90-30 METROPOLITAN AVENUE SITE

REGO PARK, QUEENS, NEW YORK

Final Engineering Report

NYSDEC VCP Number: V00253-2

Prepared for:

Titan Management LP

And

DPSW Forest Hills LLC

Prepared by:

909 MARCONI AVENUE

RONKONKOMA, NEW YORK 11779

NOVEMBER 2009

CERTIFICATIONS

I, KEVIN LOYST, am currently a registered professional engineer licensed by the State of New York. I certify that the Remedial Action Work Plan for the 90-30 Metropolitan Avenue Site (NYSDEC VCA Index No. D2-0001-04-02, Site No. V00253-2) was implemented and that all construction activities were completed substantially in accordance with the NYSDEC-approved Remedial Action Work Plan and were observed by environmental professionals under supervision.

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Operation, Maintenance and Monitoring Plan, and the Voluntary Cleanup Agreement for 90-30 Metropolitan Avenue and related amendments.

I certify that the Remedial Action Work Plan dated November 2005, the May 3, 2006 Addendum to the Remedial Action Work Plan, the June 8, 2006 Second Addendum to the Remedial Action Work Plan, the October 4, 2006 Third Addendum to the Remedial Action Work Plan, and Stipulations in a letter dated June 6, 2006 and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under supervision and that the remediation requirements set forth in the Remedial Action Work Plan have been achieved.

An Operation, Maintenance and Monitoring Plan has been submitted by the Applicant for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by NYSDEC.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor monitoring and suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

76321	11-11-09	
NYS Professional Engineer #	Date	Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

FINAL REMEDIAL ENGINEERING REPORT

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LIST OF ACRONYMS

Acronym	Definition
1,1,1-TCA	1,1,1-trichloroethane
AGC	Annual Guidance Concentration
AKRF	AKRF, Inc.
AOC	Area of Concern
AS	Air sparging
ASP	Analytical Services Protocol
AST	Aboveground storage tank
CAMP	Community Air Monitoring Plan
CLP	Contract Laboratory Procedures
CP	Community Participation
DUSR	Data Usability Summary Report
ECs	Engineering Controls
ENB	Environmental Notice Bulletin
ES&E	Environmental Science and Engineering
FER	Final Engineering Report
FPM	FPM Group, Ltd.
HASP	Health and Safety Plan
HVAC	Heating/ventilation/air conditioning
ICs	Institutional Controls
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
Objectives	NYSDEC TAGM 4046 Recommended Soil Cleanup Objectives
OM&M	Operation, Maintenance and Monitoring
PCE	Tetrachloroethene
PID	Photoionization detector
PPE	Personal protective equipment
PSA	Preliminary Site Assessment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
ROI	Radius of Influence
Roux	Roux Associates, Inc.
scfm	standard cubic feet per minute
SCGs	Standards, criteria and guidance
SGC	Short-Term Guidance Concentration

Acronym	Definition
Standards	NYSDEC Class GA Ambient Water Quality Standards
STL	Severn-Trent Laboratory
SVE	Soil vapor extraction
TAGM	Technical Administrative Guidance Memorandum
TCL	Target Compound List
ug/l	micrograms per liter
UST	Underground storage tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOC	Volatile organic compound

FINAL REMEDIAL ENGINEERING REPORT

1.0 BACKGROUND

Titan Management LP entered into a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC) in June 2002 and DPSW Forest Hills LLC became a co-volunteer in May 2005, to investigate and remediate a 1.87-acre property located in Rego Park, Queens, New York. A commercial usage (to exclude day care, child care, and medical care uses) is proposed for the property. Redevelopment has been completed and the Site presently contains retail stores.

A digital copy of this Final Engineering Report (FER) with all project documents approved under the VCP is included in Appendix A.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in Rego Park, Queens County, New York and is identified as Block 3884 and Lot 34 on the Queens County Tax Map. Figure 1.1.1 shows the Site location. The Site is situated on an approximately 1.87-acre area bounded by Metropolitan Avenue to the north, 73rd Avenue to the south, Trotting Course Lane to the east, and a bowling alley to the west (see Figure 1.1.2). The boundary map included in the VCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419 is included in Appendix A. A site plan showing utilities and easements on the Site is also included in Appendix A.

1.2 REDEVELOPMENT PLAN

The Remedial Action performed under the Remedial Action Work Plan (RAWP) has made the Site protective of human health and the environment to standards consistent with the end use. The end use is commercial (excluding day care, child care, and medical care) use. The current redevelopment includes retail use throughout the entire building.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The adjoining properties are commercial. The Woodhaven Lanes Bowling Alley adjoins the west side of the Site. Further west, across Woodhaven Boulevard, is a residential area. To the north of the Site, across Metropolitan Avenue, is a retail and commercial area with several auto-related businesses, including a gas station just north of the bowling alley. To the east,

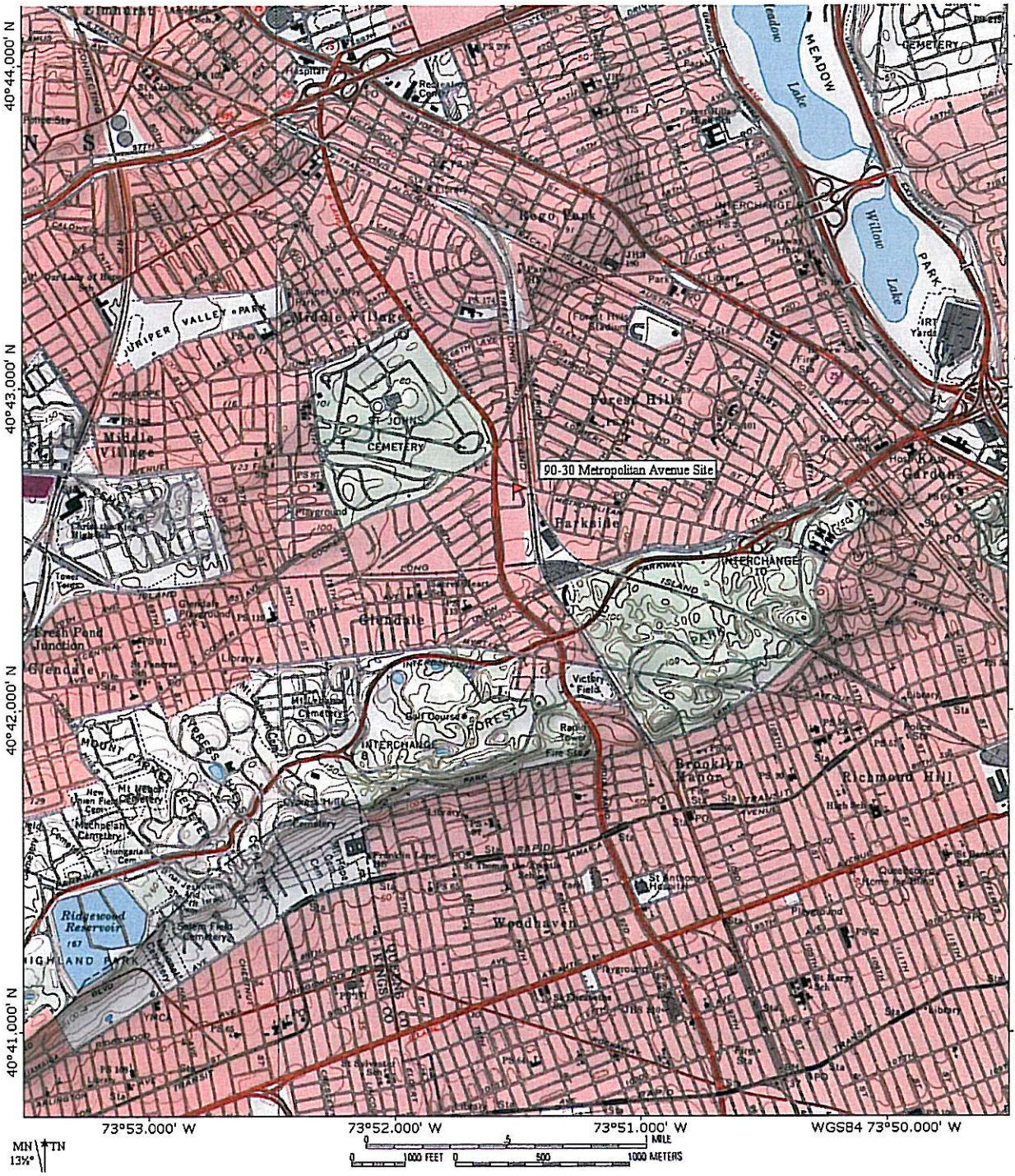

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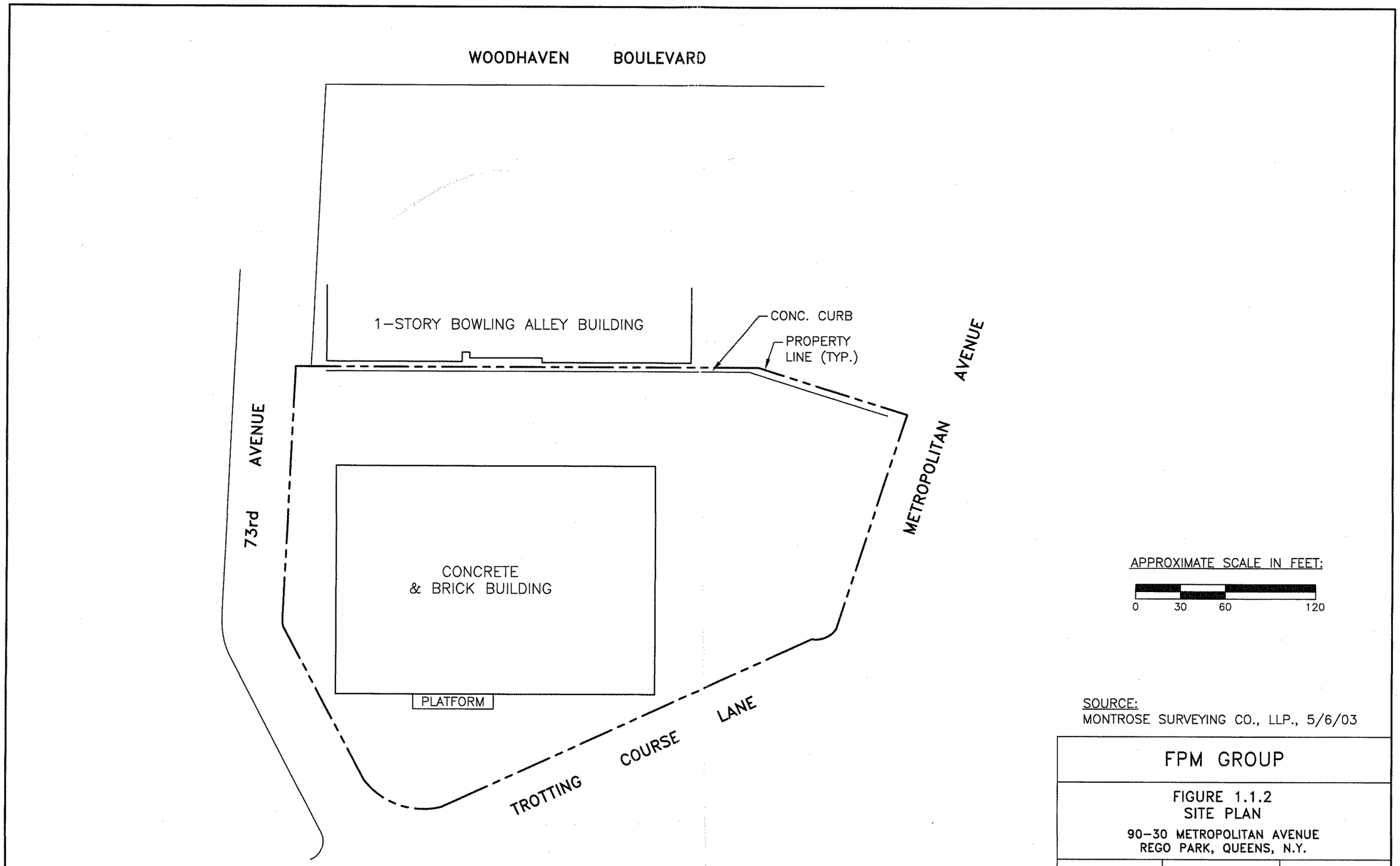
FIGURE 1.1.1

SITE LOCATION
90-30 Metropolitan Avenue
Rego Park, Queens, New York

Drawn by: TAC	Checked By: SOD	Date: 11/30/07



APPROXIMATE SCALE IN FEET:

0 30 60 120

SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 1.1.2
SITE PLAN
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: J.S.	Checked By: B.C.	Date: 9/2/05

across Trotting Course Lane, are a car wash and a former railroad embankment with tracks. To the south of the Site, across 73rd Avenue, are a Sports Authority store and an associated paved parking lot.

No sensitive receptors, such as schools, day care facilities, hospitals, residential areas, rivers, streams, or wetlands are located in close proximity to the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated on several occasions between 1992 and 2003, including a Remedial Investigation (RI) conducted in 2003 and documented in an April 2004 RI Report. Below is a summary of the RI and previous investigation findings.

2.1 SUMMARY OF INVESTIGATION FINDINGS

Tetrachloroethene (PCE) was first detected in the groundwater beneath the Site in December 1992 during an investigation performed by Environmental Science and Engineering (ES&E) for Heidelberg Eastern. PCE was found in groundwater samples from the three wells installed onsite but was not detected in soil samples from above the groundwater surface.

Delineation of PCE impact in groundwater continued in 1995 when 13 additional groundwater monitoring wells were installed by Soil Mechanics. PCE was detected in groundwater throughout the southern portion of the Site and on the west and south sides of the building. However, no source material was located in soil samples. A soil gas survey was also performed on the south side of the Site building. Organic vapors were reported to have been detected in soil gas; soil gas was further evaluated during later investigations as discussed below.

Additional investigations were performed by Roux Associates, Inc. (Roux) in 1995 and 1996 for the purposes of delineating the extent of groundwater impact and to locate any onsite source areas through soil gas and soil sampling. Soil gas samples were collected from 114 locations in and around the Site building but only trace levels of PCE (up to 4.81 micrograms per liter, or ug/l), consistent with diffusion from the impacted groundwater, were detected. Soil sampling was performed in areas where PCE was detected in soil gas; however, no PCE was detected in these samples.

Roux performed additional soil and groundwater sampling in 1997. The results indicated a southeast direction of groundwater flow. The existing and newly-obtained data failed to identify an onsite source of PCE and, since PCE was present at elevated concentrations on the western (upgradient) side of the Site, it was concluded that the PCE source was located offsite.

IT performed additional soil, soil gas, and groundwater sampling at the Site and adjoining properties in 2000 and 2001. The groundwater flow direction was identified as southwest during this study. No source area was identified during the IT sampling. However, the southern portion of the Site building was a suspected source area based on elevated PCE levels in groundwater near the south wall of the building, the past use of the building for servicing printing machinery, and the groundwater flow direction. Therefore, further investigation of this area was performed during the RI, as discussed below.

An RI was performed at the Site by AKRF, Inc. (AKRF) in 2003 and included soil and groundwater sampling. The results were reported in an April 2004 RI Report. The groundwater flow direction was confirmed to be to the southeast at the eastern end of the Site and to the south at the western end of the Site. Groundwater data indicated the presence of two slightly overlapping plumes of PCE: one associated with the southern portion of the Site and one associated with adjoining bowling alley to the west, as shown in Figure 2.1.1. Soil sampling was performed on the southern portion of the Site in an effort to identify a source area. However, no PCE source area was identified.

Additional groundwater sampling was performed in June 2005 and was reported in the RAWP (FPM, November 2005). These sample results are summarized below.

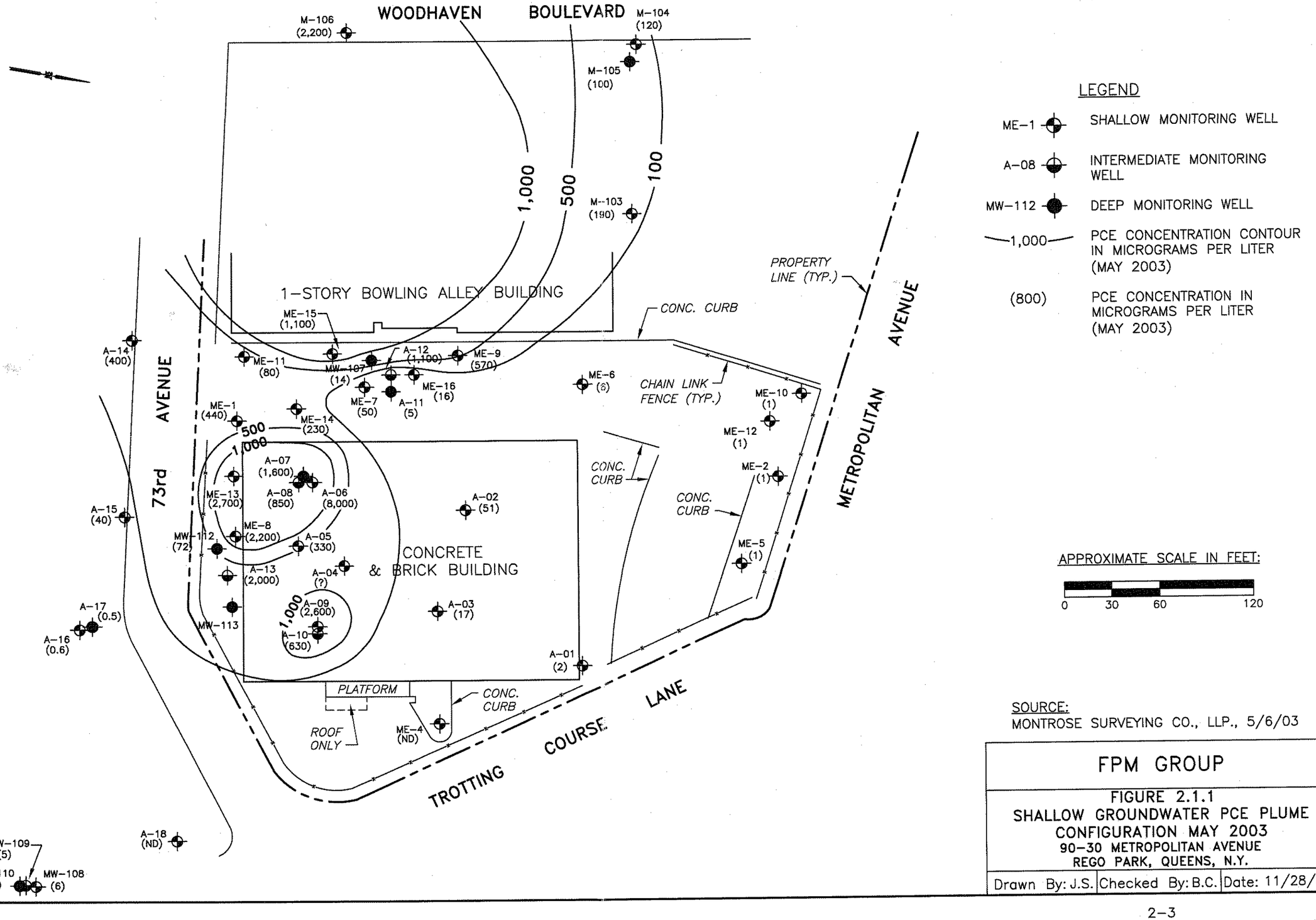
Pilot testing was performed to evaluate the suitability of air sparging/soil vapor extraction (AS/SVE) to address Site PCE contamination and to obtain necessary performance information to design a full-scale AS/SVE system. Pilot test results were described in the Pilot Test Report (FPM, September 2005).

2.1.1 Summary of Groundwater Conditions

Two separate plumes of PCE-impacted groundwater are present in the groundwater beneath the Site. The western-most plume extends from beneath the adjacent bowling alley property into the parking area located in the southwestern portion of the Site. The eastern-most plume is present beneath and to the south of the southern portion of the Site building. This plume appears to be commingling with the western plume and is generally contained onsite. Figure 2.1.1.1 depicts the configuration of the PCE plumes in the shallow groundwater in June 2005.

The groundwater flow direction in the shallow water table is generally to the south and southeast and is consistent with the distribution of PCE in the groundwater, as shown in Figure 2.1.1.1 and discussed below.

PCE concentrations in the shallow groundwater in June 2005 ranged from non-detect to 3,600 micrograms per liter (ug/l), as shown on Table 2.1.1.1. Cis-1,2-dichloroethene (cis-1,2-DCE) was also detected in one sample at an estimated concentration of 48 ug/l. Intermediate-depth groundwater contained PCE at concentrations of 200 to 3,300 ug/l, as shown in Table 2.1.1.2. Deep-interval wells contained PCE at concentrations ranging from non-detect to 170 ug/l, as shown in Table 2.1.1.3. Other than the one detection of cis-1,2-DCE, no chlorinated solvent VOCs other than PCE were detected in the shallow, intermediate, or deep groundwater.



LEGEND

ME-1	SHALLOW MONITORING WELL
A-08	INTERMEDIATE MONITORING WELL
MW-112	DEEP MONITORING WELL
1,000	PCE CONCENTRATION CONTOUR IN MICROGRAMS PER LITER (MAY 2003)
(800)	PCE CONCENTRATION IN MICROGRAMS PER LITER (MAY 2003)

APPROXIMATE SCALE IN FEET:

0 30 60 120

SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

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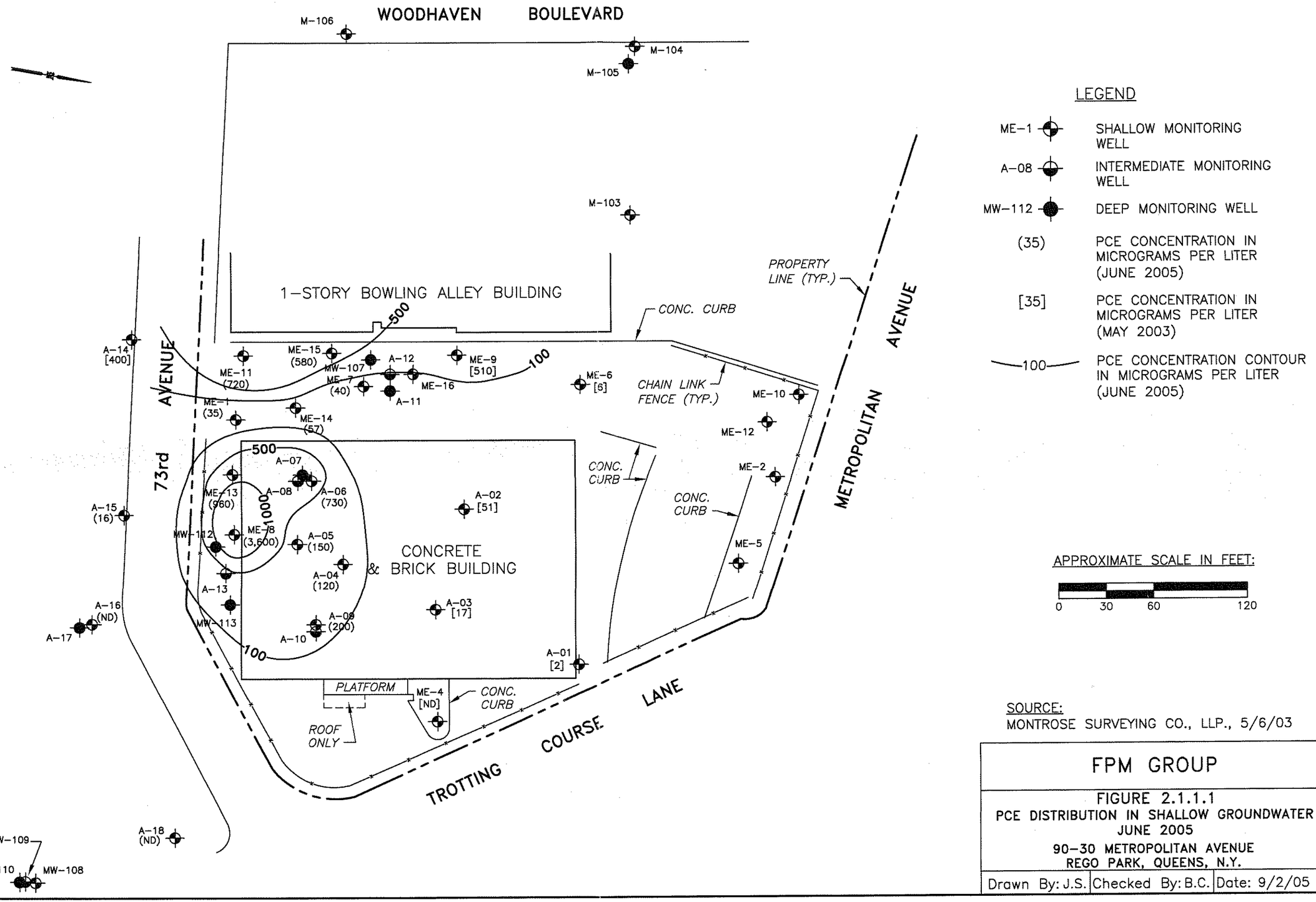
FIGURE 2.1.1
SHALLOW GROUNDWATER PCE PLUME CONFIGURATION MAY 2003
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: J.S.	Checked By: B.C.	Date: 11/28/07



SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 2.1.1.1
PCE DISTRIBUTION IN SHALLOW GROUNDWATER
JUNE 2005
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: J.S. | Checked By: B.C. | Date: 9/2/05

TABLE 2.1.1.1
GROUNDWATER CHEMICAL ANALYTICAL DATA
SHALLOW WELLS, JUNE 2005
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	ME-1	ME-7	ME-8	ME-11	ME-13	ME-14	ME-15	A-04	A-05	A-06	A-09	A-15	A-16	A-18	NYSDEC Class GA Ambient Water Quality Standards
Sample Date	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	6/05	
Target Compound List Volatile Organic Compounds in micrograms per liter															
Acetone	ND	ND	ND	ND	15 J	ND	ND	ND	ND	20 JB	2.9 JB	ND	ND	ND	50
Methylene chloride	1.8 JB	0.51 JB	**54 JB**	**17 JB**	**17 JB**	0.49 JB	**16 JB**	1.8 JB	2.0 JB	**16 JB**	1.8 JB	ND	ND	0.40 JB	5
cis-1,2-Dichloroethene	ND	ND	ND	ND	**48 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
2-Butanone	ND	ND	ND	ND	ND	ND	ND	2.5 JB	ND	21 JB	ND	ND	ND	ND	50
Chloroform	ND	ND	ND	ND	ND	ND	ND	1.6 J	ND	ND	ND	1.3 J	0.74 J	ND	7
Tetrachloroethene	**35**	**40**	**3,600**	**720**	**960**	**57**	**580**	**120**	**150**	**730**	**200**	**16**	ND	ND	5
Total VOCs*	35	40	3,600	720	1,023	57	580	121.6	150	730	200	17.3	0.74	ND	-

Notes:

ND = Not detected

VOCs = Volatile Organic Compounds

*Excluding suspected field/lab contamination

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards

NYSDEC = New York State Department of Environmental Conservation

J = Estimated concentration below reporting limit

B = Analyte detected in an associated blank sample

- = Not established

TABLE 2.1.1.2
GROUNDWATER CHEMICAL ANALYTICAL DATA
INTERMEDIATE WELLS, JUNE 2005
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	A-08	A-10	A-12	A-13	NYSDEC Class GA Ambient Water Quality Standards
Sample Date	6/05	6/05	6/05	6/05	
Target Compound List Volatile Organic Compounds in micrograms per liter					
Acetone	**450 B**	3.0 JB	31 J	ND	50
Methylene chloride	**57 JB**	1.7 JB	**35 JB**	**8.0 JB**	5
Tetrachloroethene	**3,300**	**200**	**1,900**	**470**	5
Total VOCs*	3,300	200	1,931	470	-

Notes:

ND = Not detected

VOCs = Volatile Organic Compounds

*Excluding suspected field/lab contamination

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards

NYSDEC = New York State Department of Environmental Conservation

J = Estimated concentration below reporting limit

B = Analyte detected in an associated blank sample

- = Not established

TABLE 2.1.1.3
GROUNDWATER CHEMICAL ANALYTICAL DATA
DEEP WELLS, JUNE 2005
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	A-07	A-17	MW-107	MW-112	MW-113	NYSDEC Class GA Ambient Water Quality Standards
Sample Date	6/05	6/05	6/05	6/05	6/05	
Target Compound List Volatile Organic Compounds in micrograms per liter						
Acetone	3.2 JB	ND	ND	ND	ND	50
Methylene chloride	1.8 JB	0.57 JB	1.4 JB	0.75 JB	0.62 JB	5
2-Butanone	7.0 JB	ND	ND	ND	ND	50
Tetrachloroethene	**170**	ND	1.2 J	3.2 J	1.4 J	5
Total VOCs*	170	ND	1.2	3.2	1.4	-

Notes:

ND = Not detected

VOCs = Volatile Organic Compounds

*Excluding suspected field/lab contamination

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards

These data were compared to the most recent previous sampling results from these wells and generally indicated continuing significant decreases in VOC concentrations at nearly all of the onsite and offsite wells. Decreases in PCE were observed at all of the offsite downgradient wells. Groundwater data continued to indicate the presence of two slightly overlapping plumes of PCE: one associated with the southern portion of the Site and one associated with adjoining bowling alley to the west.

The shallow groundwater PCE concentrations observed in June 2005 are shown in Figure 2.1.1.1. A comparison of Figures 2.1.1.1 and 2.1.1 indicates that between May 2003 and June 2005 the groundwater plumes in the shallow groundwater at the Site continued to decrease in both size and magnitude. Similar decreases were observed in the intermediate and deep groundwater at the Site. In addition, the area of separation between the Site plume and the bowling alley plume became more pronounced. PCE concentrations in groundwater have decreased over time and appear to reflect dispersion of the plumes since breakdown products have not been detected above trace levels and no increase in downgradient concentrations has been observed. The June 2005 groundwater PCE concentration data were used in developing the remedial design implemented at the Site.

The Site-related eastern plume extends to the north side of 73rd Avenue. The detections of PCE in offsite downgradient wells are only slightly above the NYSDEC Class GA Ambient Water Quality Standard and have generally decreased in concentration. These detections are expected to continue to decline due to the remedial measures being implemented. The remedial measures are designed to reduce the potential for further offsite migration.

The western plume associated with the bowling alley extends offsite to at least the southern side of 73rd Avenue. The remedial measures are designed to address the portion of this plume on the 90-30 Metropolitan Avenue Site only, as per the October 4, 2006 Addendum to the RAWP.

In accordance with the VCA for the Site, the remedial measures described herein are intended to address the existing contamination at the Site, which includes the portion of the adjoining PCE plume that is present on the Site as well as the onsite plume. However, the remediation is not intended to address any off-Site source material.

2.1.2 Summary of Soil Conditions

Previous investigations to identify potentially-impacted soil have been performed at the Site, both inside the Site building and beneath the surrounding property grounds, as described above. Table 2.1.2.1 presents a summary of Site soil data from the RI. A low concentration (55 ug/kg) of PCE was noted in a soil sample from one boring situated within the vicinity of the

TABLE 2.1.2.1
SOIL CHEMICAL ANALYTICAL DATA
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Client ID	WB-A01		WB-A02		WB-A03		WB-A04		WB-A05		WB-A06		WB-AB	WB-A10		WB-A12		WB-AA	WB-A13		WB-A14		WB-A15		WB-A16		WB-A18		NYSDEC Recommended Soil Cleanup Objectives
Sample Depth (feet)	0-2	45-46	10-11	46-47	0-2	43-45	0-2	45-46	3-4	45-46	1-2	46-47	4-5	0-2	44-46	2-3	43-44	2-3	2-3	42-435	4-5	42-43	4-5	43-44	1-2	42-43	1-2	41-42	
Date Sampled	3/25/03		4/4/03		3/27/03		4/3/03		4/3/03		4/4/03		4/4/03	3/28/03		3/26/03		3/26/03	4/1/03		4/4/03		4/3/03		3/28/03		4/2/03		
Volatile Organic Compounds in micrograms per kilogram																													
2-Butanone (MEK)	ND	ND	ND	ND	ND	ND	12	ND	13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	300
Acetone	ND	ND	36	19	ND	95	80	12	94	8 J	9 J	16	20	80	39	ND	170 B	ND	ND	48	18	20	120	ND	10 JB	72 B	27	10 J	200
Benzene	ND	ND	0.9 J	ND	ND	ND	4 J	ND	3 J	ND	1 J	ND	2 J	3 J	ND	ND	ND	ND	3 J	ND	2 J	ND	6 J	ND	ND	ND	12	ND	60
Carbon disulfide	ND	ND	ND	ND	ND	ND	1 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4 J	ND	2,700
Ethylbenzene	ND	ND	ND	ND	ND	ND	0.5 J	ND	ND	ND	ND	ND	ND	0.9 J	ND	ND	ND	ND	ND	ND	ND	ND	1 J	ND	ND	ND	2 J	ND	5,500
Methylene chloride	3 JB	3 JB	3 JB	2 JB	2 JB	2 JB	5 JB	2 JB	3 JB	2 JB	2 JB	2 JB	4 JB	2 JB	2 JB	3 JB	3 JB	2 JB	4 JB	3 JB	2 JB	2 JB	4 JB	2 JB	3 JB	2 JB	4 JB	2 JB	100
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2 J	ND	-
Tetrachloroethene	ND	0.6 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1 J	ND	0.7 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,400
Toluene	ND	ND	ND	ND	ND	ND	3 J	ND	1 J	ND	0.5 J	ND	ND	3 J	ND	ND	ND	ND	2 J	ND	1 J	ND	4 J	ND	ND	ND	10	0.5 J	1,500
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3 J	ND	ND	ND	ND	ND	ND	ND	ND	2 J	ND	ND	ND	4 J	ND	1,200

Client ID	GP-2	GP-3	GP-7	GP-17	GP-20	GP-22	GP-23	NYSDEC Recommended Soil Cleanup Objectives
Sample Depth (feet)	35-36	36-38	9-10	32-36	1-4	34-36	2-4	
Date Sampled	7/22/03	7/25/03	8/6/03	7/25/03	7/29/03	7/31/03	7/31/03	
Volatile Organic Compounds in micrograms per kilogram								
2-Butanone (MEK)	ND	ND	ND	ND	ND	ND	ND	300
Acetone	8 JB	6 JB	27 B	8 JB	ND	ND	18	200
Benzene	ND	ND	2 J	ND	ND	ND	ND	60
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND	2,700
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	5,500
Methylene chloride	ND	ND	5 JB	ND	3 JB	2 JB	3 JB	100
Styrene	ND	ND	ND	ND	ND	ND	ND	-
Tetrachloroethene	ND	ND	55	ND	ND	ND	ND	1,400
Toluene	ND	ND	ND	ND	ND	ND	ND	1,500
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	1,200

Notes:

ND = Not detected
VOCs = Volatile Organic Compounds
NYSDEC = New York State Department of Environmental Conservation
J = Estimated concentration below reporting limit
B = Analyte detected in an associated blank sample
- = Not established

southwest corner of the Site building and trace PCE (0.6 to 1.0 ug/kg) was also noted in three other borings, primarily in proximity to the water table. These concentrations are well below the NYSDEC Recommended Soil Cleanup Objectives (TAGM 4046) and are not indicative of a source. In addition, no significant concentrations of any other VOCs have been identified in any soil samples from the Site and no exceedances of the NYSDEC Objectives have been noted.

Although no source areas have been identified, in the unlikely event that impacted soil is present, the implemented remedial measures have been designed to address potential on-site soil impacts in the areas where the groundwater is being remediated. The remedial measures are not designed or intended to address any off-Site sources that may be present.

2.1.3 Summary of Soil Gas Conditions

Soil gas sampling results prior to the remedial activities indicated that no significant concentrations of PCE are present in the Site subsurface. These results are supported by the shallow SVE pilot test effluent sampling results, which showed a maximum PCE concentration of 140 parts per billion by volume (ppbv) in the effluent from the shallow subsurface. Additional soil gas sampling and indoor air sampling were conducted in conjunction with the remedial measures described herein. These sampling results are discussed in Section 4.4.2. The remedial measures are designed to address potential onsite soil gas impacts.

2.2 SITE HISTORY

The history and use of the Site were researched using Sanborn Fire Insurance Maps, property ownership records, and other publicly-available information. All Sanborn maps available for the Site were reviewed prior to preparation of the RAWP.

2.2.1 Past Uses and Ownership

Up to 1950 the Site was occupied by various buildings associated with the residential estates and farming activities of the Vandeveer family, as shown on Sanborn maps. In the 1930s a paved road, 90th Place, was present between the Site and the adjoining bowling alley to the west.

The existing Site building was constructed in 1951 and was operated as a pharmaceutical distribution warehouse by Foremost-McKesson, Inc. until 1976. Between 1977 and 1988 the property was owned by Heidelberg Eastern, Inc., which manufactured and distributed printing presses and parts. The Site building was used primarily for administration, equipment repair, and warehousing rather than manufacturing. Heidelberg Eastern employees reported that kerosene was the only solvent used at the Site. Kerosene was reportedly used in a cleaning booth in the northeastern portion of the building.

A 7,500-gallon underground storage tank (UST) for #2 fuel oil for heating purposes was registered for the site and was confirmed to be present to the southeast of the building. An empty 550-gallon above-ground storage tank (AST) was also identified in the northeast loading dock area and was reported to be used for storage of waste kerosene or mineral spirits.

In late 1988 the New York City Industrial Development Agency took title to the property, although Heidelberg Eastern continued to operate at the Site. In 1993 Heidelberg Eastern became EAC USA. The Site building became vacant at about that time and remained vacant until 2007 when it was redeveloped for commercial (retail) use. Redevelopment activities began in 2006 and were completed in 2007.

In July 2005, prior to redevelopment, the 7,500-gallon fuel oil UST and the 550-gallon empty AST were removed from the property and properly disposed. The AST was found to be completely empty with no residual sludge, staining, or odors. This empty AST was removed and properly disposed.

The UST was emptied of its contents prior to removal from the ground. The removed UST was inspected, cut open, and cleaned. All wastes, including residual oil, tank bottoms, and cleaning waste, were properly removed and disposed offsite by licensed waste scavengers. The UST was inspected and found to be constructed of heavy-gage steel and was free of holes or significant corrosion. Following inspection, the UST was removed from the site and properly disposed. An affidavit was filed with the NYC Fire Department to document this removal.

The UST excavation was visually examined to evaluate its condition and was screened with a calibrated photoionization detector (PID). No petroleum staining or odors or PID responses were noted in the excavation. Confirmatory samples were collected to document the condition of the remaining soil and were analyzed for NYSDEC STARS Table 2 compounds by a NYSDOH-certified laboratory. The results are summarized in Table 2.2.1.1. No VOCs were detected in any of the samples. Several semivolatile organic compounds (SVOCs) were detected in the west and south sidewalls of the excavation, but only one SVOC was noted to slightly exceed its NYSDEC Objective. This exceedance does not appear to be indicative of a petroleum release as there were no other indications of a potential petroleum release (odors, staining, or PID responses), and the detection was only slightly above its Objective. It appears that this SVOC is associated with the backfill material used during the original UST installation and does not present a concern.

TABLE 2.2.1.1
UST REMOVAL SOIL SAMPLES
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Location	FO-North	FO-South	FO-East	FO-West	FO-Bottom North	FO-Bottom South	NYSDEC Recommended Soil Cleanup Objectives*
Sampling Depth (feet below grade)	**9**	**9**	**9**	**9**	**15**	**15**	
PID Response (ppm)	**0**	**0**	**0**	**0**	**0**	**0**	
Sample Date	**7/13/05**	**7/13/05**	**7/13/05**	**7/13/05**	**7/13/05**	**7/13/05**	
STARS List Volatile Organic Compounds in micrograms per kilogram	ND	ND	ND	ND	ND	ND	-
STARS List Semivolatile Organic Compounds in micrograms per kilogram							
Benzo(a)anthracene	ND	70	ND	ND	ND	ND	224
Benzo(a)pyrene	ND	**65**	ND	ND	ND	ND	61
Benzo(b)fluoranthene	ND	52	ND	ND	ND	ND	224
Benzo(k)fluoranthene	ND	100	ND	ND	ND	ND	1,100
Chrysene	ND	68	ND	53	ND	ND	400
Fluoranthene	ND	100	ND	74	ND	ND	50,000
Phenanthrene	ND	73	ND	ND	ND	ND	50,000
Pyrene	ND	98	ND	56	ND	ND	50,000
Total SVOCs	ND	626	ND	183	ND	ND	500,000

Notes:

Only detected compounds are reported. See laboratory report for complete analytical data.

NYSDEC = New York State Department of Environmental Conservation

ND = Not detected

Bold shaded values exceed the NYSDEC Recommended Soil Cleanup Objectives.

* = NYSDEC Technical and Administrative Guidance Memorandum #HWR-94-4046: Determination of Soil Cleanup Objectives and Cleanup levels (January 1994) and NYSDEC December 10, 2000 Memorandum directing the use of Soil Cleanup Objective in TAGM 4046.

2.3 GEOLOGICAL CONDITIONS

Geologic conditions beneath the site have been evaluated from published literature and from onsite soil borings. The site is underlain by Precambrian crystalline bedrock at an estimated depth of over 400 feet below grade. The bedrock is overlain, in turn, by the Cretaceous Raritan Formation (unconsolidated sands and clays), the Cretaceous Magothy Formation (unconsolidated sands and clays), the Pleistocene Jameco Gravel, and the Pleistocene Gardiner's Clay. The surface of the Gardiner's Clay is approximately 130 to 150 feet below grade in the site area. The more recent deposits at the site consist primarily of glacial moraine materials, including gravel, sand, and silt with some boulders and clay. The glacial moraine deposits form part of the Upper Glacial Aquifer. The deeper Raritan, Magothy, and Jameco deposits also contain aquifers.

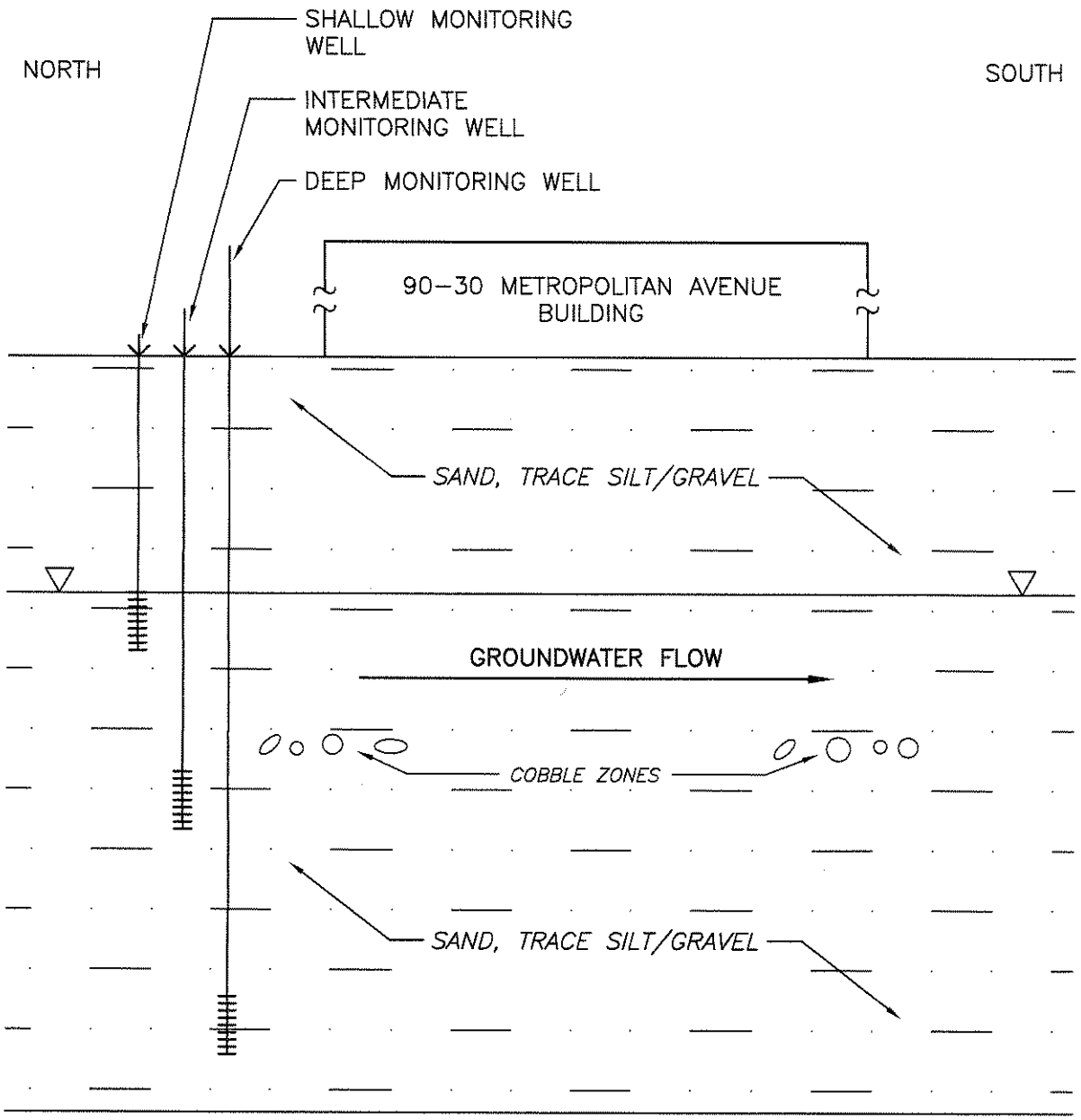
Onsite soil borings have been conducted to up to approximately 150 feet below grade and have encountered medium to fine-grained sand and silt, with some gravel and trace clays to at least 150 feet below grade. The primary lithology in the unsaturated zone is sand with trace silt, trace silt and clay, and/or fine gravel. The gravel component ranges from less than 5% to up to approximately 50%. A cobble zone was identified from approximately 65 to 70 feet. No clays, silts or other lithologies with the potential to significantly impact air flow were noted in the unsaturated zone. In a few cases, silty sand was noted in the interval from approximately 7 to 11 feet below grade. A dense clay of low plasticity was recorded in some borings at depths around 130 to 150 feet and is thought to be the top of the Gardiner's Clay. Remediation is conducted above this clay layer. Soil development was found to be minimal beneath the site and no fill material has been identified. A geologic cross-section depicting the site stratigraphy is shown in Figure 2.3.1.

Groundwater is present in the Upper Glacial moraine deposits at a depth of approximately 45 feet below grade and generally flows to the south-southeast. A groundwater flow map is shown in Figure 2.3.2. Groundwater quality has been evaluated for the shallow (0 to 10 feet below the water table), intermediate (30 to 40 feet below the water table) and deep (65 to 80 feet below the water table) intervals in the Upper Glacial Aquifer, as discussed below.

2.4 CONTAMINATION CONDITIONS

2.4.1 Conceptual Model of Site Contamination

Two separate plumes of PCE-impacted groundwater are present in the shallow, intermediate, and deep groundwater beneath the Site. The western-most plume extends from beneath the adjacent bowling alley property into the parking area located in the southwestern portion of the Site. The eastern-most plume is present beneath and to the south of the southern

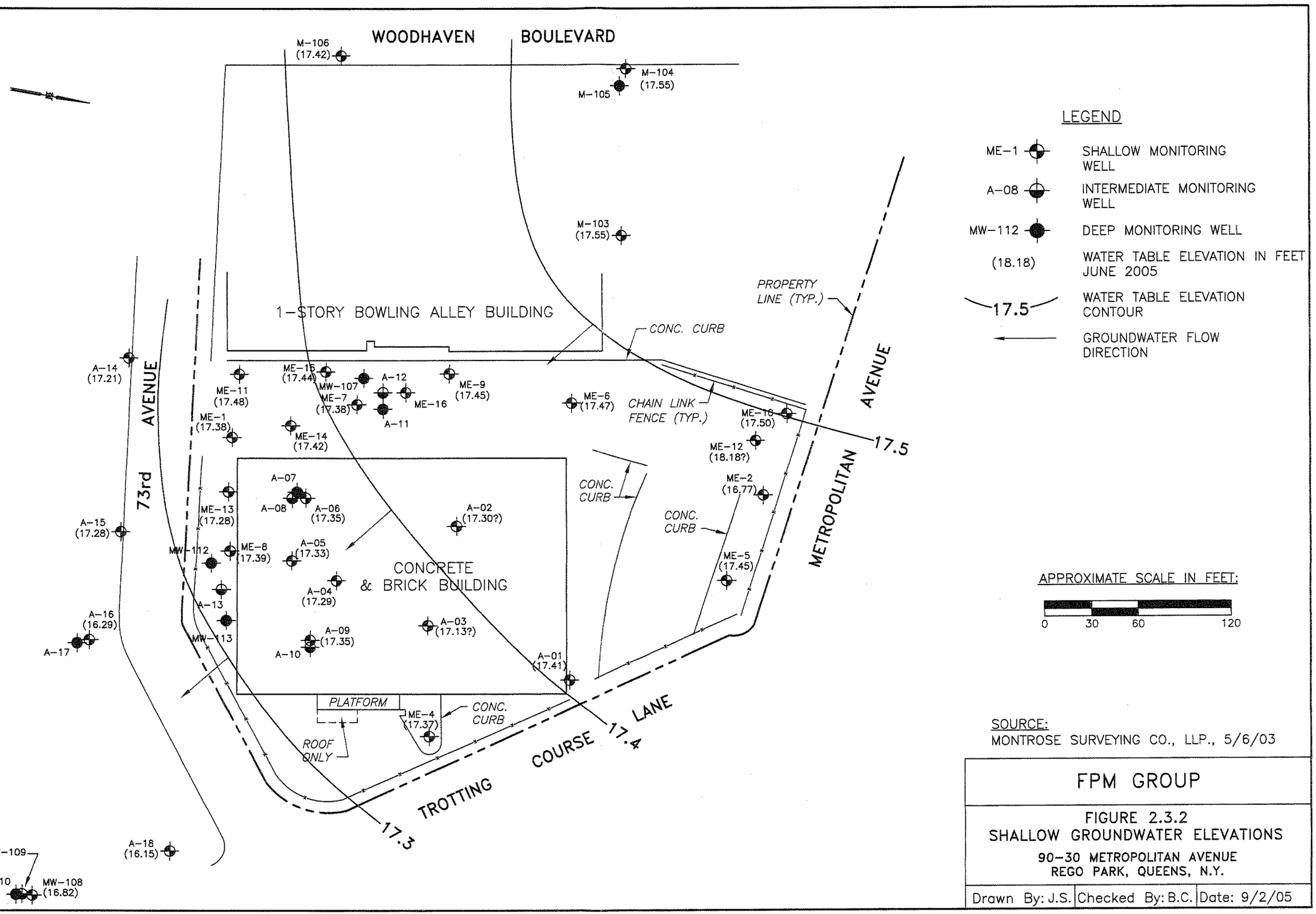


APPROXIMATE VERTICAL SCALE: 1"=30'

FPM GROUP

FIGURE 2.3.1
SUBSURFACE CROSS-SECTION
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: J.S.	Checked By: S.D.	Date: 11/28/07



LEGEND

ME-1	SHALLOW MONITORING WELL
A-08	INTERMEDIATE MONITORING WELL
MW-112	DEEP MONITORING WELL
(18.18)	WATER TABLE ELEVATION IN FEET JUNE 2005
17.5	WATER TABLE ELEVATION CONTOUR
	GROUNDWATER FLOW DIRECTION

APPROXIMATE SCALE IN FEET:

0 30 60 120

SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 2.3.2
SHALLOW GROUNDWATER ELEVATIONS
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: J.S. | Checked By: B.C. | Date: 9/2/05

portion of the Site building. This plume appears to be commingling with the western plume and is generally contained onsite.

No significant concentrations of VOCs have been identified in any soil samples from the Site and no exceedances of the NYSDEC Recommended Soil Cleanup Objectives (TAGM 4046) have been noted. Therefore, no source soil has been identified. This is consistent with the absence of any identified PCE or other chlorinated solvent use at this site.

2.4.2 Description of Areas of Concern

No source areas, or Areas of Concern (AOCs), have been identified at the site, based on historic site information and numerous soil borings. The contamination present on the site includes dissolved PCE in groundwater and potential soil vapor impacts associated with the groundwater.

2.4.3 Identification of Standards, Criteria and Guidance

Applicable standards, criteria, and guidance (SCGs) are as follows:

- NYSDEC TAGM 4046 Recommended Soil Cleanup Objectives (Objectives) for soil;
- NYSDEC Class GA Ambient Water Quality Standards and Guidance Values (Standards) for groundwater; and
- Matrix 1 and Matrix 2 values provided in Guidance for Evaluation of Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006) for sub-slab soil vapor and indoor air.

2.4.4 Soil Contamination

2.4.4.1 Description of Soil Contamination

Soil sampling performed during several investigations of the Site has not identified any contamination in excess of the SCGs. A low concentration (55 ug/kg) of PCE was noted in a soil sample from one boring situated within the vicinity of the southwest corner of the Site building and trace PCE (0.6 to 1.0 ug/kg) was also noted in three other borings, primarily in proximity to the water table. These concentrations are well below the NYSDEC Recommended Soil Cleanup Objectives (TAGM 4046) and are not indicative of a source. Previously-presented Table 2.1.2.1 compares the soil data from the RI to the NYSDEC Objectives; no exceedances of the Objectives were noted.

2.4.5 On-Site and Off-Site Groundwater Contamination

2.4.5.1 Description of Groundwater Contamination

Two separate plumes of PCE-impacted groundwater are present in the shallow, intermediate, and deep groundwater beneath the Site. The western-most plume extends from beneath the adjacent bowling alley property into the parking area located in the southwestern portion of the Site. The eastern-most plume is present beneath and to the south of the southern portion of the Site building. This plume appears to be commingling with the western plume and is generally contained onsite.

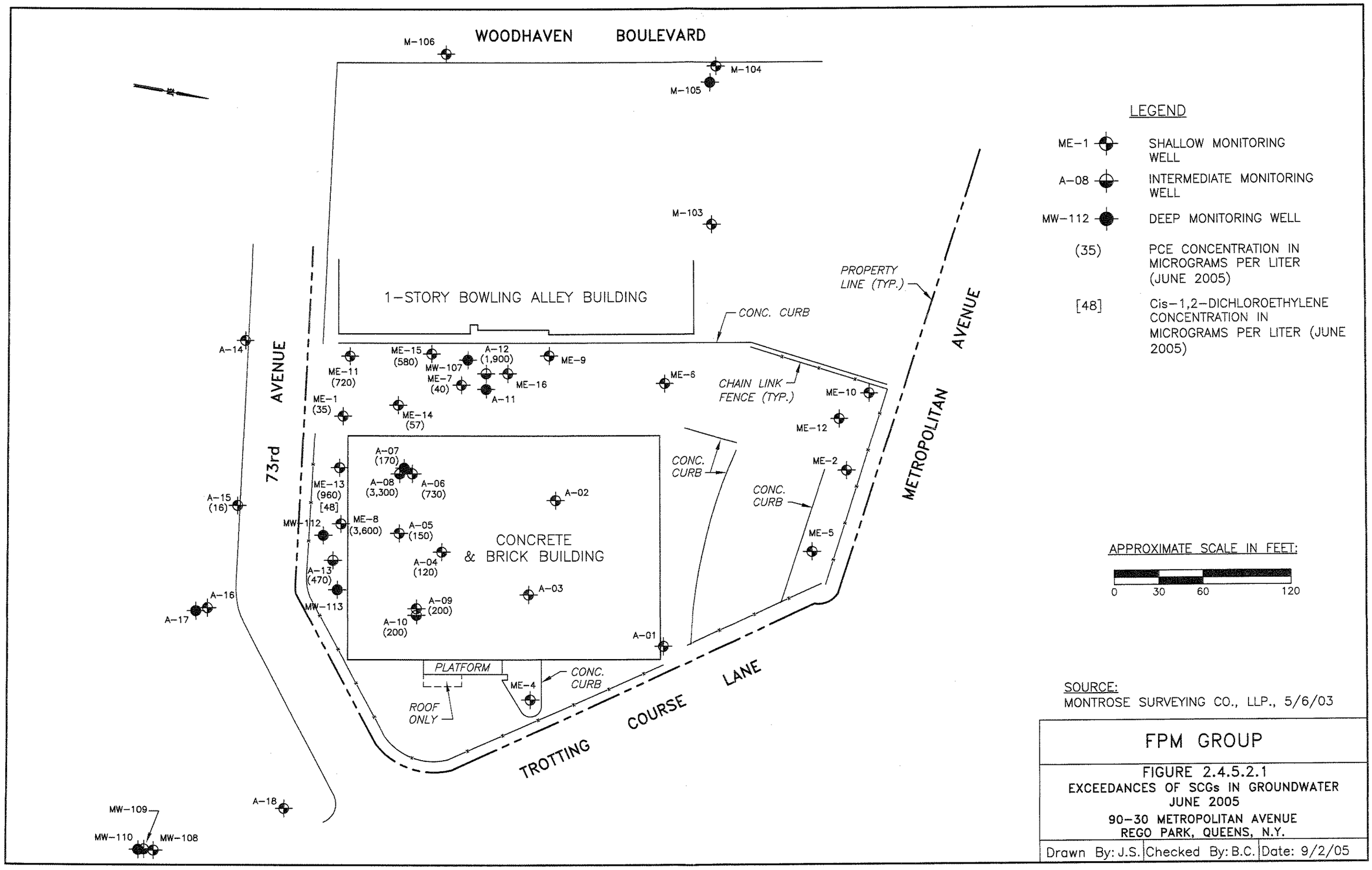
PCE concentrations in the shallow groundwater in June 2005 ranged from non-detect to 3,600 ug/l, as shown on previously-presented Table 2.1.1.1. Cis-1,2-DCE was also detected in one sample at an estimated concentration of 48 ug/l. Intermediate-depth groundwater contained PCE at concentrations of 200 to 3,300 ug/l, as shown in previously-presented Table 2.1.1.2. Deep-interval wells contained PCE at concentrations ranging from non-detect to 170 ug/l, as shown in previously-presented Table 2.1.1.3. Other then the one detection of cis-1,2-DCE, no chlorinated solvent VOCs other than PCE were detected in the shallow, intermediate, or deep groundwater.

These data were compared to the most recent previous sampling results from these wells and generally indicated continuing significant decreases in VOC concentrations at nearly all of the onsite and offsite wells. Decreases in PCE were observed at all of the offsite downgradient wells. Groundwater data continued to indicate the presence of two slightly overlapping plumes of PCE: one associated with the southern portion of the Site and one associated with adjoining bowling alley to the west.

The Site-related eastern plume extends to the north side of 73rd Street. The detections of PCE in offsite downgradient wells are only slightly above the NYSDEC Class GA Standard and have generally decreased in concentration.

2.4.5.2 Comparison of Groundwater with SCGs

Exceedances of the NYSDEC Standards (SCGs) in monitoring wells prior to the remedy are shown in previously-presented Tables 2.1.1.1 through 2.1.1.3. A map that indicates the location and summarizes exceedances of the NYSDEC Standards prior to the remedy is shown in Figure 2.4.5.2.1.



LEGEND

ME-1	SHALLOW MONITORING WELL
A-08	INTERMEDIATE MONITORING WELL
MW-112	DEEP MONITORING WELL
(35)	PCE CONCENTRATION IN MICROGRAMS PER LITER (JUNE 2005)
[48]	Cis-1,2-DICHLOROETHYLENE CONCENTRATION IN MICROGRAMS PER LITER (JUNE 2005)

APPROXIMATE SCALE IN FEET:

0 30 60 120

SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 2.4.5.2.1
EXCEEDANCES OF SCGs IN GROUNDWATER
JUNE 2005
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: J.S. | Checked By: B.C. | Date: 9/2/05

2.4.6 Soil Vapor Contamination

2.4.6.1 Description of Soil Vapor Contamination

Soil vapor conditions prior to remediation were indicated by the shallow SVE pilot test effluent sampling results, which showed a maximum PCE concentration of 140 ppbv in the effluent from the shallow subsurface. Additional soil gas sampling and indoor air sampling were conducted in conjunction with the remedial measures described herein. These sampling results are discussed in Section 4.4.2.

2.4.6.2 Comparison of Soil Vapor with SCGs

The most recent soil vapor data collected prior to initiating remedial activities are not sub-slab or indoor air data and, therefore, cannot be compared to the SCGs. Soil gas and indoor air sampling conducted during remedial activities is discussed in Section 4.4.2.

2.5 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.5.1 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment was performed and documented in the RAWP. This exposure assessment was performed using the existing Site data and following guidance from the New York State Department of Health (NYSDOH). The exposure assessment was performed by characterizing the exposure setting, identifying potential exposure pathways, and performing a qualitative evaluation of potential receptor exposure.

The onsite and offsite conditions were characterized using the existing chemical analytical data for the environmental media (soil, groundwater and soil vapor). Potential exposure pathways were then evaluated to assess if there is a potential for human health exposure to Site contaminants.

The Site has been redeveloped for commercial purposes. The reasonably foreseeable uses of the Site are for commercial purposes only, based on the Site zoning (M1-1, light manufacturing, which includes retail uses). No future residential use is reasonably foreseeable. Therefore, the exposure assessment was based on the planned and reasonably-foreseeable commercial use of the property.

Groundwater

Exposure to Site groundwater is not anticipated to occur during any reasonably-foreseeable onsite activity, with the exception of well installation and monitoring activities, due to the depth to groundwater (40 to 45 feet below grade). Well installation and sampling activities will be performed using a site-specific Health and Safety Plan (HASP) that addresses

these potential exposure concerns. No public exposure to onsite groundwater is anticipated and, therefore, this potential exposure route was not further considered.

To assess the potential for exposure to offsite impacted groundwater, the physical extent of offsite impacted groundwater was evaluated using the most recent available groundwater monitoring data, as presented in the RAWP. These data indicated that the Site-related PCE plume extended to the north side of 73rd Street and that detections of PCE in offsite downgradient wells were only slightly above the NYSDEC Standard. These concentrations were declining and further declines were expected once the proposed remedial measures were implemented. Therefore, the potential for exposure to offsite impacted groundwater was very limited.

Furthermore, the NYSDEC databases of public water supply wells and other types of wells (irrigation, non-contact cooling water, etc.) were accessed and reviewed during the Preliminary Site Assessment (PSA) for the Site to evaluate if any of these types of wells (potential receptors) were located within one-half mile of the Site (IT Engineering, January 2002, Final Field Record Report of Preliminary Site Assessment). The results of this review indicated that thirteen of the fourteen public or non-public supply wells identified within one-half mile of the Site were confirmed to be no longer active and, therefore, not considered potential receptors.

One well, located at the Metro Car Wash across Trotting Course Lane to the east (crossgradient) of the Site, was reported to be active at the time of the survey. The Metro Car Wash well provided water for non-potable car washing purposes and was completed at a depth of 84 feet, which is the equivalent of the intermediate-depth plume at the Site. This property has since been redeveloped with a new car washing facility. The New York City Department of Environmental Protection (NYCDEP) was contacted in March 2009 and the car wash facility was confirmed to have a public water connection. The NYSDEC was contacted in February 2009 and well information, including pumpage information, was requested. The NYSDEC responded with a copy of the well log and reported that no additional information was available. The New York City Department of Buildings (DOB) was contacted in April 2009 and the building plans associated with the recent redevelopment of the car wash facility were reviewed. These plans, which included plumbing and electrical plans, did not show an onsite water supply well or associated equipment. The only water supply connection shown on the plans was associated with the municipal water service. Therefore, the car wash is using municipal water and the well is not in service. Therefore, there were no identified offsite groundwater receptors for this Site.

Soil

Trace concentrations of VOCs are present in limited portions of the Site soil. However, all of the detected concentrations were below the NYSDEC Objectives, as described in the RI Report (AKRF, Inc., April 2004) and, therefore, do not present a concern. In addition, organic vapor monitoring performed during recent well installation activities did not suggest the potential presence of impacted soil. Therefore, no contamination has been identified for the Site soil.

Since the Site is a NYSDEC VCP site, any investigation or remediation activities will be conducted using a HASP, which includes provisions for monitoring and/or personal protective equipment (PPE) for workers who may contact Site soil. Therefore, in the unlikely event that impacted soil is encountered, it is unlikely that unacceptable exposure to Site soil will occur during investigation or remediation activities. Investigation and remedial activities that may result in contact with Site soil have been and will continue to be monitored for organic vapors and/or visible indications of potential soil contamination.

Soil Vapor and Indoor Air

Exposure to soil vapors may occur during invasive Site activities or via indoor air if soil vapor intrusion occurs into the Site building. Intrusive investigation and remedial activities are performed using a site-specific HASP that includes organic vapor monitoring. Therefore, if organic vapors are identified at significant concentrations, PPE can be used to protect investigation and remediation workers. Organic vapor monitoring performed during recent intrusive activities did not identify the presence of organic vapors in any of the areas where work was performed. Monitoring information from historic intrusive activities also did not indicate the potential presence of organic vapors. Therefore, it is not anticipated that this exposure will occur.

Exposure to soil vapors may also occur if soil vapors migrate into buildings. To assess the potential for soil vapor intrusion, soil vapor sampling was previously performed at the Site on several occasions, both within the building and beneath the property grounds. The investigation results have been variable. Shallow SVE pilot test effluent sampling results showed limited PCE concentrations in the effluent. Sub-slab soil vapor and indoor air sampling have been conducted during the remedial activities and are documented in Section 4.4.2 below. The results from the remedial sampling show some impacts below the building and no impacts to indoor air. Operation of the SVE system is anticipated to reduce the impacts below the building.

2.6 REMEDIAL ACTION OBJECTIVES

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

2.6.1 Groundwater RAOs

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore the groundwater aquifer, to the extent practicable, to ambient conditions. This RAO will be achieved by eliminating or reducing to the extent practicable, VOC contamination in onsite groundwater.
- Eliminate or reduce, to the extent practicable, offsite migration of contaminants in groundwater.
- Eliminate, or reduce to the extent practicable, onsite groundwater impacts from an offsite source (adjoining bowling alley property). It is noted that the remediation system is not designed or intended to address this offsite source and, therefore, this RAO may be achievable only on a short-term basis unless this offsite source is eliminated.

2.6.2 Soil RAOs

Impacted soil has not been identified at the Site and, therefore, specific remedial measures to directly address impacted soil are not included in the remedial program. However, the following RAOs are applicable in the unlikely event that VOC-impacted soil is present.

RAOs for Public Health Protection

- Prevent inhalation of, or exposure to, contaminants volatilizing from soil.

RAOs for Environmental Protection

- Prevent migration of VOC contaminants that would result in groundwater contamination, to the extent practicable.

- Reduce or eliminate VOC contamination, to the extent practicable, that would result in groundwater and/or soil vapor contamination.

2.6.3 Soil Vapor RAOs

RAOs for Public Health Protection

- Prevent soil vapor intrusion into the building.
- Prevent inhalation of VOCs associated with onsite groundwater.

3.0 DESCRIPTION OF APPROVED REMEDIAL ACTION WORK PLAN

The Site was remediated in accordance with the scope of work presented in the NYSDEC-approved Remedial Action Work Plan dated November 2005, the May 3, 2006 Addendum to the Remedial Action Work Plan, the June 8, 2006 Second Addendum to the Remedial Action Work Plan, the June 6, 2006 Stipulation List, and the October 4, 2006 Third Addendum to the Remedial Action Work Plan.

The factors considered during the analysis of remedial alternatives included:

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

Remedial Action SCGs that apply to this project are as follows:

- New York State Groundwater Quality Standards – 6 NYCRR Part 703 – applies to groundwater and surface water;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1 – applies to groundwater and surface water;
- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation - December 2002 – applies to investigation and remediation activities at the site;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan – applies to investigation and remediation activities at the site;
- NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York – October 2006 – applies to investigation and remediation of soil vapor and indoor air;

- NYS Waste Transporter Permits – 6 NYCRR Part 364 – applies to waste transportation activities associated with the site;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364 – applies to waste disposal activities associated with the site.

3.1 SUMMARY OF REMEDIAL ACTION

This section contains a description of the Remedial Actions required by the NYSDEC-approved Remedial Action Work Plan. In general, the remedial actions include installation of a soil vapor extraction (SVE) and air sparge (AS) remediation system. Monitoring of the remediation system and groundwater monitoring were not included in the RAWP but will be performed under an Operation, Maintenance and Monitoring (OM&M) Plan included in this FER. Specific remedial elements are listed as follows:

1. Installation of an AS/SVE remediation system;
2. Perform short-term monitoring of the AS/SVE system during startup and initial operation. This monitoring includes effluent sampling, pressure and flow checks, and other typical system operations;
3. Publication of an Operation, Maintenance and Monitoring Plan for long term management of contamination, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, operation and maintenance of the remediation system, and (3) reporting of the results;
4. Collection and analysis of sub-slab soil vapor and indoor air samples to evaluate the potential for soil vapor intrusion;
5. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
6. Appropriate off-Site disposal of all soil removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
7. Preparation of this FER to document the remedial activities; and
8. All responsibilities associated with the Remedial Action, including permitting requirements and monitoring requirements, addressed in accordance with all applicable Federal, State and local rules and regulations.

The remedial activities are described more fully in the following sections.

4.0 DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RAWP for 90-30 Metropolitan Avenue (November 2005), the May 3, 2006 Addendum to the Remedial Action Work Plan, the June 8, 2006 Second Addendum to the Remedial Action Work Plan, the June 6, 2006 Stipulation List, and the October 4, 2006 Third Addendum to the Remedial Action Work Plan. The approved RAWP and associated documents are included on a CD in Appendix A. All deviations from the RAWP and associated documents are noted below.

4.1 GOVERNING DOCUMENTS

Governing documents and procedures included in the RAWP and associated documents include a site-specific health and safety plan (HASP), a Community Air Monitoring Plan (CAMP) within the HASP, and analytical quality assurance/quality control (QA/QC) procedures. Highlights of these documents and procedures are included in the following sections.

4.1.1 Site-Specific Health and Safety Plan (HASP)

A Site-specific HASP was utilized at the Site during intrusive activities for the protection of worker health and safety. The HASP was prepared in accordance with OSHA Hazardous Waste Operations Standards (29 CFR 1910.120) and applicable general Construction Standards (29 CFR 1926) and was designed to be applicable to locations where installation of the AS/SVE system, and sampling of indoor air and sub-slab soil vapor were performed at the Site by all parties that either performed or witnessed the activities on Site.

The HASP included details of the Site safety procedures, Site background information, and safety monitoring. Contractors were required to adopt the HASP in full or to follow an FPM-approved HASP.

All remedial work performed under this Remedial Action was in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA. The HASP was complied with for all remedial and invasive work performed at the Site. The Site Safety Coordinator was Mr. Ben Cancemi. A resume is included in Appendix B.

4.1.2 Quality Assurance Project Plan (QAPP)

This plan governed sampling and analytical methods for soil vapor and indoor air sampling, and effluent sampling associated with the operation of the SVE system. QA/QC procedures were detailed in the RAWP and governed sampling and analytical methods for soil vapor, indoor air, and effluent sampling. These procedures included sampling and

decontamination methods, sample management procedures, field screening procedures, QA/QC samples, and laboratory analytical methods and deliverables.

4.1.3 Community Air Monitoring Plan (CAMP)

The CAMP, which was included within the HASP, included procedures to address potential community health and safety issues associated with investigation and remedial activities at the Site. The CAMP included air monitoring procedures for particulates (dust) and organic vapors during invasive activities, and noise monitoring procedures. A Vapor Emission Response Plan was included with the air monitoring procedures. Mitigation procedures were also included to control adverse dust, organic vapor, and noise conditions.

4.1.4 Contractor's Site Operations and Quality Assurance Procedures

Procedures for contractor's site operations during the performance of the remedy and procedures to assure the quality of the remedial work were implemented during this project. The contractor's site operation procedures included equipment management procedures, dust management procedures, hours of operation, and other procedures necessary to ensure the safe and proper remedial construction.

The contractor's quality assurance procedures included observation and testing activities by the contractor and the Remediation Engineer's staff to monitor construction quality and confirm that the remedy construction was in conformance with the RAWP. These quality assurance procedures included:

- Identification of the organizations and personnel involved in the remedial activities and confirmation of their responsibilities and authorities. This procedure occurred prior to the initiation of remedial activities and was updated as necessary when there was an organizational or staff change;
- Observation and monitoring of the construction of the remedial system by the Remediation Engineer's representatives during invasive and intensive remedial activities;
- Testing of the remediation system components by the contractor's and the Remediation Engineer's representatives to confirm the quality of the remedial construction. Testing included pressure testing of piping to confirm continuity and integrity, testing of electrical circuits and remediation system components, evaluation of the hydraulic connection of the remediation system wells, and other testing as necessary to confirm the proper construction of the system;

- Project coordination meetings were held as needed between representatives of the Applicant, the Remediation Engineer's representatives, the remedial construction contractor, and other onsite parties. These meetings were used to update all of the involved parties on construction progress and issues, testing results and any corrective measures, project schedule, and other issues necessary for successful completion of the remedy;
- Contractor's quality assurance activities were documented internally. Activities were also documented as needed in the project log of the Remediation Engineer's onsite representative. Remedial activities and monitoring were also reported to the NYSDEC, NYSDOH and Applicant on a weekly basis via emailed daily monitoring reports. Corrective measures identified by the Remediation Engineer's representatives or other involved parties were documented as they occurred and were promptly relayed to project members as needed; and
- Final documentation, including test results, as-built drawings, and other documents pertaining to remedial construction activities, were transmitted to the Remediation Engineer. These documents were reviewed and used in the preparation of this FER and will be retained by the Remediation Engineer in their Ronkonkoma, New York office for at least seven years beyond the duration of their contract with the Applicant.

The Remediation Engineer was responsible for all contractor plans and submittals for this remedial project (i.e. those listed above plus contractor and sub-contractor document submittals) and confirmed that they were in compliance with the RAWP. The Remediation Engineer ensured that all documents submitted for this remedial project after the RAWP and associated documents were approved, including contractor and sub-contractor document submittals, were in compliance with the RAWP and associated documents. All required remedial documents were submitted to NYSDEC and NYSDOH in a timely manner.

4.1.5 Community Participation

Community participation activities were undertaken prior to approval of the RAWP. These activities included:

- Establishing document repositories at the North Forest Public Library, the NYSDEC Region 2 office, and the Queens Community Board 6 office;
- Providing copies of project documents to each of the document repositories;

- Issuing a Notice of Availability of the RAWP in the Environmental Notice Bulletin and to the local municipality; and
- Issuance of a Fact Sheet.

A copy of the Fact Sheet and letters transmitting the project documents to the repositories are included in Appendix D.

4.2 REMEDIAL PROGRAM ELEMENTS

4.2.1 Involved Parties

The remedial work was performed by the following entities:

- The Remedial Engineers were Kevin J. Phillips, P.E., PhD and Kevin Loyst, P.E. of FPM Group, Ltd. (FPM). Project staff included Stephanie O. Davis, CPG, and Ben Cancemi, CPG. Resumes for project staff are included in Appendix B.
- The remediation system construction contractor was EnviroTrac, Ltd.

4.2.2 Project Costs

Project costs are summarized in Appendix C.

4.2.3 Site Preparation

Pre-construction meetings were held between the Remedial Engineer representatives, the Construction Contractor, and the Site Owner to coordinate activities and review Site concerns and requirements. A pre-defined grid was not established as the remedial work did not include soil removal.

A complete list of agency approvals as required by the RAWP is included in Appendix D. This list includes only development permits; no permits were required for remediation. This list includes information regarding the nature of the permit, and the originating agency.

The Site is zoned M1-1. The Site use is commercial, which is in conformance with the current zoning for the Site.

Prior to well and piping installation an onsite utility markout was conducted to identify and mark subsurface obstructions that may be present. A pre-construction meeting was held with representatives of the Volunteer, Remedial Engineer and remediation system construction contractor. The scope of work, site concerns and safety issues were reviewed at this meeting.

As the remedial system construction was conducted during onsite redevelopment activities, coordination also occurred between the Remedial Engineer representatives, the

remediation system construction contractor, and redevelopment contractors, including the parking lot pavement company, utility contractors, and the site general contractor. This coordination included discussions regarding environmental conditions at the site, environmental monitoring to be conducted by the Remedial Engineer representatives during invasive activities, soil characterization and disposal requirements, and the timing of redevelopment and remediation construction activities. This coordination continued throughout the remedial construction and the site redevelopment processes.

4.2.4 General Site Controls

Field screening for organic vapors and other indications of potential contamination was performed during all invasive remedial work and redevelopment work that penetrated Site soil. Field screening was performed using visual and olfactory indications and also using a calibrated photoionization detector (PID). Field screening was performed by qualified environmental professionals. The results of field screening are described below.

Dust suppression measures were not found to be necessary as Site conditions were not conducive to dust generation and dust monitoring results did not indicate a need for dust suppression. Invasive work generally involved excavation of utility trenches and drilling of wells. No soil removal was required or performed for remedial purposes. However, some removal of excess soil was required during redevelopment, as described in Section 4.5. The Site access points on Trotting Course Lane and 73rd Avenue were kept clean of debris and were promptly cleaned, as needed. Trucks containing soil for disposal were covered with a tarp and secured before exiting the Site.

Odors did not present a significant concern for the Site. No odors were noted and no complaints were received.

Noise generally did not present a significant concern at the Site. Work was generally conducted during normal work hours Monday through Friday and the area surrounding the site is commercial and includes major roadways. Remedial construction hours conformed to NYC Department of Building codes. Evening and/or weekend work was conducted only in emergency or unusually urgent circumstances. Work conformed to NYCDEP noise control standards.

4.2.5 HASP and CAMP Results

Monitoring for organic vapors, particulates (dust) and noise was performed during intrusive site activities to ensure that site activities were in compliance with the HASP and were not affecting the surrounding community in accordance with the CAMP. Monitoring was conducted routinely at locations around the Site, including upwind locations, downwind locations, the Site perimeter and the active work area. In accordance with the HASP and CAMP,

the upwind responses were utilized to evaluate background conditions present in the surrounding community and were compared with the work area and downwind conditions to evaluate whether corrective actions were necessary.

Monitoring for organic vapors was conducted utilizing a calibrated Photovac Model 2020 PID with a 10.6 eV bulb. No organic vapors were noted within or outside of the work zone at any time during remedial or redevelopment activities. No soil exhibiting staining, odors, or other indications of potential contamination was encountered at any time.

Monitoring for particulates (dust) was conducted utilizing a calibrated Thermo Model pDR-1000 aerosol monitor on a 15-minute weighted average basis. In general, dust levels remained at or near background conditions. Dust suppression measures were not indicated by the monitoring results or visual observations.

Noise monitoring was conducted using a hand-held Realistic sound meter set to detect A-weighted levels with a slow response factor. Background noise levels were found to be significantly influenced by traffic on Metropolitan Avenue. No significant responses above background levels were noted during remedial activities.

4.2.6 Reporting

Site activities and monitoring results were monitored during intrusive activities and were reported electronically to the NYSDEC and NYSDOH on a weekly basis via monitoring reports. Following the completion of remedial construction activities and the startup of the remediation system monitoring reports have been submitted on a monthly basis to the NYSDEC and NYSDOH. Copies of all of the monitoring reports are included on a CD in Appendix E.

The digital photo log required by the RAWP is included in Appendix E.

4.3 REMEDIATION SYSTEM INSTALLATION

An AS/SVE system was installed in accordance with the RAWP. The AS/SVE system is designed to remediate PCE-impacted groundwater along the southern and southwestern portions of the Site and to address potential soil vapor intrusion issues. The SVE portion of the system will also address any PCE-impacted soil that may be present in the system area. The VOC of concern in the groundwater is PCE, which is volatile and amenable to remediation by AS/SVE. System design and installation documents are provided in Appendix E.

The AS portion of the system is used to treat the PCE-impacted groundwater by volatilization processes. Air is injected below the water table at three different levels within the groundwater plume and the VOCs present in the groundwater will partition from the groundwater into the rising air bubbles and be carried upward to the vadose zone. The SVE

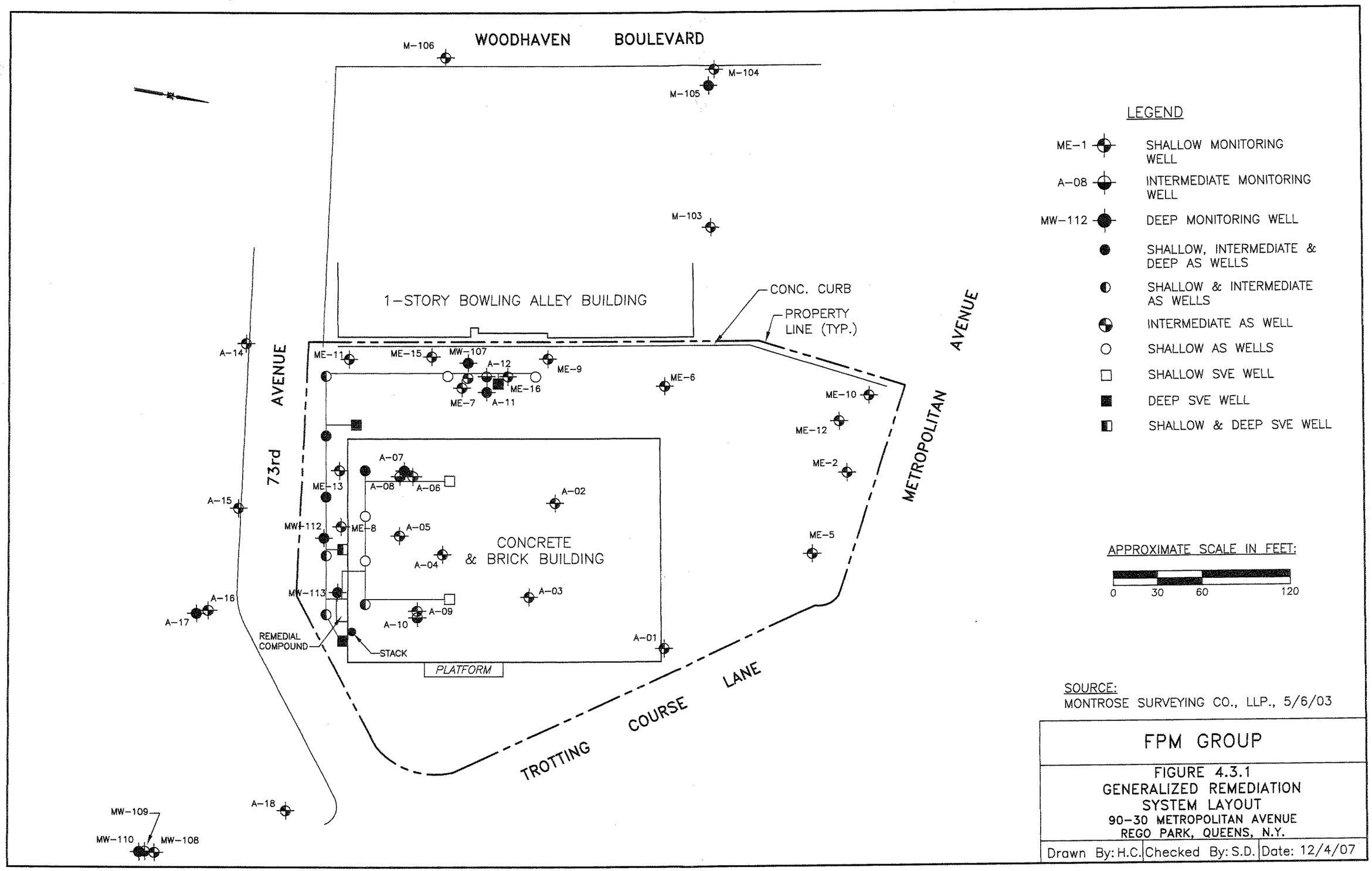
portion of the system is used to capture and remove soil vapors from the vadose zone. In addition, SVE will address subsurface soil gas that may be present. SVE is used to withdraw subsurface air from the open pores in the vadose zone soil. As the air passes through the soil, the vapors migrating from the groundwater to the vadose zone are captured and removed from the subsurface. In addition, a localized vacuum is created in the vicinity of the SVE wells, which captures potential soil vapors beneath the Site building. The general locations of the AS/SVE system wells and remedial system layout are shown on Figure 4.3.1. The generalized equipment setup is shown in Figure 4.3.2. A detailed site plan showing the remedial wells is included in Appendix E.

4.3.1 Remediation System Wells and Piping

Twenty-four AS wells were installed and are positioned to treat the area of PCE-impacted groundwater beneath the southern end of the Site building and along the Site's southern and western boundaries. The AS wells are screened at various depths to treat the plume which extends from the water table, (approximately 50 feet below grade) to approximately 70 feet below the water table. The AS wells are constructed of one or one and a half-inch-diameter Schedule 40 PVC casing and 0.02-inch slotted screen. The screened interval for the shallow, intermediate, and deep AS wells extends from approximately 10 to 12, 43 to 45, and 68 to 70 feet below the water table, respectively. The well annuli were backfilled with Morie #2 well gravel to approximately two feet above the top of each screen and the balance of the annuli were backfilled with bentonite grout to grade. The tops of the wells were protected with traffic-rated manholes. Table 4.3.1.1 shows the AS wells and their completion depths.

Seven SVE wells were installed; three of these wells were installed at shallow depths to address potential vapor intrusion issues and four wells were installed at deeper depths to capture vapors migrating from the water table. The shallow-depth SVE wells are screened 15 to 20 feet below grade. The deep SVE wells are screened from 25 to 45 feet below grade. Table 4.3.1.2 shows the SVE wells and their completion depths.

Each SVE well annulus was gravel-packed to approximately two feet above the top of the screen, a two-foot bentonite seal was then placed and the balance of the annulus was filled to just below grade with drill cuttings to allow for connection to the SVE system. The tops of the wells were protected with traffic-rated manholes. The AS and SVE wells were installed between October 2006 and June 2007. Cuttings from the well installation were screened visually and with a PID. No indications of potential contamination were noted. Some of the cuttings were reused as backfill for the installed wells and the remainder was used as fill onsite. Following well installation, the sub-grade piping was installed. The soil removed from the piping trenches was screened visually and with a PID; no indications of potential contamination were noted.

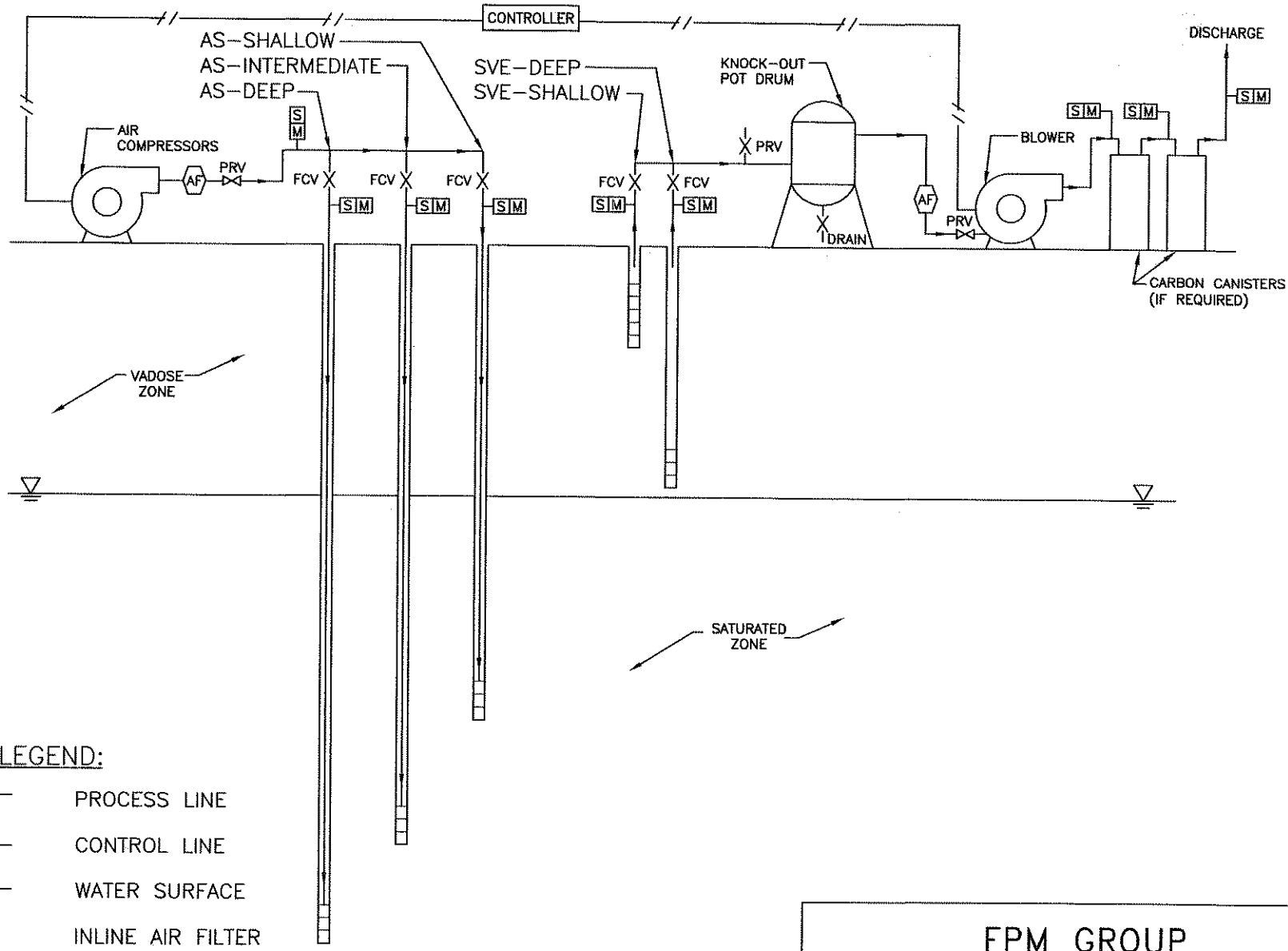


SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 4.3.1
GENERALIZED REMEDIATION SYSTEM LAYOUT
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: H.C.	Checked By: S.D.	Date: 12/4/07



LEGEND:

- PROCESS LINE
- CONTROL LINE
- WATER SURFACE
- AF — INLINE AIR FILTER
- PRV — PRESSURE RELIEF VALVE
- FCV — FLOW CONTROL VALVE
- S M — SAMPLE/MONITOR POINT

FPM GROUP

FIGURE 4.3.2
SCHEMATIC OF REMEDIATION SYSTEM SETUP
90–30 METROPOLITAN AVENUE
REGO PARK, QUEENS, NEW YORK

Drawn By: H.C., J.S.	Checked By: S.D.	Date: 12/6/07

TABLE 4.3.1.1
AIR SPARGE WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Type	Shallow Screen	Intermediate Screen	Deep Screen
Screen Depth (feet below grade)	60-62	83-85	118-120
Screen Depth (feet below water table)	10-12	43-45	68-70
Well Number			
AS-1S	X		
AS-1I		X	
AS-1D			X
AS-2S	X		
AS-3S	X		
AS-4S	X		
AS-4I		X	
AS-5S	X		
AS-5I		X	
AS-6S	X		
AS-6I		X	
AS-7S	X		
AS-7I		X	
AS-7D			X
AS-8S	X		
AS-8I		X	
AS-8D			X
AS-9S	X		
AS-9I		X	
AS-10S	X		
AS-11I		X	
AS-12S	X		
AS-13S	X		
AS-13I		X	

TABLE 4.3.1.2
SOIL VAPOR EXTRACTION WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Type	Shallow Screen	Deep Screen
Screen Depth (feet below grade)	15-20	25-45
Well Number		
SVE1S	X	
SVE-2D		X
SVE-3S	X	
SVE-4S	X	
SVE-5D		X
SVE-6D		X
SVE-7D		X

Most of the soil was re-used as backfill in the piping trenches and the remainder was used as fill onsite. Pipe placement and backfilling were performed in a manner so that following paving, buried piping can withstand normal traffic loads without deformation or breakage.

The reinforced concrete pad for the remediation system was then constructed and the piping was extended above grade and manifolds constructed. During this time the sub-grade piping was pressure-tested to confirm connections with the wells and to check the piping integrity. Piping that had been damaged during the redevelopment process was replaced.

4.3.2 Remediation System Above-Grade Equipment

The remediation system SVE above-grade components include the following items:

- A manifold for the SVE piping configured with shutoff valves, sampling ports, flow meters, and vacuum gages such that each SVE well may be monitored and operated separately;
- A 28.58-horsepower Nash Elmo blower (model 2BH1930-8AH6) rated for up to 1,500 scfm. The blower is affixed to the floor of the enclosure using shock mounts;
- A Gasho model GX-90 water knockout vessel equipped with a high-level float alarm light and valve shutoff, a vacuum relief valve, and a drain port;
- A Solberg model CSL-275P-600F particulate filter; and
- A vacuum relief valve;
- A manifold with camlock fittings and bypass valving to allow for carbon treatment, if necessary.
- Two Carbtrol G-3 carbon treatment canisters situated for rapid connection if needed;
- A PVC discharge stack affixed to the adjacent site building. The stack extends to five feet above the top of the site building and is supported so to withstand wind loads anticipated at the site.

The remediation system AS above-grade components include the following items:

- A manifold for the AS piping configured with shutoff valves, flow meters, pressure gages such that each AS well may be monitored and operated separately;
- An Orbit electric flow controller and corresponding valves to operate the AS wells in a sequential mode; and

- Three oil-free air compressors (two Becker model KDT 3.80 rotary vane compressors and one Powerex STS050 scroll compressor) with pressure relief valves. The compressors are affixed to the floor of the system enclosure with shock mounts. An alarm light system is connected to the compressors to indicate a shutdown condition

The remediation system is equipped with an electrical panel with separate circuits for major system components. A control panel is included to operate the system. Detailed electrical and control system design information is provided in Appendix F.

The remediation system is housed in a locked weatherproof enclosure with soundproofing to reduce noise, interior lighting, and a thermostatically-operated exhaust fan. The system is further secured by a locked chain-link fence enclosure.

4.3.3 Remediation System Startup and Operation

The remediation system was initiated on August 23, 2007 and has since remained in continuous operation. System equipment is operated in accordance with manufacturer recommendations. System flow rates, vacuums, temperatures, and pressures were initially monitored on a daily to weekly basis for the first month of system operation. Monitoring of system operating parameters is now performed bi-weekly to monthly. System monitoring information is provided in Appendix G.

The design flow rate for the shallow SVE wells is approximately 126 scfm under an applied vacuum of 14 inches of water, which is anticipated to produce a ROI of approximately 60 feet based upon the pilot test results. The actual flow rates for the shallow SVE wells are approximately 225 scfm under an applied vacuum of 40 inches of water. Based on the actual operating conditions, the target ROI should be met or exceeded.

The design flow rate for the deep SVE wells is 100 scfm under an applied vacuum of 10 inches of water, which is anticipated to produce an ROI of approximately 50 feet based upon the pilot test results. The actual flow rates for the deep SVE wells are approximately 200 scfm under an applied vacuum of 30 inches of water. Based on the actual operating conditions, the target ROI should be met or exceeded.

The design flow rates and pressures for the shallow, intermediate and deep AS points are 12 scfm at 15, 18, and 40 psi, respectively. The ROI of the AS wells were anticipated to be approximately 20 feet, based upon the pilot test results. The flow rates and pressures for the shallow, intermediate, and deep AS points generally range from 2 to 15 scfm at 18 to 22 psi for the shallow, 3 to 10 scfm at 18 to 20 psi for the intermediate and 10 scfm at 35 psi for the deep

sparge wells. Based on these operating conditions, the target ROI of 20 feet for the AS wells should generally be met or exceeded.

To confirm that the shallow-depth SVE wells have induced a negative pressure gradient between the sub-slab and the building interior, the vacuum at the shallow-depth SVE wells and at the soil vapor implant locations (discussed in Section 4.4.2 below) was monitored. These monitoring results show that a negative pressure ranging from 0.02 to 0.11 inches of water was observed in interior shallow-depth monitoring wells and sub-slab implant locations. Therefore, a negative pressure gradient is induced beneath the building by the shallow SVE wells.

During the startup period, difficulties with establishing air flow were encountered in wells AS-3S, AS-7S, AS-8S, AS-9S, AS-1I, AS-4I and AS-5I. Subsequent monitoring and adjustment of well flow rates and pressures have restored AS capabilities to all wells except AS-7S, AS-8S and AS-5I. The locations of these wells were reviewed with respect to the July 2007 groundwater monitoring results, obtained immediately before startup of the remediation system (see Section 4.4.1). This review indicated that shallow groundwater conditions in the vicinity of AS-7S and AS-8S have significantly improved prior to the initiation of air sparging. Furthermore, air sparging is also being conducted within the vicinity of the AS-7S and AS-8S locations via the intermediate and deep groundwater AS wells AS-7I, AS-7D, AS-8I, and AS-8D. Therefore, air sparging may no longer be required at the AS-7S and AS-8S locations.

For the AS-5I location, the intermediate-level groundwater in this area contains only a very low level of PCE (10 ug/l at A10) and groundwater quality in this area has also significantly improved prior to the initiation of air sparing. Therefore, air sparging may no longer be required at the AS-5I location.

Groundwater monitoring results in these areas will be closely reviewed to evaluate whether air sparging will be necessary. If the monitoring results indicate the need for sparging, the affected wells will be redeveloped by jetting, air or water-lifting, and pumping to remove obstructing materials and re-establish connections with the formation. Following redevelopment, the wells will be reconnected to the system piping and tested to confirm that the target flow and pressures can be achieved. Procedures for these measures are included in the OM&M Plan.

4.3.4 SVE Effluent Monitoring

To ensure SVE system emissions compliance, effluent sampling was conducted on August 28, 2007, September 18, 2007 and November 6, 2007. The effluent samples were collected from the effluent sampling port utilizing tedlar air sampling bags and transported via overnight courier to a NYSDOH-approved laboratory for analysis of VOCs by EPA Method

T0-14 or T0-15. Table 4.3.4.1 summarizes the laboratory data and the complete laboratory analytical reports are included in Appendix F.

Following receipt of the analytical data and using site-verified parameters, the maximum PCE concentration detected was used to calculate potential air impacts as outlined in Appendix B of the NYSDEC Division of Air Resources DAR-1 policy document entitled "Guidelines for the Control of Toxic Ambient Air Contaminants" (November 1997). These impacts were then compared with the corresponding Annual Guidance Concentration (AGC) or Short-Term Guidance Concentration (SGC) value, as applicable. These comparisons are shown on Table 4.3.4.2. This comparison indicates that the maximum concentration of PCE detected in the effluent is below its AGC and SGC values. Other compounds, including acetone, toluene, trichloroethylene and trichloroflouromethane, were also noted, but are also confirmed to be well below their respective AGC and SGC values.

Therefore, no SVE effluent treatment measures are necessary at this time and PCE levels in the effluent have been confirmed to be declining as the system operates. Effluent monitoring will be continued in accordance with the Operation, Maintenance and Monitoring (OM&M) Plan to ensure continued compliance.

4.4 PRE-REMEDIAL SAMPLE RESULTS

Immediately prior to initiating the operation of the remediation system, the groundwater, sub-slab soil vapor, and indoor air monitoring were conducted to document subsurface conditions. The results of these monitoring events are documented in the following sections.

4.4.1 Groundwater Monitoring Results

Groundwater monitoring was performed prior to the startup of the remediation system at the wells described in our November 29, 2005 correspondence to the NYSDEC regarding the proposed groundwater monitoring network. These wells are listed in Table 4.4.1.1. Certain wells were found to be damaged or missing and could not be sampled during this monitoring event. These wells include ME-1, ME-4, ME-14, A-02, and A-13. Certain wells were, therefore, added to the monitoring network to substitute for some of the missing wells where appropriate. These substitutions are as follows: added well A-03 to replace well ME-4. Wells A-02 and A-13 have since been located and confirmed to be functional. These wells will be sampled during future monitoring events. Wells ME-1 and ME-14, which are both shallow wells, remain missing. These wells are both on the west side of the Site between the Site plume and the plume from the adjoining bowling alley. Several other shallow wells, including ME-7 and ME-11, are present in this area and will continue to be monitored.

TABLE 4.3.4.1
SVE EFFLUENT MONITORING
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Sample Date	8/28/07	9/18/07	11/6/07
Volatile Organic Compounds in micrograms per cubic meter			
Acetone	ND	ND	16
Tetrachloroethylene	8,968	7,590	3,240
Toluene	ND	ND	11.9
Trichloroethylene	ND	ND	13.1
Trichlorofluoromethane	ND	ND	25.1

Note:

ND = Not detected.

TABLE 4.3.4.2
AGC/SGC COMPARISON TABLE
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

II. Cavity Impact Evaluation Procedure

II.A. Basic cavity impact method

h_b = height of building = 30 feet

II.A.I.

$3h_b$ = 90 feet
D_{pl} = distance to property line = 10 feet
$D_{pl} < 3h_b$, therefore, cavity impacts are not confined to on-site receptors. Therefore, calculate cavity impacts.

$$L(\text{lbs/hr}) = Q(\text{ft}^3/\text{min}) \cdot C(\text{ppbv}) \cdot \frac{1}{25.85}(\text{mol/L}) \cdot 166(\text{g/mol}) \cdot 60(\text{min/hr}) \cdot 28.32(\text{L/ft}^3) \cdot$$

$$2.203(\text{lbs/g}) = 1{,}400\text{ft}^3/\text{min} \cdot 1{,}300\text{ppbv} \cdot \frac{1}{1*10^9} \cdot 24.59(\text{lbs} \cdot \text{min/hr}) = 4.48*10^{-2}\,\text{lbs/hr}$$

II.A.2

h_c = building cavity height equals $1.5h_b$ = 45 feet
h_s= stack height = 44 feet
$h_s < h_c$, therefore, calculate worst-case cavity impacts.

II.A.3.

Q_a = L (lbs/hr)*24 hrs/day*365 days/yr = 392.04 lbs/yr

C_c = Worst case annual cavity impact (ug/m^3) $= \frac{1.72Q_a}{h_b^2}$ = 0.75 ug/m^3 **< AGC** (1.0 ug/m^3)

II.A.4.

$C_{CST} = \frac{904{,}000 * L}{h_b^2}$ = 44.95 ug/m^3

II.C. Cavity impact evaluation method

C_{CST}= 44.95 << SGC (1,000 ug/m^3)

III.A. Standard point source method

III.A.1

h_s/h_b = 44/30 = 1.47, stack height to building height ratio for vertical stacks
Ratio is less then 1.5, therefore, assume no plume rise occurs and $h_e=h_s$

III.A.2

C_a = Maximum actual annual impact = $\frac{6.0 * Q_a}{h_e^{2.25}}$ = **0.437 ug/m^3 < AGC** (1.0 ug/m^3)

because Qa is based on continuous operation, $C_a=C_p$.

III.A.3.

C_p = Maximum annual potential impact = $\frac{52{,}500 * L}{h_e^{2.25}}$ = **0.437 ug/m^3 < AGC** (1.0 ug/m^3)

III.A.4 Does not apply

III.A.5

C_{ST} = Maximum short term impact = C_p * 65 = **28.40ug/m^3 << SGC** (1,000 ug/m^3)

TABLE 4.4.1.1
MONITORING WELL NETWORK
90-30 METROPOLITAN AVENUE, REGO PARK, QUEENS, NEW YORK

Well Number	Total Depth (feet)	Top of Casing Elevation (feet)	Wells to be Monitored	Depth to Water in feet, June 2005	Water Table Elevation in feet, June 2005
Shallow Wells					
ME-1	49.31	60.18	X*	42.80	17.38
ME-2	51.00	57.67		40.90	16.77
ME-4	49.70	58.66	X*	41.29	17.37
ME-5	50.30	57.73		40.28	17.45
ME-6	50.00	58.81		41.34	17.47
ME-7	50.66	59.61	X	42.23	17.38
ME-8	55.00	59.60	X	42.21	17.39
ME-9	54.76	59.03		41.58	17.45
ME-10	54.00	58.28		40.78	17.50
ME-11	54.88	59.64	X	42.16	17.48
ME-12	52.05	58.38		40.20	18.18
ME-13	55.15	59.60	X	42.32	17.28
ME-14	54.70	59.60	X*	42.18	17.42
ME-15	54.86	59.55	X	42.11	17.44
ME-16	54.85	59.19		-	-
A-01	53.48	58.05		40.64	17.41
A-02	58.75	61.45	X	44.15	17.30
A-03	57.40	61.57	+	44.44	17.13
A-04	60.30	61.29		44.00	17.29
A-05	57.60	61.54	X	44.21	17.33
A-06	59.80	61.59	X	44.24	17.35
A-09	58.75	61.29	X	43.94	17.35
A-14	53.20	59.47	X	42.26	17.21
A-15	52.60	59.46	X	42.18	17.28
A-16	51.80	58.99	X	42.70	16.29
A-18	50.50	58.70	X	42.55	16.15
MW-103	60.70	58.60		41.05	17.55
MW-104	58.90	59.40		41.85	17.55
MW-106	48.30	57.92		40.50	17.42
MW-108	55.00	58.74		41.92	16.82
Intermediate Wells					
A-08	84.35	61.53	X	45.70	15.83
A-10	85.1	61.16	X	45.40	15.76
A-12	78.17	59.46	X	43.42	16.04
A-13	83.9	59.59	X	43.75	15.84
MW-109	85	59.38	X	43.42	15.96
Deep Wells					
A-07	115	61.28	X	45.40	15.88
A-11	110	59.64	X	43.73	15.91
A-17	110	59.11	X	42.86	16.25
MW-105	98.6	59.39		43.38	16.01
MW-107	127	59.46		43.52	15.94
MW-110	110	59.38	X	43.35	16.03
MW-112	129.5	61.94	X	46.08	15.86
MW-113	131	59.71	X	43.85	15.86

Notes:

* Indicates damaged/missing well.
\+ Indicates added well.

The sampling and analytical procedures applied were in accordance with procedures previously used at this site, as described below. Sampling was performed in July 2007, approximately one month prior to the startup of the remediation system. At each well to be sampled, the depth to the static water level and depth of the well were measured using an interface probe. No wells were found to contain free-phase product. A decontaminated low-flow submersible pump was then used to purge a minimum of three to a maximum of five casing volumes of water from each well, if feasible. Following the removal of each casing volume, field parameters, including pH, turbidity, specific conductivity, and temperature, were monitored. When all stability parameters varied by less than 10 percent between the removal of successive casing volumes, the wells were sampled. Well sampling forms documenting the well purging and sampling procedures are included in Appendix H.

During well purging the groundwater was examined for visual indications of potential contamination. No visible contamination was noted and, therefore, produced water was discharged onto the ground in the vicinity of the wells and allowed to infiltrate. Following purging, groundwater sampling was performed. Samples were obtained using dedicated disposable polyethylene bailers. The retrieved samples were decanted into laboratory-supplied sample containers. The filled sample containers were labeled and placed in a cooler with ice to suppress temperature. A chain of custody form was filled out and kept with the cooler to document the sequence of sample possession. The filled cooler was transported to a NYSDOH-certified laboratory and the samples were analyzed for Target Compound List (TCL) VOCs in accordance with NYS ASP methods and the data were reported with CLP deliverables.

The data from the July 2007 sampling event are summarized in Tables 4.4.1.2 through 4.4.1.4 together with the data from the two previous monitoring events. The laboratory data from the July 2007 event are included on a CD in Appendix H. Data Usability Summary Reports (DUSRs) were prepared for all groundwater data generated in this monitoring program. The DUSRs are included in Appendix H. Site plans showing exceedances of the SGCs for groundwater in the shallow, intermediate, and deep sampling intervals are presented in Figures 4.4.1.1 through 4.4.1.3, respectively.

The shallow groundwater generally shows a continuing decrease in the level of exceedances of the SCGs for PCE. PCE continues to be the only groundwater contaminant detected in excess of the SCGs. PCE concentrations decreased in all of the shallow wells sampled with the exceptions of A-14, ME-7 and ME-15. At ME-7 and ME-15, the concentrations remained comparable to those of the previous sampling event in 2005. At offsite shallow well A-14 a moderate increase in PCE was noted. This well is downgradient of the PCE plume associated with the adjoining bowling alley property to the west of the site.

TABLE 4.4.1.2
GROUNDWATER CHEMICAL ANALYTICAL DATA
SHALLOW WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	ME-7			ME-8			ME-11			ME-13			ME-15			A-02	NYSDEC Class GA Ambient Water Quality Standards
Sample Date	5/03	6/05	7/07	5/03	6/05	7/07	5/03	6/05	7/07	5/03	6/05	7/07	5/03	6/05	7/07	7/07	
Target Compound List Volatile Organic Compounds in micrograms per liter																	
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15 J	ND	ND	ND	ND	ND	50
Methylene chloride	ND	0.51 JB	ND	**16 JB**	**54 JB**	ND	ND	**17 JB**	ND	59 JB	**17 JB**	ND	4 JB	**16 JB**	ND	ND	5
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**48 J**	ND	ND	ND	ND	ND	5
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Chloroform	ND	ND	0.88 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7
Tetrachloroethene	**50**	**40**	**41**	**2,200**	**3,600**	**250**	**810**	**720**	**290**	**2,700**	**960**	**54**	**1,100**	**580**	**480**	**32**	5
Total VOCs*	50	40	41.88	2,200	3,600	250	810	720	290	2,700	1,023	54	1,100	580	480	32	-

Notes:

ND = Not detected

VOCs = Volatile Organic Compounds

*Excluding suspected field/lab contamination

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards

NYSDEC = New York State Department of Environmental Conservation

J = Estimated concentration below reporting limit

B = Analyte detected in an associated blank sample

- = Not established

TABLE 4.4.1.2 (CONTINUED)
GROUNDWATER CHEMICAL ANALYTICAL DATA
SHALLOW WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	A-03		A-05			A-06			A-09			A-14		A-15			A-16			A-18			NYSDEC Class GA Ambient Water Quality Standards
Sample Date	5/03	7/07	5/03	6/05	7/07	5/03	6/05	7/07	5/03	6/05	7/07	5/03	7/07	5/03	6/05	7/07	5/03	6/05	7/07	5/03	6/05	7/07	
Target Compound List Volatile Organic Compounds in micrograms per liter																							
Acetone	ND	ND	ND	ND	ND	ND	20 JB	ND	ND	2.9 JB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Methylene chloride	ND	ND	ND	2.0 JB	ND	ND	16 JB	ND	15 JB	1.8 JB	ND	5 JB	ND	ND	ND	ND	ND	ND	ND	ND	0.40 JB	ND	5
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
2-Butanone	ND	ND	ND	ND	ND	ND	21 JB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Chloroform	9	1.4	2 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.3 J	ND	ND	0.74 J	ND	ND	ND	ND	7
Tetrachloroethene	17	14	330	150	39	8,000	730	290	2,600	200	23	400	470	40	16	10	0.6 J	ND	ND	ND	ND	ND	5
Total VOCs*	26	15.4	332	150	39	8,000	730	290	2,600	200	23	400	470	40	17.3	10	0.6	0.74	ND	ND	ND	ND	-

Notes:

ND = Not detected

VOCs = Volatile Organic Compounds

*Excluding suspected field/lab contamination

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards

NYSDEC = New York State Department of Environmental Conservation

J = Estimated concentration below reporting limit

B = Analyte detected in an associated blank sample

- = Not established

TABLE 4.4.1.3
GROUNDWATER CHEMICAL ANALYTICAL DATA
INTERMEDIATE WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	A-08			A-10			A-12			MW-109		NYSDEC Class GA Ambient Water Quality Standards
Sample Date	5/03	6/05	7/07	5/03	6/05	7/07	5/03	6/05	7/07	5/03	7/07	
Target Compound List Volatile Organic Compounds in micrograms per liter												
Acetone	ND	**450 B**	**97 J**	ND	3.0 JB	ND	ND	31 J	ND	ND	ND	50
Methylene chloride	ND	**57 JB**	ND	ND	1.7 JB	ND	**9 JB**	**35 JB**	ND	ND	ND	5
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7
Tetrachloroethene	**8,500**	**3,300**	**4,400**	**630**	**200**	**10**	**1,900**	**1,900**	**1,800**	5 J	2.6 J	5
Total VOCs*	8,500	3,300	4,400	630	200	10	1,900	1,931	1,800	5	2.6	-

Notes:

ND = Not detected

VOCs = Volatile Organic Compounds

*Excluding suspected field/lab contamination

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards

NYSDEC = New York State Department of Environmental Conservation

J = Estimated concentration below reporting limit

B = Analyte detected in an associated blank sample

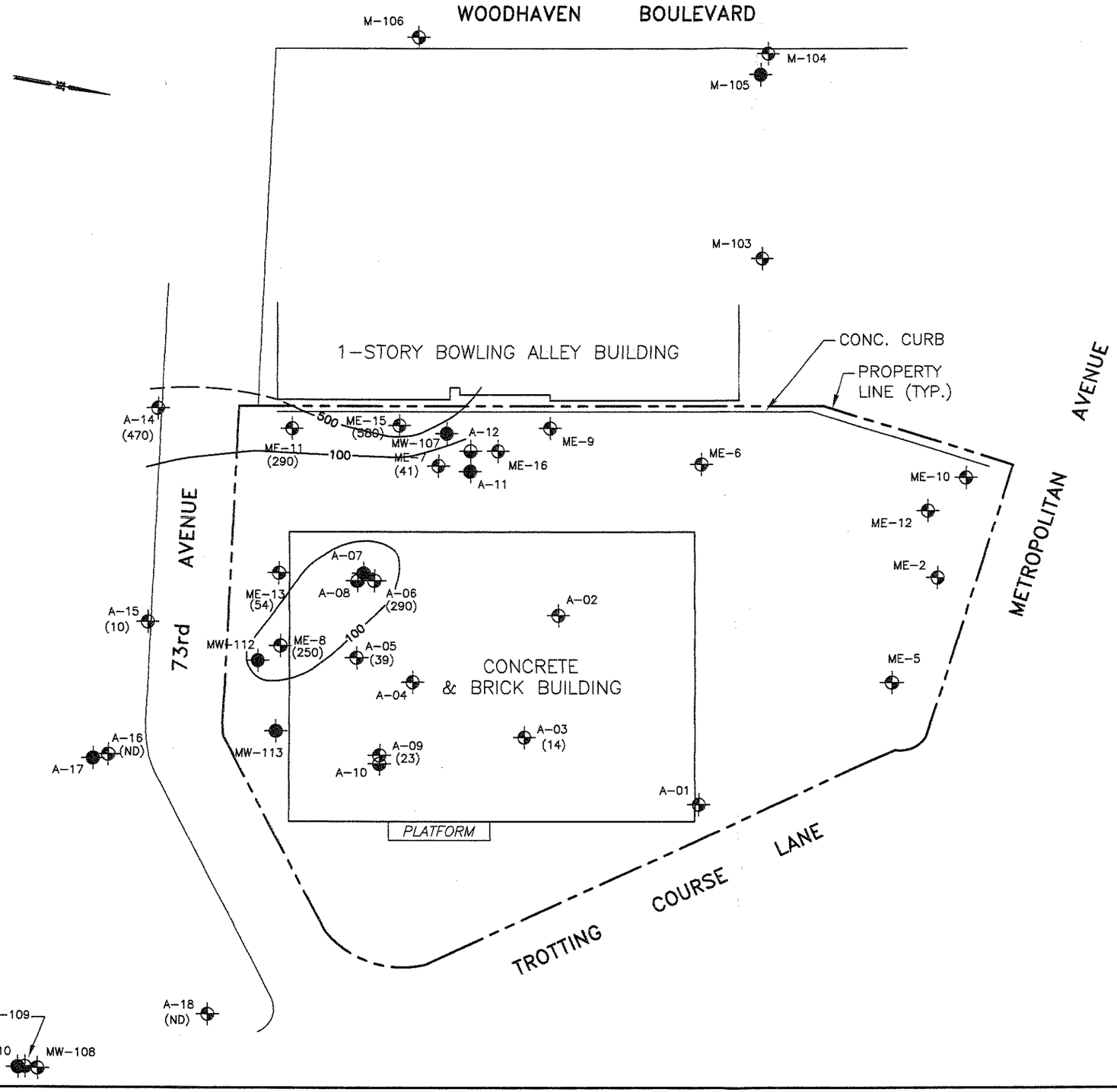
- = Not established

TABLE 4.4.1.4
GROUNDWATER CHEMICAL ANALYTICAL DATA
DEEP WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	A-07			A-11		A-17			MW-110		MW-112			MW-113		NYSDEC Class GA Ambient Water Quality Standards
Sample Date	5/03	6/05	7/07	5/03	7/07	5/03	6/05	7/07	5/03	7/07	5/03	6/05	7/07	6/05	7/07	
Target Compound List Volatile Organic Compounds in micrograms per liter																
Acetone	ND	3.2 JB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4 JB	50
Methylene chloride	**13 JB**	1.8 JB	ND	ND	ND	ND	0.57 JB	ND	ND	ND	ND	0.75 JB	ND	0.62 JB	ND	5
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
2-Butanone	ND	7.0 JB	26	14	ND	43	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Tetrachloroethene	**1,600**	**170**	**41**	5	0.78	0.5 J	ND	0.79	ND	ND	**72**	3.2 J	1.3 J	1.4 J	**8.7**	5
1,1,2,2-Tetrachloroethane	**18 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Total VOCs*	1,618	170	67	19	0.78	43.5	ND	0.79	ND	ND	72	3.2	1.3	1.4	8.7	-

Notes:

ND = Not detected
VOCs = Volatile Organic Compounds
*Excluding suspected field/lab contamination
Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards
NYSDEC = New York State Department of Environmental Conservation
J = Estimated concentration below reporting limit
B = Analyte detected in an associated blank sample
- = Not established



LEGEND

ME-1	SHALLOW MONITORING WELL
A-08	INTERMEDIATE MONITORING WELL
MW-112	DEEP MONITORING WELL
(39)	PCE CONCENTRATION IN MICROGRAMS PER LITER, JULY 2007
100	PCE CONCENTRATION CONTOURS IN MICROGRAMS PER LITER, JULY 2007

APPROXIMATE SCALE IN FEET:

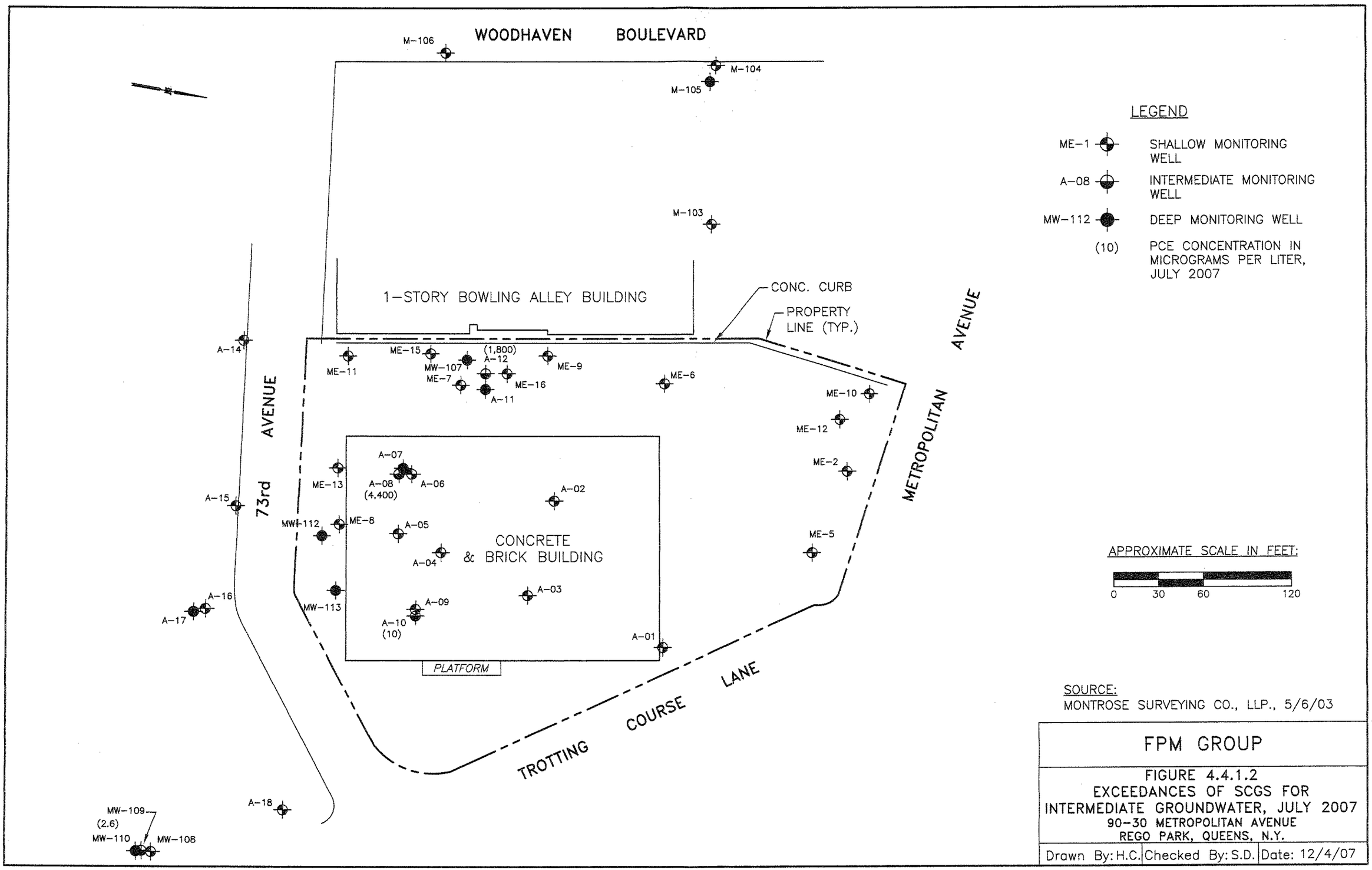
0 30 60 120

SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 4.4.1.1
EXCEEDANCES OF SCGS FOR SHALLOW GROUNDWATER, JULY 2007
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: H.C. | Checked By: S.D. | Date: 12/4/07

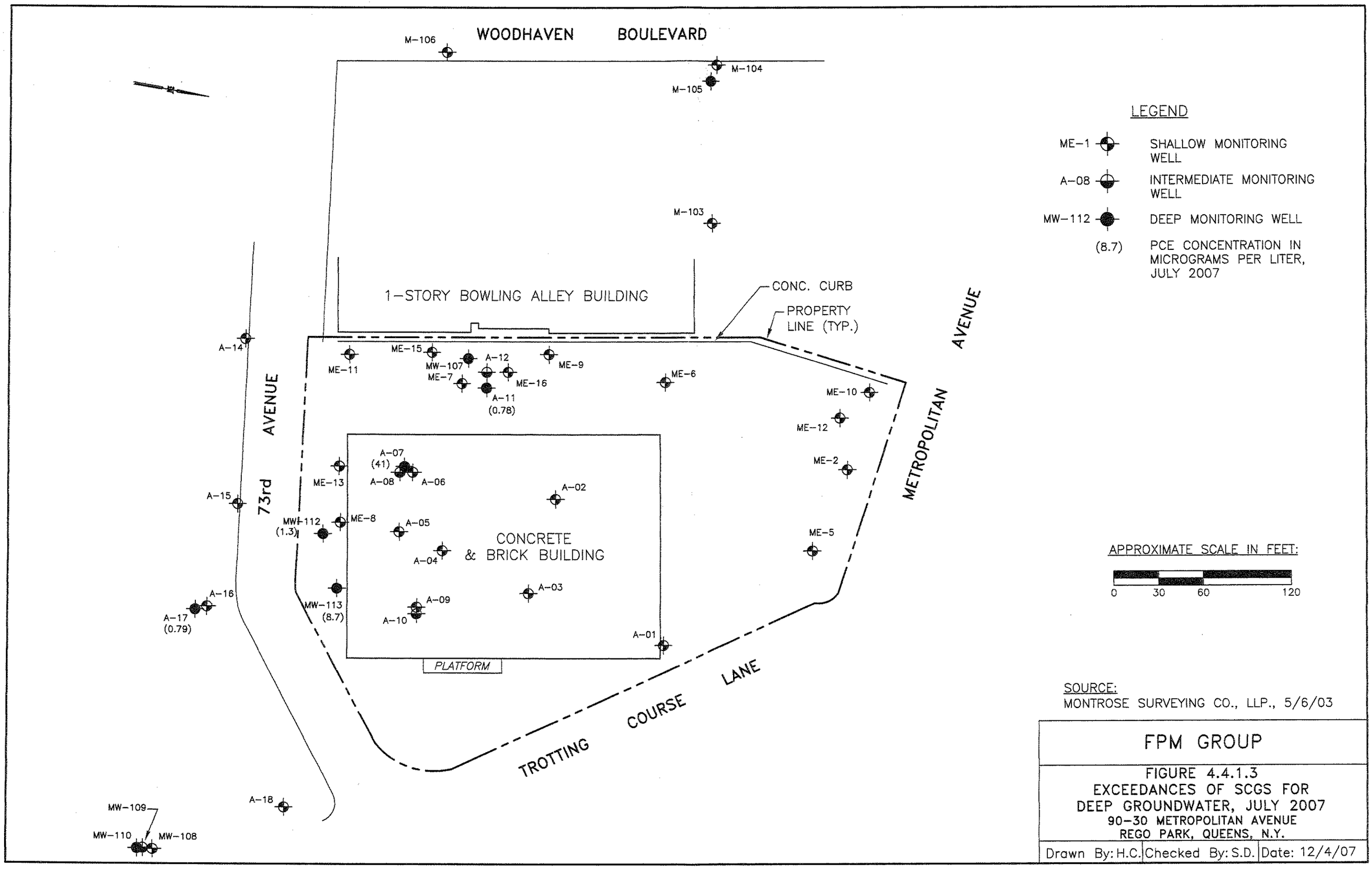


SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 4.4.1.2
EXCEEDANCES OF SCGS FOR INTERMEDIATE GROUNDWATER, JULY 2007
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: H.C. | Checked By: S.D. | Date: 12/4/07



SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 4.4.1.3
EXCEEDANCES OF SCGS FOR
DEEP GROUNDWATER, JULY 2007
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: H.C. | Checked By: S.D. | Date: 12/4/07

The intermediate groundwater also shows PCE as the only contaminant that exceeds its SCGs, with decreasing PCE concentrations noted in all wells except A-08, where a minor increase was noted.

The deep groundwater results show PCE exceeding the SCGs at only two locations. The concentration decreased at A-07 and increased very slightly at MW-113.

No PCE detections exceeding the SCGs were noted at offsite wells downgradient of the southeastern portion of the site. A low-level exceedance (20 ug/l) was noted at well A-15, downgradient of the south-central portion of the site. This detection is lower than previous detections in this well. At well A-14, which is downgradient of the southwest corner of the site, and also downgradient of the adjoining bowling alley (which also has a PCE plume), showed a moderate increase in PCE relative to the most recent previous sampling.

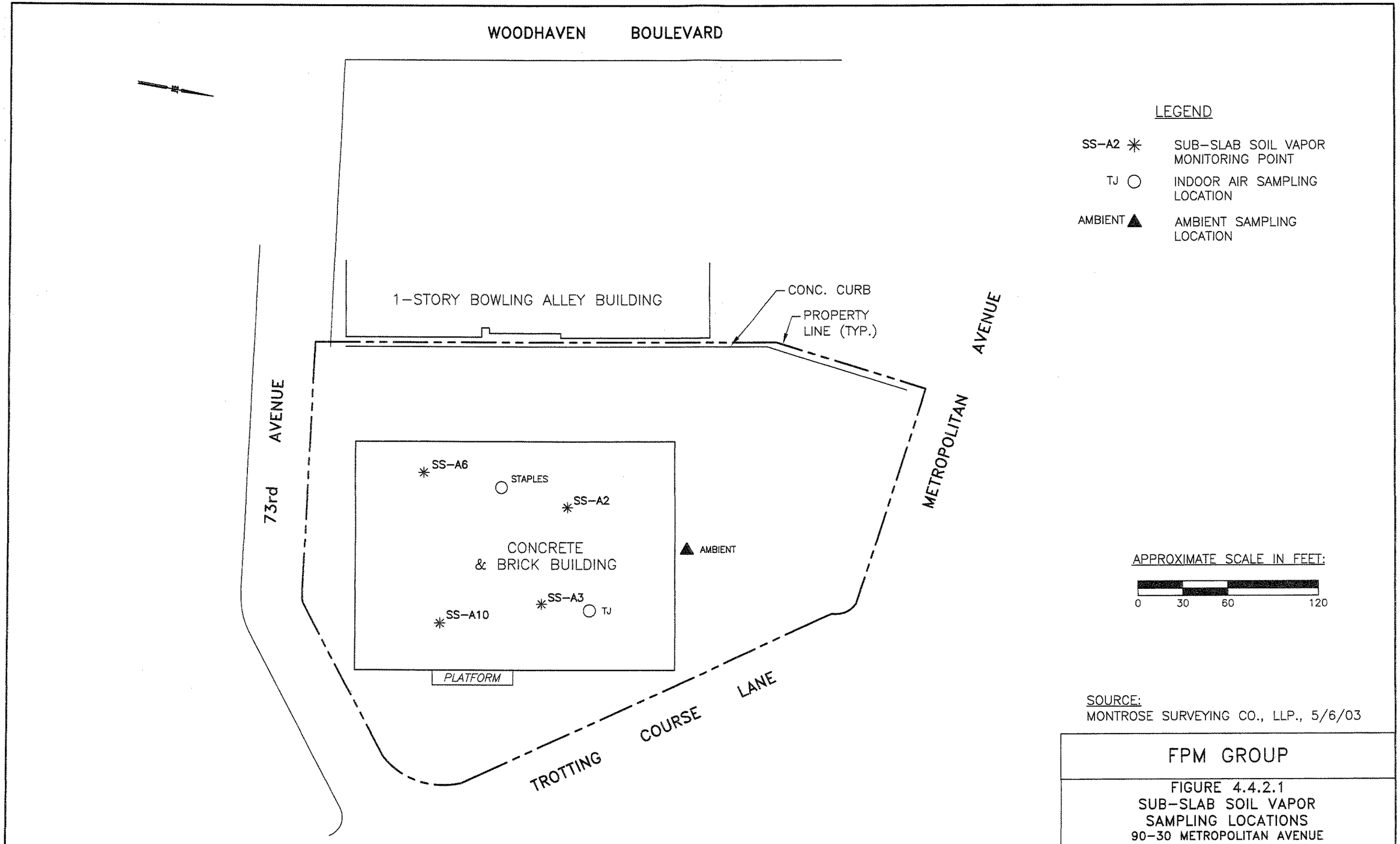
In summary, the July 2007 groundwater monitoring results show a generally decreasing trend of PCE concentrations in onsite and offsite groundwater at the shallow, intermediate, and deep levels. Increases were noted only at onsite wells A-08 and MW-113 and at offsite well A-14, which is also downgradient of the PCE plume associated with the adjoining bowling alley property.

Groundwater monitoring will continue to be performed on the wells in the monitoring network in accordance with the OM&M included in Appendix K herein. Monitoring procedures are discussed in the Monitoring Plan included in the OM&M Plan.

4.4.2 Sub-Slab Soil Vapor and Indoor Air Sampling Results

Sub-slab soil vapor and indoor air sampling were conducted at the Site in accordance with the approved RAWP. Sub-slab soil vapor samples were collected at four locations (SS-A-2, SS-A-3, SS-A-6, and SS-A-10) in July 2007. Indoor air sampling was conducted concurrently within each of the two tenant spaces in the building, which was undergoing redevelopment at the time of sampling. One outdoor (ambient) air sample was also collected. The sampling was performed prior to building occupancy and prior to the remediation system being operable. In addition, the building had been fully enclosed but no HVAC system was operating at the time of sampling. Therefore, it is anticipated that the sampling was performed under "worst-case" conditions.

The sub-slab sampling locations are situated within the well boxes for wells A-2, A-3, A-6 and A-10, as shown on Figure 4.4.2.1. The approximate locations of the two indoor air samples and the ambient sample are also shown on this figure.



SOURCE:
MONTROSE SURVEYING CO., LLP., 5/6/03

FPM GROUP

FIGURE 4.4.2.1
SUB-SLAB SOIL VAPOR
SAMPLING LOCATIONS
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: H.C. | Checked By: B.C. | Date: 12/4/07

Sub-slab sampling was performed using soil vapor implants, in accordance with the procedures in the NYSDOH February 2005 Soil Vapor Intrusion guidance document. Implants were installed within approximately one foot of the base of each well box, which is just below the base of the slab-on-grade foundation. Each implant was purged prior to sampling, in accordance with NYSDOH guidance and each sample was collected into a laboratory-provided batch-certified Summa canister using a flow controller set to a flow rate of less than 0.2 liters per minute.

The indoor and outdoor air samples were collected into laboratory-provided batch-certified Summa canisters using flow controllers set to a flow rate of less than 0.2 liters per minute. The canisters were set atop stands at an approximate height of five feet.

The filled canisters were transported to the analytical laboratory under chain of custody procedures. The samples were analyzed for VOCs using Method TO-15. The analytical laboratory utilized was Severn Trent Laboratories, Inc. (STL) of Colchester (Burlington), Vermont, which is NYSDOH-certified for this analysis. Canister sampling forms were used to document the sampling observations for each sample. Copies of the canister sampling forms are included in Appendix I. The sampling results are summarized in Table 4.4.2.1 and the complete laboratory report is included on a CD in Appendix I. A DUSR was prepared for all data generated in this monitoring program. The DUSR is included in Appendix H.

PCE was detected in each of the sub-slab soil vapor samples at concentrations ranging from 200 to 2,800 ug/m^3, with the highest concentration near the southwest portion of the building in the area where the greatest onsite groundwater impact is present. PCE was not detected in any of the indoor air samples or in the outdoor (ambient) sample. These values were compared to the Matrix 2 values provided in the NYSDOH guidance document. Three of the sub-slab vapor results indicated a monitor response and one of the values indicated a mitigate response.

1,1,1-trichloroethane (1,1,1-TCA) was also detected in three of the sub-slab soil vapor samples but was not found in any of the indoor air samples or in the outdoor air sample. It should be noted that 1,1,1-TCA has not been detected in site groundwater or soil. The detected sub-slab levels indicate that no further action is required for 1,1,1-TCA.

Several other VOCs were noted in the indoor air samples. These VOCs were generally also found at comparable concentrations in the ambient air sample and do not appear to present a concern.

TABLE 4.4.2.1
SUB-SLAB SOIL VAPOR AND INDOOR AIR SAMPLE RESULTS
JULY 2007
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Sample Location	Sub-Slab				Indoor		Outdoor	NYSDOH Indoor Air Trigger Concentration*	NYSDOH Sub-Slab Trigger Concentration*	EPA BASE** Database (Homes & Offices)
Sample No	SS-A-2	SS-A-3	SS-A-6	SS-A-10	TJ	Staples	Ambient			
Sample Date	7/8/07	7/8/07	7/8/07	7/8/07	7/9/07	7/9/07	7/9/07			
TO-15 Volatile Organic Compounds in ug/m^3										
Dichlorodifluoromethane	ND	ND	ND	ND	2.4	ND	ND	-	-	4.8 - 32.9
Chloromethane	ND	ND	ND	1.1	1.2	ND	ND	-	-	2.1 - 4.4
Trichlorofluoromethane	15	5.6	ND	12	1.4	ND	17	-	-	ND - 54.0
Acetone	ND	ND	ND	26	76	140	110	-	-	32.4 - 120.2
Carbon Disulfide	6.5	4.0	ND	1.6	ND	ND	ND	-	-	ND - 6.4
Methylene Chloride	ND	ND	ND	ND	ND	15	ND	-	-	ND - 16.0
tert-Butyl Alcohol	ND	ND	ND	ND	ND	ND	28	-	-	-
n-Hexane	ND	ND	ND	ND	ND	2.7	ND	-	-	1.6 - 15.2
Methyl Ethyl Ketone	ND	ND	ND	7.1	12	91	16	-	-	3.3 - 13.5
Chloroform	4.5	ND	ND	36	ND	ND	ND	-	-	ND - 1.4
1,1,1-Trichloroethane	6.0	6.0	ND	3.7	ND	ND	ND	3	100	2.6 - 33.0
Cyclohexane	ND	ND	ND	0.96	1.1	1.7	ND	-	-	-
2,2,4-Trimethylpentane	ND	ND	ND	ND	0.79	ND	ND	-	-	-
Benzene	ND	ND	ND	ND	1.2	1.4	17	-	-	2.1 - 12.5
n-Heptane	ND	ND	ND	3.6	2.7	4.1	1.8	-	-	-
Toluene	53	4.9	17	12	16	100	28	-	-	10.7 - 70.8
Tetrachloroethene	**620**	**350**	**2,800**	**200**	ND	ND	ND	3	100	ND - 25.4
Ethylbenzene	100	11	28	15	3.0	2.2	2.7	-	-	ND - 7.6
Xylene (m,p)	480	42	110	48	9.1	5.2	8.3	-	-	4.1 - 28.5
Xylene (o)	91	8.7	25	10	3.6	2.2	2.3	-	-	ND - 11.2
Xylene (total)	610	52	140	61	13	7.8	10	-	-	-
Styrene	ND	ND	ND	5.1	31	37	1.7	-	-	ND - 4.3
4-Ethyltoluene	ND	ND	ND	1.2	4.0	ND	2.7	-	-	ND - 5.9
1,3,5-Trimethylbenzene	ND	ND	ND	1.4	1.8	ND	ND	-	-	ND - 4.6
1,2,4-Trimethylbenzene	4.4	2.6	ND	2.7	5.4	1.7	2.3	-	-	1.7 - 13.7

Notes:

Only compounds detected in one or more samples are reported herein. See lab report for complete data.
ug/m^3 = micrograms per cubic meter.
ND = Not detected.
* = From NYSDOH Matrix 1 or Matrix 2, NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).
- = Not established.
** = USEPA Indoor Air Quality Study of homes and offices (BASE 1994-1996), 25th to 95th percentiles.
Please note that the 100 Duffy Avenue samples are labeled as 102 due to recent address changes.
Bold values = monitor response (matrix 1/2).
Bold shaded values = mitigate response (matrix 1/2).

As discussed in the RAWP, the remediation system includes shallow-depth SVE wells beneath the building slab, which provide mitigation by capture of soil vapors present beneath the building and inducement of a downward pressure gradient, thereby reducing the potential for soil vapor intrusion. Monitoring of the sub-slab pressure and shallow-depth SVE wells beneath the building has confirmed the induced negative pressure beneath the building, as discussed above. Furthermore, the indoor air sampling results from this sampling event show that there is no impact to indoor air under the anticipated "worst-case" building conditions. Therefore, the current response to the sub-slab and indoor air sampling results is appropriate and protective.

4.5 SOIL REMOVAL

Soil removal was not performed as a remedial action at this site since no impacted soil has been identified by either previous sampling programs or during the course of remedial system construction or property redevelopment. However, in accordance with the Stipulations, soil screening was performed by an environmental professional during all invasive remedial construction and property redevelopment activities and all excess soil to be removed from the property was properly characterized and disposed as regulated material in accordance with the Stipulations in the RAWP.

The soil screening procedures included visual observations and screening with a calibrated PID. No indications of potential contamination were noted in association with any of the soil encountered onsite.

Once excess soil was identified onsite during the redevelopment process, waste characterization samples were collected and analyzed for the constituents required by the selected disposal facility, Clean Earth of Philadelphia. This proposed disposal facility, which is appropriately authorized by the state in which it is located, was identified in advance of soil removal. Waste characterization samples were collected at the frequency specified by the disposal facility and were analyzed for the required parameters. These results indicated that the soil was non-hazardous and that no VOCs were detected in the soil. Based upon the results of the waste characterization, a waste profile was prepared, including the chemical analytical results and a description of the nature and origin of the soil. The waste profile was submitted to the proposed disposal facility and approval for disposal was obtained. Copies of the profile and the approval from the disposal facility are included in Appendix J.

Soil to be removed from the site was stockpiled such that the soil removal was performed as a load-and-go operation. The stockpiled soil was segregated onsite, stored on plastic sheeting, and covered with secured plastic sheeting. All excavated soil was promptly transported off Site by a licensed waste hauler and delivered to the permitted waste disposal facility.

A waste manifest was prepared for each shipment of soil to be disposed. Completed manifests confirming the proper disposal of all material were obtained. Manifests are included on a CD in Appendix J. A summary showing the shipments to the facility is presented in Table 4.5.1. A total of 2,909.49 tons of soil was properly disposed offsite between December 2006 and April 2007.

TABLE 4.5.1
SOIL DISPOSAL SUMMARY
90-30 METROPOLITAN AVENUE, REGO PARK, NY

Facility	Tonnage
Clean Earth of Philadelphia	2,909.49
Total:	2,909.49

4.6 RESIDUAL CONTAMINATION REMAINING ONSITE

Contamination remains present beneath the site in the form of groundwater and soil vapor impacted with PCE.

Table 4.6.1 summarizes the exceedances of the groundwater SCGs based on the July 2007 groundwater monitoring data, collected approximately one month prior to remediation system startup. Previously-presented Figures 4.4.1.1 though 4.4.1.3 summarize the exceedances of the groundwater SCGs for the shallow, intermediate and deep groundwater intervals.

Sub-slab soil vapor data were previously presented in Table 4.2.1. Figure 4.6.1 shows the concentrations of PCE in sub-slab soil vapor in July 2007, approximately one month before remediation system startup.

Contaminated groundwater and soil vapor exist beneath the Site. Engineering Controls are required to protect human health and the environment. These Engineering Controls (ECs) are described hereafter.

4.7 ENGINEERING CONTROL SYSTEM

Contamination is present at this Site and an EC was implemented to protect public health and the environment in the future. The Site has one primary EC system. This is the AS/SVE remediation system.

TABLE 4.6.1
GROUNDWATER EXCEEDANCES OF SCGs, JULY 2007
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Number	ME-7	ME-8	ME-11	ME-13	ME-15	A-03	A-05	A-06	NYSDEC Class GA Ambient Water Quality Standard
Sample Date	7/07	7/07	7/07	7/07	7/07	7/07	7/07	7/07	
Tetrachloroethene	**41**	**250**	**290**	**54**	**580**	**14**	**39**	**290**	5

Well Number	A-09	A-14	A-15	A-16	A-18	A-08	A-10	A-12	NYSDEC Class GA Ambient Water Quality Standard
Sample Date	7/07	7/07	7/07	7/07	7/07	7/07	7/07	7/07	
Tetrachloroethene	**23**	**470**	**10**	ND	ND	**4,400**	**10**	**1,800**	5

Well Number	MW-109	MW-110	A-07	A-11	A-17	MW-112	MW-113	NYSDEC Class GA Ambient Water Quality Standard
Sample Date	7/07	7/07	7/07	7/07	7/07	7/07	7/07	
Tetrachloroethene	2.6 J	ND	**41**	0.78	0.79	1.3 J	**8.7**	5

Notes:

ND = Not detected

Bold shaded values exceed NYSDEC Class GA Ambient Water Quality Standards (SCGs)

NYSDEC = New York State Department of Environmental Conservation

J = Estimated concentration below reporting limit

SCGs = Standards, Criteria and Guidance.

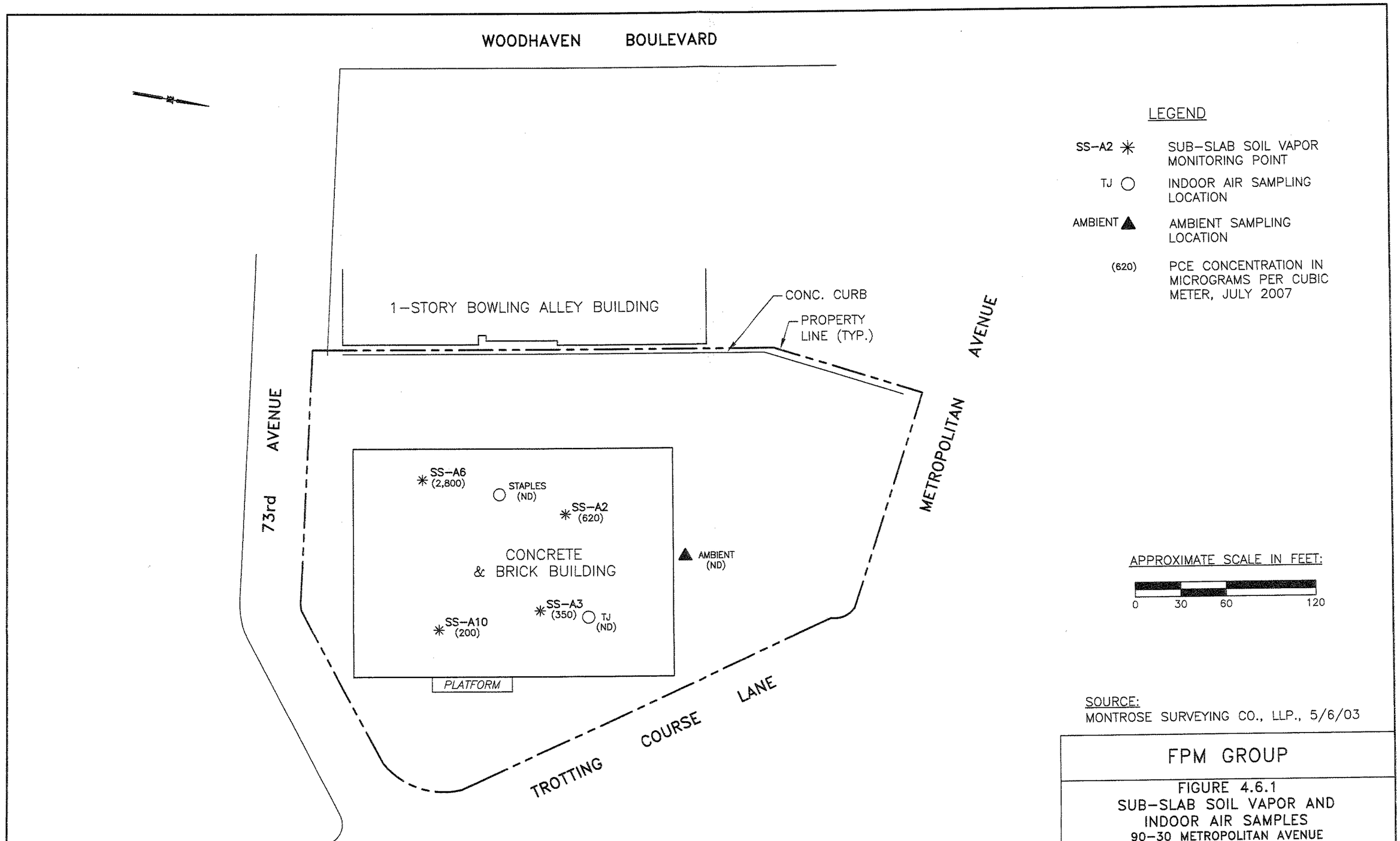


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FIGURE 4.6.1
SUB-SLAB SOIL VAPOR AND INDOOR AIR SAMPLES
90-30 METROPOLITAN AVENUE
REGO PARK, QUEENS, N.Y.

Drawn By: H.C. | Checked By: B.C. | Date: 12/4/07

4.7.1 Air Sparge/Soil Vapor Extraction System

An AS/SVE system has been constructed on the south and west sides of the site and is designed to remediate PCE-impacted groundwater along the southern and southwestern portions of the Site. The SVE portion of the system will also address any PCE-impacted soil that may be present in the system area. The VOC of concern in the groundwater is PCE, which is volatile and amenable to remediation by AS/SVE. System design and installation documents are provided in Appendix E.

The locations of the AS/SVE system wells and remedial system layout are shown on a site plan in Appendix E. The generalized equipment setup is shown in previously-presented Figure 4.3.2.

Twenty-four AS wells were installed and are positioned to treat the area of PCE-impacted groundwater beneath the southern end of the Site building and along the Site's southern and southwestern boundaries. The AS wells are constructed of one-inch-diameter Schedule 40 PVC casing and 0.02-inch slotted screen. The screened interval for the shallow, intermediate, and deep AS wells extends from approximately 10 to 12, 43 to 45 and 68 to70 feet below the water table, respectively. Table 4.7.1.1 shows the AS wells and their completion depths.

Seven SVE wells were installed; three of these wells were installed at shallow depths to address potential vapor intrusion issues and four wells were installed at deeper depths to capture vapors migrating from the water table. The shallow-depth SVE wells are screened 15 to 20 feet below grade. The deep SVE wells are screened from 25 to 45 feet below grade. Table 4.7.1.2 shows the SVE wells and their completion depths.

The remediation system SVE above-grade components include the following items:

- A manifold for the SVE piping configured with shutoff valves, sampling ports, flow meters, and vacuum gages such that each SVE well may be monitored and operated separately;
- A 28.58-horsepower Nash Elmo blower (model 2BH1930-7AH6) rated for up to 1,500 scfm. The blower is affixed to the floor of the enclosure using shock mounts;
- A water knockout vessel equipped with a high-level float alarm light and valve shutoff, a vacuum relief valve, and a drain port;
- A particulate filter; and
- A vacuum relief valve;

TABLE 4.7.1.1
AIR SPARGE WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Type	Shallow Screen	Intermediate Screen	Deep Screen
Screen Depth (feet below grade)	60-62	83-85	118-120
Screen Depth (feet below water table)	10-12	43-45	68-70
Well Number			
AS-1S	X		
AS-1I		X	
AS-1D			X
AS-2S	X		
AS-3S	X		
AS-4S	X		
AS-4I		X	
AS-5S	X		
AS-5I		X	
AS-6S	X		
AS-6I		X	
AS-7S	X		
AS-7I		X	
AS-7D			X
AS-8S	X		
AS-8I		X	
AS-8D			X
AS-9S	X		
AS-9I		X	
AS-10S	X		
AS-11I		X	
AS-12S	X		
AS-13S	X		
AS-13I		X	

TABLE 4.7.1.2
SOIL VAPOR EXTRACTION WELLS
90-30 METROPOLITAN AVENUE, REGO PARK, NEW YORK

Well Type	Shallow Screen	Deep Screen
Screen Depth (feet below grade)	15-20	25-45
Well Number		
SVE1S	X	
SVE-2D		X
SVE-3S	X	
SVE-4S	X	
SVE-5D		X
SVE-6D		X
SVE-7D		X

- A manifold with camlock fittings and bypass valving to allow for carbon treatment, if necessary.
- Two Carbtrol carbon treatment canisters situated for rapid connection if needed;
- A PVC discharge stack affixed to the adjacent site building.

The remediation system AS above-grade components include the following items:

- A manifold for the AS piping configured with shutoff valves, flow meters, pressure gages such that each AS well may be monitored and operated separately;
- An electric timer and corresponding valves to operate the AS wells in a sequential mode; and
- Three oil-free air compressors: two Becker model KDFT 3.80 and one Powerex STS050 with pressure relief valves. The compressors are affixed to the floor of the system enclosure with shock mounts. An alarm light system is connected to the compressors to indicate a shutdown condition.

The remediation system is equipped with an electrical panel with separate circuits for major system components. A control panel is included to operate the system. Detailed electrical and control system design information is provided in Appendix E.

The remediation system is housed in a locked weatherproof enclosure with soundproofing to reduce noise, interior, lighting, and an exhaust fan. The system is further secured by a locked chain-link fence enclosure.

To confirm that the shallow-depth SVE wells have induced a negative pressure gradient between the sub-slab and the building interior, the vacuum at the shallow-depth SVE wells and at the soil vapor implant locations (discussed in Section 4.4.2) was monitored. These monitoring results show that a negative pressure ranging from 0.02 to 0.11 inches of water was observed in interior shallow-depth monitoring wells and sub-slab implant locations, as discussed in Section 4.3.3.

To ensure SVE system emissions compliance, effluent sampling was conducted on August 28, 2007, September 19, 2007 and November 6, 2007. Following receipt of the analytical data and using site-verified parameters, the detected analytes were used to calculate potential air impacts as outlined in Appendix B of the NYSDEC Division of Air Resources DAR-1 policy document entitled "Guidelines for the Control of Toxic Ambient Air Contaminants" (November 1997). These impacts were then compared with the corresponding AGC or SGC value, as applicable. These comparisons are shown on previously-presented Table

4.3.4.2. This comparison indicates that all compounds are below their respective AGC and SGC values. Therefore, no SVE effluent treatment measures are necessary at this time. Effluent monitoring will be continued in accordance with the OM&M Plan to ensure continued compliance.

Procedures for operating and maintaining the AS/SVE system are documented in the Operation and Maintenance Plan in Section 4 of the OM&M Plan. The procedures for monitoring the system are included in Section 3, "Monitoring Plan" of the OM&M Plan. The Monitoring Plan also addresses inspection procedures that must occur after any severe weather condition has taken place that may affect on-Site ECs.

4.8 INSTITUTIONAL CONTROL

After remediation is complete, Institutional Controls may be required for the Site in the form of Site restrictions. Adherence to these Institutional Controls will be required under a Declaration of Covenants and Restrictions ("deed restriction") substantially similar to Exhibit E of the June 4, 2002 VCA (Index # D2-0001-04-02), except that there shall be no restriction on soil disturbance and no requirement to maintain a cap covering the Site. The deed restriction will be recorded following the completion of remediation. Compliance with the deed restriction will be required of the Site Owner and the Site Owner's successors.

After remediation is complete, the Site will have a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls will be required under the deed restriction. Site restrictions that are anticipated to apply to the Site are:

- The Site Owner shall continue in full force and effect the Institutional Controls required and maintain such controls unless the Owner first obtains permission to discontinue such controls from the NYSDEC;
- The deed restriction shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Site, and shall provide that the Owner and its successors and assigns consent to enforcement by the NYSDEC of the prohibitions and restrictions contained in such deed restriction which shall be recorded and hereby covenants not to contest the authority of the NYSDEC to seek enforcement;
- Any deed of conveyance of the Site, or any portion thereof, shall recite, unless the NYSDEC has consented to the termination of such covenants and restrictions, that said conveyance is subject to this deed restriction;
- Use of groundwater underlying the Site will be prohibited without treatment rendering it safe for the intended purpose; and

- The Site may be used for commercial use only (to exclude day care, child care, and medical care uses) unless express written waiver of this covenant is provided by the NYSDEC.

4.9 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

The approved RAWP included measures for soil management in the Stipulations and soil screening procedures under the QAPP. Soil screening was conducted for all intrusive activities conducted during the remedial action and also during the site redevelopment, which was conducted concurrently with remedial activities. This screening did not indicate the potential presence of impacted soil. However, as a precautionary measure and in accordance with the Stipulations, excess soil to be removed from the site during redevelopment was properly characterized and disposed to approved facilities in conformance with the soil management procedures in the Stipulations. This action was undertaken so as to alleviate any concern for improper management of soil originating from a VCP site. The effect of this action was to ensure that soil was properly disposed to approved facilities with appropriate documentation.

4.10 OPERATION, MAINTENANCE AND MONITORING PLAN

An Operation, Maintenance and Monitoring (OM&M) Plan has been developed for the 90-30 Metropolitan Avenue Site and is included as Appendix K to this FER. The OM&M Plan includes a description of the Site and the remedial actions, an Institutional and Engineering Control Plan, a Monitoring Plan, an Operation and Maintenance Plan, and a Reporting Plan. A HASP is included in the OM&M Plan.