PUBLIC VERSION
SOIL VAPOR INTRUSION DATA SUMMARY REPORT
2010/2011 HEATING SEASON

WORK ASSIGNMENT NO. C007540-3

MEEKER AVENUE PLUME TRACKDOWN
GREENPOINT/EAST WILLIAMSBURG INDUSTRIAL AREA

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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DIVISION OF ENVIRONMENTAL REMEDIATION
REMEDIAL BUREAU B

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Final
July 2011
SOIL VAPOR INTRUSION DATA SUMMARY REPORT
2010/2011 HEATING SEASON
FOR THE
MEEKER AVENUE PLUME TRACKDOWN
SITE NUMBER 2-24-121
GREENPOINT/EAST WILLIAMSBURG INDUSTRIAL AREA OF BROOKLYN
KINGS COUNTY, NEW YORK

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LIST OF ACRONYMS AND ABBREVIATIONS

%  percent
1,1,1-TCA  1,1,1-trichloroethane
1,1-DCA  1,1-dichloroethane
1,1-DCE  1,1-dichloroethene, aka 1,1-dichloroethylene
1,2-DCA  1,2-dichloroethane
aka  also known as
ASP  Analytical Services Protocol
BP  British Petroleum
BQE  Brooklyn-Queens Expressway, aka Interstate 278
CD  compact disk
cis-1,2-DCE  1,2-dichloroethene (cis), aka cis-1,2-dichloroethylene
COC  chain-of-custody
Con-Test  Con-Test Analytical Laboratory
DCA  dichloroethane
DCE  dichloroethene, aka dichloroethylene
DER  Division of Environmental Remediation
DUSR  Data Usability Summary Report
EEPC  Ecology & Environment Engineering, P.C.
ELAP  Environmental Laboratory Approval Program
EPM  Environmental Planning and Management, Inc.
FAP  Field Activity Plan
Freon 11  trichlorofluoromethane
Freon 12  dichlorodifluoromethane
Freon 113  1,1,2-trichloro-1,2,2-trifluoroethane
ID  inside diameter
L  liter
L/min  liters per minute
mg/kg  milligrams per kilogram (parts per million)
mL  milliliter
MW  monitoring well
NYSDEC  New York State Department of Environmental Conservation
NYSDOH  New York State Department of Health
NYSDOT  New York State Department of Transportation
OD  outside diameter
PCE  perchloroethene, aka tetrachloroethene or tetrachloroethylene or perchloroethylene
PDF  portable document format
PID  photoionization detector
ppb  parts per billion
ppbv  parts per billion by volume
ppm  parts per million
QA  quality assurance
QC  quality control
LIST OF ACRONYMS AND ABBREVIATIONS

(Continued)

RPD relative percent difference
SSD subslab depressurization
SVI soil vapor intrusion
TCE trichloroethene, aka trichloroethylene
TCL target compound list
trans-1,2-DCE 1,2-dichloroethene (trans), aka trans-1,2-dichloroethylene
µg/m³ micrograms per cubic meter
UHP ultra high purity
URS URS Corporation
USCG United States Coast Guard
USEPA United States Environmental Protection Agency
VOC volatile organic compound
1.0 INTRODUCTION

This Data Summary Report has been prepared to summarize the fourth round of soil vapor intrusion (SVI) sampling performed by URS Corporation – New York and analytical results for the Meeker Avenue Plume Trackdown Site. The Meeker Avenue Plume Trackdown Site is located in the Greenpoint/East Williamsburg Industrial Area section of Brooklyn, New York (Figure 1). The fourth round of SVI sampling was performed during the 2010/2011 heating season in and around two outreach areas that are located within the Meeker Avenue Plume Trackdown Site; the Spic and Span Outreach Area and the ACME Steel/Klink Cosmo Outreach Area (Figure 2). The extent of the 2010/2011 heating season outreach area was based upon the results of soil-gas, soil and groundwater samples collected during the five phases of investigation in the area and the results of the three previous rounds of SVI sampling (2007/2008, 2008/2009 and 2009/2010 heating seasons). Follow-up sampling was also performed at several previously evaluated locations because they were designated as “Monitor” situations, subslab depressurization (SSD) systems were installed, or the owner requested resampling.

The first phase of SVI sampling work for this site was issued to URS Corporation (URS) by the New York State Department of Environmental Conservation (NYSDEC) as Work Assignment (WA) Number D004433-22. The second and third phases of SVI sampling were performed by URS as a subcontractor to EnviroTrac Ltd. of Yaphank, New York under Contract Numbers D400310 and C100902, Call Out ID: 117824. This fourth phase of sampling was performed under URS’ Standby Contract with the NYSDEC as WA Number C007540-3.

1.1 Site Description and History

The Meeker Avenue Plume Trackdown Site is located in a region of historic petroleum refining and storage operations that occupied a significant portion of the Greenpoint area. By 1870, over 50 refineries were located along the banks of Newtown Creek. Currently, bulk oil storage terminals exist north of the site, including the British Petroleum (BP) Terminal, and the ExxonMobil Brooklyn Terminal (Brooklyn Terminal). The former Paragon Oil facility was located on the site along Newtown Creek, north of Bridgewater Street, between Meeker Avenue and Apollo Street. Peerless Importers, Inc., currently is located on a portion of the former Paragon Oil facility along Newtown Creek.
In September 1978, the United States Coast Guard (USCG) noted the signs of an oil spill entering Newtown Creek from the area at the end of Meeker Avenue. A subsequent investigation concluded that the area of the spill under the Greenpoint/East Williamsburg Industrial Area was in excess of 52 acres and the total spill volume, as estimated in 1979, was approximately 17 million gallons of petroleum products. The current BP property was determined to be the source of the petroleum free product plume. Investigation and remediation activities were conducted by Roux Associates Inc. (Roux Associates) on behalf of ExxonMobil from 1990 to the present and have further defined the extent of the Off-Site Plume. The Off-Site Plume area consists of the area underlain by the petroleum free product plume that is not on the BP Terminal or the Peerless Imported, Inc. properties. Currently, the extent of the Off-Site Plume area is less than what it was in 1990 due to the operation of the Off-Site Free Product Recovery System (Off-Site System). The Off-Site System has recovered over 5,600,000 gallons since it became operational in 1995 (Roux, October 29, 2010).

Based on the results of several investigations conducted in the area [see Phase IV report (URS, 2009a)], chlorinated solvents such as tetrachloroethene (PCE) and trichloroethene (TCE) were found in soil-gas, soil, and groundwater in areas outside the Off-Site Plume area. As these chemicals are not related to petroleum, the NYSDEC initiated the Meeker Avenue Plume Trackdown Site investigation in order to determine the source(s) of this contamination. For the SVI portion of the investigation, the focus was on the residential areas of the site.

The original Meeker Avenue Plume Trackdown Site investigation area was bounded by the former ExxonMobil Brooklyn Refinery/current BP Terminal to the north (Norman Avenue/Bridgewater Street), Newtown Creek to the east, Lombardy Street to the south, and Kingsland Avenue to the west. Through the five phases of the investigation performed to date (URS, 2009b), the site investigation area boundary has been expanded to the current configuration which is bounded by the former ExxonMobil Brooklyn Refinery/current BP Terminal to the north (Norman Avenue/Bridgewater Street) and one block north from Norman Avenue between Kingsland Avenue and Monitor Street, Newtown Creek to the east; Withers Street between Vandervoort and Morgan Avenues to the south; and west to Kingsland Avenue between Lombardy Street and Nassau Avenue, Monitor Street between Nassau and Meserole Avenues and Morgan Avenue between Lombardy and Withers Streets (Figure 2).
The area located north of Nassau Avenue and east of Van Dam Street and south of Meeker Avenue is primarily used for commercial/industrial purposes. Residential areas are located in both the northwest portion of the site (extending from Van Dam Street between Nassau and Meeker Avenues, to the western site boundary) and within the southern portion of the site (along Beadel Street from Morgan to Porter Avenues and along Vandervoort Avenue from Lombardy Street to Division Place).

1.2 **Soil Vapor Investigations by Other Consultants**

SVI sampling was conducted by Ecology & Environment Engineering, P.C. (EEEPC), a technical consultant under the direction of the NYSDEC, in the residential area north of Interstate 278, also known as the Brooklyn-Queens Expressway (BQE) during the 2006-2007 heating season (EEEPC, July 2007). The purpose of the SVI sampling performed by EEEPC was to evaluate possible exposure concerns related to chemical vapors from the ExxonMobil Off-Site Plume underlying the residential area. During that investigation, a total of 52 residences were sampled. The results of this sampling event indicated that chemicals related to the historic petroleum spill were not migrating into area homes. However, several homes showed a potential for soil vapor intrusion by chemicals unrelated to the historic petroleum spill. Nine of these homes were re-sampled in March 2008 by EEEPC under the direction of the New York State Department of Health (NYSDOH).

1.3 **Findings from Previous Rounds of Soil Vapor Intrusion Sampling**

1.3.1 **2007/2008 Heating Season**

URS completed the first round of SVI sampling at the Meeker Avenue Plume Trackdown site during the 2007/2008 heating season (February-March 2008). As the area north of the BQE was being investigated separately (see Section 1.2), the NYSDEC and the NYSDOH directed URS to focus the first round of SVI sampling in the residential area south of the BQE (Figure 3). The residential area south of the BQE has been subsequently identified by the NYSDOH as the ACME Steel/Klink Cosmo Outreach area. The first phase of sampling was performed to assess the potential for vapor intrusion into residences within the ACME Steel/Klink Cosmo Outreach area based upon the results of soil-gas, soil, and groundwater samples collected during the Phase II Site Characterization investigation (URS, 2008). Of the 57 potential houses in the ACME Steel/Klink
Cosmo Outreach area, only 12 residences were ultimately sampled during the first round of SVI sampling.

At each address an indoor air, outdoor air, and subslab soil vapor sample were collected and analyzed for the target compound list (TCL) volatile organic compounds (VOCs) listed in Table 1, to a minimum detection limit of 1.0 microgram per cubic meter (µg/m³). TCE, carbon tetrachloride and vinyl chloride in all indoor and outdoor air samples were analyzed to a minimum detection limit of 0.25 µg/m³. If adjacent structures were sampled on the same day, only one outdoor air sample was collected for those structures. A summary of detected VOCs in the 2007/2008 indoor air, outdoor air, and subslab samples is presented in Table 2.

Indoor air and subslab analytical results were compared to the Soil Vapor/Indoor Air Decision Matrices, provided in Appendix A. Based on this guidance, locations H-01, H-03 through H-10, and H-12 had concentrations that resulted in “Mitigate” recommendations. The recommended action for H-11 was “Monitor/Mitigate”. For location H-02 “No further action” was required. It should be noted that if the concentration of TCE and/or PCE in the indoor air sample was similar to the concentration of TCE and/or PCE in the outdoor air sample, the results of the indoor air sample can be considered marginal based on the results of the outdoor air sample. Therefore, the recommendation was “No further action” at location H-02. It should be noted that at locations where a sample and a field duplicate sample were collected, only the higher value was used for evaluation.

1.3.2 2008/2009 Heating Season

The second round of SVI sampling was conducted during the 2008/2009 heating season at both the ACME Steel/Klink Cosmo and the Spic and Span Outreach Areas (Figures 3 and 4, respectively). The owners and/or tenants of approximately 172 residential/commercial structures in the two outreach areas were contacted for participation in the second round (2008/2009) SVI sampling program. In addition, homes outside the outreach areas were sampled based upon owner’s requests to the NYSDOH. Forty-five residences were ultimately sampled during the second round of SVI sampling.

At each address an indoor air, outdoor air, and subslab soil vapor sample were collected and analyzed for the TCL VOCs listed in Table 1, to a minimum detection limit of 1.0 µg/m³. TCE, carbon tetrachloride and vinyl chloride in all indoor and outdoor air samples were analyzed to a
minimum detection limit of 0.25 μg/m³. If adjacent structures were sampled on the same day, only one outdoor air sample was collected for those structures. A summary of detected VOCs in the 2008/2009 indoor air, outdoor air, and subslab samples is presented in Table 3.

Based on the Soil Vapor/Indoor Air Decision Matrices provided in Appendix A, locations H-05-09, H-25-09 and H-33-09 had concentrations that resulted in “Mitigate” recommendations. The recommended action for H-30-09 was “Monitor/Mitigate”. The recommendation for locations H-06-09, H-15-09, H-20-09, H-22-09, H-24-09, H-34-09 and H-37-09 was “Take reasonable and practical actions to identify sources and reduce exposures.” For all other locations “No further action” was required. It should be noted that if the concentration of TCE and/or PCE in the indoor air sample was similar to the concentration of TCE and/or PCE in the outdoor air sample, the results of the indoor air sample can be considered marginal based on the results of the outdoor air sample. Therefore, the recommendation was “No further action” at those locations.

1.3.3 2009/2010 Heating Season

The third round of SVI sampling was conducted during the 2009/2010 heating season at both the Spic and Span and the ACME Steel/Klink Cosmo Outreach Areas (Figures 4 and 3, respectively). The owners and/or tenants of approximately 120 residential and residential/commercial structures within the two outreach areas were contacted for participation. A total of 16 new residential and residential/commercial structures and 8 previously evaluated residential structures were sampled in and around the two outreach areas. Of the 24 residential and residential/commercial structures sampled during the 2009/2010 SVI sampling program, 22 were from within the outreach areas and 2 were residences outside the outreach areas. The 2 structures sampled from outside the outreach areas were sampled because the owners contacted the NYSDOH requesting participation in the SVI sampling program. The 8 previously evaluated structures were resampled because: a) the owners requested sampling; b) the homes were designated as “Monitor” situations; or, c) SSD systems were installed as a result of “Mitigate” situations and resampling of indoor air was performed to evaluate the effectiveness of the mitigation system.

A summary of detected VOCs in the 2009/2010 indoor air, outdoor air, and subslab samples is presented in Table 4. Based on the Soil Vapor/Indoor Air Decision Matrices provided in Appendix A, locations H-60, and H-61 had concentrations of PCE and/or TCE that fell under the “Mitigate” category. Locations H-52 and H-53 had concentrations of TCE that fell under the
“Monitor” category. All other locations sampled had “Take reasonable and practical actions to identify source(s) and reduce exposure” or “No further action” recommendations.
2.0 FIELD INVESTIGATION ACTIVITIES

The fourth round of SVI sampling was conducted during the 2010/2011 heating season at both the Spic and Span and the ACME Steel/Klink Cosmo Outreach Areas (Figures 4 and 3, respectively). The activities conducted during the 2010/2011 heating season consisted of the following work tasks:

- The NYSDOH generated a standard letter, dated January 20, 2011, that was sent to each property owner and residence that described the sampling program and requested that owners interested in the SVI sampling program contact the NYSDOH or NYSDEC.
- URS contacted owners and/or tenants by telephone prior to and throughout the field investigation to determine interest in participating in the SVI sampling program. Only residential and residential-commercial property owners that accepted the offer for the SVI sampling were scheduled for sampling. For properties where the tenants were the initial contact, URS asked for the owner’s information and encouraged the tenants to have the owners contact URS if they were unwilling to provide the owner’s information. URS provided multi-lingual personnel to discuss the SVI sampling program with owners/tenants over the telephone.
- URS canvassed the outreach areas on February 28 to March 2, 2011 by going door-to-door to identify potential participants for the SVI sampling program. URS provided multi-lingual personnel to discuss the SVI sampling program with owners/tenants during the door-to-door program.
- URS scheduled appointments for home surveys and indoor air sampling for the participating residences.
- URS conducted interviews with owners/tenants and completed indoor air quality questionnaires and building surveys. URS provided multi-lingual personnel to conduct owner/tenant interviews and for completing indoor air quality questionnaires and building surveys.
- URS conducted an inventory of household chemicals present in the sampling area and evaluated their potential to affect air sample results.
- URS collected SVI samples from 8 locations, which consisted of 8 basement/lower level indoor air samples plus 1 field duplicate, and 2 subslab soil vapor samples. During indoor air sampling, 8 outdoor air samples plus 1 field duplicate were also collected.
2.1 **Indoor Air Investigation**

URS conducted indoor air, outdoor air, and subslab vapor sampling at residences in the site area following procedures outlined in *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, Final, (NYSDOH, October 2006). The fourth phase of SVI sampling was conducted from February 28 through March 6, 2011. The following modification to the indoor air investigation program was implemented based on discussions with the NYSDEC and NYSDOH:

- Pursuant to a February 8, 2008 e-mail agreement between the NYSDOH and NYSDEC, when a structure contains a basement or crawl space, the NYSDOH and NYSDEC no longer require that first floor samples be collected as part of the routine vapor intrusion sampling program. First floor samples will continue to be collected at slab-on-grade structures.

The owners and/or tenants of all residential structures on both sides of Kingsland Avenue between Nassau and Norman Avenues, all structures with SSD systems installed, and those locations identified by the NYSDOH within the two outreach areas were contacted for participation in the fourth round (2010/2011) SVI sampling program. A total of 8 residential structures were sampled in the two outreach areas. Six of the 8 structures had SSD systems installed as a result of “Mitigate” situations and resampling of indoor air was performed to evaluate the effectiveness of the mitigation system. Two of the 6 structures with SSD systems previously did not participate in the SVI sampling program; however, they elected to participate in the blanket mitigation offered in the ACME Steel/Klink Cosmo Outreach Area. Only indoor and outdoor air samples were collected from structures with SSD systems. Two of the 8 structures were sampled because the homes were designated as “Monitor” situations in previous SVI sampling rounds. Residential and residential/commercial structures within the outreach areas were not sampled during the 2010/2011 SVI sampling program for one or more of the following reasons:

- The owners/tenants declined sampling of their homes;
- The owners/tenants were not present for scheduled appointments and did not respond to rescheduling attempts;
- The owners/tenants could not be contacted;
- The owners/tenants did not return multiple phone calls; and/or
- The owners/tenants did not respond during door-to-door outreach.
2.1.1 Indoor Air Quality Survey and Questionnaire

Prior to sampling, URS and NYSDEC personnel conducted owner/tenant interviews and completed an inventory of household chemicals found in the basement/lower level. A RAE Systems ppbRAE Plus PGM 7240 part-per-billion (ppb)-range photoionization detector (PID) was used to screen indoor air and identify potential sources of VOC from household chemicals prior to collecting the air samples. During this inventory, a handout (Appendix B) was provided to the owners/tenants that lists activities that should be avoided prior to and during the air sampling.

2.1.2 Indoor Air and Outdoor Air Sampling

URS selected the indoor air sampling locations in consultation with each of the owners/tenants. Where possible, the indoor air locations were placed in the breathing zone (approximately three feet above the floor), central to the building and away from the foundation walls, appliances, and apparent penetrations.

All sampling was performed in accordance with the procedures outlined in the Generic Field Activity Plan (URS, 2010). The indoor air and outdoor air samples were collected using laboratory evacuated 6-liter Summa® canisters with 24 hour laboratory calibrated flow regulators. The regulators were calibrated at the flow rate of approximately 0.004 liters per minute (L/min). Upon opening the canister valve, the initial vacuum pressure was read from the built-in gauge on the flow controller and recorded onto a Summa® Canister Sampling Field Data Sheet. After the 24 hour sampling period, the canister vacuum was recorded on the Summa® Canister Sampling Field Data Sheet and the valve was then closed.

Outdoor air samples were collected at each residence. All outdoor air samples were collected in the building’s back yard for the purpose of canister security. The outdoor air samples were also collected over a 24-hour period concurrent with the indoor air samples and/or subslab samples. Eight indoor air samples plus one field duplicate and eight outdoor air samples and one field duplicate were collected during the indoor air sampling.
The field duplicate samples were collected at locations H-10. The indoor air and outdoor air field duplicates were collected by placing independently flow controlled canisters adjacent to each other.

2.1.3 Subslab Soil Vapor Sampling

Only two of the 8 locations sampled required subslab soil vapor sampling. Both locations were previously sampled for subslab soil vapor, therefore URS selected a location near to or the same as the previous subslab sample collection point. URS used a ppbRAE to screen indoor air and penetrations such as concrete floor cracks, floor drains, and sump holes prior to collecting the air samples.

At subslab sample locations, an electric hammer drill was used to advance a 1-inch diameter hole approximately 1/2-inch into the concrete slab, followed by a 3/8-inch diameter hole through the remaining thickness of the concrete slab. All concrete debris was removed using a hand brush to prevent it from entering the hole. Subslab samples were collected through a 1/8-inch inside diameter by 1/4-inch outside diameter Teflon-lined polyethylene tubing which was inserted through the hole in the slab. The tubing was sealed to the concrete slab with modeling clay.

A helium tracer gas was utilized during the sampling of each subslab soil vapor location. The tracer gas was used to evaluate whether indoor (ambient) air was short circuiting into the sample collection tubing. To perform the test, a one gallon enclosure was placed over the sealed subslab sample location. The sample tubing was run through a hole in the enclosure and plumber’s putty was used to seal the interface between the tubing and the enclosure. The enclosure was then sealed at the ground surface with plumber’s putty. A tank containing ultra high purity (UHP) helium [99.999 percent (%)] was connected to the side port of the enclosure and enough helium was released to displace any ambient air and to maintain a positive pressure within the enclosure. Following the application of the tracer gas, one liter of soil vapor was purged using a Gillian GilAir-3 air sample pump at a rate of approximately 0.02 L/min into a 1 liter Tedlar bag.

The contents of the tedlar bag were measured for helium using a Radiodetection/Dielectric MGD-2002 Multi-gas Detector. If the helium concentration was less than 10%, the enclosure was removed and the tubing was connected to the Summa canister via the flow controller and sampling
commenced. If the concentration of helium exceeded 10%, the clay seal between the sample tubing and the concrete slab was redone and the seal was retested. The contents of the Tedlar bag containing the subslab purged air were subsequently discharged outside the building.

The subslab samples were collected over a 24-hour period using 6-liter Summa® canisters equipped with flow controller valves pre-calibrated at the laboratory (i.e., calibrated at the flow rate of approximately 0.004 L/min). Upon opening the canister valve, the initial vacuum pressure was read from the built-in gauge on the flow controller and recorded onto a Summa® Canister Sampling Field Data Sheet. After the 24 hour sampling period, the canister vacuum was recorded on the Summa® Canister Sampling Field Data Sheet and the valve was then closed. The seal was re-tested after the completion of sampling using the tracer gas to determine if the integrity of the seal was maintained throughout the sampling period. Both locations passed the post sampling seal test. The subslab sample point was then filled to grade with hydraulic cement.

2.2 Sample Analysis

All indoor, subslab, and outdoor air samples were shipped under chain-of-custody (COC) via Federal Express to Con-Test Analytical Laboratory (Con-Test), located in East Longmeadow, MA. Con-Test is a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory for the analysis of VOCs by USEPA Method TO-15. All indoor air, outdoor air, and subslab soil vapor samples were analyzed for the TCL VOCs listed in Table 1, to a minimum detection limit of 1.0 µg/m³. TCE, carbon tetrachloride and vinyl chloride in all indoor and outdoor air samples were analyzed to a minimum detection limit of 0.25 µg/m³.

In one instance, for sample H-62-AA (outdoor air) the pressure gauge on the flow controller registered zero (i.e., no vacuum remained in the canister) at the time of canister retrieval (i.e., after the 24 hour sampling period). This Summa canister was still submitted to the laboratory, where the vacuum was checked prior to analysis using a more precise pressure monitor. The canister registered a positive pressure at the laboratory. The sample was analyzed. The sample was not recollected.
3.0 RESULTS OF THE INVESTIGATION

3.1 Data Validation and Data Usability Summary Report

The data packages submitted by the laboratory were equivalent to the NYSDEC’s Analytical Services Protocol (ASP) Category B Deliverable requirements. A Data Usability Summary Report (DUSR) was prepared following the guidelines provided in Department of Environmental Remediation DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B, Guidance for Data Deliverables and the Development of Data Usability Summary Reports, May 2010. The complete validated analytical results and Form 1s are provided in the DUSR which has been included in Appendix C. The DUSR is provided in an Adobe Acrobat® portable document format (PDF) on a compact disk (CD).

Field duplicate results in general were in good agreement with the parent sample. Appendix C, Table 3 lists the relative percent differences (RPDs) for all field duplicate results. At locations where a sample and a field duplicate sample are collected, the higher value is used for the evaluation of soil vapor intrusion.

3.2 Soil Vapor Intrusion Investigation Sampling Results

SSD systems had been installed at six of the eight 2010/2011 sampling locations. The SSD system manometers were checked at all locations sampled. All SSD systems appeared to be operating properly.

Of the compounds analyzed (Table 1), only PCE, TCE (including their degradation products) and 1,1,1-TCA are site related, based on detections of chlorinated compounds in groundwater. A summary of detected VOCs in the 2010/2011 samples is presented in Table 5.

A copy of the Soil Vapor/Indoor Air Decision Matrices is provided in Appendix A. Based on this guidance, the following decisions were made for the two locations without SSD systems: Location H-10 had PCE and TCE concentrations that fell under the “Monitor” recommendation. Location H-53 had PCE and TCE concentrations which fell under the “No further action” recommendations. The NYSDEC and NYSDOH will further evaluate these data and other data in
order to determine if any actions are necessary. All other locations have SSD systems; therefore subslab samples were not collected.

At locations where a subslab sample was not collected because an SSD system was installed, indoor air samples were used to determine the effectiveness of the mitigation systems. At location H-25-09 the indoor air concentrations of PCE (180 µg/m$^3$) and TCE (6.2 µg/m$^3$) exceeded NYSDOH guideline concentrations of 100 µg/m$^3$ and 5 µg/m$^3$, respectively. Also, these concentrations were greater than concentrations detected during the 2009/2010 event (PCE at 48 µg/m$^3$, TCE at 3.1 µg/m$^3$), and more similar to those detected during the sampling event in 2008/2009 prior to SSD installation (PCE at 170 µg/m$^3$, TCE at 12 µg/m$^3$). Therefore, this location requires additional monitoring and evaluation.

A statistical summary of the subslab, indoor air and outdoor air sample results can be found in Tables 6, 7 and 8, respectively. The tables list the number of locations sampled, minimum detected value, maximum detected value, average detected value and standard deviation of the detected values, along with the location of the maximum value. It should be noted that the number of detections includes field duplicate samples.

PCE was detected in 2 of 2 subslab sample locations, 8 of the 8 indoor air locations, and 8 of the 8 outdoor air locations. PCE results in the subslab samples were 860 µg/m$^3$ at H-10 and 37 µg/m$^3$ at H-53. Indoor air results for PCE ranged from 0.67 µg/m$^3$ to 180 µg/m$^3$, with the highest concentration at H-25-09. Outdoor air results for PCE ranged from 0.40 µg/m$^3$ to 1.0 µg/m$^3$, with the highest concentration at H-09.

TCE was detected in both subslab locations, 4 of the 8 indoor air locations and 4 of 8 outdoor air locations sampled. TCE results in the subslab samples were 50 µg/m$^3$ at H-10 and 34 µg/m$^3$ at H-53. Indoor air results for TCE ranged from not detected to 6.2 µg/m$^3$, with the highest concentration at location H-25-09. Outdoor air results for TCE ranged from not detected to 1.3 µg/m$^3$, with the highest concentration at location H-62.

1,1-Dichloroethane (1,1-DCA) was detected only at the subslab location H-10 (0.62 µg/m$^3$). 1,1-DCA was not detected in the indoor air or outdoor air samples.
1,2-Dichloroethane (1,2-DCA) was not detected in both subslab locations and detected in only 1 of the 8 indoor air locations sampled. The detected results for 1,2-DCA was 1.3 μg/m³ at H-63. 1,2-DCA was not detected in the outdoor air samples.

Cis-1,2-dichloroethene (cis-1,2-DCE) was not detected in both subslab locations and detected in only 1 of the 8 indoor air locations sampled. Indoor air results for cis-1,2-DCE was 5.9 μg/m³ at H-25-09. Cis-1,2-DCE was not detected in the outdoor air samples.

Trans-1,2-dichloroethene (trans-1,2-DCE) was only detected in 1 indoor air location, at 0.20 μg/m³ at H-25-09. It was not detected in any of the subslab or outdoor air locations sampled.

Chloroethane was detected in 1 of the 2 subslab locations, 1 of the 8 indoor air and 1 of the 8 outdoor air locations sampled. The subslab result for chloroethane at H-10 was 1.4 μg/m³. The indoor air result for chloroethane at H-25-09 was 0.51 μg/m³. The outdoor air concentration at location H-10 was 0.11 μg/m³.

Vinyl chloride was not detected in either of the 2 subslab locations. It was detected in 1 of the 8 indoor air and 1 of the 8 outdoor air locations sampled. The indoor air result for vinyl chloride was 0.54 μg/m³ at location H-25-09. Vinyl chloride was detected in the outdoor air location H-10 at 0.36 μg/m³.

1,1,1-TCA was detected in both subslab locations and 2 of the 8 indoor air locations sampled. 1,1,1-TCA results in the subslab samples were 56 μg/m³ at H-10 and 1.1 μg/m³ at H-53. Indoor air results for 1,1,1-TCA were1.1 μg/m³ at H-03 and 0.23 μg/m³ at H-25-09. Outdoor air results for 1,1,1-TCA were non-detect.

Several other VOCs were also detected in the samples. However, none of these compounds are contaminants of concern at this site and/or are addressed by the current NYSDOH guidance action matrices or indoor air guidelines.

The analytical results were compared against the household product inventories. Products most commonly encountered were cleaning supplies (e.g., laundry detergent, household bleach),
paints, paint thinners and strippers, and insecticides. The product contents include petroleum distillates, glycols, methylene chloride, acetone, toluene, and xylene. Based on the PID screening during product inventory, the presence of these products did not appear to contribute to the presence of chlorinated compounds of interest in the indoor air samples.
4.0 FUTURE ACTIVITIES

4.1 Residential Mitigation and Monitoring

The NYSDEC and NYSDOH will further evaluate the vapor intrusion sampling results from the 2010/2011 heating season. The NYSDEC and NYSDOH may recommend that additional new residences be sampled, continued monitoring be performed on some residences, or that mitigation systems be installed or upgraded in some of the residences sampled during this and previous field investigations.
5.0 REFERENCES


