.** Managed all aspects of pre-application investigation, BCP application, RI Work Plan development, 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** for all Phase I ESA, Phase II investigations, and remediation projects for a major commercial developer on Long Island, New York. Projects have included environmental services associated for the 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 BCP projects.

- **Program Manager, Remedial Investigation/ Feasibility Study (RI/FS), 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, and conceptual design.
- **Project Manager, RCRA Facilities Investigation (RFI), Barksdale AFB, LA, AFCEE**. 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** for site investigation activities, 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, NYCT.** 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 the Suffolk County Department of Health Services (SCDHS) and NYS Department of Environmental Conservation (NYSDEC). Proposed remediation technologies for onsite soil contamination and onsite and offsite groundwater contamination.
- **Project Manager, Site Investigation, Newark Airport, NJ, FAA.** 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.
- **Senior Hydrogeologist, multiple sites, NY metro area**. Supervised drilling, installation, development, and sampling of monitoring wells at numerous sites in the greater New York metro area. Utilized resulting stratigraphic, hydrologic, and chemical analytical data to evaluate site conditions.
- **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 sampling 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.

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 Remedial Investigation and Remedial Work Plan; coordinated with the owner, other contractors, and the 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 annual Certification Report.
- **Program Manager, Major Oil Storage Facility (MOSF) closure, Glen Harbor, NY. Real estate developer.** 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.** Managed all aspects of RCRA Closure of a former printing facility, including scope, budget and schedule development, Closure Plan, NYSDEC interactions, QAPP, and specifications for contractor services.
- **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.
- **Project Manager, Soil Remediation, Hauppauge, NY. Metal plating facility**. Planned remedial project and managed contractor support for soil remediation. Project was completed and approved by SCDHS.
- **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 Ms. Davis provides ongoing review of system operations and remedial monitoring results.
- **Program Manager, Waste soil management, Brooklyn, NY. Travelers Insurance**. 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 Plans (SAP), coordination of staffing, review of lab data, preparation of Field Sampling Summary Reports (FSSR), coordination with disposal facilities, and preparation of waste profiles.
- **Program Manager, NYS Inactive Hazardous Waste Disposal (Superfund) site, Hicksville, NY. Property owner**. 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), maintaining ongoing OM&M programs.
- **Project Manager, Remedial projects, Patchogue, NY. US Tape**. Designed and performed indoor underground storage tank abandonment program, leaching pool remediation plan, and managed contractor support for closure activities at a manufacturing facility. SCDHS provided oversight and approval.
- **Senior Hydrogeologist, Remedial design for a landfill, 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.
- **Project Manager, Soil remediation, Carle Place, NY, Kimco**. 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, Groundwater containment system, Richmond, CA**. Coordinated technical aspects of groundwater barrier wall construction, including routing, permitting, design, material selection, and field activities.
- **Project Manager, Multiple UIC investigations and closures, Suffolk and Nassau Counties, NY** Responsible for investigation and remediation of contaminated cesspool and stormwater drain pool in 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. Private client**. Prepared Engineer's Report for Long Island Well Permit for a 230-gpm irrigation supply well. Responsible for evaluation of well interference, salt water upcoming, impacts from contaminants, and other factors affecting the proposed well. Performed well design (gravel pack size, screen size, etc.) for numerous groundwater wells on Long Island. Familiar with sieve analyses, well construction and development methods.
- **Senior Hydrogeologist, groundwater modeling, East Hampton,** NY. Utilized Visual Modflow to evaluate the impact of 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 various wellfield locations and pumping rates.
- **Hydrogeologist, aquifer testing, Manhattan, NY. NYCT.** Participated in a multi-day, multi-well aquifer pumping test for NYCT. Responsible for operating and maintaining data logging equipment, coordinating manual water level measurements, and analyzing resulting drawdown data.
- **Hydrogeologist, aquifer evaluation, Brooklyn, NY. NYCT.** Evaluated subsurface geologic conditions for subway site utilizing existing boring logs, topographic, and historic map data.
- **Hydrogeologist, aquifer testing, Queens, NY. NYCT**. Performed slug tests on monitoring wells at an East Side Access site, and evaluated hydrologic properties using the HYDROLOGIC ISOAQX computer program.
- **Hydrogeologist, remedial wells, Deer Park, NY**. **USEPA.** Supervised drilling, installation and development of groundwater extraction, injection, and monitoring wells at a Superfund site. Interpreted aquifer and well performance from development data and recommended modification of drilling and development procedures.
- **Hydrogeologist, aquifer testing, NYC, NYCT**. Performed aquifer pumping and slug tests and evaluated hydrologic properties using the computer program AQTESOLV.

  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. Town of East Hampton**. Prepared a detailed evaluation of groundwater conditions and potential impacts for a water 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-stern 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, private client**. Performed groundwater sampling at a radio tower facility constructed on a landfill. Analyzed results and made recommendations.
- **Hydrogeologist, Landfill gas monitoring, Town of East Hampton, NY**. Conducted methane monitoring at two landfills over a multi-year period.
- **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 successfully 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 the FLOW PATH 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 production of 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.

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.
- **QAPPs, multiple projects**. Developed and implemented numerous QAPP, including QAPP design, sample delivery group (SDG) evaluations, sampling procedures and sequences, and QA/QC sample preparation/collection.
- **DUSR Preparation, multiple projects**. Prepared Data Usability Summary Reports (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.
- **Electronic Data Deliverables, multiple projects**. Implemented protocols and procedures for all FPM sites for which NYSDEC Electronic Data Deliverables (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 numerous 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 (CAMP) 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 reviewed and 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
- **Vector Assessments, multiple landfill sites, Long Island, NY**. Evaluated and implemented abatement for vectors (rodents, flies, and seagulls) in association with landfill closures, including inspection and reporting of vector populations, development of vector abatement plans, and assisting Town personnel with vector abatement.
- **Odor Abatement, NYSDEC BCP site, NYC, NY. Major real estate developer**. 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. Private client**. 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. Private client.** 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 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, solvent plume site, Nassau County, NY. Private client**. 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 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.
- **Expert Technical Services, road construction projects, Westchester County, NY. Croton Watershed Clean Water Coalition**. Provided technical services to the CWCWC 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

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 and combustible gas indicator (CGI) for methane. 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.
- **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 ESAs**. Performed numerous Phase I Site Assessments for residential and industrial sites in the metropolitan New York area.
- **Environmental Trainer.** Conducted aquifer pumping and soil vapor extraction test training. Instructed classes for site investigation methods, aquifer pumping test analysis, 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

- **Site Audits**. Has conducted numerous site audits for regulatory compliance, particularly with respect to Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Responsibility and Liability Act (CERCLA), the Clean Water Act (CWA) and Clean Air Act (CAA).
- **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 environmental site assessments (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 overseen activities at many Superfund sites from investigation through closure.
- **CWA 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.
- **CAA 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, 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**	**18**

Personal Data

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

Registration and Certifications
Certified Professional Geologist – American Institute of Professional Geologists
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

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.

Hydrogeologic Evaluations

- 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.
- 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.
- Performed aquifer pumping and slug tests and evaluated hydrologic properties using the computer program AQTESOLV.

Site Investigations/Groundwater Monitoring

- 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.
- 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.
- 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.

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Coordinated and performed soil and groundwater 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

- Performed numerous Phase I Environmental Site Assessments (ESAs) for commercial and industrial properties throughout the Northeastern United 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

- 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 a final engineering report to document remedial activities.
- 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.
- 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.
- Designed and oversaw the installation of a sub-slab depressurization system (SSDS) in the Bronx, NY to mitigate chlorinated solvent impacts. SSDS monitoring was conducted to ensure proper operation and emissions compliance of with NYSDEC air discharge guidelines.
- Operated and maintained remediation systems, including SVE, groundwater pump and treat, AS, dual-phase extraction, SSDS and free-phase petroleum recovery systems.

Health and Safety

- 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.
- 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 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.
- Performed screening for radiation at select sites. Operated Geiger counter in different radiation modes and obtained and evaluated background readings.

Other

- Coordinated RCRA closure activities and performed confirmatory sampling at a former package manufacturing facility in Garden City, NY. Project duties included contractor procurement, rinsate and soil sampling, and regulatory agency reporting and coordination.
- 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.
- 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 related reporting were performed to ensure that a gasoline groundwater plume migrating through the school property was not impacting the school occupants.
- Performed compliance inspections to assess issues of potential environmental concern at manufacturing, aviation, trucking, retail and not-for-profit facilities.
- Managed and performed methane monitoring at two eastern Long Island landfills to evaluate potential offsite impacts, indoor air quality, and methane generation and migration.
- 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 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.

APPENDIX D

EQUIPMENT AND MATERIALS SPECIFICATIONS

PVC Industrial Pipe: Schedule 40

Application:

Corrosion resistant pressure pipe, IPS sizes 1/8" through 24", for use at temperatures up to and including 140°F. Pressure rating (120 psi to 810 psi) varies with schedule, pipe size, and temperature as stated in Georg Fischer Harvel LLC engineering bulletin (Product Bulletin 112/401). Pipe is also suitable for PVC plastic drain, waste, and vent (DWV) applications. Generally resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens. Chemical resistance data is available and should be referenced for proper material selection. Pipe exhibits excellent physical properties and flammability characteristics (independently tested flame and smoke characteristics-ULC). Typical applications include: chemical processing, plating, high purity applications, potable water systems, water and wastewater treatment, drainage, irrigation, agricultural, and other applications involving corrosive fluid transfer.

Scope:

This specification outlines minimum manufacturing requirements for Polyvinyl Chloride (PVC) Schedule 40 iron pipe size (IPS) pressure pipe. This pipe is intended for use in applications where the fluid conveyed does not exceed 140°F. This pipe meets and or exceeds the industry standards and requirements as set forth by the American Society for Testing and Materials (ASTM D1785 & D2665) and the National Sanitation Foundation (NSF International STD 61 & Std 14).

PVC Materials:

The material used in the manufacture of the pipe shall be domestically produced rigid polyvinyl chloride (PVC) compound, Type I Grade I, with a Cell Classification of 12454 as defined in ASTM D1784, trade name designation H 707 PVC. This compound shall be white or gray in color as specified, and shall be approved by NSF International for use with potable water (NSF Std 61).

Dimensions:

All sizes of PVC Schedule 40 pipe shall be manufactured in strict accordance to the requirements of ASTM D1785 for physical dimensions and tolerances. PVC Sch 40 pipe sizes 1-1/4" through 24" diameters shall also meet the requirements of ASTM D2665 Standard Specification for PVC plastic drain, waste and vent (DWV) pipe and shall be dual marked as such. Each production run of pipe manufactured in compliance to the standard, shall also meet or exceed the test requirements for materials, workmanship, burst pressure, flattening, and extrusion quality defined in ASTM D1785 and ASTM D2665 as applicable. All belled-end pipe shall have tapered sockets to create an interference-type fit, which meet or exceed the dimensional requirements and the minimum socket length for pressure-type sockets as defined in ASTM D2672. All PVC Schedule 40 pipe must also meet the requirements of NSF Standard 14 and CSA Standard B137.3 rigid PVC pipe for pressure applications, and shall bear the mark of these Listing agencies. This pipe shall have a flame spread rating of 0-25 when tested for surface burning characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent.

Marking:

Product marking shall meet the requirements of ASTM D1785 and ASTM D2665 as applicable and shall include: the manufacturer's name (or the manufacturer's trademark when privately labeled); the nominal pipe size; the material designation code; the pipe schedule and pressure rating in psi for water @ 73°F; the ASTM designation D1785; the ASTM designation D2665 (when dual marked); the independent laboratory's seal of approval for potable water usage; and the date and time of manufacture.

Sample Specification:

All PVC Schedule 40 pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785 and D2665 (where applicable), consistently meeting and/or exceeding the Quality Assurance test requirements of these standards with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall be manufactured in the USA, using domestic materials, by an ISO 9001 certified manufacturer. Standard lengths of pipe sizes 6" and larger shall be beveled each end by the pipe manufacturer. All pipe shall be stored indoors after production at the manufacturing site until shipped from factory. This pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications. All pipe shall be manufactured by Georg Fischer Harvel LLC.

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Schedule 40 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P.
1/8	0.405	0.249	0.068	0.051	810
1/4	0.540	0.344	0.088	0.086	780
3/8	0.675	0.473	0.091	0.115	620
1/2	0.840	0.602	0.109	0.170	600
3/4	1.050	0.804	0.113	0.226	480
1	1.315	1.029	0.133	0.333	450
* 1-1/4	1.660	1.360	0.140	0.450	370
* 1-1/2	1.900	1.590	0.145	0.537	330
* 2	2.375	2.047	0.154	0.720	280
2-1/2	2.875	2.445	0.203	1.136	300
* 3	3.500	3.042	0.216	1.488	260
3-1/2	4.000	3.521	0.226	1.789	240
* 4	4.500	3.998	0.237	2.118	220
5	5.563	5.016	0.258	2.874	190
* 6	6.625	6.031	0.280	3.733	180
* 8	8.625	7.942	0.322	5.619	160
* 10	10.750	9.976	0.365	7.966	140
* 12	12.750	11.889	0.406	10.534	130
* 14	14.000	13.073	0.437	12.462	130
* 16	16.000	14.940	0.500	16.286	130
* 18	18.000	16.809	0.562	20.587	130
* 20	20.000	18.743	0.593	24.183	120
* 24	24.000	22.544	0.687	33.652	120

* Denotes these sizes are dual marked as being in compliance with both ASTM D1785 (pressure pipe) and ASTM D2665 (drain, waste & vent pipe-DWV).

The pressure ratings given are for water, non-shock, @ 73°F. The following temperature de-rating factors are to be applied to the working pressure ratings (WP) listed when operating at elevated temperatures.

Multiply the working pressure rating of the selected pipe at 73°F, by the appropriate de-rating factor to determine the maximum working pressure rating of the pipe at the elevated temperature chosen.

EX:
10" PVC SCH 40 @ 120°F = ?
140 psi x 0.40 = 56 psi max.
@ 120°F

De-Rating Factor

Operating Temp (°F)	De-Rating Factor
73	1.00
80	0.88
90	0.75
100	0.62
110	0.51
120	0.40
130	0.31
140	0.22

THE MAXIMUM SERVICE TEMPERATURE FOR PVC IS 140°F.

Solvent-cemented joints should be utilized when working at or near maximum temperatures. GF Harvel does not recommend the use of PVC for threaded connections at temperatures above 110°F; use flanged joints, unions, or roll grooved couplings where disassembly is necessary at elevated temperatures.

Threading of Schedule 40 PVC pipe is not a recommended practice due to insufficient wall thickness. Thread only Schedule 80 or heavier walls. Threading requires a 50% reduction in pressure rating stated for plain end pipe @ 73°F.

Chemical resistance data should be referenced for proper material selection and possible de-rating when working with fluids other than water. Refer to GF Harvel 112/401 Product Bulletin for chemical resistance, installation data, and additional information.

ASTM STANDARD D1784 MATERIAL EQUIVALENTS:

Cell Classification 12454 = PVC Type I Grade I = PVC1120

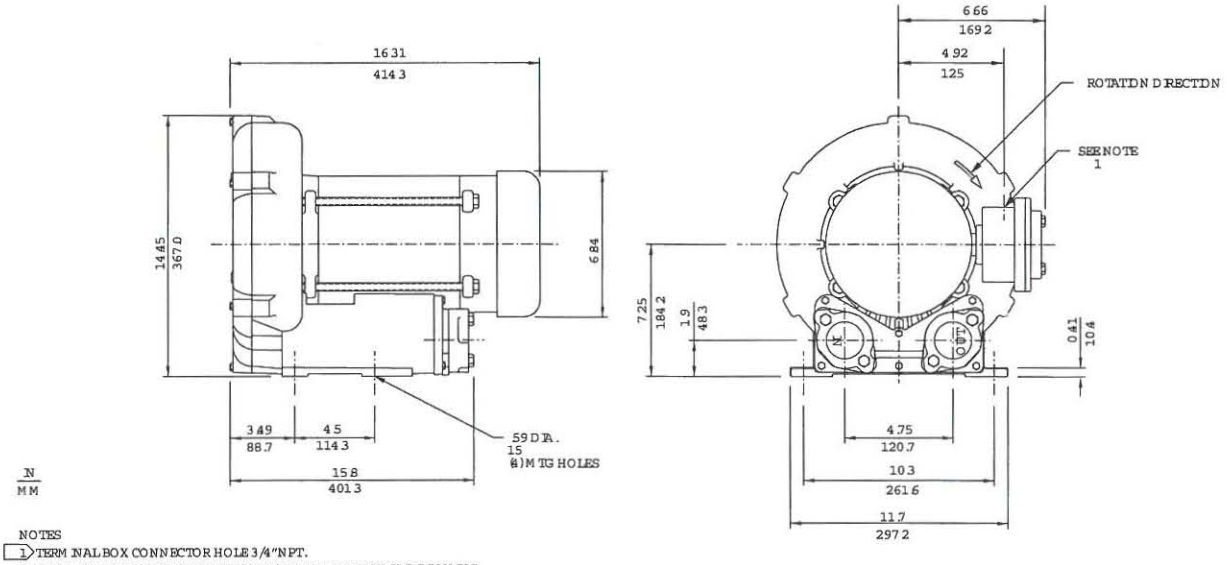
Pipe sizes shown are manufactured in strict compliance with ASTM D1785 and ASTM D2665 where applicable.

Environmental / Chemical Processing Blowers

ROTRON®

EN 505 & CP 505

2.0 / 2.5 HP Sealed Regenerative w/Explosion-Proof Motor



NOTES

1. TERMINAL BOX CONNECTOR HOLE 3/4" NPT.
2. DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3. CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN

		Part/Model Number			
		EN505AX58ML	EN505AX72ML	CP505FS58MLR	CP505FS72MLR
Specification	Units	038177	038178	080655	038962
Motor Enclosure - Shaft Mtl.	-	2.0	2.0	2.0	2.0
Horsepower	-	Explosion-proof-CS	Explosion-proof-CS	Chem XP-SS	Chem XP-SS
Phase - Frequency	-	Single-60 hz	Three-60 hz	Single-60 hz	Three-60 hz
Voltage	AC	115/230	230/460	115/230	230/460
Motor Nameplate Amps	Amps (A)	22/11	5.8/2.9	22/11	5.8/2.9
Max. Blower Amps	Amps (A)	24/12	6.4/3.2	24/12	6.4/3.2
Inrush Amps	Amps (A)	112/56	56/28	112/56	56/28
Service Factor	-	1/0	0/0	1/0	0/0
Starter Size	-	1.0	1.0	1.0	1.0
Thermal Protection	-	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty
XP Motor Class - Group	-	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G
Shipping Weight	Lbs	92	84	92	84
	Kg	41.7	38.1	41.7	38.1

Voltage - ROTRON motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: 208-230/415-460 VAC-3 ph-60 Hz and 190-208/380-415 VAC-3 ph-50 Hz. Our dual voltage 1 phase motors are factory tested and certified to operate on both: 104-115/208-230 VAC-1 ph-60 Hz and 100-110/200-220 VAC-1 ph-50 Hz. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

Operating Temperatures - Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

Maximum Blower Amps - Corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

XP Motor Class - Group - See Explosive Atmosphere Classification Chart in Section I

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
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Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

Environmental / Chemical Processing Blowers

ROTRON®

EN 505 & CP 505

2.0 / 2.5 HP Sealed Regenerative w/Explosion-Proof Motor

FEATURES

Manufactured in the USA - ISO 9001 and NAFTA compliant
- Maximum flow: 150 SCFM

Maximum pressure: 75 IWG
Maximum vacuum: 70 IWG
Standard motor: 2.0 HP, explosion-proof
Cast aluminum blower housing, impeller, cover & manifold; cast iron flanges (threaded); teflon® lip seal
UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
Sealed blower assembly
Quiet operation within OSHA standards

MOTOR OPTIONS

International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS

Corrosion resistant surface treatments & sealing options
Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

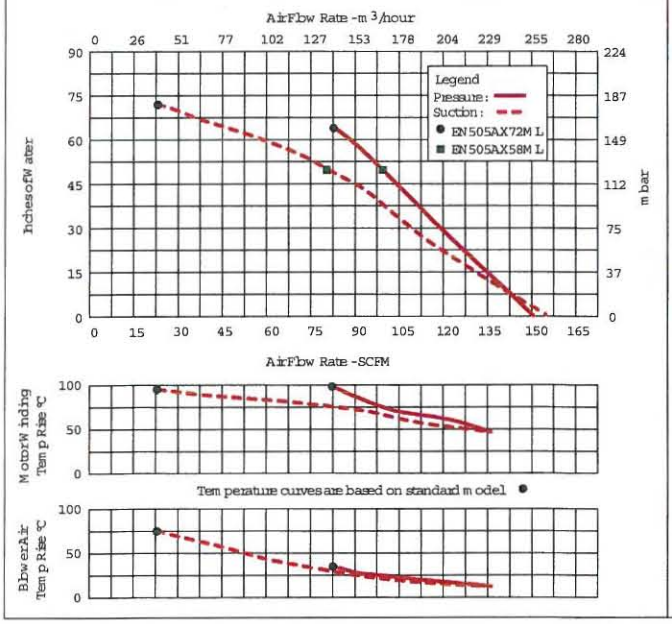
ACCESSORIES

Flow meters reading in SCFM
Filters & moisture separators
Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature

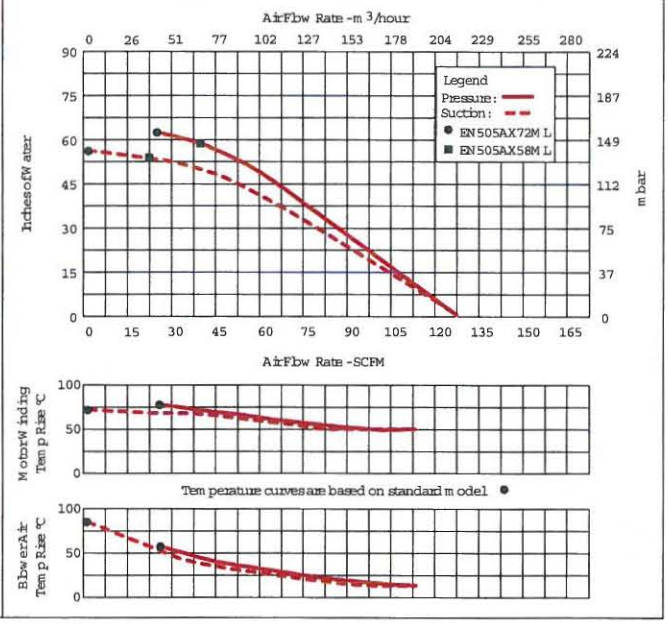
External mufflers for additional silencing
Air knives (used on blow-off applications)
Variable frequency drive package

Blower Performance at Standard Conditions

60 Hz



50 Hz



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AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

SERVICE AND PARTS MANUAL FOR BLOWER MODEL

EN454 – EN656

ROTRON Industrial Products
627 lake Street, Kent, ohio 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
internet: www.ametektip.com

Your Choice. Our Commitment.™

WARRANTY, INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

TECHNICAL AND INDUSTRIAL PRODUCTS
627 Lake Street, Kent, Ohio 44240 USA
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com web site: www.ametektip.com

1. AMETEK Rotron DR, EN and HiE regenerative direct drive blowers are guaranteed for one full year from the date of installation (limited to 18 months from the date of shipment) to the original purchaser only. Should the blower fail we will evaluate the failure If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

2. AMETEK Rotron Minispiral, Revaflow, Multiflow, Nautilair, remote drive blowers, moisture separators, packaged units, CP blowers, Nasty Gas™ models and special built (EO) products are guaranteed for one full year from date of shipment for workmanship and material defect to the original purchaser only. Should the blower fail, If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

3. **Parts Policy** - AMETEK Rotron spare parts and accessories are guaranteed for three months from date of shipment for workmanship and material defect to the original purchaser only. If failure is determined to be workmanship or material defect related we will at our option repair or replace the part.

Corrective Action - A written report will be provided indicating reason(s) for failure, with suggestions for corrective action. Subsequent customer failures due to abuse, misuse, misapplication or repeat offense will not be covered. AMETEK Rotron will then notify you of your options. Any failed unit that is tampered with by attempting repair or diagnosis will void the warranty, unless authorized by the factory.

Terms and Conditions - Our warranty covers repairs or replacement of regenerative blowers only, and will not cover labor for installation, outbound and inbound shipping costs, accessories or other items not considered integral blower parts. Charges may be incurred on products returned for reasons other than failures covered by their appropriate warranty. Out-of-warranty product and in warranty product returned for failures determined to be caused by abuse, misuse, or repeat offense will be subject to an evaluation charge. Maximum liability will in no case exceed the value of the product purchased. Damage resulting from mishandling during shipment is not covered by this warranty. It is the responsibility of the purchaser to file claims with the carrier. Other terms and conditions of sale are stated on the back of the order acknowledgement.

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200°F. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOES NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

* 3 phase units

** 1 phase units

*** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.

Blower Disassembly:

WARNING: Attempting to repair or diagnose a blower may void Rotron's warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE:** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement:

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

NOTE: On DR068 models with tubular mufflers it is necessary to remove the cover and impeller accessing the muffler material from the housing cavity.

Blower Reassembly:

1) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	Torque Pound-Force-Foot
1/4-20	6.25 +/- 0.25
5/16-18	11.5 +/- 0.25
3/8-16	20.0 +/- 0.5
½-13	49.0 +/- 1
5/8 –11	90.0 +/- 2

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

Tools Needed: Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

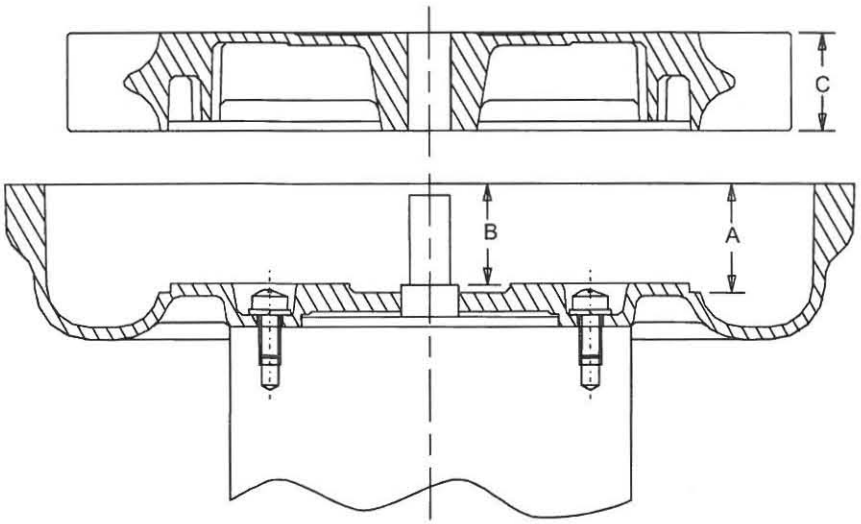
Measure the Following:

Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder (B)
Impeller Thickness (C)

Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

Shim Thickness = B – (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A-C)/2.



AMETEK®
ROTRON TECHNICAL MOTOR DIVISION
REGENERATIVE BLOWER GROUP

75 North Street
Saugerties, New York 12477
Phone: (845) 246-3401
Fax: (845) 246-3802

EXPLOSION-PROOF BLOWERS

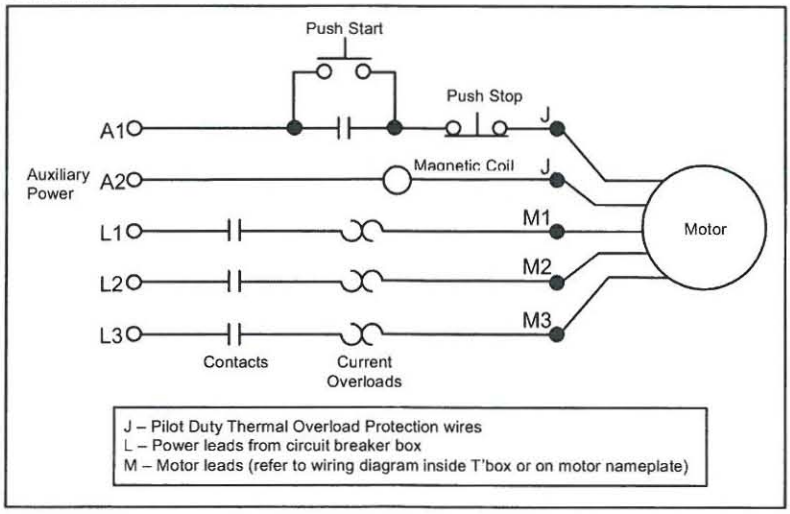
IMPORTANT: Read before wiring this Explosion-proof Blower

This AMETEK Rotron Explosion-proof Regenerative Blower may be equipped with Pilot Duty Thermal Overload (PDTO) or Automatic Thermal Overload (ATO) protection. When properly wired to a motor starter, this protection limits the motor winding temperature rise per the National Electric Code (NEC) article 500. Failure to properly wire this blower is an NEC violation and could cause an explosion. AMETEK Rotron assumes no responsibilities for damages incurred by negligent use of this product, and will not warranty a blower on which the PDTO is not properly connected. Some blowers 1 HP and under do not require PDTO and have built in ATO. Consult the factory if verification of wiring connections is required.

In all cases, follow the motor controller manufacturer's instructions. The following schematic is for conceptual understanding only, and may not apply to all motor/controller combinations.

The manufacturer's wiring diagram found on the motor takes precedent over reference diagrams supplied by AMETEK Rotron Technical Motor Division.

Schematic



The schematic is shown for a three phase motor. For a single phase motor disregard L3 and M3. Pushing the START button completes the auxiliary control circuit, allowing current to flow through the magnetic coil. The contacts are magnetically closed, starting the motor and latching the auxiliary circuit. The motor will continue to run until the STOP push button is depressed, the motor reaches the overload temperature, or the current sensing overloads trip out.

If you have any questions, contact AMETEK Rotron at 914-246-3401 for the location of your area representative.

POLICY REGARDING INSTALLATION OF AMETEK ROTRON REGENERATIVE BLOWERS IN HAZARDOUS LOCATIONS

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, explosive location without the proper NEMA motor enclosure. AMETEK Rotron does not recognize sealed blowers as a substitute for explosion-proof motors. Sealed units with standard TEFC motors should never be utilized where local, state, and/or federal codes specify the use of explosion-proof equipment.

AMETEK Rotron has a complete line of regenerative blowers with explosion-proof motors. Division 1 & 2, Class I, Group D; Class II, Groups F & G requirements are met with these standard explosion-proof blowers.

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, corrosive environment without the proper surface treatment and sealing options.

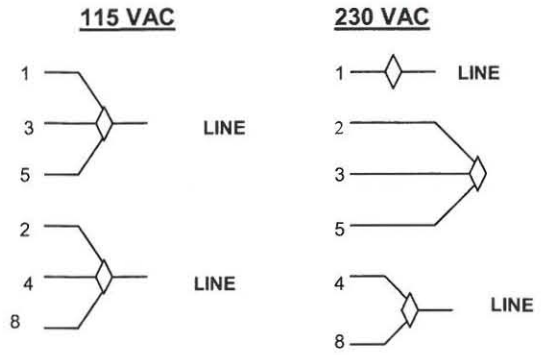
AMETEK Rotron has a complete line of Chemical Processing and Nasty Gas™ regenerative blowers with Chem-Tough™, stainless steel parts, and seals.

AMETEK Rotron offers general application guidance; however, suitability of the particular blower selection is ultimately the responsibility of the purchaser, not the manufacturer of the blower.

FS2 Rev B 3/10/98

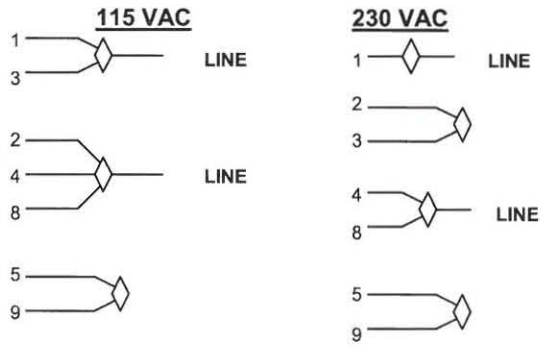
WIRING DIAGRAMS, XP MOTORS

H. 1Ø, 6 WIRE



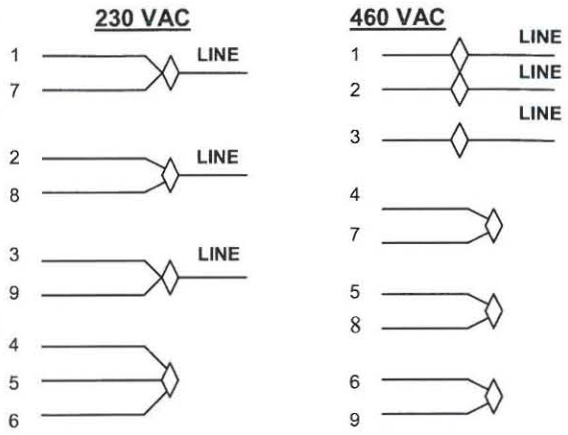
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

I. 1Ø, 7 WIRE



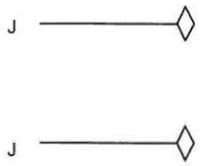
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

K. 3Ø, 9 WIRE



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

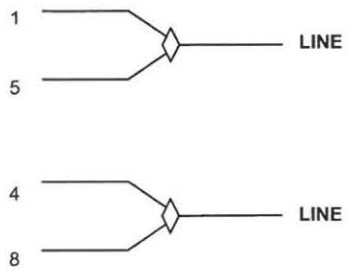
L. PILOT DUTY THERMAL OVERLOADS



HOOK J LEADS TO CONTROL CIRCUITRY

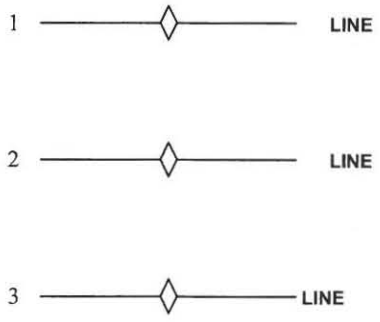
M. 1Ø 230 VAC

SINGLE VOLTAGE



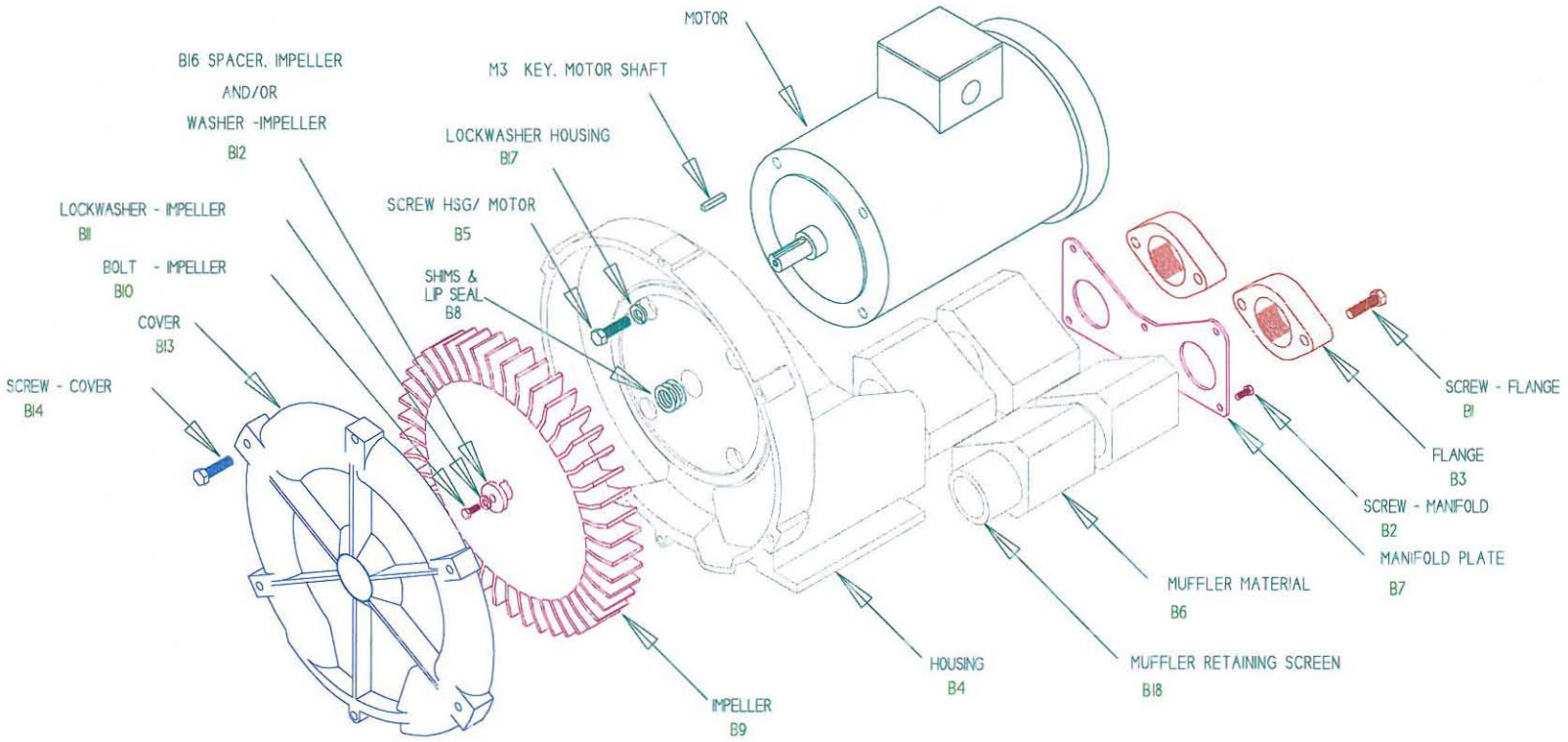
INTERCHANGE LEADWIRES 5 & 8 TO REVERSE ROTATION

N. 3Ø 575 VAC



INTERCHAGE ANY TWO LEAD LINES TO REVERSE ROTATION

ASSEMBLY DIAGRAM
EN454 EN513 EN523 EN505
EN555 EN606 EN656



EN 454/513/523/505/555/606/656
Service and Parts Manual

Parts Breakdown

Item No.	Qty. Req'd	Description	EN454 038175 038176	EN454 080487 080488 080916	EN513 038183 038037	EN523 038223 038184	EN505 038177 038178 038445	EN555 038045	EN606 038179 038222 038437 038536 038538
M3	1	Key Motor Shaft	510629	510629	510629	155099	510629	510629	510629
B1	4	Screw, Flange	120162	120162	120162	120162	120162	120162	155095
B2	6	Screw, Manifold	155496	155170	(10 pcs) 120214	(10 pcs) 120214	155170	155496	155176
B3	2	Flange	510354	510354	510354	510354	510354	510354	511480
B4	1	Housing	515737	551001	523419	523420	See Next Page	516721	See Next Page
B5	4	Screw, Hsg /Motor	251791	155128	251791	251791	155128	251791	251791
B6	4	Muffler Material	515743	515743	516560	516560	(6 pcs) 515743	515743	See Next Page
	2	Muffler Insert	Not Used	551006	Not Used	Not Used	Not Used	Not Used	Not Used
B7	1	Manifold Plate	516410	516410	529868	529868	517460	515482	516392
B8	*	Shim .002"	510356	510356	510356	500664	510356	510356	510356
	*	Shim .005"	510357	510357	510357	500665	510357	510357	510357
	*	Shim .010"	510358	510358	510358	500666	510358	510358	510358
	*	Shim .020"	510359	510359	510359	500667	510359	510359	510359
	*	Shim .030"	Not Used	Not Used	Not Used	510292	Not Used	Not Used	Not Used
B9	1	Impeller	515675	551067	516557	(2 pcs) 516562	517433	516678	511272
B10	1	Bolt, Impeller	120214	120214	120325	120214	120214	120262	120325
B11	1	Lockwasher, Impeller	120203	120203	120203	120203	120203	120203	120203
B12		Washer, Impeller	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	517807	551065	516559	516559	517808	516675	511274
B14	6	Screw, Cover	155236	155129	(8 pcs) 120255	(8 pcs) 155098	155236	(7 pcs) 155236	155236
B16	1	Spacer, Impeller Bolt	510355	510355	510355	510355	510355	510355	510355
B17		Lockwasher, Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B18	1	Screen, Muffler Retaining, Right (**)	510362	551087	511718	511718	See Next Page	510362	See Next Page
	1	Screen, Muffler Retaining, Left (**)	510362	551087	511718	511718	See Next Page	510362	See Next Page
B19		Bolt, Muffler Hsg/Hsg	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B20		Muffler Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Bolt, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Lockwasher, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Washer, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Spacer, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B23		Bolt, Mounting Rail	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B24		Lockwasher, Rail	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B25		Nut, Rail	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B26		Rail Mounting	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
	1	Lip Seal	516587	516587	516587	516587	516587	516587	516587

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below

Model	Part No.	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)
EN454W58L	038175	515747	H + L		510449
EN454W72L	038176	515746	K + L		
EN454W58ML	080487	515747	H + L		
EN454W72ML	080488	515746	K + L		
EN454W86ML	080916	517391	N + L		
EN513W58L	038183	515747	H + L		
EN513W72L	038037	515746	K + L		
EN523M72L	038184	517675	K + L		
EN523M5L	038223	551373	M + L	B13 516555 1 pc Center Annulus	510217
EN505AX58ML	038177	510326	H + L		510449
EN505AX72ML	038178	510325	K + L	B4 517419 B18 517435 2 pcs	
EN505CJ5ML	038445	529622	M + L	B4 529654 B18 517436 2 pcs	510449
EN555M72L	038045	516687	K + L		
EN606M72L	038179 ***	516687	K + L	B4 511276 1 pc	
EN606M5L	038222 **	551366	M + L	B6 511285 4 pcs	510217
EN606M86L	038437	529630	N + L	B4 529790 1 pc	510449
EN606M72ML	038536	516687	K + L	B6 529781 4 pcs	
EN606M5ML	038538	551366	M + L	B18 529782 2 pcs	510217
EN656M86XL	080058	529630	N + L		510449
EN656M72XL	080059	516687	K + L		
EN656M5XL	080060	551366	M + L	B7 Muffler extension 551974 1 pc	510217

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below

EN656 080058 080059 080060
510629
120255
155170
511480
550195
251791
(10 pcs.) 551585
Not Used
See Next Page
510356
510357
510358
510359
Not Used
550305
120325
120203
Not Used
550249
(8 pcs) 155236
510355
Not Used
517436
517436
Not Used
Not Used
Not Used
Not Used
Not Used
Not Used
Not Used
Not Used
Not Used
Not Used
516587

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below

Bearing, Impeller End (M2)
510217
510218
510217
510217
510218
510217
510218
510217
510218

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below