



Submitted to  
The Dow Chemical Company  
1790 Building  
Midland, MI 48667

Submitted by  
AECOM  
25 Building  
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2017 Corrective Action Implementation Summary Report  
and 2018 Work Plan  
The Dow Chemical Company  
Midland Plant  
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## List of Acronyms

%	percent
$\alpha$	attenuation factor
$\mu\text{g}$	microgram
$\mu\text{g}/\text{kg}$	microgram per kilogram
$\mu\text{g}/\text{L}$	microgram per liter
"Hg	inches of mercury
AOC	area of concern
AOI	analyte of interest
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAS	Chemical Abstracts Service
CFC	chlorofluorocarbon
cfs	cubic feet per second
cm	centimeter
cm/sec	centimeter per second
CMI	Corrective Measures Implementation
COC	contaminate of concern
COI	constituent of interest
CSM	conceptual site model
DCE	dichloroethene
DNAPL	dense non-aqueous phase liquid
OSHA	Occupational Safety and Health Administration
DOS	Dow On-Site
DPT	direct push technology
DU	decision unit
EDB	1,2-dibromoethane
EI	Environmental Indicator
EPA	U.S. Environmental Protection Agency
EVO	Environmental Operations
EVS	Enterprise Venture Corporation
ft	feet
ft <sup>2</sup>	square feet
ft/ft	feet per foot
ft/day	feet per day
GCL	geosynthetic clay liner
GSI	Groundwater Surface Water Interface
HCB	hexachlorobutadiene
HDPE	high-density polyethylene
HPT	hydraulic profiling tool
HSWA	hazardous and solid waste amendment
HVAC	heating, ventilation, and air conditioning
IA	indoor air



ID	Identification
IH	industrial hygiene
IM	interim measures
IRA	Interim Response Action
ISM	Incremental Sampling Methodology
lf	linear foot
kg	killogram
LNAPL	light non-aqueous phase liquid
m <sup>2</sup>	square meter
m <sup>3</sup>	cubic meter
MCL	maximum contaminant level
MDEQ	Michigan Department of Environmental Quality
MDL	method detection limit
MEK	methyl ethyl ketone
mg/kg	milligram per kilogram
mg/L	milligram per liter
MiHPT	Membrane interface hydraulic profiling tool
MIP	membrane interface probe
ml	milliliter
ml/min	milliliter per minute
MIOSHA	Michigan Occupational Safety and Health Administration
mm	millimeter
NAPL	non-aqueous phase liquid
NAVFAC	Naval Facilities Engineering Command
ND	non-detect
NEP	Northeast Perimeter
ng/kg	nanogram per kilogram
NGVD	National Geodetic Vertical Datum
OA	outdoor air
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
PAH	polynuclear aromatic hydrocarbon
PCE	tetrachloroethene
PEL	permissible exposure limit
PFOS/PFOA	perfluorooctane sulfonic acid/perfluorooctanoic acid
PID	photoionization detector
PLF	Poseyville Landfill
ppbv	parts per billion by volume
PPE	personal protection equipment
ppm	parts per million
ppt	parts per thousand
PVC	polyvinyl chloride
RAP	Response Action Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

RGIS	Revetment Groundwater Interception System
RL	reporting limit
RPF	relative potency factor
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SDF	Sludge Dewatering Facility
SG	soil gas
SS	sub-slab
SVOC	semi-volatile organic compound
SWL	static water level
TAL	target analyte list
TCE	trichloroethene
TEQ	total toxicity equivalent
URS	URS Corporation
USGS	U.S. Geological Survey
UT	under trailer
VI	vapor intrusion
VOC	volatile organic compound
WMU	Waste Management Unit
VSIC	Volatile Soil Inhalation Criteria
WWTP	Waste Water Treatment Plant

## EXECUTIVE SUMMARY

This 2017 Annual Corrective Action Implementation Summary Report and 2018 Work Plan is being submitted to summarize the Corrective Action activities that were completed in 2017 and those activities that are planned for 2017, in accordance with the Condition XI.R of the Operating License issued September 25, 2015. Dow intends to achieve the following goals during the current license period (2015-2025):

- Maintain status as “under control” for the Migration of Contaminated Groundwater Environmental Indicator (EI) through on-going operation and maintenance of remediation systems.
- By 2020, reach “under control” status for the Human Exposures EI for the Midland Plant.
- By 2025, define and implement remedy as required at areas of concern (AOCs) located along the Midland Plant perimeter not contained by the Revetment Groundwater Interception System (RGIS) including the Former Ash Pond, Overlook Park/Brine Well 13S, Chemical Disposal Well 3, Northeast Perimeter (NEP), Former Diesel Tank Farm, Pure Oil, US-10 Tank Farm and Brine Spill Sites 4M, 32S, and 6 Pond Purge Wells.
- Implement additional Source Control measures where mobile free phase liquids are identified, with priority given to those areas with potential to impact human health and the environment beyond the source area.

In order to achieve these goals, Dow has prioritized the corrective action activities, implemented planning, sampling, remedy in 2017, and has identified the next activities as described in this 2017 Summary Report and Work Plan for 2018. Sections 1.0 and 2.0 provide introduction and background information and the specific sections of the Work Plan listed below will describe the 2018 priority corrective actions that will be implemented:

- Section 3.0 Upgrades to RGIS and SDF Investigation
- Section 4.0 Midland Plant Facility-Wide Direct Contact to Soil Pathway
- Section 5.0 Midland Plant Facility-Wide Vapor Intrusion Pathway
- Section 6.0 Ambient Air Pathway
- Section 7.0 Fuel Oil Tank Farm (7<sup>th</sup> Street Purge Wells Area)
- Section 8.0 Poseyville Landfill
- Section 9.0 Northeast Perimeter

Investigation activities at Poseyville Landfill (PLF) and Sludge Dewatering Facility (SDF) completed during 2017 supported the long-term site goal to maintain the EI status of “under control” for the migration of contaminated groundwater. The corrective actions for both the Direct Contact to Soil and Vapor Intrusion (VI) Pathways continue to work towards achieving an “under control” status for the Human Exposure EI. Remediation plans developed for and implemented at the Former Ash Pond AOC, as well as work performed at the NEP, support the goal to define and implement remedy for AOCs at the Midland Plant perimeter. Continued operation of existing recovery systems will occur in 2018 to maintain source control measures where mobile free phase liquids are identified.

## 1.0 Introduction

Licensed hazardous waste management facilities are required to conduct corrective action as necessary to protect the public health, safety, welfare, and the environment for all releases of a contaminant from any waste management units (WMUs) at a facility, pursuant to Part 111. The purpose of the Part 111 Corrective Action Program is to address releases of hazardous wastes and hazardous constituents at hazardous waste management facilities in a timely manner. Corrective actions conducted pursuant to Part 111 are designed to be protective of human health and the environment both in the short-term and long-term. Short-term corrective action focuses on the implementation of interim actions to achieve stabilization and to control the source(s) of release to reduce or eliminate, to the extent practicable, further releases of hazardous waste or hazardous constituents that may pose a threat to human health or the environment. To be protective in the long-term, final remedies are designed and implemented to achieve media specific cleanup objectives, either through remediation and/or institutional controls, including identification (ID) of specific points of compliance and monitoring.

For the purposes of Part 111, corrective action applies to areas or units described as WMUs or areas of concern (AOCs). WMUs are defined as any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at the Midland Plant at which solid wastes have been routinely and systematically released. AOCs are areas where hazardous waste, hazardous constituents, or hazardous substances may have been released to the environment on a non-routine basis, which may present an unacceptable risk to public health, safety, welfare, or the environment, and are subject to the corrective action requirements of Part 111 of Act 451 and the remediation requirements of Part 201 of Act 451.

The Michigan Operations Midland Plant is a large industrial site located in Midland, Michigan with an operating history of over 115 years and multiple historical sources of contamination. The site location is identified in Figure 1-1. The entire Midland Plant is designated as a WMU and within the Midland Plant there are a number of individual WMUs and AOCs. The locations of the WMUs and AOCs at the Midland Plant are shown in Figures 1-2 and 1-3, respectively. A summary of each unit/area is provided on the updated Summary of Actual or Potential Sources of Contamination (Attachment 1). At the Midland Plant, corrective action is performed in a phased approach that focuses on areas that represent the greatest short-term risk to human health and/or the environment, which is consistent with site corrective action objectives.

Corrective action at the Midland Plant focused on five main priorities:

- Site-Wide Containment;
- Worker Exposure Control Program;
- Monitored Natural Attenuation;
- Contaminant Mass Reduction; and
- Off-site Corrective Action.

The goal of these activities and programs has been to achieve stabilization of the WMUs, meet the Groundwater Contained EI, manage worker exposure, and address off-site releases. The next phase of corrective action will emphasize meeting the Human Exposure EI.

This 2017 Annual Corrective Action Implementation Summary Report and 2018 Work Plan is being submitted to summarize the Corrective Action activities completed in 2017 and those that are planned for 2018, in accordance with the Condition XI.R of the Operating License issued September 25, 2015. The comprehensive schedule for the current license period (2015 to 2025) is summarized in the updated Corrective Action Implementation Plan High Level Overview (Attachment 2).

## 2.0 Background

Dow intends to achieve the following goals during the next license period:

- Maintain status as “under control” for the Migration of Contaminated Groundwater EI through on-going operation and maintenance of remediation systems.
- By 2020, reach “under control” status for the Human Exposures EI for the Midland Plant.
- By 2025, define and implement remedy as required at AOCs located along the Midland Plant perimeter not contained by the Revetment Groundwater Interception System (RGIS) including, the NEP, US-10 Tank Farm, Former Diesel Tank Farm, Ash Pond, Chemical Disposal Well 3, Pure Oil, Overlook Park and Brine Spill Site 13S, and Brine Spill Sites 4M, 32S and 6 Pond Purge Wells.
- Implement additional Source Control measures where mobile free phase liquids are identified, with priority given to those areas with potential to impact human health and the environment beyond the source area.

Each of the goals is discussed further below.

### 2.1 Sustain Control of Contaminated Groundwater

To maintain the status as “under control” for the Migration of Contaminated Groundwater EI, corrective action would include activities such as maintaining RGIS and other corrective action systems, completing system upgrades as necessary, monitoring groundwater, investigation and other remedial actions to address increasing trends in contaminants or indicator parameters identified during environmental monitoring. Based on age, design, and current operating conditions, a project to upgrade the RGIS from Lift Station #4 to Lift Station #5 is planned for future construction. Additional investigation was conducted in the northwestern portion of the closed Sludge Dewatering Facility (SDF) during 2017, within and adjacent to Cell 1. Engineering and operational evaluations of these systems are on-going. At locations where engineering controls are not in place, such as the Northeast Perimeter (NEP), Former Fuel Oil Tank Farm, Ash Pond, and Chemical Disposal Well 3, additional corrective actions may be required to stabilize migration of contaminated groundwater or demonstrate that the area of contamination is not expanding.

### 2.2 Achieve Control of Human Exposures

As part of the License Reapplication, Dow completed the Resource Conservation and Recovery Act (RCRA) EIs for Human Health for the Midland Facility. Based on the conclusions of the EI, the following exposure pathways warrant further evaluation to achieve “under control” status under the EI:

- Soil Direct Contact;
- Indoor Air; and
- On-site Outdoor Air.

The conclusions of the EI found that soils (surface and subsurface soils) were known to be contaminated above appropriately protective risk-based levels. The EI conclusions indicated that it was unknown whether or not indoor air due to vapor intrusion (VI) was contaminated above appropriately protective risk-based levels. Based on the ongoing ambient air monitoring program, no significant impact has been identified at the facility; however, Dow will further evaluate the ambient air pathway (on-site outdoor air).

The following subsections present further discussion on the soil direct contact, indoor air and on-site outdoor air exposure pathways and an overview of how Dow plans to achieve “under control” status for each of these medium.

### **2.2.1 Soil Direct Contact**

Surface soil (< 2 feet deep) contamination is generally present throughout the Facility as a result of historical releases from former combustion units and manufacturing units and largely contains persistent compounds with low solubility that are strongly sorbed to soil particles. Subsurface soil (> 2 feet deep) contamination is generally present throughout the Facility as a result of historical releases from manufacturing or WMUs and may also include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals, in addition to the persistent compounds also found in surface soil.

The soil direct contact pathway includes exposure via long-term dermal contact with and ingestion of soils throughout the soil column, regardless of depth. For potential on-site receptors, this exposure pathway is complete. Aerial dispersion, wind-blown dust, and operations of the facility over time have yielded some detected soil concentrations near or at the surface that are greater than the soil direct contact non-residential generic criteria. Exposure to soils at depth is not reasonably expected to be significant since the exposure routes are managed by the required use of personal protection equipment (PPE) specified in the Worker Exposure Control Plan.

Dow has placed surface cover to prevent exposure via the direct contact pathway for surface soils (Figure 2-1). The covers include clean top soil and vegetation, gravel, and/or asphalt. In order to achieve “under control” status for the EI, Dow is evaluating the site in a phased approach and will continue to complete surface improvements in the remaining areas of the facility, as necessary. Section 4.0 summarizes the work that was completed in 2017 and presents the work that will be completed in 2018.

### **2.2.2 Indoor Air**

Indoor air at the facility is currently evaluated through the industrial hygiene (IH) program. To date, the absence or presence of contaminants in indoor air beyond the IH program is not known. The IH program evaluates and measures those analytes that are relevant for occupational industrial exposure. However, the specific potential influence of VI on the indoor air is not known. VI can occur from groundwater volatilization to indoor air and soil volatilization to indoor air. In order to achieve “under control” status for the EI, Dow is evaluating VI at the facility in a phased approach. Section 5.0 presents the work that was completed in 2017 and presents the work that will be completed in 2018.

The groundwater volatilization to indoor air exposure pathway addresses vapors emanating from groundwater that could move through the soil vadose zone and migrate to indoor air at the Midland Plant, and is only applicable to volatile compounds. The soil volatilization to indoor air exposure pathway addresses vapors that could move through the soil vadose zone and migrate to indoor air in buildings at the facility. This exposure pathway is potentially complete for on-site workers through the inhalation of vapors in indoor air of buildings where they work or routinely visit. On-site worker protection and compliance with Michigan Occupational Safety and Health Administration (MIOSHA) standards is monitored through plant specific industrial hygiene monitoring programs.

### **2.2.3 On-Site Outdoor Air**

In order to achieve “under control” status for the EI, Dow will maintain current ambient air and fugitive dust monitoring programs until further evaluation is completed and it is determined that further action is warranted. The soil volatilization to ambient air and particulate soil inhalation pathways will be considered as relevant data is collected to support the direct contact pathway evaluation during this license period (2015-2025).

### **2.2.3.1 Soil Volatilization to Ambient Air**

The soil volatilization to ambient air exposure pathway applies to all land uses where hazardous substance vapors may emit from soils to ambient air. The outdoor air at the facility is monitored by the Ambient Air Monitoring Program (Attachment 16 of the License). To date, the program has not identified significant impacts from the facility. Dow will continue to monitor and review ambient air as part of future corrective action efforts (Appendix G of Attachment 19 of the License).

Construction workers can potentially encounter vapors when working with subsurface soils or in a trench scenario; however, exposure is not reasonably expected to be significant since the exposure routes are managed by the required use of PPE and air monitoring specified in the Worker Exposure Control Plan, Appendix C of Attachment 19 of the License.

### **2.2.3.2 Particulate Soil Inhalation**

The particulate soil inhalation exposure pathway addresses the emission and dispersion of contaminated soil particles into the ambient air (inhalation of fugitive dust particles). Exhaust constituents from process vents, power generation, and thermal incineration processes may have deposited onto plant soils. During dry periods, these soils may have been disturbed by equipment or vehicles and blown by the wind, resulting in fugitive dust emissions.

Fugitive dust control has been in progress at the Midland Plant since 1986. Dow is currently required by the 2015 Operating License and its Renewable Operating Permit (Section 1, IX.5) to provide and regularly update an operating program to control fugitive dust sources or emissions. The current fugitive dust control program requires semi-annual review and updates. In addition, fugitive dust emissions from the facility are monitored for dioxin emissions on an ongoing basis along the plant perimeter pursuant to the "Soil Box Data Evaluation Plan," approved by Michigan Department of Environmental Quality (MDEQ) on September 25, 2015. Monitoring began in 2002 and continues to show the fugitive dust control program for the facility is effective.

In order to limit the generation of fugitive dust and particulates, Dow has placed surface cover on surface soil in certain areas of the facility. The covers include clean top soil and vegetation, gravel, and/or asphalt. Existing covers are managed and maintained. Based on current conditions, this pathway is likely to be adequately controlled.

## **2.3 Remedy Implementation for AOCs**

By 2025, Dow intends to define and implement remedy as required at AOCs located along the Midland Plant perimeter not contained by the RGIS including, the Former Ash Pond, Overlook Park/Brine Well 13S, Chemical Disposal Well 3, NEP, Former Fuel Oil Tank Farm, Pure Oil, US-10 Tank Farm and Brine Spill Sites 4M, 32S and 6 Pond Purge Wells. Background information on each of these AOCs can be found in the 2016 Corrective Action Implementation Work Plan (12/30/2015). During 2017, corrective actions were conducted at the following AOCs:

- Former Ash Pond;
- Sludge Dewatering Facility; and
- NEP.

Additional actions are planned during 2018 for the following sites:

- Former Ash Pond;
- Chemical Disposal Well 3;

- NEP; and
- Former Fuel Oil Tank Farm.

Work at the remaining AOCs will be completed according to the updated Corrective Action Implementation Plan High Level Overview (Attachment 2).

## **2.4 Additional Source Control Measures for Mobile Free Phase Liquids**

Dow has identified 16 areas of free product, consistent with the Compliance Schedule H-8 of the 2003 Operating License (listed in Table 2-1). In 2014, Dow installed a free-product recovery system in LEL III. Since installation, approximately 23,830 gallons of free product were recovered through the end of November 2017. Manual recovery operations conducted at two additional locations recover approximately sixteen gallons of dense non-aqueous phase liquid (DNAPL) each year. During 2018, work will consist of on-going operation of the manual recovery and free product recovery system installed in LEL III as well as additional recovery at the Fuel Oil Tank Farm (7<sup>th</sup> Street Purge Well Area) AOC (described in Section 7.2).

## **2.5 Priority Actions Completed in 2017**

Dow completed the following activities during 2016:

### RGIS and SDF

- Completed geotechnical evaluation of riverbank from Lift Station #104 to #105, including a tile sizing and capacity evaluations for an upgrade to the existing RGIS in the area;
- Completion of design drawings for RGIS Upgrade from Lift Station #104 to #105;
- Conducted evaluation of pumping test results and hydraulic information from Cell 1 at SDF;
- Completion of a design for a demonstration-scale system to lower leachate levels within Cell 1 at SDF; and
- Submitted repair plan approval request to MDEQ for final cover of Cell 1 at SDF.

### Direct Contact to Soil Pathway

- Performed Interim Response Actions (IRAs) in Zone 1 to address elevated concentrations of dioxins and furans;
- Performed IRAs in Zone 2 to address elevated concentrations of dioxins and furans;
- Conducted soil sampling of identified decision units (DUs) in Zone 2;
- Conducted replicate sampling for specific DUs and tested in triplicate using U.S. Environmental Protection Agency (EPA) Method 1613b; and
- Evaluated results and identified a path forward based on the results.



### VI Pathway

- Defined areas of the facility for the phased approach and implemented work within Zone 2 of VI work;
- Performed target analyte list (TAL) verification sampling in Zone 2 at areas of clustered buildings of interest;
- Conducted building structure, use, and occupancy assessments to categorized structures in Zone 2;
- Performed building surveys for those buildings identified for sampling (Categories 1 and 2);
- Created a sampling plan for each building to be sampled; and
- Conducted soil-gas, indoor air and outdoor air sampling at the Category 1 and 2 buildings within Zone 2 Phase I and Phase II (analytical results for Phase II are not included in this report but will be presented to MDEQ during a January or February 2018 meeting and formally presented with evaluation in the December 2018 Annual Report).

### Former Ash Pond AOC

- Finalized the Response Action Plan/Corrective Measures Implementation (RAP/CMI) Report for the source removal actions performed in 2016, including a proposed groundwater monitoring program.

### NEP

- Conducted 67 soil borings equipped with a membrane interface probe (MIP);
- Collected 77 confirmatory groundwater samples from the MIP borings and additional groundwater from existing wells
- Identified the potential source area for chlorinated ethenes undergoing natural attenuation along the northeast plant perimeter; and
- Delineated the extent of chlorofluorocarbons (CFCs) in groundwater in the northeast perimeter.

### Poseyville Landfill (PLF)

- Conducted plume analytics to help provide a better understanding and delineation of the northeast plume;
- Conducted 27 soil borings equipped with a MIP;
- Collected 33 confirmatory groundwater samples from the MIP borings and additional groundwater from existing wells;
- Redeveloped Purge Wells 2960P and 2917 on October 19 and December 13, 2017; and
- Began purge well pilot optimization on November 13, 2017 (running two purge wells at plume core – 2960P and 2917 at higher flow rates and shutting down purge wells at the outer edge of the plume 2961 and 2960).

Dow has prioritized the following corrective action activities for continued efforts to achieve the long-term goals described in this work plan for 2017.

## **2.6 Follow-Up Work from 2017**

### **2.6.1 Ash Pond**

An updated groundwater monitoring program for the former Ash Pond AOC was developed, and draft institutional control documents were prepared during 2017 to enable the finalization of the RAP/CMI. The RAP/CMI will be submitted by March 31, 2018.

### **2.6.2 Chemical Disposal Well 3**

Closed Chemical Disposal Well #3 is located east of Poseyville Road within the Midland Plant (see Figure 2-2). The well was formerly used for injection of wastewater and was closed in 1985. Off-site flow was determined to have the potential to vent to storm sewers that were present at that time that drained southwards, eventually discharging to the Tittabawassee River downstream of the Dow Dam. Supplemental soil and groundwater characterization was completed in 2011 and early 2012. Results were used to evaluate the exposure pathways at the relevant properties affected by this contamination. An IRA Work Plan was submitted on March 16, 2012 to address venting to surface water and dermal contact to groundwater and the work described in the Plan was completed in the summer and fall of 2012.

The IRA included a source removal activity was performed and approximately 5,280 cubic yards of existing contaminated soil was removed and disposed of at Salzburg Landfill. The source removal areas are identified on Figure 2-3 (hatched areas). Due to the presence of three existing active utilities that remain in place (8-inch Consumer's Gas Main, 12-inch High Pressure BreitBurn Management Company, LLC High Pressure Gas Main, City of Midland 10-inch Water Main), contaminated soils remained in place after completion of the IRA.

Four cross-ties linking the sewers on each side of the road potentially acted as preferential flow paths. Three cross-ties were subsequently physically removed, and the fourth (4<sup>th</sup>) cross-tie, a 60-inch culvert, was plugged with flow fill. A 30-foot clay plug was also installed on the eastern boundary of the culvert to minimize flow along the backfill. To provide for proper drainage after removal of the sewers, the following drainage enhancements were completed:

- Relocated the north branch of the Hardy Drain to drain beneath Poseyville Road (north of the subject site);
- Regraded the Dow West Property to direct roadway and other surface drainage to the north towards the newly relocated north branch of the Hardy Drain; and
- Regraded the Dow East Property to direct roadway runoff northwards to the newly relocated north branch of the Hardy Drain.

The historic release from former refinery related pipelines was addressed at the Poseyville Road Property by conducting soil and pipeline removal during roadway construction in 2012. Excavation activities were conducted simultaneously with road closures planned for the re-paving of Poseyville Road by the City of Midland. The pipeline removal activities included not only removing the pipelines, but also the impacted soils that were encountered surrounding the pipelines.

The IRAs completed in 2012 were designed to be protective of human health and the environment; however, they were not intended to result in un-restricted residential use. Ultimately, an institutional control agreement is anticipated for any property that may be affected by residual contamination. In support of an institutional control agreement, the following will be addressed:

- Residual impacts as a result of the contaminated soils that remain in place surrounding the active utilities, as described above; and
- Drinking Water Use (which includes evaluating the potential to impact drinking water use in the deeper sand layer identified at the Dow East Property).

The following follow-up actions will be completed during 2018 to address these items:

- Collect additional groundwater samples from select shallow wells for a reduced target list to identify if any trends are evident;
- Collect and analyze additional samples from deeper wells and testing for major ions to determine if the chloride impacts are limited to the area around deep well 3143;
- Slug tests will be performed on nine monitoring wells to establish representative hydraulic conductivity values;
- Based on results of these actions, identify the area or parcels that would need an institutional control agreement to address the residual issues at the site; and
- Perform corrective action groundwater monitoring program for the area.

The following sections will describe the 2018 priority corrective actions that will be implemented:

- Section 3.0 Upgrades to RGIS and SDF Investigation
- Section 4.0 Midland Plant Facility-Wide Direct Contact to Soil Pathway
- Section 5.0 Midland Plant Facility-Wide Vapor Intrusion Pathway
- Section 6.0 Ambient Air Pathway
- Section 7.0 Fuel Oil Tank Farm (7<sup>th</sup> Street Purge Wells Area)
- Section 8.0 Poseyville Landfill
- Section 9.0 Northeast Perimeter

### 3.0 Upgrades to the RGIS and SDF Investigation

The RGIS was originally installed between 1980 and 1992 along the banks of the Tittabawassee River and around the Tertiary Pond in Midland Plant. The 6 Pond Collection Tile (originally referred to as the 'Riverbank Restoration System') was installed in the late 1970's. The South Saginaw Road Tile was installed in 2002 along the Eastern perimeter of the Facility. Each system is a French drain tile collection and pumping system designed and built to ensure untreated groundwater does not enter the Tittabawassee River and Bullock Creek. Starting in 1994, sections of RGIS were upgraded to enhance performance and extend their operational life. A section of RGIS was upgraded in 2016.

The following sections summarize the work that was completed on the RGIS in 2016, as well as future changes to the RGIS and work performed at SDF during 2016.

#### 3.1 Seventh Street Purge Well Area

The Seventh Street Purge Well Area is located in Sections 21 of T14N, R2E, within the City of Midland, Midland County, Michigan. The area is east of Poseyville Road, along the western bank of the Tittabawassee River, just upstream of The Dow Dam at the Dow Michigan Operations Plant. The location is identified on Figure 3-1. The Seventh Street Purge Well Area is currently an industrial area including paved and gravel roadways, a service water pump house, and above ground utility truss supporting utilities which cross the Tittabawassee River via either of two bridges spanning the River at the eastern extent of the study area (see Figure 3-2). Groundwater pumping wells (purge wells) are operated in the area as stipulated by RCRA License operating conditions. Along the eastern margin of the study area, the Tittabawassee River flows from north to south at levels generally around 597 feet National Geodetic Vertical Datum (NGVD) 29. A service water intake basin was constructed along the west portion of the Tittabawassee River within the study area, partially separated from the main flow channel by a steel sheet pile wall.

##### 3.1.1 Geology

The site lies in the Eastern Lowlands Physiographic Region of Michigan's Lower Peninsula. This region has very flat topography of lacustrine origin and is found along coastal areas in the southeastern part of the state, extending north from the Saginaw Bay area, along Lake Huron to the northern tip of the Lower Peninsula. Soil types are typically derived from glacial and post-glacial fluvial processes and generally are composed of coarse-grained material deposited in ancient beach and near-shore environments and clay-rich lacustrine deposits.

A number of soil borings have been made in the immediate area up to 80 feet (ft) below ground surface (bgs), which provide detailed geologic information for the study area. The geologic setting is fully described in the Update to the Hydrogeologic Report (URS Corporation [URS], June 5, 2013). In general, there are four functional geologic units at the Facility:

- Bedrock;
- Regional Aquifer;
- Regional Aquitard (Lakebed Clay and Glacial Till Units); and
- Surface Sands.

The bedrock in the Midland area, are from the Paleozoic Era, Pennsylvanian Age Saginaw Formation. The sediments, which formed these rocks, were deposited in the Michigan Basin 210 to 235 million years ago. In the area studied, the uppermost bedrock is primarily shale, often sandy or silty, and is interbedded with sand seams. Deep wells and borings in the area indicate the bedrock surface has a

good deal of relief. The bedrock surface elevation ranges from less than 200 feet U.S. Geological Survey (USGS) datum to more than 500 feet USGS datum. Most of the available water in this formation is contained in the sandstone seams, and is often highly mineralized, with dilute brine and/or iron and sulfur. The sandstone layers are not significantly used as aquifers except in a few areas where other aquifers are not available for domestic water supplies. The salinity of the water and necessary depth of wells (over 400 feet) are barriers to widespread usage of the bedrock as a viable water supply.

The fluvial sediments of the Regional Aquifer comprise the largest usable aquifer beneath the Facility, although it has not been extensively developed as a water supply. Analysis of the water indicates that while useable, mineralization (predominantly iron, hardness, and sodium) levels are higher than the standards for a satisfactory water supply, due primarily to mixing with the saline waters of the bedrock. The dendritic nature of the Regional Aquifer fluvial deposits results in uneven distribution of the wells used to monitor the aquifer. Only thin clayey sands isolated from the main aquifer were encountered in the southwest corner of the Tertiary Pond, and the aquifer pinches out altogether under the Salzburg Landfill. Regional Aquifer wells in the west half of the Facility area are flowing wells. The hydraulic head, although still artesian, falls toward the east, with the water level about 15 feet below grade along Waldo Road.

The Regional Aquitard Unit is composed of two sub-units: Lakebed Clay and Till with hydraulic conductivity ranging roughly from  $1 \times 10^{-6}$  to  $1 \times 10^{-9}$  centimeters per second (cm/sec). The Lakebed Clay is a lake bottom sedimentary deposit from a late pleistocene pro-glacial lake, lying directly over the Till. It consists of stratified, highly plastic clay layers mixed with varying fractions of silt and sand. Discrete layers of sand, sandy gravel, and silt, usually 0.5 feet or less in thickness, are interbedded within the clay and represent a small fraction of the total unit. These sandy and silty layers are often wet, and are the source of most of the water in borings that penetrate this unit. The Lakebed Clay ranges in thickness from being absent under much of the Tittabawassee River and Bullock Creek to 24 feet in thickness along the north edge of the Facility. The bottom elevations range from 580 to 605 feet USGS datum, and top elevations typically lie between 617 and 622 feet USGS datum.

The Till sub-unit is an ice-deposited formation (lodgement till) with occasional interbedded fluvial sands and gravels, as well as interglacial intervals representing varved proglacial lake deposits. It is extremely stiff, highly compacted, grayish blue, poorly sorted diamict, being a compacted mixture of sand, silt, and clay, with the clay fraction (defined as particles less than five microns in diameter, rather than by specific mineralogy) averaging about 30 percent (%). This is in direct contrast to the Lakebed Clay unit, where the clay fraction usually exceeds 50%. The liquid limit and plastic index average 20.4 and 8.4, respectively. The pH ranges from 8.0 to 9.0. The Till is classified as SM, SC, SC-SM, CL-ML, and CL in the Unified Soil Classification Standard. The Till can be identified during drilling by rock fragments, hard drilling, and a more uniform and coarse texture than the overlying Lakebed Clay unit. Soil borings which have completely penetrated the aquitard indicate an aquitard thickness of 120 to over 250 feet.

Stratified drift inclusions, sand tills, commonly referred to as "Deep Sands" or "Till Sands" within the massive (unstratified) till. As part of the glacial episodes, streams and deep pockets ("kettles") were eroded into the clay till. These structures often received deposits of fine-grained silty sand or coarser material carried by the meltwater. Subsequent glacial advances resulted in high compression of these sediments along with the water trapped in the pore spaces of the sediments. The result was the random occurrence in several areas of pockets of more permeable material within the Glacial Till. Most Till Sands are small units, completely isolated by Glacial Till, but a few fluvial structures extend for several thousand feet through the glacial sediments. Very few of these structures are shallow (e.g., high in the glacial stratigraphic sequence) where post-glacial erosion has exposed them to shallow surface sediments. Two areas have been identified at the erosional base of the Tittabawassee River, one of which is located within the subject area of this work plan. In the subject area, the base of the deep sand is identified at 35 ft bgs near Purge Well 7, and slopes downwards to a low point (77 feet) near Purge Well 4.

Because the area near Michigan Operations offsite is urban, the near-surface soil has been disturbed by excavation, filling, and grading activities since land development began in the area. The uppermost stratum in the immediate area is the "surface sand" (0 to 18 feet). This unit is described in soil borings

generally as loose miscellaneous fill sand, with cinders, in some cases with significant debris. In the subject area, a firm sandy gray silt has been encountered at the base of the surface sands, which in some areas is found with a plastic silt clay which function as a localized aquitard, isolating the shallow perched groundwater from the deep sand. Portions of the subject area do not include the upper aquitard and are directly connected to the underlying deep sand. The deep sand in the subject area is described as very compact to extremely compact fine to coarse brown sand with seams of gravel or gravelly sand which yields significant quantities of water. At the base of the sand, the Regional Aquitard is encountered, being described as extremely stiff moist silty blue clay, or hardpan. The critical geologic units are the surface sand and the glacial deep sand, historically referred to as the 'Area 1 Till Sand'.

### 3.1.2 Hydrology

The Tittabawassee River runs along the eastern edge of the study area. It has a drainage area of 2,400 square miles. The river has an average discharge of 1,750 cubic feet per second (cfs) (average of 1936 to 2011), with the peak streamflow of 38,700 cfs measured in 1986, at a gage height of 33.89. The national weather service has established 'flood stage' at a gage height of 24 feet (measured at the USGS gaging station, roughly 1,000 downstream of the study area). The national weather service has also established a 'moderate flood stage' at a gage height of 25 feet. Immediately downstream of the study area, the Dow Dam maintains the river level above the spillway elevation of 596.4 feet, to facilitate intake pumping for fire protection at the site.

During April and May of 2013, prolonged rains resulted in a peak discharge on April 20 of 25,900 cfs at a gage height of 28.34. During this high water event, the water level stayed above the 'moderate flood stage' for 8 days. Continued rainfall during May resulted in a second high water event on May 30 of 16,700 cfs at a gage height of 23.61 (just below flood stage). The daily average river levels during both of these high water events can be observed on the hydrograph presented as Figure 3-3.

Groundwater in the study area is generally present in two strata, the surface sands (generally miscellaneous fills from 0-18 feet in the study area, generally referred to as the shallow perched groundwater) and the deep sand area. Previous study (URS, 2007) of the shallow groundwater concluded that the shallow perched groundwater is flowing easterly toward the Tittabawassee River at an approximate hydraulic gradient of 0.03 feet per foot (ft/ft). The perched groundwater flow is restricted and/or retarded along the bank by the presence of silts and clays present adjacent to the river. Although the sediments in this immediate area have a relatively low hydraulic conductivity, a hydraulic connection to the Tittabawassee River is present.

Previous studies (McDowell and Associates, 1986 and Radian International, 2000) of the deep sand area have concluded that a hydraulic connection between the groundwater in the deeper sand till and the Tittabawassee River exists. The geometric mean of hydraulic conductivity utilized in this portion of the deep sand is  $9.11 \times 10^{-3}$  cm/sec (25.82 feet per day [ft/day]) (Revetment Groundwater Interception System Hydraulic Loading and Flow Study, 1996). This value was determined by various aquifer test analyses of wells 2925, 2927, 2930, 2931, 3141, 4175, 3863, 3308, 4174, 3305, 3304, 3688, 3289, 3689, and 3690. The potentiometric gradient measured between 3141 and 3549A (located 578.3 feet apart) on February 25, 2002 was 0.0043 ft/ft (Michigan Operations Shallow Groundwater Elevation Contours for the First Quarter 2002; EPA Facility ID Number MID 000 724 724, submitted March 13, 2002). The assumed porosity for the deep sand in the area is 20%, which is reasonable for a glacial till sand. Applying the above values to Darcy's equation for groundwater velocity yields an estimated groundwater velocity potential at this portion of the deep sand of 0.553 ft/day from 3141, adjacent to Poseyville Road eastward to the Seventh Street Purge Well Area.

Dow conducted interim measures (IMs) during 2013 and 2014 in the Seventh Street Purge Well Area to improve the performance of hydraulic controls during extended flood events similar to those observed during the spring of 2013. Included in the IRA was the installation of a 365-foot long section of 8-inch diameter stainless steel screen horizontal well that was installed at an approximate elevation of 583 feet and a centralized lift station (LS #121). The new horizontal well has a demonstrated capability to greatly

out-perform the vertical wells in the area, effectively making them obsolete. As outlined in the IRA for the Seventh Street Purge Well Area, submitted August 2, 2013 and the Horizontal Well Design for the Seventh Street Purge Well Area, submitted April 15, 2014, the horizontal well installed during 2014 was intended to replace the existing Purge Wells #5, #6 and #7 (reference Figure 3-1); and Dow reviewed their initial plans to do so with MDEQ during a meeting on October 11, 2016.

Pursuant to the Midland Plant Sampling and Analysis Plan (SAP), Table 2-F, performance monitoring is performed by measuring water levels in 10 piezometers on a monthly basis, developing a groundwater contour map and determining if groundwater at the site is being captured by the purge wells (preventing upland groundwater from flowing to the Tittabawassee River), within seven calendar days. Dow will cease pumping wells PW-5, PW-6, and PW-7, beginning March 1, 2017. During the initial shutdown of the wells, water levels will be made from the piezometers listed in Table 2-F of the SAP on a daily basis for a period of one week. Provided performance criteria are still met, routine monthly monitoring will resume, and PW-5, PW-6, and PW-7 will be properly abandoned by the end of 2018.

### 3.2 Future RGIS Upgrades

The next planned upgrade project is designated as the RGIS LS # 104 to LS #105 Tile Upgrade Project (see Figure 3-4). In general, all work will be performed in accordance with the detailed specifications that have been used and approved by the MDEQ on past RGIS upgrade projects, as well as Appendix A of Attachment 19 of the Operating License issued September 25, 2015.

The major scope items proposed for this project include:

- Installation of a new concrete sump/lift station to replace existing Lift Station #105;
- Installing just under 2,300 feet of new 8-inch diameter, SDR 21, perforated, high-density polyethylene (HDPE) pipe and drainage media;
- Constructing four new piezometer clusters, including automated primary piezometers;
- Installation of a composite cap and access roadway over the drainage media; and
- Use of a temporary gravel construction roadway outboard the existing sheet piling for access during construction.

Tasks that have been previously completed to support the design and planning of the construction include a hydrogeological soils investigation and chemical characterization of soils. Chemical characterization data have been submitted previously in quarterly environmental reports.

Dow currently anticipates completing this work over two construction seasons. The first year will likely include installation of the new lift station and approximately 30% of the drainage media and perforated pipe, composite cap and relevant piezometer clusters. The second year of construction will complete the installation of the drainage media, composite cap and relevant piezometer clusters. At both the end of the first construction season and the end of the project, the site will be restored prior to the winter. Dow currently anticipates construction during 2019 and 2020; however, that is dependent upon other projects and the construction schedule may be adjusted.

The Project Site is located along the Eastern bank of the Tittabawassee River, approximately 940 feet downstream of the Dow Dam in Section 28 of Midland Township (T14N, R2E), Michigan (see Figure 3-4). The Site includes an approximately 2,277-foot excavation beginning roughly at existing LS #104 and extending southeast to new LS #105, being the new proposed downstream leg for LS #104 and upstream leg for LS #105. The site ranges in elevation from 595 to 598 feet (referenced to NGVD 29). This project will help prevent upland groundwater from migrating to the Tittabawassee River.

A new groundwater collection tile and permeable cutoff wall (french drain) will be installed by excavating an approximately 30-inch wide trench and installing filter stone (drainage media) and an 8-inch perforated HDPE collection pipe (tile). The upper portion of the trench will be backfilled with natural soils that were excavated and stockpiled from the trench. The natural soils backfill portion of the system will be isolated from the drainage media by a geosynthetic clay liner (GCL). Relevant design drawings are included as Attachment 3.

Soils were investigated by completing 10 geotechnical soil borings ranging in depth from 18 to 38 ft bgs. A field geologist identified the soils by logging with continuous split-spoon sampling. Soil boring logs are included as Attachment 3. Twenty-three soil samples were obtained using split-spoon liners and tested for index properties to establish ranges of key design parameters.

### **3.2.1 Soils Evaluation**

Ten soil borings, designated 8878G through 8886G and 8888G, were completed at the site in a northwest to southeast orientation along the proposed routing for the groundwater collection tile and permeable cutoff wall (see Figure 3-5). Results of soil index testing are presented in Attachment 3.

Soils encountered in soil boring 8878G included roughly 18 inches of sand fill on top of compacted clay down to 5 feet. Beneath the clay was sand and sandy soils to a depth of 15 feet. Till was encountered beneath the sandy soils from 15 feet to the bottom of the boring at 20 feet.

Boring 8879G was advanced to a depth of 28 feet. Observed soils include 18 inches of sand and crushed limestone roadway on top of compacted clay cap soils down to 3 feet. Sand and fill materials were encountered beneath the clay to a depth of 13 feet, 6 inches. Clay till was encountered below the sand from 13 feet, 6 inches to the bottom of the boring at 28 feet.

Soils encountered in soil boring 8880G included roughly 12 inches of crushed limestone roadway followed by 2 feet of compacted clay. Sand and sand fills were encountered beneath the clay from 3 feet to 13 feet. Silt and medium dense clay was observed to 15 feet. Till was observed from 15 feet to the bottom of the boring at 28 feet.

Boring 8881G was advanced to a depth of 18 feet. Observed soils include roughly 12 inches of crushed limestone roadway followed by 18 inches of compacted clay. Sand and sand fill was encountered to a depth of 15 feet. Dense gravel was observed beneath the sand. Till was encountered beneath the gravel to the bottom of the boring at 18 feet .

Soils encountered in soil boring 8882G included roughly 12 inches of fine sand followed by a 3 feet, 6 inches of compacted clay. Sand, sand fill and debris was observed below that to the top of the clay at 14 feet. Competent till was encountered from 15 feet to the bottom of the boring at 18 feet.

Boring 8883G was advanced to a depth of 28 feet. Observed soils include roughly 15 feet of sand and sand fill. Till was observed beneath that from 15 feet to the bottom of the boring.

Soils encountered in soil boring 8884G included roughly 12 inches of sand fill over 3 feet of compacted clay soils. Sand and sand fill was observed to a depth of approximately 16 feet, 6 inches with competent till encountered from 17 feet to the bottom of the boring at 28 feet.

Boring 8885G was advanced to a depth of 18 feet. Observed soils include 4 feet of sand fill with some gravel followed by 2 feet of compacted clay. Below that, clay and sand fill was encountered to a depth of 12 feet. Clay and silt was observed from 12 feet to 15 feet. Till was encountered from 15 feet to the bottom of the boring.

Soils encountered in soil boring 8886G included roughly 18 inches of sand and gravel fill, followed by 18 inches of compacted clay. Below that, sand and sand fill with traces of gravel were observed to a depth



of 18 feet. Medium dense silt and very stiff clays were encountered to a depth of 27 feet. Till was encountered from 27 feet to the bottom of the boring at 38 feet.

Boring 8888G was completed at the top of the revetment and was advanced to a depth of 21 feet. Observed soils include roughly 2 feet of sand clay fill, followed by sand fill to a depth of just under 8 feet. Below that, ash and cinder fill were encountered to the bottom of the boring.

### **3.2.2 Tile Sizing Evaluation**

Evaluation of the system was made by developing conservative estimates of inflow and verifying that design parameters were sufficient to manage worst-case scenario.

#### **3.2.2.1 Estimation of Tile Inflow Components**

The proposed groundwater collection tile and permeable cutoff wall is oriented roughly north-to-south; therefore each of the parameters considered below are made with respect to inflows from both Plant side and River sides of the system. The methods for estimating inflows are in accordance with those presented in Naval Facilities Engineering Command (NAVFAC) P-418, Dewatering and Groundwater Control.

#### **3.2.2.2 Upland Groundwater Head**

To establish the upland groundwater head along the Plant side, water levels from upland piezometers were reviewed and the maximum water level in the area was measured at MW-1 in 1925 Landfill on May 19, 2009, being 608.7 feet. Through most of the area, the contact elevation of the underlying clay soils ranges from 583.3 feet (8878G) to 578.7 feet (8884G); with boring 8886G being the lowest encountered within the till sand area near LS #105 at 569.2 feet. For the portion of the project where the tile is embedded or at the Till elevation, the upland head is computed by  $(608.7 \text{ feet} - 578.7 \text{ feet}) = 30.0 \text{ feet}$ . For the till sand area, the upland head is computed by  $(608.7 \text{ feet} - 569.2 \text{ feet}) = 39.5 \text{ feet}$ .

The River side upland groundwater head is established using typical downstream water level of 591 feet and the Till elevation; with upland head computed as  $(591 \text{ feet} - 578.7 \text{ feet}) = 12.3 \text{ feet}$ ; and  $(591 \text{ feet} - 569.2 \text{ feet}) = 21.8 \text{ feet}$ . The 100-year river elevation of approximately 612 feet. The upland head values for the River side segments is computed by  $(612 \text{ feet} - 578.7 \text{ feet}) = 33.3 \text{ feet}$ ; and  $(612 \text{ feet} - 569.2 \text{ feet}) = 42.8 \text{ feet}$ .

#### **3.2.2.3 Head at the Point of Inflow**

Head at tile is conservatively assumed to be one-half foot, measured from the bottom of the tile.

#### **3.2.2.4 Hydraulic Conductivity**

As discussed above, 18 samples from representative soils contributing to inflow were tested for hydraulic conductivity by Method ASTM International D2434. Results ranged from  $4.9 \times 10^{-8}$  to  $1.9 \times 10^{-3}$  cm/sec. In a few instances, due to the presence of significant fine fraction (in some cases, greater than 20%) in the soils that will provide inflow to the tile, some soils are classified as silts or clays under the Unified Soil Classification System. The distribution of the remaining data were evaluated and found to be lognormally distributed, and no obvious outliers were identified. A geometric mean was used to generalize the dataset, based on their distribution. For inflows from existing soils, the range of hydraulic conductivity evaluated across the range from  $2.1 \times 10^{-4}$  cm/sec to  $1.9 \times 10^{-3}$  cm/sec.

### **3.2.2.5 Radius of Influence**

The radius of influence for artesian and gravity flow is estimated from equation (1) from NAVFAC, pg. 4-24. Based on this evaluation, the radius of influence for the Plant side influence is ranges from 60 to 193 feet. The radius of influence for the River side inflow also ranges from 26 to 214 feet.

### **3.2.2.6 Design Inflows**

The design inflows were computed using equation (3) from NAVFAC, pg. 4-2. Based on this evaluation, the conservative design inflow for the upstream leg of system is 0.0212 cfs. The conservative design inflow for the downstream leg of the system is 0.0436 cfs. Localized areas of the tile may experience flows as high as  $2.25 \times 10^{-4}$  cfs/linear foot (lf).

### **3.2.2.7 Pipe Capacity Evaluation**

The capacity of the pipe can be estimated using Manning's equation. Based on that evaluation, the currently proposed 8-inch pipe with a minimum slope of 0.19% is adequate to manage 0.616 cfs, which is sufficient to manage all inflow (0.0212 cfs for the upstream portion to the high point and 0.0436 cfs for the portion downstream of the high point) with considerable factor of safety.

### **3.2.2.8 Pipe Perforation Evaluation**

The typical RGIS pipe perforation specification that will be utilized for this project call for four ¼-inch diameter openings, with each set of four placed 3 inches on center longitudinally along the pipe. This specification will allow for additional flow beyond that required by the design computations (including higher localized flow conditions), and is more than adequate for this project.

### **3.2.2.9 General Discussion**

The current 8-inch diameter pipe, 0.19% slope, backfill plan and perforation design provides sufficient capacity to manage all inflows for the project with significant factor of safety. The factors of safety are likely higher than those estimated due to the inclusion of significant conservatism assuming worst-case scenarios during the design process.

## **3.3 Sludge Dewatering Facility Investigation**

The SDF is a closed land-based disposal located on the corner of Saginaw Road and Salzburg Road in Midland County. It was used in the 1970's and 1980's for dewatering and disposal of wastewater treatment sludge generated at Dow's Midland Plant site. The unit is currently maintained under the Post-Closure Plan (modified 2015) and routine sampling is currently conducted in accordance with Condition II.L.4. of the Act 451 Part 111 Operating License (Operating License) issued to The Dow Chemical Company, Michigan Division, effective September 25, 2015.

### **3.3.1 Overview of Site Characterization and Interim Measures**

As detailed in the Environmental Monitoring Program SAP for the Operating License, samples and field parameters are obtained from the SDF Groundwater Detection monitoring wells on a quarterly basis. Samples and field parameters are obtained from Perimeter Wells every 4 years, or in response to Hydraulic Monitoring Performance Criteria not being met (Figure 3-6). Static water levels (SWLs) are collected from SDF wells on a quarterly basis.

The *2015 Operation and Maintenance Inspection Report for the Sludge Dewatering Facility (SDF)* (Inspection Report) conducted by the MDEQ noted an outward gradient identified at Cell 1. This report also noted that water levels in the internal piezometer (6143) within Cell 1 and external well 3775

appeared to be tracking. As an immediate action in response to the noted outward gradient in Cell 1, Perimeter Monitoring Well 3916 was added to 2016 quarterly sampling events and will continue as such until determined otherwise.

In further response to the conditions of concern noted in the MDEQ Inspection Report, Dow also submitted a *Response to 2015 Operation and Maintenance Inspection Report*, dated November 19, 2015; Dow initiated the drilling and hydraulic profiling tool (HPT) investigation at Cell 1 and Cell 7 on July 12, 2016. HPT borings were conducted along the north and west perimeter of Cell 1 (SDF-1 through SDF-7; and SDF-15 through 19). An additional two locations were pushed within the central area of Cell 1 (SDF-8 and SDF-9), including one adjacent to the existing internal piezometer (6143). Another three locations were advanced outside Cell 1 along the northeastern perimeter (SDF-11, SDF-12, and SDF-13) and one other near the center of Cell 7 (SDF-10) (Figure 3-7). Fisher Contracting cut the existing 30-millimeter (mil) HDPE liner to facilitate the borings. NAL Services, Inc. completed the repairs to the liner by extrusion welding the full perimeter of an HDPE patch to the existing liner at each boring location, and each weld was vacuum box tested and visually inspected. The repairs were certified by a Registered Professional Engineer in the State of Michigan and the certification was submitted to the MDEQ in October 2016.

Single well pump tests were completed at both Cell 1 and Cell 7 in September 2016. The pump tests were conducted at the existing internal piezometer locations in both cells.

### **3.3.2 Current Status and Priority Actions for 2018**

Based on the evaluations performed in 2017, the priority actions for SDF during 2018 include the installation of an approximately 100-foot long section of permeable backfill and perforated collection tile, that will be tied into the existing manhole within Cell 1. The demonstration-scale system will be monitored for drawdown and will be used to design a full-scale implementation for Cell 1 to reduce the head inside the cell to an elevation below that of the external piezometers. Dow anticipates that an evaluation of the monitoring data and preliminary design will be completed during 2018, provided the demonstration-scale system is effective. If the system is not effective, alternative designs will need to be considered and evaluated. Dow submitted a request to the MDEQ to review a liner repair plan to facilitate installation of the demonstration scale dewatering system for Cell 1 at the SDF on December 19, 2017.

## 4.0 Midland Plant Facility-Wide Direct Contact to Soil Pathway

Dow completed the RCRA Corrective Action EI Form for Human Health as part of the License Reapplication. In order to achieve an “under control” status for the EI for direct contact to surface soil, further evaluation is necessary. Soil Direct Contact is an exposure pathway that includes exposure via long-term dermal contact with and ingestion of soils throughout the soil column, regardless of depth. The focus of this on-site investigation is to evaluate the potential shallow surface soil DC exposure pathway for Dow employees and contractors.

The Dow Midland Facility is a large, industrial facility of approximately 1,900 acres in size and the land use is non-residential, including nearly 400 acres of industrial ponds. The surface cover at the site currently includes nearly 600 acres of buildings and pavement. Roughly, 220 acres of the Midland Plant are vegetated final cover for closed WMUs that were installed from 1980 to 1989. Nearly 70 acres of new topsoil and vegetative cover have been placed on areas of the plant as part of Phase I Enhanced Exposure Control activities and other greenbelt enhancements. An additional 100 acres of vegetative stormwater detention areas have been constructed from 2009 to 2011.

While significant work has been completed to date to improve surface cover at the Midland Plant, there are still areas that are eligible for assessment in order to determine if surface improvements are warranted. Approximately 430 acres, or just over 23% of the Midland Plant area, includes gravel or grassed areas that have not been addressed or assessed to evaluate the need for enhanced surface cover. In order to evaluate the direct contact pathway for the site, the site was split up into manageable areas.

Currently on-site, ongoing efforts to address worker exposure to impacted soil at the Midland Plant are implemented under the on-site Worker Exposure Control Plan, Appendix C of Attachment 19 of the License. The objective of the Worker Exposure Control Plan is to describe the implementation of various IMs at the Midland Plant designed to address potential exposure pathways to on-site workers as part of final corrective action, in compliance with Part 111 of Michigan Public Act 451. The Worker Exposure Control Plan will continue to be updated and utilized.

The Surface Soil Exposure Control Program, a component of the Worker Exposure Control Plan, is designed to specifically address direct contact exposure to surface soils located at the Midland Plant. The goal of the Surface Soil Exposure Control Program and focus of on-going efforts is the elimination of unacceptable direct contact exposure to surface soils by 2020 in order to achieve “under control” status for direct contact with soils on the Midland Plant EI. The Surface Soil Exposure Control Program currently limits fugitive dust controls by street cleaning, applying dust suppressant to gravel roadways and appropriately managing soil stockpiles during excavations. Direct contact management includes PPE and air monitoring requirements during excavation activities and specifies clean cover shall be placed over areas disturbed by excavation. In addition, the Worker Exposure Control Plan will be modified as appropriate in the future to include monitoring and O&M obligations related to maintenance of any surface cover.

Soils relocated within the Midland Plant and from areas of the Tittabawassee River Floodplain are managed in specific areas within the Midland Plant. A listing of relevant soil relocation activities is provided in Tables 4-1 through 4-3.

### 4.1 Zone 1 Direct Contact to Soil Pathway Summary

Zone 1 represents approximately 300 acres that were evaluated by soil sampling in 2016. Zone 1 encompasses sites such as the 1925 Landfill, LELs II and III, and borders the river. The Campus Area and Greenbelt Areas were also included for evaluation in Year 1 in order to expedite sampling in those areas. The following land use categories were sampled in Zone 1:

- Category 1, Laydown Areas – 11 DUs for Aerial Dispersion and Other Sources TALs;

- Category 2, Historic Grass Areas – 6 DUs for Aerial Dispersion TAL;
- Category 4, Relocated Soils covered with Imported Top Soil – 3 DUs for Imported Soils TAL;
- Category 5, Stormwater Basins – 6 DUs for Imported Soils, Aerial Dispersion via Run-off TALs; and
- Category 6, Vegetated Cap Closed by Dow – 9 DUs for Aerial Dispersion, Leachate Breakout, and Imported Soil TALs

Areas approved and closed under MDEQ and/or EPA oversight were not sampled and include the Approved RGIS Construction and Upgrade Project, LEL II, Waste Storage Area IIA, Open Waste Water Conduits, 703 Incinerator Area, and the Closed Diversion Basin.

All non-dioxin results in the Campus Area, Greenbelt Areas, and Zone 1 are below non-residential direct contact and ambient air criteria. All dioxins and furans total toxicity equivalent (TEQ) results for the Campus and Greenbelt Areas are below the non-residential direct contact criterion. Therefore, no further action is proposed at this time for the Campus Area and Greenbelt Areas.

In Zone 1, out of the 32 DUs sampled, the dioxins and furans TEQ results were below the non-residential direct contact criterion (990 parts per thousand [ppt]) in 17 DUs. Therefore, no further action is proposed for those 17 DUs (see Figure 4.1-1). Based on dioxin and furan TEQ results, the following were identified:

- Category 1, Laydown Areas – Seven DUs were identified with elevated dioxins and furans related to historic Aerial Dispersion;
- Category 4, Relocated Soils covered with Imported Top Soil – Elevated dioxins and furans were identified in one DU (2D);

## **4.2 Zone 1 Additional Sampling and Interim Measures**

### **4.2.1 Zone 1 Additional Design Sampling**

Based on dioxins and furans TEQ results, the following Zone 1 DUs warranted further evaluation: 1A-2 through 1A-8 and 2D. Additional DUs were defined and samples were collected in areas adjacent to these during 2017, including 5E-5, 1A-9 through 1A-12 and 4C (see Figure 4.2-1).

Specific to the Category 1 Laydown Areas, 0-12-inch samples were collected from DUs 1A-2 through 1A-8 to evaluate the thickness of the impacted soil layer. There were a number of stormwater areas that received stormwater runoff from the Category 1 Laydown Areas in Zone 1. One DU (5E-3) had been sampled, but samples were collected from an additional four DUs that received runoff (5E-1, 5E-2, and 5E-5). Samples from DU 5E-6 were collected, although a berm separated runoff from the Category 1 Laydown Areas from the detention basins. An additional stormwater DU to the north of the Category 1 Laydown Areas was defined and samples were obtained from that area as well. Additional Category 1 Laydown Area DUs 1A-9 through 1A-12 were defined in adjacent areas and 0-6-inch incremental composite samples were collected from each during 2017.

Higher than expected concentrations of dioxins and furans identified at DU 2D were suspected to be from placement of an inadequate thickness of clean topsoil (less than 6 inches), so 0-3 inch samples were collected from this DU. A nearby area was also included in the project that included soil relocation represented by 2D, so an additional DU (4C) was created and both 0-3-inch and 0-6-inch samples were collected from that DU.

## 4.2.2 Zone 1 Dioxin and Furan Confirmation Sampling

DUs from Zone 1 were selected at an approximate frequency of 10% for triplicate sampling and testing by EPA Method 1613b. DUs for this preliminary evaluation were selected with concentrations closest to the Generic Non-Residential Direct Contact Criteria. The locations of the DUs selected are shown in Figure 4.2-2. For the DUs selected, the original sample had been retained and two additional replicates were obtained from each of the original increment locations. The original sample and two replicates were then analyzed by EPA Method 1613b. Results are summarized in Table 4.2-1.

Based on results of replicate sampling for dioxin and furan TEQ, Dow will continue to work with MDEQ to implement sampling techniques and analyses to better characterize variability within Zone 1.

## 4.2.3 Additional Zone 1 Characterization

Because of the extensive open areas in Zone 1, many DUs were selected to be representative of larger areas. After review of the proposed sampling areas, MDEQ also requested that additional areas be sampled, including:

- LEL II Final cover,
- Additional evaluation of former fire training area on 1925 Landfill;
- an additional DU from the 8Pond Final Cover; and
- Low-lying areas adjacent to the Waste Water Treatment Plant (WWTP).

In addition to these areas, there are additional DUs that will be evaluated because results were not consistent with the conceptual site model (CSM) for the DUs, so additional samples will be collected to resolve those inconsistencies. Additional characterization samples will be obtained from the DUs identified in Figure 4.2-3 during 2018.

One of the areas requested by MDEQ includes a former fire training area, to include characterization of soil for Perfluorooctane sulfonic acid and Perfluorooctanoic acid (referred to as PFOS/PFOA) which are common components in certain fire-fighting foaming agents. These emerging contaminants are also contained in a number of common products, and additional sampling precautions must be taken to prevent inadvertent contamination of environmental samples. In addition, laboratory analytical techniques have not been uniformly adopted for soil; therefore, a specific proposal for this area including the sampling and analytical procedures is in process and will be provided to MDEQ prior to sampling according to the schedule in Section 10.0.

## 4.2.4 Zone 1 Completed Interim Measures

There were a number of IMs conducted during 2017, to address the findings from sampling in 2016. The specific IMs are described below:

For the Category 1, Laydown Areas, the IMs included restricting access to areas where surface soil was contained elevated dioxin and furan TEQ. This was accomplished by adding barriers, signage, and fencing. Results and hazard information was provided to the workers in nearby areas. Operations located within the area, including metal recycling and wood pallet grinding and loading were all re-located to other locations within the plant site. In cases where access to the areas was necessary, additional PPE for workers who must enter and work the area, and the means for proper disposal of PPE after use were implemented. A summary of controls is provided in Figure 4.2-4.

## 4.2.5 Interim Measures for 2018

The results of the depth-discrete dioxin and furan testing are summarized below. The results confirm that over approximately half of the area, impacts are within the upper twelve inches. DUs 1A2, 1A4, 1A7, and 1A8 have greater than twelve inches of impacted soils. During 2018, additional IMs will be performed for DUs 1A2 through 1A8, 1A10, and 2D and 4C. A long-term direct contact barrier will be installed where dioxin and furan TEQ remains elevated, with the final cover being established according to the general sections shown in Figure 4.2-5. Sections for this area will include a minimum of six inches of new cover, with a marker layer consisting of a non-woven geotextile layer placed over the entire extent of each DU with elevated dioxin and furan TEQ.

DU	0-6" Sample TEQ (ppt)	0-12" sample TEQ (ppt)	6-12" calculated TEQ (ppt)
1A2	6,900	8,590	10,280
1A3	31,100	12,400	ND
1A4	2,600	3,420	4,240
1A5	3,480	1,260	ND
1A6	10,200	1,490	ND
1A7	1,950	2,770	3,590
1A8	1280	2,080	2,880

For the following DUs, additional sampling was completed to determine if a thin layer (less than 6 inches) of clean topsoil had been placed over these areas. Based on results of the sampling, additional IMs will be performed during 2018. Due to the slope of these areas, a visual barrier is not practicable for long-term soil cover stability and signage will be used as an alternative control.

DU	0-3" Sample TEQ (ppt)	0-6" sample TEQ (ppt)
2D	4,180	3,400
4C	2,650	2,790

In some areas, it may be necessary for some of the existing materials to be excavated prior to placement of a marker layer and establishment of final cover. Because this material has been tested for a wide array of substances, and the only significant impacts are related to dioxins and furans this material could be removed and relocated to the 6 Pond area currently being used to manage soils removed from the floodplain (see Figure 4.2-6) that exceed the Generic Non-Residential Direct Contact Criteria for dioxins and furans. The soils from this area would be managed consistently with the floodplain soils and would be included in the summary of relocated soil provided to MDEQ.

A set of construction drawings and a soil management plan, which will include a dust and track-out control plan for the area will be provided to MDEQ prior to start of work; and a set of as-built drawings will be provided to MDEQ upon completion which will identify the final dimensions of the corrective actions, marker layer layout, thickness and makeup of the final cover layers within each DU (see Section 10.0).

## 4.3 Zone 2 Direct Contact to Soil Pathway

### 4.3.1 Zone 2 Overview

For Year 2, the on-site Zone 2 was selected for evaluation and covers approximately 280 total acres. Zone 2 encompasses an area in the east (approximately 245 acres) and a small area in the west of the facility (approximately 35 acres). Figure 4.3-1 presents the facility overview with Zone 2. Figures 4.3-2

and 4.3-3 present closer views of the east and west locations of Zone 2. The following sections discuss the exposure characterization, target analytes, sampling methods and activities, analytical results, and the path forward determined for Zone 2.

### 4.3.2 Exposure Characterization

A CSM for the on-site soil at the Midland facility is presented in Figure 4.3-4. This CSM identifies the potential soil exposure pathways and types of sources for the on-site properties. The initial step for Year 2 was to determine the types of surface cover in Zone 2 and to identify the gravel or grassed areas that have not been assessed or recently covered during Dow's surface cover enhancements. In addition to determining the types of surface cover, an evaluation was performed considering historical use in each of the areas within Zone 2, as well as the present use and maintenance required to evaluate the types of potential exposure that could occur (e.g., land use and activities that occur on or near those areas). Figure 4.3-5 presents the Zone 2 Direct Contact Category Flowchart. The flowchart categorizes and describes the property types present in Zone 2, possible sources, exposure types, use (e.g., frequency of activity), and the path forward for sampling. Thirteen property types were identified through this process and are listed in the table below.

Additionally, there were three possible sources identified in Zone 2. These include aerial dispersion, imported soils, and other sources (e.g., point source release, historic area operations).

- Aerial dispersion includes areas potentially impacted by the historical aerial release.
- Imported soils are soils that were brought on-site as final cover for excavations or where site soils were relocated. Soils were imported from regional agricultural areas and may not have been tested when acquired.
- Other sources (e.g. point source release and historic area operations) apply to the laydown areas. The laydown areas serve as storage for equipment that may be reused or demolished. These areas may also have seasonal construction projects and have activity preparing equipment for reuse or cutting for disposal.

Exposure and current use were evaluated for each property type and is shown on Figure 4.3-5. Exposure categories included intermittent event based exposure with regular use, limited exposure with regular to low frequency use, limited access with low frequency use, and limited access or no access with very low frequency use. The combination of property type, possible sources, exposure, and use led to the development of seven categories for direct contact sampling and evaluation. These seven categories are shown on Figure 4.3-5 and are presented in the Table below. The recommended sampling density is included in the Table below.



Category	Property Type	Sampling Density
1	Laydown Area, Gravel Areas (Historical Process Area)*	Direct Contact Sampling Proposed
2	Gravel Areas, Historic Grass Area, Campus Area, Greenbelt Prior to 2000	While Exposure is Limited, Direct Contact Sampling Proposed
3	Greenbelt 2000 – Present	Not applicable to Zone 2
4	Relocated Soil Covered with Imported Topsoil	Limited Confirmation Sampling Proposed
5	Stormwater Basin	Limited Confirmation Sampling Proposed
6	Vegetated Cap, Closed by Dow	Not applicable to Zone 2
7	Vegetated Cap Closed with MDEQ or EPA Oversight, Limited Access, Paved/Buildings/Process Areas	Not applicable to Zone 2
N/A	Rail Yard and Electrical Substation	Defer

\*Note: Gravel areas, such as parking lots, process areas, road shoulders, and vacant land that have a history of process operations based on review of historical aerials, are more prevalent in Zone 2 than laydown areas.

No sampling is proposed for areas with restricted access (limited to very infrequent maintenance, including the wastewater treatment tanks and dike areas), and areas where pavement or building footprint and slab areas under process areas impede exposure to soil via direct contact. The Rail Yard and Electrical Substation will be evaluated as individual, complete areas and are deferred to a later date. Access to each of these areas is limited by either train activity or fencing. Evaluating these areas will involve strict safety considerations.

### 4.3.3 Target Analyte Lists and Sampling Density

TALs were determined based on the possible sources. The aerial dispersion TAL includes dioxins and furans and arsenic. Sampling density for each category varies because this possible source is applicable to several direct contact property type categories. All areas classified as Category 1 and 2 were sampled. Areas classified as Category 5 warranted limited confirmation sampling based on exposure and use so at least 20% of the area within these categories was sampled.

The TAL for imported soils includes metals, herbicides, and pesticides. Limited confirmation sampling was proposed for areas covered by imported soils and sampling density was based on category. Fifty percent of area classified as Category 4 was sampled and at least 20% of the area within Category 5 was sampled.

The TAL for other sources was determined based on detections from the 2005-2006 Dow On-Site (DOS) sampling effort and the 2010-2015 Worker Exposure Control Program sampling efforts. The TAL includes detected metals, herbicides, pesticides, SVOCs, VOCs, and dioxins and furans. For the Category 1 Laydown Areas, the sampling density is 100%.

Source	Analytes	TAL Determination	Applicable
Imported Soils - Historical Agriculture	Metals, herbicides, pesticides	Analytes commonly detected in agricultural area soils	Categories 4, 5
Aerial Dispersion	Dioxins and furans and arsenic	Based on Midland Area Soils	Categories 1, 2, 5
Other Sources (e.g. relocated soils, imported soil, point sources)	Metals, herbicides, pesticides, SVOCs and VOCs, Dioxins and furans	E-1225 Detections, DOS Detections, Area history/Aerial Photo Evaluation, Chemicals used On-Site	Category 1

#### 4.3.4 2017 Zone 2 Sampling Activities

Due to the anthropogenic deposition of the contaminants of concern (COCs) within the sampling areas, a heterogeneous distribution throughout the direct contact sampling areas is likely. Studies have shown that sampling heterogeneous populations, with individual particles that are likely to have different concentrations of COC, through conventional sampling methods (e.g., discrete or standard composite sampling) inadequately represent the average COC concentration of that population (EPA 2012; ERDC/CRREL 2009; Jenkins et al. 2005). Therefore, an incremental sampling methodology (ISM) was employed throughout the DC sampling areas to provide a more unbiased and reproducible estimate of the mean concentrations of analytes in heterogeneous sample populations.

ISM is a structured sampling and analytical methodology developed to address the problems associated with collecting representative samples from volumes of particulate material with high compositional and distributional heterogeneity by identifying and minimizing types of sampling and analytical errors. Essentially, ISM is a more robust and ordered type of composite sampling that combines uniform, spatially representative grab samples or "increments" to produce a sample result for an area and depth of soil, or DU, that is representative of the average concentration of COC of that population sampled. ISM is also more appropriate than conventional discrete sampling for comparison with risk-based screening values and for evaluating concentrations relative to background concentrations.

ISM describes both the field sample collection and laboratory processing methods necessary to obtain samples that contain the COC in the same proportions as the sampled population. Some of the primary differences between ISM and conventional composite or grab sampling are the need to define the spatial boundaries of the DUs, a sample mass much larger than required by most analytical methods, the number of increments that will be collected in each sample, the spacing and distribution of the increments to be collected, and the laboratory preparation procedures (ERDC, 2013).

##### 4.3.4.1 Decision Units

The evaluation of Zone 2 began by overlaying the area with a 2-acre grid which represents a non-residential DU. Each of the grids were evaluated for property type and current/historical use. Figures 4.3-6 and 4.3-7 present the grid map with the property types highlighted by category. Using these maps together with the flowchart presented on Figure 4.3-5, rationale was developed for whether or not sampling was proposed for each grid. If sampling was not proposed, justification for no sampling was documented and is provided in Table 4.3-1. For example, areas that are covered by pavement, buildings, or process areas were not proposed for direct contact sampling.

DUs were delineated throughout the target sampling areas based on site characteristics and historical land use. DUs ranged from less than 1 acre up to approximately 2 acres. A small percentage of DUs slightly exceeded 2 acres but were not further divided due to the small area above 2 acres and site-

specific conditions such as the contiguous nature of the land and common past and present land use. In each DU, 10-30 increments were collected, dependent on the acreage of the decision unit:

- Decision units less than 0.5 acre contained 10 increment sampling locations;
- Decision units greater than 0.5 acre and less than 1 acre contained 20 increment sampling locations; and/or
- Decision units greater than 1 acre contained 30 increment sampling locations.

Increment locations were generated using a systematic random sampling approach. The increments were laid out by selecting a random starting point and generating evenly spaced increments based on that starting point using GIS for each DU. Individual sample plans were developed for each DU and are included in Attachment 6 and this concept is further discussed and illustrated in 4.3.7.

#### **4.3.4.2 Zone 2 Direct Contact Sampling Areas**

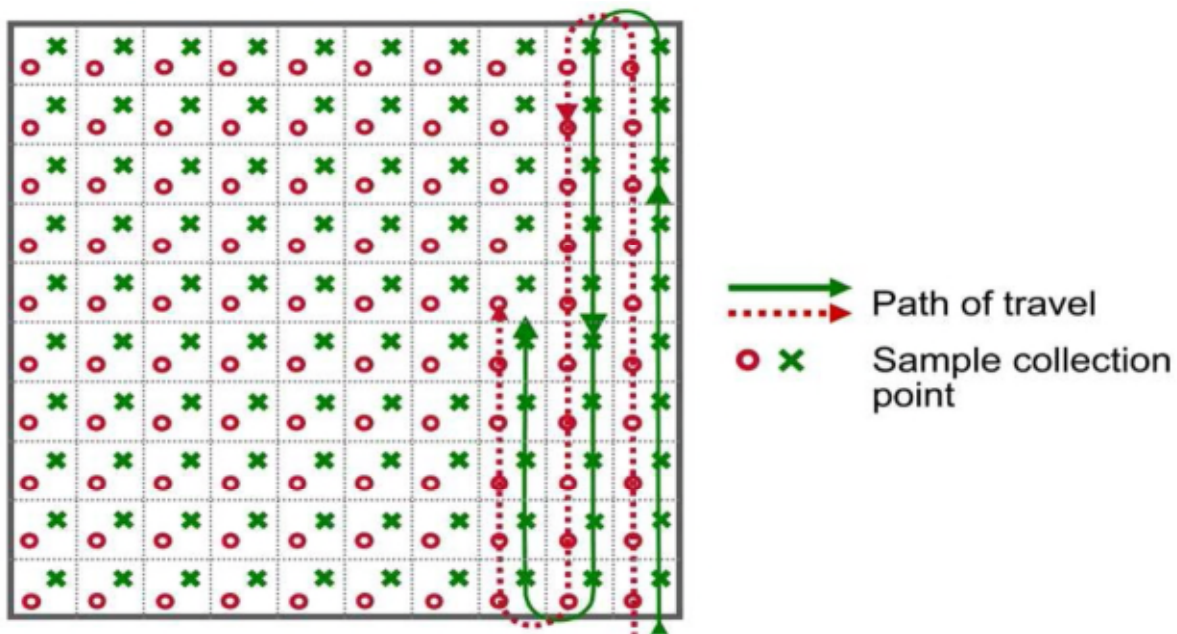
Figures 4.3-2 and 4.3-3 presented the overview of Zone 2, including shading according to property type category. Figures 4.3-6 and 4.3-7 and Table 4.4-2 present the DU overview for Zone 2. The following areas were included for sampling across the on-site area of Zone 2.

- Category 1, Laydown Areas and Gravel Areas (Historical Process Area) – 54 DUs for Aerial Dispersion and Other Sources TALs;
- Category 2, Historic Grass Areas – 16 DUs for Aerial Dispersion TAL;
- Category 4, Relocated Soils covered with Imported Top Soil – 6 DUs for Imported Soils TAL; and
- Category 5, Stormwater Basins – 19 DUs for Imported Soils, Aerial Dispersion via Run-off TALs.

Table 4.3-3 presents those DUs with increments moved due to obstructions and a list of DUs with documentation for why the DU could not be sampled.

#### **4.3.4.3 Field Sampling Methods**

For Zone 2, the ISM soil sampling activities were conducted in May and June for 95 DUs in areas immediately within the Michigan Operations facility.



Example path to collect increments plotted in a random systematic manner (CRREL/ERDC 2013).

Maps and GPS units containing the increment locations within each DU were provided to each sampling team for sample collection. Field teams would either first mark all increment locations with a flag prior to collection or work as a team to navigate up and down the rows of sample locations collecting the increments and tracking collection via the GPS device (see figure above).

#### 4.3.4.4 Sample Collection

Ideally, each increment serves as an equivalent portion of the overall sample, which represents the DU as a whole. The ability to take uniform increments at a consistent depth, each representative of a portion of the sample and contributing equally to a representative sample of the entire DU, is greatly dependent on the sampling tool and proper sampling methods.

Generally, increments in most DUs, for all analyses except VOCs, were collected using stainless steel push samplers or Enterprise Venture Corporation (EVS) Incremental Sampling tools in order to ensure that each increment was collected at the same depth and volume. Each increment was collected using a 1-inch diameter coring device to a depth of 6 inches bgs. Once an increment was collected in the device, it was extruded into a bucket lined with a 3 millimeter (mm)-thick 24-inch x 30-inch zip-close plastic bag to create a resulting composite sample with a target mass of between 1 to 3 kilograms (kg).

For decision units with non-volatile COCs being sent to different laboratories for analyses field replicates were collected for each laboratory so that the entire sample mass was sent to each laboratory for analysis and errors due to splitting samples would be eliminated. Two increment cores were collected approximately 6-12 inches apart and each core went into a different bucket. A 12-inch x 12-inch custom made polyvinyl chloride (PVC) grid was used to ensure that replicates were collected in the same manner with respect to the primary increment sample location. At each primary increment collection location, the corner of the marked corner of the PVC grid marked was lined up with the increment collection location identified on the GPS. Then an increment was collected from approximately the center of each cell in the grid as necessary to create field replicates. Increment collection was not biased to avoid vegetation. However, vegetation was not included in the analysis of the soil sample. Vegetation included with the collection of the increment remained with the sample until processing either by the field team prior to delivery to the laboratory for the dioxins/furans analyses or by the laboratory for all other analyses.

As VOCs can be quickly lost from an exposed surface, for DUs that included VOCs on the TAL, additional measures were employed in order to collect a representative sample (ITRC 2012; Hewitt, Jenkins, and Grant 1995). For samples collected for VOC analysis, individual increments were collected as 5-g plugs at the desired core depth and immediately preserved in methanol. A Terra Core was used to collect a 5-g aliquot from approximately 3 inches below ground surface from the side of the augered hole and then extruded into a 1-L amber jug containing 150 ml of methanol for field preservation.

At some decision units composed primarily of gravel covered lots (e.g., 1B and 1A-1 through -6), the EVS incremental sampling tool would not effectively collect the non-cohesive increments. As a result, it was necessary to employ an augering device to drill down to the planned sampling depth of 6 inches and use a trowel to collect the increment.

Each composite sample was assigned a unique sample ID number which included the decision unit designation. Each decision unit has a unique ID that corresponds to its category and TAL. Soils collected for dioxin/furan analyses were sieved through a 2 mm (US Standard #10 mesh) sieve prior to delivery to the Dow EAC lab. Plant material and debris were removed during the process.

Environmental samples were shipped or hand-delivered using standard chain-of-custody procedures. Environmental soil samples were analyzed for the TALs for each category listed in Section 4.3.3.

#### **4.3.4.5 Field Documentation**

Each field team was provided with a detailed daily assignment log of sampling units and samples to be collected within each sampling unit. Each field team was responsible for supplying the required information on the form upon sample collection including time of sample collection, date of sample collection, any unusual field conditions or mechanical issues encountered and initial each sample collection line items to verify the entry. At the end of each field day, the Field Team Leader collected all team logs and conducted a quality control check of all samples delivered from the daily activities.

#### **4.3.4.6 Equipment Decontamination**

Solid materials samplers and soil processing equipment including stainless steel sieves and bowls were decontaminated according to the following procedures:

- A. Scrub the equipment to remove visible contamination, using appropriate brush(es), approved water, and non-phosphate laboratory detergent.
- B. Rinse with tap water.
- C. Rinse with solvent (acetone).
- D. Rinse with deionized water.
- E. Allow equipment to air dry or wipe dry with paper towels prior to reuse.

All cleaned sampling equipment was stored in a clean environment and covered in aluminum foil or clean plastic sheeting for protection between uses. All decontamination solutions were properly disposed of according to Dow site policies.

#### **4.3.4.7 Sample Processing**

Once samples were collected, they were brought back to a clean designated work space for further processing or to be packaged directly for shipment to the laboratory. Samples collected for dioxins and furan analyses to be analyzed by the Dow EAC Laboratory were sieved prior to packaging for laboratory delivery. During this step, the vegetation was broken in smaller pieces to release trapped particles and

extracted from the soil sample. The majority of vegetation did not pass through the sieve and therefore is not part of the subsample extracted for analysis.

Once the samples were sieved, all samples were packed for immediate delivery to the Dow EAC laboratory. Processed samples were returned to the original polyethylene sampling bag if possible or into Ziploc bags. A second sampling bag was labeled in accordance with sample labeling procedures and all samples were double bagged. Samples were placed in coolers with chain-of-custody forms and were immediately delivered to the laboratory for login and storage.

The laboratories then air dried each composite sample, disaggregated the entire volume using rotary hammers, and sieved the resultant matrix. Once samples were dried and sieved, a statistical subsampling procedure was performed to sub-aliquot sample volume to be used for analyses. Moisture samples for field preserved VOC samples were removed from the as received ISM samples prior to any drying.

#### 4.3.4.8 Laboratory Analyses

As described in Section 4.3.3, the TALs for the DUs included metals, pesticides, herbicides, SVOCs, VOCs, PCBs, and dioxins and furans. The table below shows which laboratories and which analyses were used for each analyte or analyte group. Soil samples collected for VOC analysis were preserved in accordance with U.S. EPA Method 5035.

#### Laboratories and Methods Used to Analyze for Target Analytes

Analyte/Analyte Group	Laboratory	Method
Dioxins/Furans	Dow EAC Laboratory	Midland Fast Analysis
Metals	TestAmerica Canton	EPA 6010B
Chromium	TestAmerica Canton	EPA 7196A
Mercury	TestAmerica Canton	EPA 7471A
Herbicides	TestAmerica Canton	EPA 8151A
Pesticides	TestAmerica Canton	EPA 8081A
Semi-volatiles	TestAmerica Canton	EPA 8270C
Volatiles	TestAmerica Canton	EPA 8260C
Arochlors	TestAmerica Canton	EPA 8082A

#### 4.3.5 2017 Zone 2 Direct Contact Sampling Results and Evaluation

This section presents the analytical results and evaluation for Zone 2. The results were evaluated using summary statistics with a comparison to screening criteria, as discussed below.

##### 4.3.5.1 Development of Summary Statistics

Basic summary statistics were prepared for the soil results in Zone 2. These tables include common statistical parameters, such as mean, standard deviation, minimum and maximum detected values, and minimum and maximum reporting limits of non-detects, in addition to presenting the results of the screening comparison to relevant criteria. The number of samples and detection rate were also included to provide information regarding sample size and detection frequency.

#### 4.3.5.1.1 MDEQ Screening Criteria

A screening-level evaluation of the data was performed by comparing each data point to non-residential Direct Contact screening criteria for soil. MDEQ Part 201 December 30, 2013 non-residential direct contact soil criteria were selected whenever available (MDEQ, 2013). EPA Regional Screening Levels (RSLs) for industrial soil were selected whenever MDEQ screening criteria were not available (document release date: May 2016) (EPA, 2016).

#### 4.3.5.1.2 Background

MDEQ State-wide default background values were used as an initial screen for metals, when available. MDEQ also developed and provided a regional background and modified urban background for some metals during the Midland Area Soil project, which were used as a secondary screen. Table 4.3-4 presents the metals background screening and summary statistics.

#### 4.3.5.1.3 Screening of Chemical Groups (Totals)

Certain classes of analytes were present in several isomer forms. The isomer-specific concentrations were summed into a total before being compared to the appropriate screening criteria. These classes of analytes included chlordanes, endosulfans, methylphenols (cresols), polynuclear aromatic hydrocarbons (PAHs), and xylenes and are discussed further below. Table 4.3-5 provides the totals comparison screening and summary statistics.

- Chlordanes: Total chlordane includes alpha-chlordane and gamma-chlordane. When a sample had a total chlordane result available, only the total chlordane result was evaluated. If a sample result was not detected, one-half the reporting limit was assumed in the total value.
- Endosulfans: Total endosulfan includes endosulfan I, endosulfan II, and endosulfan sulfate. When a sample had a total endosulfan result available, only the total endosulfan result was evaluated. If a sample result was not detected, one-half the reporting limit was assumed in the total value.
- Endrins: Total endrins includes endrin, endrin aldehyde, and endrin ketone. If a sample result was not detected, one-half the reporting limit was assumed in the total value.
- Methylphenols (cresols): Total cresol includes 2-, 3-, and 4-methylphenols. If a sample result was not detected, one-half the reporting limit was assumed in the total value.
- PAHs: Each result from the seven carcinogenic PAHs (benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) were multiplied by their respective relative potency factor (RPF), and then summed to achieve the PAH TEQ (EPA, 1993). The sample TEQ was then compared to the screening criteria for benzo(a)pyrene to determine if the sample exceeded the criteria. If a sample result was not detected, one-half the reporting limit was assumed in the total value.
- PCBs: Total PCBs includes PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, and PCB-1268. If a sample result was not detected, one-half the reporting limit was assumed in the total value. For Total PCBs, based on Footnote (T) in the Part 201 December 2013 criteria, the non-residential screening value of 16,000 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) was used for comparison.
- Xylenes: Total xylenes includes m&p-xylenes and o-xylene. When a sample had a total xylenes result available, only the total xylenes result was evaluated. If a sample result was not detected, one-half the reporting limit was assumed in the total value.

### **4.3.5.2 Zone 2 Direct Contact Sampling Results**

Zone 2 includes four of the six property type categories. The results are presented by category below.

#### **4.3.5.2.1 Category 1 - Laydown Areas and Historical Area Operations (Gravel Areas)**

For Category 1, 54 DUs were identified, sampled, and analyzed for the Aerial Dispersion, Point Source Release and Historic Area Operations TALs. As shown on Figures 4.3-6 and 4.3-7, there were areas identified for historical area operations identified as Category 1 across both the eastern and western portions of Zone 2. Table 4.3-6 presents the summary statistics for the non-dioxin results. Table 4.3-7 presents the summary statistics for dioxins and furans TEQ and then Table 4.3-8 presents the dioxins and furans TEQ results by DU.

As shown in Table 4.3-6, all non-dioxin results were below the non-residential direct contact screening criteria in Category 1. Eleven out of the 54 DUs sampled in Category 1 had dioxins and furans TEQ results greater than the non-residential direct contact criteria of 990 ppt.

#### **4.3.5.2.2 Category 2 - Historic Grass and Gravel Areas**

As shown on Figures 4.3-6 and 4.3-7, for Category 2, 16 DUs were sampled for the aerial dispersion TAL. Table 4.3-9 presents the summary statistics for arsenic. Table 4.3-7 presents the summary statistics for dioxins and furans TEQ and Table 4.3-8 presents the dioxins and furans TEQ results by DU.

All but one arsenic result were below the non-residential direct contact criterion (37 ppt). In DU 2A, in the western portion of Zone 2, arsenic was detected at a concentration (41 milligrams per kilogram [mg/kg]).

Six of the sixteen DUs had dioxins and furans TEQ results greater than 990 ppt.

#### **4.3.5.2.3 Category 4 - Relocated Soils Covered with Imported Top Soil**

As shown on Figures 4.3-6 and 4.3-7, six DUs were sampled for Category 4 and the samples were analyzed for the Imported Soil TAL (metals, herbicides, and pesticides). Table 4.3-10 presents the summary statistics for Category 4.

All results are less than non-residential direct contact criteria. Therefore, no further action is proposed at this time for Zone 2 Category 4.

#### **4.3.5.2.4 Category 5 - Stormwater Basin**

Nineteen DUs were sampled for Category 5, as shown on Figures 4.3-6 and 4.4-7. The samples were analyzed for the following TALs: Imported Soils and Aerial Dispersion via Run-off. Table 4.3-11 presents the summary statistics for non-dioxin analytes for Category 5. For the dioxins and furans TEQ results, Table 4.3-7 presents the summary statistics and Table 4.3-8 presents the dioxin and furans TEQ results by DU.

All non-dioxin results are less than non-residential direct contact criteria. All dioxins and furans TEQ results are less than the non-residential direct contact criteria of 990 ppt. Therefore, no further action is proposed at this time for Zone 2 Category 5.

### **4.3.6 Results Evaluation**

For Zone 2, as discussed in the sections above the Category 1 Gravel Areas (Historical Process Areas) were defined in Figure 4.3-5, the Zone 2 Direct Contact Category Flowchart, as the areas with the most potential direct contact exposure. No non-dioxin results exceeded non-residential direct contact criteria in Category 1. The highest arsenic concentration was found in Category 2 at DU 2A. The detected result of



41 mg/kg slightly exceeded the non-residential direct contact criterion for arsenic (37 mg/kg). This represents the only DU that exceeded non-residential direct contact criteria for non-dioxin substance. Categories 1 and 5 had very similar arsenic concentrations that ranged from 1.3 – 19 mg/kg and 1.4 – 14 mg/kg, respectively. Category 4 had the lowest arsenic results in Zone 2 and the results ranged from 2.1 – 2.6 mg/kg.

In Zone 2, there were dioxins and furans TEQ results that exceeded the non-residential direct contact criterion of 990 ppt. Figures 4.3-8 and 4.3-9 present the dioxins and furans TEQ results by DU. Out of the four property category types present in Zone 2, three were analyzed for dioxins and furans TEQ. Two of the three categories had a DU with an exceedance of the non-residential direct contact criterion. Category 5 did not have any dioxins and furans TEQ results that exceeded the non-residential direct contact criterion. Of the three categories, Category 1 Laydown Areas and Gravel Areas (Historical Process Areas) demonstrated the highest dioxins and furans TEQ results ranging from 30.9 ppt – 180,000 ppt. The next highest dioxins and furans TEQ result in Category 1 was 29,400 ppt. The area with the two DUs exhibiting the highest concentrations of dioxins and furans TEQ were addressed through IMs and those activities are discussed in Section 4.4. Category 2 results ranged from 46.5 ppt to 12,100 ppt and there were exceedances in six out of sixteen DUs sampled. For Category 5, there were no dioxins and furans TEQ results that exceeded the criterion in the nineteen DUs sampled in this category.

Figure 4.3-1. Facility Overview with Zone 2

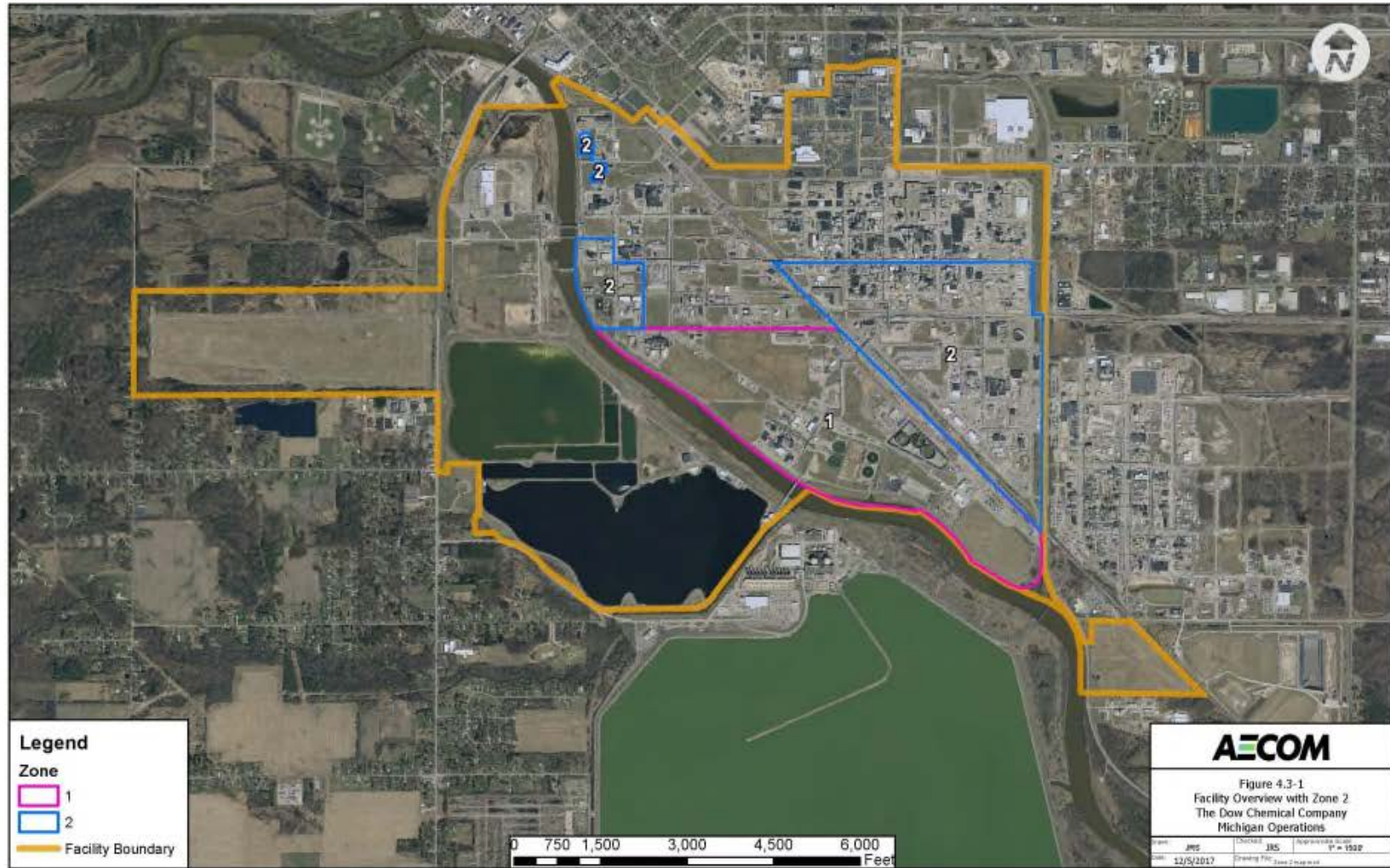


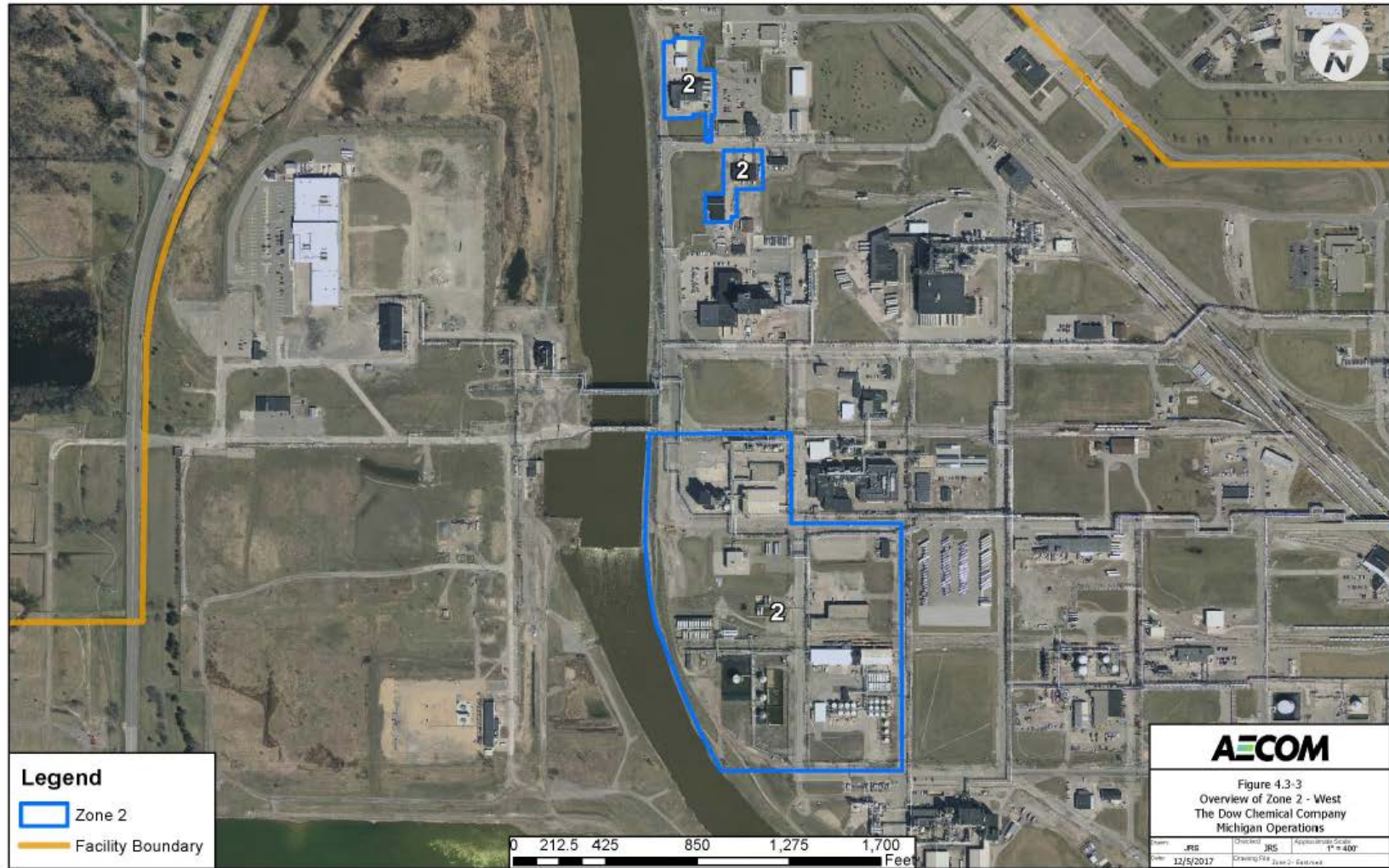


Figure 4.3-2. Overview of Zone 2 – East

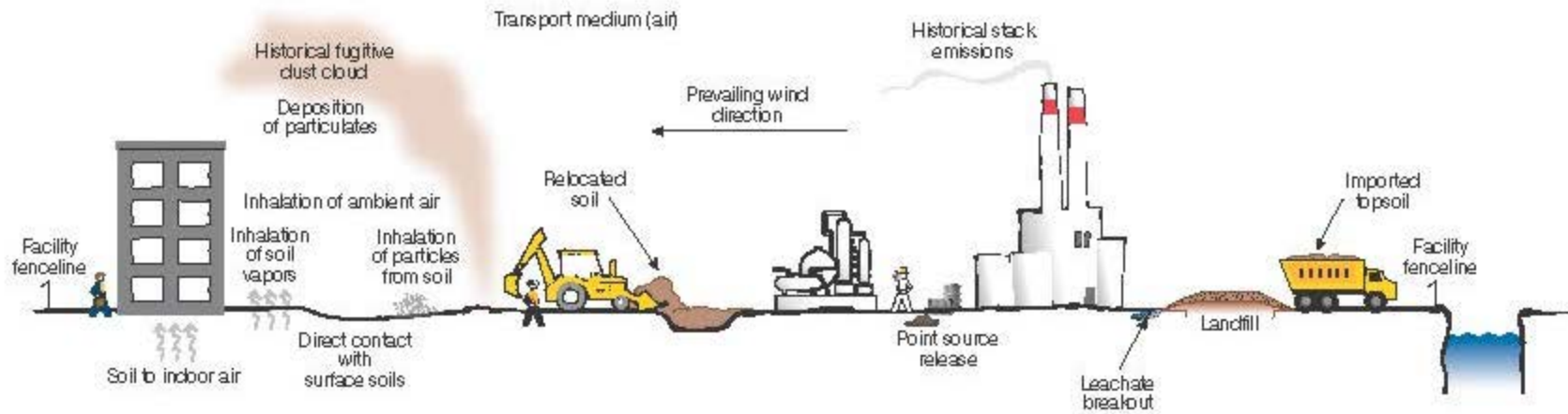





Figure 4.3-3. Overview of Zone 2 – West



**Figure 4.3.4. Conceptual Site Model for Potential Sources and Soil Exposure Pathways at the Dow Midland Facility**



**Figure 4.3-5. Zone 2 Direct Contact Category Flowchart**

Property Type	Possible Sources	Exposure	Usage	Category No.	Path Forward
Laydown Area <sup>1</sup> Gravel Areas <sup>2</sup> (Historical Process Area)	Aerial Dispersion Point Source Release Historical Area Operations	Intermittent Exposure (Event Based)	Regular	1	Direct Contact Sampling Proposed
Gravel Areas <sup>2</sup> (Not a Historical Process Area) Historic Grass Area <sup>3</sup> Campus Area <sup>4</sup> Greenbelt Prior to 2000 <sup>5</sup>	Aerial Dispersion	Limited Exposure	Regular to Low Frequency	2	While Exposure is Limited, Direct Contact Sampling Proposed
Greenbelt 2000-Present <sup>6</sup>	Imported Soil	Limited Exposure	Regular to Low Frequency	3	Limited Confirmation Sampling Proposed
Relocated Soil Covered with Imported Topsoil <sup>7</sup>	Imported Soil	Limited Access, Limited Exposure	Low Frequency	4	Limited Confirmation Sampling Proposed
Stormwater Basin <sup>8</sup>	Imported Soil Aerial Dispersion via Run-off	Limited Access, Limited Exposure	Low Frequency	5	Limited Confirmation Sampling Proposed
Vegetated Cap, Closed by Dow	Aerial Dispersion Leachate Breakout Imported Soil	Limited Access, Limited Exposure	Low Frequency	6	Limited Confirmation Sampling Proposed
Vegetated Cap, Closed with DEQ or EPA Oversight Limited Access <sup>9</sup> Paved/Buildings/Process Areas <sup>11</sup>	--	Limited Exposure/Access or No Exposure/Access	Very Low Frequency	7	
Rail Yard and Electrical Substation	--	Defer <sup>12</sup>			

**NOTES:**

If land use changes in the future, direct contact will be reevaluated at that time. O&M Plan will be defined and will address use and exposure in the future. Dow reserves the right to forgo sampling and implement presumptive remedy at any time.

**Property Type:** This includes areas associated with structures that have been placed on the facility demolition list.

- <sup>1</sup> Gravel cover with no vegetation that serves as equipment storage waiting for reuse/demolition. Area may also have activity preparing equipment for reuse or cutting for disposal. Possible seasonal construction projects (may last up to 1 week at a time) that may lead to morning pick up and evening drop off.
- <sup>2</sup> Gravel areas such as parking lots, process areas, road shoulders and vacant land that have a history of process operations based on review of historical aerials.
- <sup>3</sup> Gravel areas such as parking lots, road shoulders and vacant land that have no history of process operations.
- <sup>4</sup> These areas have always been vegetated and little to no investigation or presumptive remedy has taken place. These areas are mowed and maintained.
- <sup>5</sup> The Campus Area is within the facility fence line and access is limited. The grassed areas are mowed and maintained.
- <sup>6</sup> This area includes the greenbelt outside of the property fence line from the southeastern point of the site to the ball park. These areas are mowed and maintained. This does not include greenbelt areas where some level of presumptive remedy has been completed.
- <sup>7</sup> This area includes the portion of greenbelt outside of the property fence line from the southeastern point of the site to the ball park where some level of presumptive remedy has taken place since 2000. These areas are mowed and maintained.
- <sup>8</sup> Vegetated excavated areas with replaced soils covered with imported topsoil from either 10 miles away or more recently, City of Midland soils. These areas are mowed and maintained.
- <sup>9</sup> Vegetated detention areas addressed in 2009-2011 covered with imported topsoil. These areas are mowed and maintained and undergo event-driven inspections.
- <sup>10</sup> Restricted areas with very limited access and very infrequent maintenance. This area includes the wastewater treatment tanks and dike areas.
- <sup>11</sup> Buildings, areas between buildings, paved process areas, paved parking lots, roads, etc.
- <sup>12</sup> The Rail Yard and Electrical Substation will be evaluated as individual, complete areas and are deferred until a later date.



Figure 4.3.6. Zone 2 Sampling Plan – East

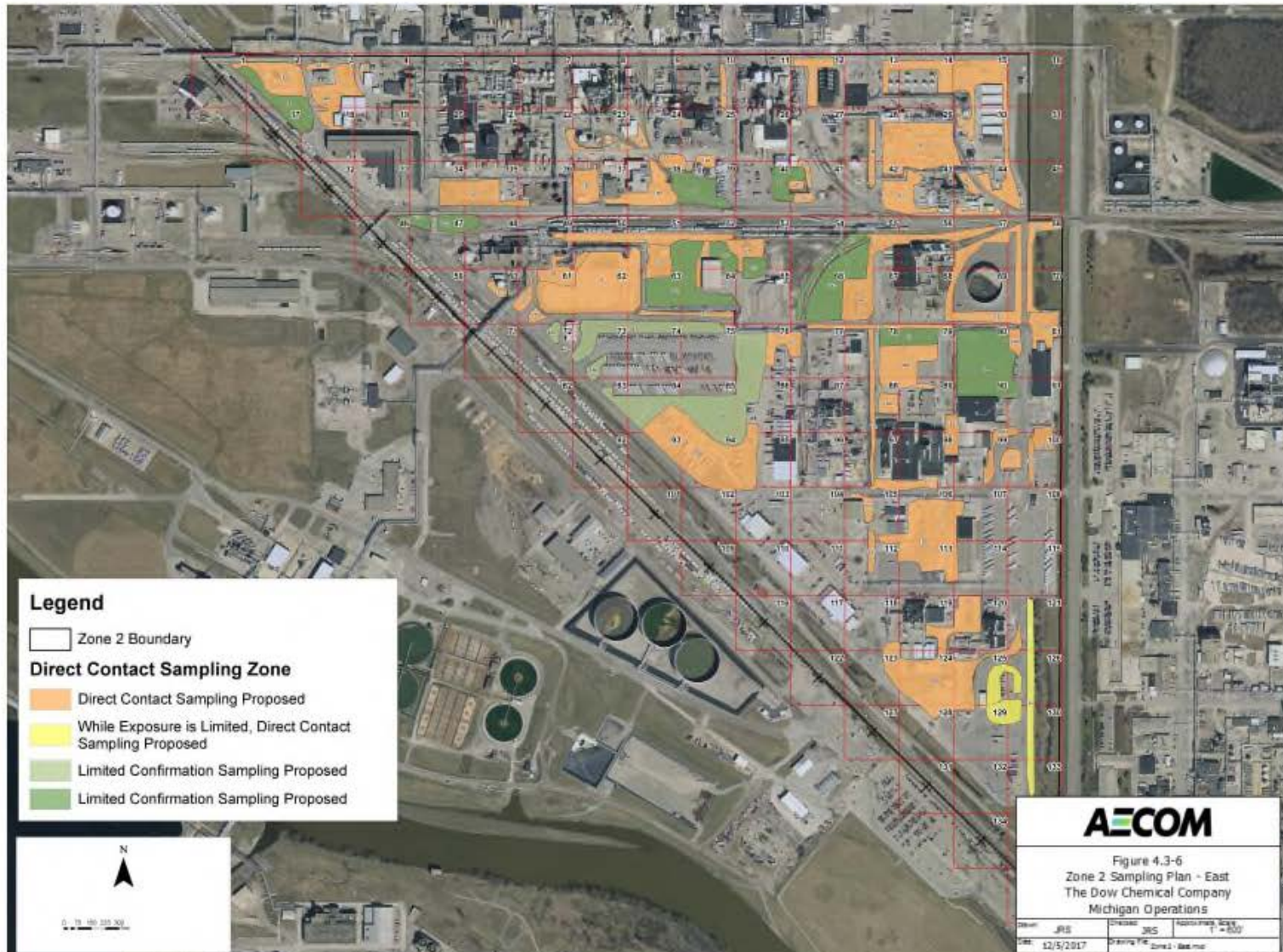


Figure 4.3-7. Zone 2 Sampling Plan – West





Figure 4.3-8. Zone 2 Dioxin ad Furan Results – East

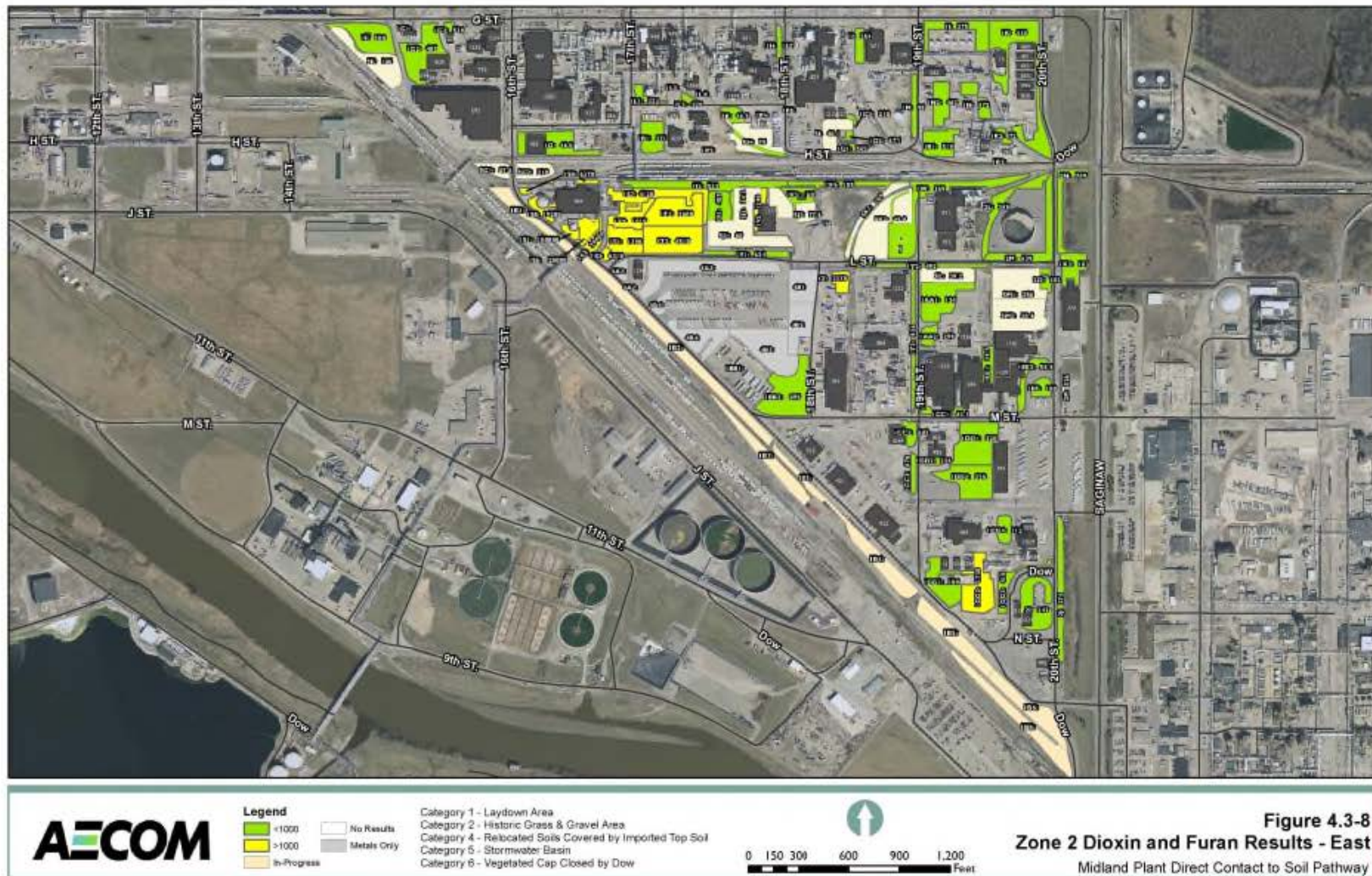
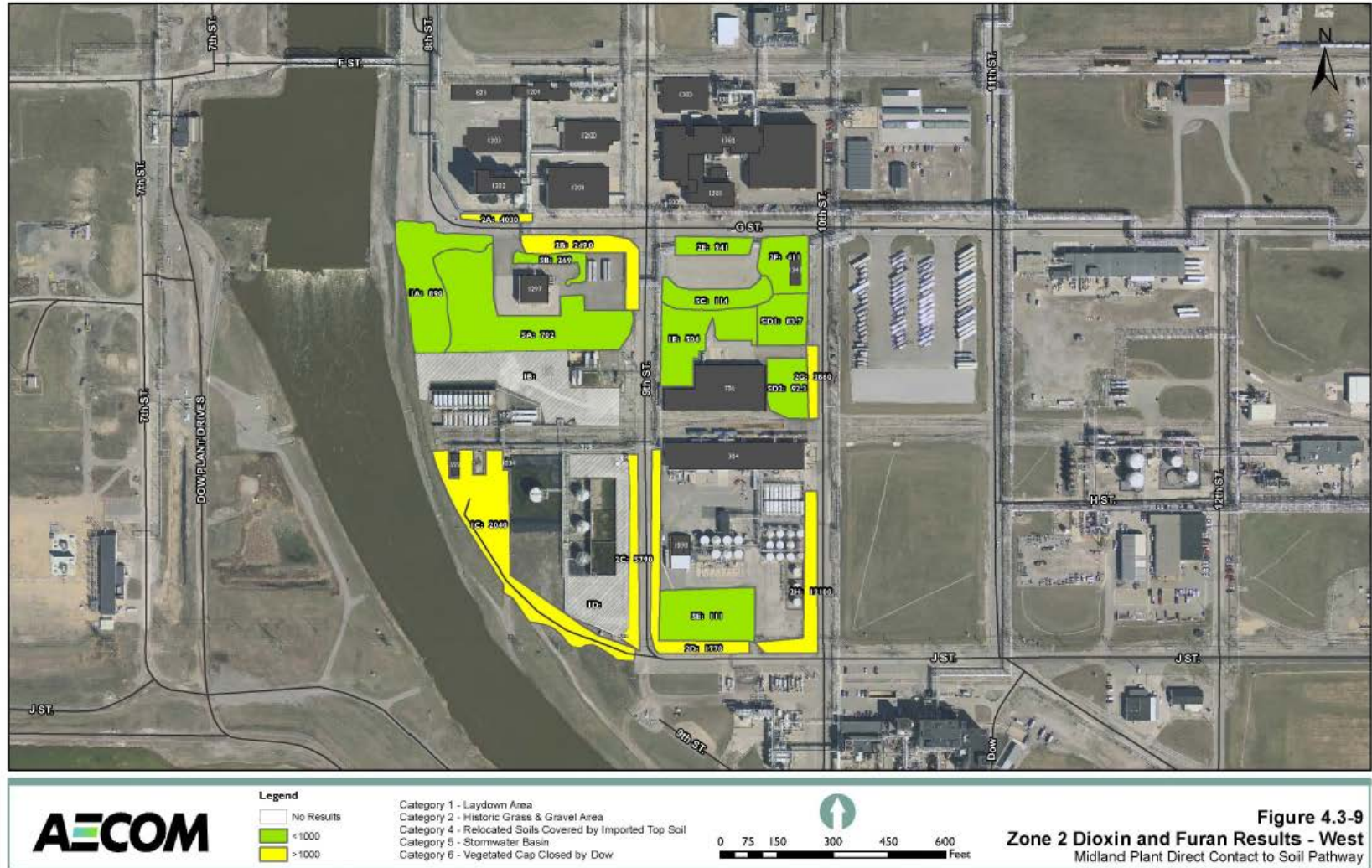


Figure 4.3-9. Zone 2 Dioxin and Furan Results – West





**Table 4.3-1. Direct Contact Sampling Plan Grid Numbers Where No Sampling is Proposed**

Grid #	Not Sampling = X	Notes	Railroad - Defer	Paved	RGIS Construction & Upgrade Project	Greenbelt - Confirm Sampled
<b>Zone 2 - Part 1 East</b>						
1	X	Railroad = defer; link the small gravel area in the northeast corner to Grid 2 for sampling.	X			
4	X	Mostly paved or process area. Small gravel area in the northwest corner that was combined with Grid 3 area for sampling.		X		
5	X	All paved and process area.		X		
6	X	All paved and process area.		X		
7	X	All paved and process area.		X		
8	X	All paved and process area.		X		
9	X	All paved and process area.		X		
10	X	Mostly paved or process area. Small gravel area was sampled.		X		
11	X	All paved and process area.		X		
13	X	Mostly paved or process area. Small gravel area was sampled.		X		
16	X	The portion of Zone 2 included in this grid has new cover (gravel).		X		X
17	X	Railroad = defer; link small portion of stormwater basin with Grid 2 for sampling.	X			
18	X	Includes a portion of the Railroad = defer; combined small amount of stormwater basin and old gravel with Grids 2 and 3 for sampling.				
19	X	All paved and process area.		X		
20	X	All paved and process area.		X		
21	X	All paved and process area.		X		
22	X	All paved and process area; small portion of gravel combined with Grid 23 and 24 for sampling.		X		
23	X	All paved and process area; small portion of gravel combined with Grid 23 and 24 for sampling.		X		
24	X	All paved and process area; small portion of gravel combined with Grid 23 and 24 for sampling.		X		
25	X	All paved and process area; small portion of gravel combined with Grid 37, 38, and 39 for sampling.		X		
26	X	All paved and process area.		X		
27	X	All paved and process area.	X	X		
31	X	Greenbelt already sampled.				X
32	X	Railroad = defer	X			
33	X	Includes a portion of the Railroad = defer; all paved and process area.		X		
36	X	All paved and process area with small gravel space combined with Grids 34 and 35 for sampling.				
45	X	Greenbelt already sampled.				X
46	X	Railroad = defer; small portion of stormwater basin included with Grid 47 for sampling.	X			
59	X	Includes a portion of the Railroad = defer	X			
71	X	Includes a portion of the Railroad = defer	X			
82	X	Includes a portion of the Railroad = defer	X			
87	X	All paved and process area.		X		
88		Paved parking areas, aboveground lines, process area and Buildings but I cannot read the numbers		X		
92	X	Railroad = defer	X			
96	X	All paved and process area.		X		
101	X	Includes a portion of the Railroad = defer	X			
102	X	All paved and process area.		X		
103	X	All paved and process area.		X		
104	X	All paved and process area.		X		

**Table 4.3-1. Direct Contact Sampling Plan Grid Numbers Where No Sampling is Proposed (Continued)**

Grid #	Not Sampling = X	Notes	Railroad - Defer	Paved	RGIS Construction & Upgrade Project	Greenbelt - Confirm Sampled
<b>Zone 2 - Part 1 East</b>						
107	X	All paved and process area.		X		
108	X	All paved and process area.		X		
109	X	Includes a portion of the Railroad = defer	X			
110	X	All paved and process area.	X	X		
111	X	All paved and process area.		X		
114	X	All paved and process area.		X		
115	X	All paved and process area.		X		
116	X	Includes a portion of the Railroad = defer	X			
117	X	All paved and process area.	X	X		
118	X	All paved and process area; small gravel area combined with Grids 123 and 124 for sampling.		X		
122	X	Includes a portion of the Railroad = defer	X			
127	X	Includes a portion of the Railroad = defer (very small); paved road and parking area	X	X		
131	X	Includes a portion of the Railroad = defer (very small); paved parking area		X		
132	X	Paved road and parking lot with railroad = defer.		X		
134	X	Includes a portion of the Railroad = defer; Greenbelt = already sampled.	X	X		X
135	X	Includes a portion of the Railroad = defer; Greenbelt = already sampled.	X	X		X
136	X	Includes a portion of the Railroad = defer; Greenbelt = already sampled.	X	X		X
<b>Zone 2 - Part 2 West</b>						
1	X	Includes a portion of the RGIS Construction and Upgrade Project along the river and remainder is paved.		X	X	
2	X	Paved and process area with aboveground piping.		X		
3	X	Paved and process area with aboveground piping.		X		
17	X	Primarily paved with structures and parking lot.		X		
24	X	Includes areas previous sampled in Zone 1 and a portion of the approved RGIS Construction and Upgrade Project.			X	

**Table 4.3-2. Zone 2 Direct Contact Sampling Areas**

DU	Original Estimated Acreage	Zone 2 East or West (E/W)	TAL	Sampling Density	Increments	Total Number of DUs	Total Number of DUs Sampled
<b>Category 1 - Laydown Area (Source Type: Aerial Dispersion, Point Source Release and Historical Area Operations)</b>							
1A	0.96	W	<b>Detected Metals, Herbicides, Pesticides, SVOCs and VOCs, Dioxins/Furans, Arochlors 8081</b>	<b>All Decision Units will be sampled</b>	20	67	54 (See Table 4-2)
1B	1.31	W			NS		
1C	1.44	W			30		
1D	0.81	W			NS		
1E	0.87	W			20		
1F	1.04	E			30		
1G1	0.09	E			NS		
1G2	1.05	E			30		
1G3	0.1	E			10		
1H	0.17	E			10		
1I	0.5	E			10		
1J	0.79	E			20		
1K	1.99	E			30		
1L1	0.16	E			10		
1L2	0.06	E			NS		
1L3	0.07	E			10		
1L4	0.14	E			NS		
1M	0.29	E			10		
1N	1.01	E			20 (~ half of DU was concrete/asphalt)		
1N2	1.33				20 (~ half of DU was concrete/asphalt)		
1O	1.17	E			30		
1P1	0.57	E			20		
1P2*	0.87	E			NS		
1P4	0.15	E			NS		
1P5	0.03	E			NS		
1Q1	0.13	E			10		
1Q2	0.1	E			10		
1Q3	0.11	E			10		
1R1	0.87	E			20		
1R2	0.15	E			10		
1R3	0.16	E			NS		
1S1	0.13	E			10		
1S2	0.25	E			10		
1S3	0.12	E			10		
1S4	0.57	E	20				
1T1	0.75	E	20				
1T2	1.31	E	30				
1T3	1.31	E	30				
1U	1.05	E	30				
1V1	0.56	E	20				
1V2	0.2	E	10				
1V3	0.5	E	20				
1V4	0.45	E	10				
1W	1.78	E	30				
1X1	1.57	E	NS				
1X2	0.59	E	NS				
1X3	0.58	E	20				
1Y1	0.25	E	10				
1Y2	0.46	E	10				
1Y3	0.47	E	10				
1Z	0.54	E	20				

**Table 4.3-2. Zone 2 Direct Contact Sampling Areas (Continued)**

DU	Original Estimated Acreage	Zone 2 East or West (E/W)	TAL	Sampling Density	Increments	Total Number of DUs	Total Number of DUs Sampled
<b>Category 1 - Laydown Area (Source Type: Aerial Dispersion, Point Source Release and Historical Area Operations)</b>							
1AA1	1.38	E			30		
1AA2	0.26	E			10		
1BB1	1.77	E			NS		
1BB2	1.9	E			30		
1CC1	0.39	E			10		
1CC2	0.21	E			10		
1CC3	0.2	E			10		
1DD1	1.33	E			30		
1DD2	1.3	E			30		
1EE1	0.36	E			10		
1EE2	0.37	E			10		
1FF	0.27	E			10		
1GG1	0.93	E			20		
1GG2	1.19	E			30		
1GG3	0.45	E			10		
1GG4	0.4	E			10		
<b>Category 2 - Gravel Areas (Not Historical Process Areas), Historic Grass Areas (Source Type: Aerial Dispersion)</b>							
2A	0.25	W	Dioxins/Furans and Arsenic	All Decision Units will be sampled.	10	16	16
2B	0.74	W			20		
2C	0.34	W			10		
2D	0.5	W			20		
2E	0.23	W			10		
2F	0.43	W			10		
2G	0.3	W			10		
2H	0.46	W			10		
2I	1.05	E			30		
2J	0.94	E			20		
2K	0.25	E			10		
2L	0.7	E			20		
2M	0.86	E			20		
2N	0.59	E			20		
2O	0.2	E			10		
2P	0.16	E			10		
<b>Category 4 - Relocated Soil Covered by Clean Topsoil (Source Type: Imported Soils)</b>							
4A2	0.2	E	Herbicides, Pesticides, Metals	Limited Confirmation Sampling - only a portion of the DUs	10	6	6
4A3	1.51	E			30		
4A4	0.2	E			10		
4B1	0.88	E			20		
4B2	1.88	E			30		
4B3	1.01	E			30		
<b>Category 5 - Stormwater Basin (Source Type: Imported Soil, Aerial Dispersion via Run-off)</b>							
5A	1.78	W	Metals, Herbicides, Pesticides; Dioxins/Furans on a case-by-case basis	Limited Confirmation Sampling - only a portion of the DUs	30	19	19
5B	0.17	W			10		
5C	0.39	W			10		
5D1	0.4	W			10		
5D2	0.4	W			10		
5E	0.72	W			20		
5F	0.95	E			20		
5G1	0.29	E			10		
5G2	0.45	E			10		

**Table 4.3-2. Zone 2 Direct Contact Sampling Areas (Continued)**

DU	Original Estimated Acreage	Zone 2 East or West (E/W)	TAL	Sampling Density	Increments	Total Number of DUs	Total Number of DUs Sampled
<b>Category 5 - Stormwater Basin (Source Type: Imported Soil, Aerial Dispersion via Run-off)</b>							
5H	0.76	E			20		
5I	0.52	E			20		
5J1	1.85	E			30		
5J2	0.4	E			10		
5J3	0.33	E			10		
5K2	0.35	E			30		
5K1	1.75	E			10		
5L	0.63	E			20		
5M1	1.22	E			30		
5M2	1.33	E			30		

\* There is no DU 1P3 - it was inadvertently left out in a counting error.

**Table 4.3-3. Direct Contact Sampling Plan - Decision Units Modified or Not Sampled**

DU	Documentation of Modified Increments
<b>DUs with Increments Modified due to Ground Conditions</b>	
1E	Considerable portion of DU is asphalt.
1I	Entire northern portion of T-shaped DU is asphalt. Road runs down N-S center of DU. Placed 5 increments on each side of the N-S road, 10 total.
1J	In eastern portion of DU, considerable asphalt and too close/on tracks. Moved seven increments spaced out through rest of DU
1K	Eastern portion of DU near 600 series warehouses is mostly asphalt (non-contiguous patches of gravel). Asphalt also present in other areas of DU, consult map. Moved 7 increments to gravel areas.
1N	Over half of DU is asphalt/concrete. Remaining DU is two non-contiguous areas of asphalt. Decreased increment count to 20, with 10 increments in each non-contiguous portion.
1N2	Over half of DU is asphalt/concrete. Decreased increment count to 20 and moved locations to where gravel is present. DU is two non-contiguous parts.
1Q1	Eastern portion of DU is asphalt, resulting in 2 increments moved west into gravel. Gravel is 2-3" thick, 1-1.5" in diameter.
1Q2	Shoveled 3" of 1-1.5" diameter gravel out of way to sample increments.
1Q3	Southern portion of DU had small non-contiguous 1" deep gravel spots, moved four increments north.
1R1	Moved 8 increments off of asphalt. DU is two non-contiguous parts.
1R2	Multiple increments shifted to west since NE edge of DU was asphalt.
1T2	There was 3-4" of 1-2" diameter gravel moved out of way in order to collect sample.
1U	Most of DU is asphalt road, alternated increments on opposite sides of road.
1AA2	SE corner is asphalt. Moved two increments to West.
1CC1	Southern portion and eastern end of DU = asphalt. Moved several increments to avoid asphalt.
1CC2	Note sand blaster grit from Niles blasting pipe runs is visible on ground surface. NW portion of DU is asphalt. Moved two increments.
1CC3	Note sand blaster grit from Niles blasting pipe runs is visible on ground surface.
1GG1	Moved 1 increment from the portion of the DU that is asphalt. Note: there was another area where refusal was met at 3".
1GG2	Note asphalt portion and areas where refusal met at 3"
1GG3	Most areas could only reach to 4" before refusal.
2A	Eastern portion of DU is asphalt with very small non-contiguous portions with gravel near posts for overhead trusses.
2B	Decreased increments from 20 to 10 because over half of the decision unit (southern portion) covered in asphalt.
2D	Middle portion of N-S arm has about 2 inches of gravel 1-1.5" in diameter. Southern E-W arm is about 60% gravel/40% asphalt, shifted increments northward as close as possible to Cat 5 DU.
2F	East of Bldg 1343 has asphalt. Northern portion of DU is asphalt, so two increments moved.
2G	Over half of DU is asphalt/concrete. Moved increments to southern portion that was not asphalt.
2J	Southern tip of DU sampled as part of GB50B-18 in Aug/Sept 2016, four increments moved to northern portion of DU
<b>DUs Not Sampled</b>	
1B	Area is restricted/extremely hazardous.
1D	Restricted Area within dike
1G1	Only very small portion (see map) actually has gravel that could possibly be sampled.
1L2	Huge pile of soil takes up 80% of area, looks like entire thing is recently disturbed.
1L4	100% covered by asphalt
1P2	Active construction on railroad over entire DU.
1P4	100% covered by asphalt/concrete
1P5	Mostly asphalt/concrete with exception of a portion making up less than 10% of the DU that was gravel.
1R3	100% covered by asphalt/concrete
1BB1	100% covered by asphalt
Original 2P	Sampled August/September 2016. No longer DU. DU to SW that was 1EE4/2Q is now 2P.



**Table 4.3-4. Metals Background Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Background Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Statewide Default Background (Mean + 1 Std Dev)	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	Modified Urban Background (Mean + 2 Std Dev)	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 1	SW6010B	ALUMINUM	7429-90-5	mg/kg	55	100%	3328	2007	830	10000	-	-	-	-	6900	7%	0%	11673	0%	0%
Zone 2 - Category 1	SW6010B	ANTIMONY	7440-36-0	mg/kg	55	71%	0.508	0.366	0.27	1.7	0.24	0.27	0.51	0.56	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	ARSENIC	7440-38-2	mg/kg	55	100%	4.63	3.57	1.3	19	-	-	-	-	5.8	18%	0%	11.29	9%	0%
Zone 2 - Category 1	SW6010B	BARIUM	7440-39-3	mg/kg	55	100%	28.1	11.3	11	52	-	-	-	-	75	0%	0%	178	0%	0%
Zone 2 - Category 1	SW6010B	BERYLLIUM	7440-41-7	mg/kg	55	100%	0.283	0.114	0.1	0.74	-	-	-	-	-	-	-	0.43	7%	0%
Zone 2 - Category 1	SW6010B	CADMIUM	7440-43-9	mg/kg	55	100%	0.262	0.163	0.1	1.1	-	-	-	-	1.2	0%	0%	2	0%	0%
Zone 2 - Category 1	SW6010B	CALCIUM	7440-70-2	mg/kg	55	100%	187309	69804	20000	330000	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	CHROMIUM, TOTAL	7440-47-3	mg/kg	55	100%	19.6	32.5	5.4	250	-	-	-	-	18	24%	0%	21.93	16%	0%
Zone 2 - Category 1	SW6010B	COBALT	7440-48-4	mg/kg	55	100%	2.04	1.08	0.69	5.6	-	-	-	-	6.8	0%	0%	5.9	0%	0%
Zone 2 - Category 1	SW6010B	COPPER	7440-50-8	mg/kg	55	100%	18.0	15.0	5.5	87	-	-	-	-	32	9%	0%	38.08	7%	0%
Zone 2 - Category 1	SW6010B	IRON	7439-89-6	mg/kg	55	100%	6125	2554	2800	15000	-	-	-	-	12000	2%	0%	21916	0%	0%
Zone 2 - Category 1	SW6010B	LEAD	7439-92-1	mg/kg	55	100%	13.9	8.8	3.9	45	-	-	-	-	21	20%	0%	114.22	0%	0%
Zone 2 - Category 1	SW6010B	MAGNESIUM	7439-95-4	mg/kg	55	100%	7204	2151	1600	15000	-	-	-	-	-	-	-	29875	0%	0%
Zone 2 - Category 1	SW6010B	MANGANESE	7439-96-5	mg/kg	55	100%	134	46	31	320	-	-	-	-	440	0%	0%	1298	0%	0%
Zone 2 - Category 1	SW6010B	MOLYBDENUM	7439-98-7	mg/kg	55	100%	0.947	0.673	0.23	4	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	NICKEL	7440-02-0	mg/kg	55	100%	13.5	6.5	3.9	42	-	-	-	-	20	13%	0%	-	-	-
Zone 2 - Category 1	SW6010B	POTASSIUM	7440-09-7	mg/kg	55	100%	464	272	160	1500	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	SELENIUM	7782-49-2	mg/kg	55	40%	0.282	0.463	0.18	3.2	0.17	0.19	0.25	0.28	0.41	16%	0%	0.77	5%	0%
Zone 2 - Category 1	SW6010B	SILVER	7440-22-4	mg/kg	55	0%	-	-	-	-	0.032	0.035	0.25	0.28	1	0%	0%	-	-	-
Zone 2 - Category 1	SW6010B	SODIUM	7440-23-5	mg/kg	55	100%	278	361	59	2700	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	STRONTIUM	7440-24-6	mg/kg	55	100%	98.1	30.1	19	160	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	THALLIUM	7440-28-0	mg/kg	55	71%	0.148	0.111	0.074	0.49	0.067	0.073	0.51	0.56	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	TITANIUM	7440-32-6	mg/kg	55	100%	110	55	27	270	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	ZINC	7440-66-6	mg/kg	55	100%	95.9	93.0	29	620	-	-	-	-	47	73%	0%	139.65	13%	0%
Zone 2 - Category 1	SW7196A	CHROMIUM, HEXAVALENT	18540-29-9	mg/kg	36	83%	0.510	0.660	0.26	4.1	0.24	0.24	0.8	0.82	-	-	-	-	-	-
Zone 2 - Category 1	SW7471A	MERCURY	7439-97-6	mg/kg	55	93%	0.135	0.170	0.019	0.71	0.018	0.022	0.098	0.12	0.13	24%	0%	0.18	18%	0%
Zone 2 - Category 2	SW6010B	ARSENIC	7440-38-2	mg/kg	16	100%	11.2	11.9	1.4	41	-	-	-	-	5.8	50%	0%	11.29	38%	0%
Zone 2 - Category 4	SW6010B	ALUMINUM	7429-90-5	mg/kg	6	100%	8350	831	7300	9300	-	-	-	-	6900	100%	0%	11673	0%	0%
Zone 2 - Category 4	SW6010B	ANTIMONY	7440-36-0	mg/kg	6	0%	-	-	-	-	0.25	0.27	0.53	0.56	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	ARSENIC	7440-38-2	mg/kg	6	100%	2.37	0.20	2.1	2.6	-	-	-	-	5.8	0%	0%	11.29	0%	0%
Zone 2 - Category 4	SW6010B	BARIUM	7440-39-3	mg/kg	6	100%	43.2	4.9	36	48	-	-	-	-	75	0%	0%	178	0%	0%
Zone 2 - Category 4	SW6010B	BERYLLIUM	7440-41-7	mg/kg	6	100%	0.358	0.034	0.32	0.41	-	-	-	-	-	-	-	0.43	0%	0%
Zone 2 - Category 4	SW6010B	CADMIUM	7440-43-9	mg/kg	6	100%	0.203	0.005	0.2	0.21	-	-	-	-	1.2	0%	0%	2	0%	0%
Zone 2 - Category 4	SW6010B	CALCIUM	7440-70-2	mg/kg	6	100%	8900	4617	4200	16000	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	CHROMIUM, TOTAL	7440-47-3	mg/kg	6	100%	14.7	1.2	13	16	-	-	-	-	18	0%	0%	21.93	0%	0%
Zone 2 - Category 4	SW6010B	COBALT	7440-48-4	mg/kg	6	100%	4.32	0.56	3.6	4.9	-	-	-	-	6.8	0%	0%	5.9	0%	0%
Zone 2 - Category 4	SW6010B	COPPER	7440-50-8	mg/kg	6	100%	7.52	0.56	6.7	8.2	-	-	-	-	32	0%	0%	38.08	0%	0%
Zone 2 - Category 4	SW6010B	IRON	7439-89-6	mg/kg	6	100%	9233	766	8200	10000	-	-	-	-	12000	0%	0%	21916	0%	0%
Zone 2 - Category 4	SW6010B	LEAD	7439-92-1	mg/kg	6	100%	7.27	0.42	6.8	8	-	-	-	-	21	0%	0%	114.22	0%	0%
Zone 2 - Category 4	SW6010B	MAGNESIUM	7439-95-4	mg/kg	6	100%	2733	423	2300	3500	-	-	-	-	-	-	-	29875	0%	0%
Zone 2 - Category 4	SW6010B	MANGANESE	7439-96-5	mg/kg	6	100%	198	13	180	220	-	-	-	-	440	0%	0%	1298	0%	0%
Zone 2 - Category 4	SW6010B	MOLYBDENUM	7439-98-7	mg/kg	6	100%	0.337	0.054	0.27	0.42	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	NICKEL	7440-02-0	mg/kg	6	100%	11.5	1.7	9.2	14	-	-	-	-	20	0%	0%	-	-	-
Zone 2 - Category 4	SW6010B	POTASSIUM	7440-09-7	mg/kg	6	100%	1017	137	860	1200	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	SELENIUM	7782-49-2	mg/kg	6	100%	0.448	0.135	0.34	0.63	-	-	-	-	0.41	33%	0%	0.77	0%	0%
Zone 2 - Category 4	SW6010B	SILVER	7440-22-4	mg/kg	6	0%	-	-	-	-	0.033	0.035	0.26	0.28	1	0%	0%	-	-	-
Zone 2 - Category 4	SW6010B	SODIUM	7440-23-5	mg/kg	6	100%	165	77	74	270	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	STRONTIUM	7440-24-6	mg/kg	6	100%	15.0	2.9	11	19	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	THALLIUM	7440-28-0	mg/kg	6	100%	0.317	0.042	0.27	0.39	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	TITANIUM	7440-32-6	mg/kg	6	100%	152	8	140	160	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	ZINC	7440-66-6	mg/kg	6	100%	35.8	3.2	32	41	-	-	-	-	47	0%	0%	139.65	0%	0%
Zone 2 - Category 4	SW7471A	MERCURY	7439-97-6	mg/kg	6	67%	0.0189	0.0069	0.021	0.026	0.02	0.021	0.11	0.12	0.13	0%	0%	0.18	0%	0%
Zone 2 - Category 5	SW6010B	ALUMINUM	7429-90-5	mg/kg	19	100%	6221	2426	2400	8800	-	-	-	-	6900	58%	0%	11673	0%	0%
Zone 2 - Category 5	SW6010B	ANTIMONY	7440-36-0	mg/kg	19	5%	0.140	0.032	0.27	0.27	0.25	0.28	0.53	0.58	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	ARSENIC	7440-38-2	mg/kg	19	100%	4.91	4.13	1.4	14	-	-	-	-	5.8	21%	0%	11.29	21%	0%
Zone 2 - Category 5	SW6010B	BARIUM	7440-39-3	mg/kg	19	100%	42.3	10.8	15	64	-	-	-	-	75	0%	0%	178	0%	0%

**Table 4.3-4. Metals Background Summary Statistics and Screening Comparison (Continued)**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Background Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Statewide Default Background (Mean + 1 Std Dev)	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	Modified Urban Background (Mean + 2 Std Dev)	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 5	SW6010B	BERYLLIUM	7440-41-7	mg/kg	19	100%	0.305	0.115	0.092	0.44	-	-	-	-	-	-	-	0.43	5%	0%
Zone 2 - Category 5	SW6010B	CADMIUM	7440-43-9	mg/kg	19	100%	0.216	0.045	0.12	0.3	-	-	-	-	1.2	0%	0%	2	0%	0%
Zone 2 - Category 5	SW6010B	CALCIUM	7440-70-2	mg/kg	19	100%	29726	27586	6600	110000	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	CHROMIUM, TOTAL	7440-47-3	mg/kg	19	100%	13.0	3.5	5.4	18	-	-	-	-	18	0%	0%	21.93	0%	0%
Zone 2 - Category 5	SW6010B	COBALT	7440-48-4	mg/kg	19	100%	3.48	1.51	0.8	5.7	-	-	-	-	6.8	0%	0%	5.9	0%	0%
Zone 2 - Category 5	SW6010B	COPPER	7440-50-8	mg/kg	19	100%	9.75	2.79	3	14	-	-	-	-	32	0%	0%	38.08	0%	0%
Zone 2 - Category 5	SW6010B	IRON	7439-89-6	mg/kg	19	100%	8342	2189	3100	12000	-	-	-	-	12000	0%	0%	21916	0%	0%
Zone 2 - Category 5	SW6010B	LEAD	7439-92-1	mg/kg	19	100%	10.9	5.0	6.5	26	-	-	-	-	21	11%	0%	114.22	0%	0%
Zone 2 - Category 5	SW6010B	MAGNESIUM	7439-95-4	mg/kg	19	100%	4824	1912	970	8000	-	-	-	-	-	-	-	29875	0%	0%
Zone 2 - Category 5	SW6010B	MANGANESE	7439-96-5	mg/kg	19	100%	167	65	35	290	-	-	-	-	440	0%	0%	1298	0%	0%
Zone 2 - Category 5	SW6010B	MOLYBDENUM	7439-98-7	mg/kg	19	100%	0.531	0.533	0.086	2	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	NICKEL	7440-02-0	mg/kg	19	100%	11.1	3.6	3.1	17	-	-	-	-	20	0%	0%	-	-	-
Zone 2 - Category 5	SW6010B	POTASSIUM	7440-09-7	mg/kg	19	100%	781	350	180	1200	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	SELENIUM	7782-49-2	mg/kg	19	84%	0.353	0.141	0.25	0.54	0.19	0.2	0.27	0.29	0.41	42%	0%	0.77	0%	0%
Zone 2 - Category 5	SW6010B	SILVER	7440-22-4	mg/kg	19	0%	-	-	-	-	0.033	0.037	0.26	0.29	1	0%	0%	-	-	-
Zone 2 - Category 5	SW6010B	SODIUM	7440-23-5	mg/kg	19	100%	85.8	58.8	32	300	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	STRONTIUM	7440-24-6	mg/kg	19	100%	31.4	26.9	8.7	100	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	THALLIUM	7440-28-0	mg/kg	19	42%	0.101	0.084	0.13	0.29	0.07	0.076	0.54	0.58	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	TITANIUM	7440-32-6	mg/kg	19	100%	101	17	59	130	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	ZINC	7440-66-6	mg/kg	19	100%	43.6	18.2	16	100	-	-	-	-	47	26%	0%	139.65	0%	0%
Zone 2 - Category 5	SW7196A	CHROMIUM, HEXAVALENT	18540-29-9	mg/kg	8	38%	0.524	0.370	0.37	0.75	0.24	2.5	0.82	8.2	-	-	-	-	-	-
Zone 2 - Category 5	SW7471A	MERCURY	7439-97-6	mg/kg	19	95%	0.0588	0.0384	0.025	0.17	0.017	0.017	0.095	0.095	0.13	5%	0%	0.18	0%	0%

**Table 4.3-5. Totals Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	Unit	Number of Samples	Summary Statistics								Screening Comparison						
					Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 1	SW8081A	Total Chlordanes	ug/kg	55	7%	33.7	73.3	3.7	36	-	-	-	-	150000	0%	0%	7700	0%	0%
Zone 2 - Category 1	SW8081A	Total Endosulfans	ug/kg	55	5%	27.4	59.6	3.05	29.5	-	-	-	-	4400000	0%	0%	7000000	0%	0%
Zone 2 - Category 1	SW8081A	Total Endrins	ug/kg	55	16%	34.9	100.0	2.565	715	-	-	-	-	190000	0%	0%	-	-	-
Zone 2 - Category 1	SW8082A	Total PCBs	ug/kg	55	47%	202	608	34	4200	-	-	-	-	16000	0%	0%	940	5%	0%
Zone 2 - Category 1	SW8260B	XYLENES, TOTAL	ug/kg	55	42%	431	910	38	4300	35	270	630	4900	1000000000	0%	0%	2500000	0%	0%
Zone 2 - Category 1	SW8270C	Total BaP TEQ	ug/kg	55	96%	349	334	16.9815	1384	-	-	-	-	8000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	Total Cresols	ug/kg	55	11%	36.5	34.8	27	199	-	-	-	-	36000000	0%	0%	82000000	0%	0%
Zone 2 - Category 4	SW8081A	Total Chlordanes	ug/kg	6	0%	-	-	-	-	-	-	-	-	150000	0%	0%	7700	0%	0%
Zone 2 - Category 4	SW8081A	Total Endosulfans	ug/kg	6	0%	-	-	-	-	-	-	-	-	4400000	0%	0%	7000000	0%	0%
Zone 2 - Category 4	SW8081A	Total Endrins	ug/kg	6	0%	-	-	-	-	-	-	-	-	190000	0%	0%	-	-	-
Zone 2 - Category 5	SW8081A	Total Chlordanes	ug/kg	19	5%	17.2	29.3	5.65	5.65	-	-	-	-	150000	0%	0%	7700	0%	0%
Zone 2 - Category 5	SW8081A	Total Endosulfans	ug/kg	19	11%	14.0	23.8	3.05	4.65	-	-	-	-	4400000	0%	0%	7000000	0%	0%
Zone 2 - Category 5	SW8081A	Total Endrins	ug/kg	19	11%	13.9	23.9	2.95	3	-	-	-	-	190000	0%	0%	-	-	-

**Table 4.3-6. Zone 2 Category 1 Non-Dioxin Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics									Screening Comparison					
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 1	SW6010B	ALUMINUM	7429-90-5	mg/kg	55	100%	3328	2007	830	10000	-	-	-	-	370000	0%	0%	1100000	0%	0%
Zone 2 - Category 1	SW6010B	ANTIMONY	7440-36-0	mg/kg	55	71%	0.508	0.366	0.27	1.7	0.24	0.27	0.51	0.56	670	0%	0%	470	0%	0%
Zone 2 - Category 1	SW6010B	ARSENIC	7440-38-2	mg/kg	55	100%	4.63	3.57	1.3	19	-	-	-	-	37	0%	0%	3	55%	0%
Zone 2 - Category 1	SW6010B	BARIUM	7440-39-3	mg/kg	55	100%	28.1	11.3	11	52	-	-	-	-	130000	0%	0%	220000	0%	0%
Zone 2 - Category 1	SW6010B	BERYLLIUM	7440-41-7	mg/kg	55	100%	0.283	0.114	0.1	0.74	-	-	-	-	1600	0%	0%	2300	0%	0%
Zone 2 - Category 1	SW6010B	CADMIUM	7440-43-9	mg/kg	55	100%	0.262	0.163	0.1	1.1	-	-	-	-	2100	0%	0%	980	0%	0%
Zone 2 - Category 1	SW6010B	CALCIUM	7440-70-2	mg/kg	55	100%	187309	69804	20000	330000	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	CHROMIUM, TOTAL	7440-47-3	mg/kg	55	100%	19.6	32.5	5.4	250	-	-	-	-	1000000	0%	0%	-	-	-
Zone 2 - Category 1	SW6010B	COBALT	7440-48-4	mg/kg	55	100%	2.04	1.08	0.69	5.6	-	-	-	-	9000	0%	0%	350	0%	0%
Zone 2 - Category 1	SW6010B	COPPER	7440-50-8	mg/kg	55	100%	18.0	15.0	5.5	87	-	-	-	-	73000	0%	0%	47000	0%	0%
Zone 2 - Category 1	SW6010B	IRON	7439-89-6	mg/kg	55	100%	6125	2554	2800	15000	-	-	-	-	580000	0%	0%	820000	0%	0%
Zone 2 - Category 1	SW6010B	LEAD	7439-92-1	mg/kg	55	100%	13.9	8.8	3.9	45	-	-	-	-	900	0%	0%	800	0%	0%
Zone 2 - Category 1	SW6010B	LITHIUM	7439-93-2	mg/kg	55	76%	8.05	6.06	1.8	19	1.2	1.3	25	28	31000	0%	0%	2300	0%	0%
Zone 2 - Category 1	SW6010B	MAGNESIUM	7439-95-4	mg/kg	55	100%	7204	2151	1600	15000	-	-	-	-	1000000	0%	0%	-	-	-
Zone 2 - Category 1	SW6010B	MANGANESE	7439-96-5	mg/kg	55	100%	134	46	31	320	-	-	-	-	90000	0%	0%	26000	0%	0%
Zone 2 - Category 1	SW6010B	MOLYBDENUM	7439-98-7	mg/kg	55	100%	0.947	0.673	0.23	4	-	-	-	-	9600	0%	0%	5800	0%	0%
Zone 2 - Category 1	SW6010B	NICKEL	7440-02-0	mg/kg	55	100%	13.5	6.5	3.9	42	-	-	-	-	150000	0%	0%	22000	0%	0%
Zone 2 - Category 1	SW6010B	POTASSIUM	7440-09-7	mg/kg	55	100%	464	272	160	1500	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	SELENIUM	7782-49-2	mg/kg	55	40%	0.282	0.463	0.18	3.2	0.17	0.19	0.25	0.28	9600	0%	0%	5800	0%	0%
Zone 2 - Category 1	SW6010B	SILVER	7440-22-4	mg/kg	55	0%	-	-	-	-	0.032	0.035	0.25	0.28	9000	0%	0%	5800	0%	0%
Zone 2 - Category 1	SW6010B	SODIUM	7440-23-5	mg/kg	55	100%	278	361	59	2700	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	STRONTIUM	7440-24-6	mg/kg	55	100%	98.1	30.1	19	160	-	-	-	-	1000000	0%	0%	700000	0%	0%
Zone 2 - Category 1	SW6010B	THALLIUM	7440-28-0	mg/kg	55	71%	0.148	0.111	0.074	0.49	0.067	0.073	0.51	0.56	130	0%	0%	12	0%	0%
Zone 2 - Category 1	SW6010B	TITANIUM	7440-32-6	mg/kg	55	100%	110	55	27	270	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 1	SW6010B	VANADIUM	7440-62-2	mg/kg	55	100%	8.72	4.22	2.7	21	-	-	-	-	5500	0%	0%	5800	0%	0%
Zone 2 - Category 1	SW6010B	ZINC	7440-66-6	mg/kg	55	100%	95.9	93.0	29	620	-	-	-	-	630000	0%	0%	350000	0%	0%
Zone 2 - Category 1	SW7196A	CHROMIUM, HEXAVALENT	18540-29-9	mg/kg	36	83%	0.510	0.660	0.26	4.1	0.24	0.24	0.8	0.82	9200	0%	0%	6.3	0%	0%
Zone 2 - Category 1	SW7471A	MERCURY	7439-97-6	mg/kg	55	93%	0.135	0.170	0.019	0.71	0.018	0.022	0.098	0.12	580	0%	0%	46	0%	0%
Zone 2 - Category 1	SW8081A	ALDRIN	309-00-2	ug/kg	55	2%	16.4	34.5	77	77	2	420	4.3	880	4300	0%	0%	180	0%	4%
Zone 2 - Category 1	SW8081A	ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	319-84-6	ug/kg	55	4%	10.1	22.2	1.5	3.1	1.3	280	4.3	880	12000	0%	0%	360	0%	0%
Zone 2 - Category 1	SW8081A	ALPHA ENDOSULFAN	959-98-8	ug/kg	55	2%	8.24	18.22	1.8	1.8	1.1	230	4.3	880	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	ALPHA-CHLORDANE	5103-71-9	ug/kg	55	0%	-	-	-	-	3.2	660	4.3	880	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	319-85-7	ug/kg	55	0%	-	-	-	-	3.3	680	4.3	880	25000	0%	0%	1300	0%	0%
Zone 2 - Category 1	SW8081A	BETA ENDOSULFAN	33213-65-9	ug/kg	55	4%	11.6	24.8	14	18	1.5	310	4.3	880	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	Chlordane Gamma	5103-74-2	ug/kg	55	7%	9.76	20.74	1.9	18	1.3	260	4.3	880	-	-	-	7700	0%	0%
Zone 2 - Category 1	SW8081A	DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	319-86-8	ug/kg	55	2%	8.27	18.22	5.9	5.9	1.1	230	4.3	880	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	DIENDRIN	60-57-1	ug/kg	55	11%	6.87	13.06	4.7	31	0.76	160	4.3	880	4700	0%	0%	140	0%	2%
Zone 2 - Category 1	SW8081A	ENDOSULFAN SULFATE	1031-07-8	ug/kg	55	0%	-	-	-	-	1	210	4.3	880	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	ENDRIN	72-20-8	ug/kg	55	5%	9.07	19.18	2.9	13	1.2	240	4.3	880	190000	0%	0%	250000	0%	0%
Zone 2 - Category 1	SW8081A	ENDRIN ALDEHYDE	7421-93-4	ug/kg	55	13%	12.5	24.9	1.5	32	1.5	310	4.3	880	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	ENDRIN KETONE	53494-70-5	ug/kg	55	5%	13.3	59.3	2.8	440	0.93	110	4.3	510	-	-	-	-	-	-
Zone 2 - Category 1	SW8081A	GAMMA BHC (LINDANE)	58-89-9	ug/kg	55	0%	-	-	-	-	2.4	500	4.3	880	42000	0%	0%	2500	0%	0%
Zone 2 - Category 1	SW8081A	HEPTACHLOR	76-44-8	ug/kg	55	7%	5.05	10.98	0.78	4.4	0.66	140	4.3	880	23000	0%	0%	630	0%	0%
Zone 2 - Category 1	SW8081A	HEPTACHLOR EPOXIDE	1024-57-3	ug/kg	55	2%	15.2	33.5	3.2	3.2	2	420	4.3	880	9500	0%	0%	330	0%	2%
Zone 2 - Category 1	SW8081A	METHOXYCHLOR	72-43-5	ug/kg	54	9%	8.34	17.15	1.2	34	1	210	8.3	1700	5600000	0%	0%	4100000	0%	0%
Zone 2 - Category 1	SW8081A	P,P'-DDD	72-54-8	ug/kg	55	9%	26.2	51.4	3.5	190	2.8	570	4.3	880	400000	0%	0%	9600	0%	0%
Zone 2 - Category 1	SW8081A	P,P'-DDE	72-55-9	ug/kg	55	22%	8.96	16.98	1.3	35	1	210	4.3	880	190000	0%	0%	9300	0%	0%
Zone 2 - Category 1	SW8081A	P,P'-DDT	50-29-3	ug/kg	55	11%	12.0	24.0	1.5	110	1.2	240	4.3	880	280000	0%	0%	8500	0%	0%
Zone 2 - Category 1	SW8081A	Total Chlordanes		ug/kg	55	7%	33.7	73.3	3.7	36	-	-	-	-	150000	0%	0%	7700	0%	0%
Zone 2 - Category 1	SW8081A	Total Endosulfans		ug/kg	55	5%	27.4	59.6	3.05	29.5	-	-	-	-	4400000	0%	0%	7000000	0%	0%
Zone 2 - Category 1	SW8081A	Total Endrins		ug/kg	55	16%	34.9	100.0	2.565	715	-	-	-	-	190000	0%	0%	-	-	-
Zone 2 - Category 1	SW8081A	TOXAPHENE	8001-35-2	ug/kg	55	0%	-	-	-	-	31	6400	84	17000	85000	0%	0%	2100	0%	4%
Zone 2 - Category 1	SW8082A	CHLOROBIPHENYL	37324-23-5	ug/kg	55	0%	-	-	-	-	6.8	810	42	5000	-	-	-	-	-	-
Zone 2 - Category 1	SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	ug/kg	55	0%	-	-	-	-	20	2400	42	5000	-	-	-	27000	0%	0%
Zone 2 - Category 1	SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	ug/kg	55	0%	-	-	-	-	19	2300	42	5000	-	-	-	830	0%	5%

**Table 4.3-6. Zone 2 Category 1 Non-Dioxin Summary Statistics and Screening Comparison (Continued)**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Screening Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 1	SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	ug/kg	55	0%	-	-	-	-	14	1600	42	5000	-	-	-	720	0%	5%
Zone 2 - Category 1	SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	ug/kg	55	2%	60.0	156.6	72	72	17	2000	42	5000	-	-	-	950	0%	4%
Zone 2 - Category 1	SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	ug/kg	55	33%	232	612	50	4200	14	1700	42	5000	-	-	-	950	5%	2%
Zone 2 - Category 1	SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	ug/kg	55	13%	49.1	112.0	34	220	12	1400	42	5000	-	-	-	970	0%	2%
Zone 2 - Category 1	SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	ug/kg	55	4%	54.8	141.0	23	100	15	1800	42	5000	-	-	-	990	0%	2%
Zone 2 - Category 1	SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	ug/kg	55	0%	-	-	-	-	17	2000	42	5000	-	-	-	-	-	-
Zone 2 - Category 1	SW8082A	Total PCBs		ug/kg	55	47%	202	608	34	4200	-	-	-	-	16000	0%	0%	940	5%	0%
Zone 2 - Category 1	SW8151A	2,4,5-T (TRICHLOROPHOXYACETIC ACID)	93-76-5	ug/kg	55	5%	3.79	2.35	7.6	18	5.9	7.1	51	61	-	-	-	8200000	0%	0%
Zone 2 - Category 1	SW8151A	2,4-D (DICHLOROPHOXYACETIC ACID)	94-75-7	ug/kg	55	18%	38.4	127.4	30	950	25	30	200	240	8600000	0%	0%	9600000	0%	0%
Zone 2 - Category 1	SW8151A	SILVEX (2,4,5-TP)	93-72-1	ug/kg	55	2%	2.99	1.25	12	12	5.1	6.1	51	61	5500000	0%	0%	6600000	0%	0%
Zone 2 - Category 1	SW8260B	1,1,1-TRICHLOROETHANE	71-55-6	ug/kg	55	2%	45.6	25.7	150	150	35	270	310	2400	1E+09	0%	0%	36000000	0%	0%
Zone 2 - Category 1	SW8260B	1,1,2,2-TETRACHLOROETHANE	79-34-5	ug/kg	55	0%	-	-	-	-	30	230	310	2400	240000	0%	0%	2700	0%	0%
Zone 2 - Category 1	SW8260B	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ug/kg	55	18%	99.3	209.7	46	1400	29	220	310	2400	1E+09	0%	0%	1.7E+08	0%	0%
Zone 2 - Category 1	SW8260B	1,1,2-TRICHLOROETHANE	79-00-5	ug/kg	55	0%	-	-	-	-	29	220	310	2400	840000	0%	0%	5000	0%	0%
Zone 2 - Category 1	SW8260B	1,1-DICHLOROETHANE	75-34-3	ug/kg	55	0%	-	-	-	-	39	300	310	2400	87000000	0%	0%	16000	0%	0%
Zone 2 - Category 1	SW8260B	1,1-DICHLOROETHENE	75-35-4	ug/kg	55	0%	-	-	-	-	45	350	310	2400	660000	0%	0%	1000000	0%	0%
Zone 2 - Category 1	SW8260B	1,2,4-TRICHLOROBENZENE	120-82-1	ug/kg	55	2%	41.2	21.6	100	100	33	250	310	2400	5800000	0%	0%	110000	0%	0%
Zone 2 - Category 1	SW8260B	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	ug/kg	55	0%	-	-	-	-	60	470	630	4900	20000	0%	0%	64	0%	93%
Zone 2 - Category 1	SW8260B	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	106-93-4	ug/kg	55	0%	-	-	-	-	29	220	310	2400	430	0%	0%	160	0%	2%
Zone 2 - Category 1	SW8260B	1,2-DICHLOROBENZENE	95-50-1	ug/kg	55	2%	29.0	16.8	100	100	23	170	310	2400	63000000	0%	0%	9300000	0%	0%
Zone 2 - Category 1	SW8260B	1,2-DICHLOROETHANE	107-06-2	ug/kg	55	0%	-	-	-	-	38	290	310	2400	420000	0%	0%	2000	0%	0%
Zone 2 - Category 1	SW8260B	1,2-DICHLOROPROPANE	78-87-5	ug/kg	55	0%	-	-	-	-	38	290	310	2400	660000	0%	0%	4400	0%	0%
Zone 2 - Category 1	SW8260B	1,3-DICHLOROBENZENE	541-73-1	ug/kg	55	0%	-	-	-	-	48	370	310	2400	660000	0%	0%	-	-	-
Zone 2 - Category 1	SW8260B	1,4-DICHLOROBENZENE	106-46-7	ug/kg	55	2%	45.5	36.0	260	260	34	260	310	2400	1900000	0%	0%	11000	0%	0%
Zone 2 - Category 1	SW8260B	2-HEXANONE	591-78-6	ug/kg	55	0%	-	-	-	-	110	840	1300	9700	1E+08	0%	0%	1300000	0%	0%
Zone 2 - Category 1	SW8260B	ACETONE	67-64-1	ug/kg	55	0%	-	-	-	-	120	940	1300	9700	73000000	0%	0%	6.7E+08	0%	0%
Zone 2 - Category 1	SW8260B	BENZENE	71-43-2	ug/kg	55	15%	64.7	96.4	80	530	30	230	310	2400	840000	0%	0%	5100	0%	0%
Zone 2 - Category 1	SW8260B	BROMODICHLOROMETHANE	75-27-4	ug/kg	55	2%	28.4	14.0	51	51	23	170	310	2400	490000	0%	0%	1300	0%	0%
Zone 2 - Category 1	SW8260B	BROMOFORM	75-25-2	ug/kg	55	0%	-	-	-	-	29	220	310	2400	3800000	0%	0%	86000	0%	0%
Zone 2 - Category 1	SW8260B	BROMOMETHANE	74-83-9	ug/kg	55	0%	-	-	-	-	35	270	310	2400	1000000	0%	0%	30000	0%	0%
Zone 2 - Category 1	SW8260B	CARBON DISULFIDE	75-15-0	ug/kg	55	0%	-	-	-	-	23	170	310	2400	43000000	0%	0%	3500000	0%	0%
Zone 2 - Category 1	SW8260B	CARBON TETRACHLORIDE	56-23-5	ug/kg	55	0%	-	-	-	-	34	260	310	2400	440000	0%	0%	2900	0%	0%
Zone 2 - Category 1	SW8260B	CHLOROBENZENE	108-90-7	ug/kg	55	0%	-	-	-	-	38	290	310	2400	14000000	0%	0%	1300000	0%	0%
Zone 2 - Category 1	SW8260B	CHLOROETHANE	75-00-3	ug/kg	55	0%	-	-	-	-	35	270	310	2400	12000000	0%	0%	57000000	0%	0%
Zone 2 - Category 1	SW8260B	CHLOROFORM	67-66-3	ug/kg	55	0%	-	-	-	-	30	230	310	2400	5500000	0%	0%	1400	0%	0%
Zone 2 - Category 1	SW8260B	CHLOROMETHANE	74-87-3	ug/kg	55	0%	-	-	-	-	23	170	310	2400	7400000	0%	0%	460000	0%	0%
Zone 2 - Category 1	SW8260B	CIS-1,2-DICHLOROETHYLENE	156-59-2	ug/kg	55	0%	-	-	-	-	44	340	310	2400	8000000	0%	0%	2300000	0%	0%
Zone 2 - Category 1	SW8260B	CIS-1,3-DICHLOROPROPENE	10061-01-5	ug/kg	55	0%	-	-	-	-	29	220	310	2400	240000	0%	0%	8200	0%	0%
Zone 2 - Category 1	SW8260B	CYCLOHEXANE	110-82-7	ug/kg	55	29%	145	245	48	1200	38	290	630	4900	-	-	-	27000000	0%	0%
Zone 2 - Category 1	SW8260B	DIBROMOCHLOROMETHANE	124-48-1	ug/kg	55	0%	-	-	-	-	43	330	310	2400	500000	0%	0%	39000	0%	0%
Zone 2 - Category 1	SW8260B	DICHLORODIFLUOROMETHANE	75-71-8	ug/kg	55	0%	-	-	-	-	28	210	310	2400	1.7E+08	0%	0%	370000	0%	0%
Zone 2 - Category 1	SW8260B	ETHYLBENZENE	100-41-4	ug/kg	55	22%	99.5	122.3	58	670	44	340	310	2400	71000000	0%	0%	25000	0%	0%
Zone 2 - Category 1	SW8260B	ISOPROPYLBENZENE (CUMENE)	98-82-8	ug/kg	55	13%	72.2	71.7	67	390	43	330	310	2400	80000000	0%	0%	9900000	0%	0%
Zone 2 - Category 1	SW8260B	METHYL ACETATE	79-20-9	ug/kg	55	15%	148	135	110	870	94	730	1600	12000	-	-	-	1.2E+09	0%	0%
Zone 2 - Category 1	SW8260B	METHYL ETHYL KETONE (2-BUTANONE)	78-93-3	ug/kg	55	25%	108	76	68	340	63	490	1300	9700	7E+08	0%	0%	1.9E+08	0%	0%
Zone 2 - Category 1	SW8260B	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	108-10-1	ug/kg	55	0%	-	-	-	-	50	390	1300	9700	1.8E+08	0%	0%	1.4E+08	0%	0%
Zone 2 - Category 1	SW8260B	METHYLCYCLOHEXANE	108-87-2	ug/kg	55	44%	403	827	52	4300	46	360	630	4900	-	-	-	-	-	
Zone 2 - Category 1	SW8260B	METHYLENE CHLORIDE	75-09-2	ug/kg	55	18%	207	319	140	1700	82	320	310	1200	5800000	0%	0%	1000000	0%	0%
Zone 2 - Category 1	SW8260B	NAPHTHALENE	91-20-3	ug/kg	55	65%	290	573	35	2700	32	190	400	2400	52000000	0%	0%	17000	0%	0%
Zone 2 - Category 1	SW8260B	STYRENE	100-42-5	ug/kg	55	22%	25.6	28.6	17	180	13	97	310	2400	1900000	0%	0%	35000000	0%	0%
Zone 2 - Category 1	SW8260B	TERT-BUTYL METHYL ETHER	1634-04-4	ug/kg	55	0%	-	-	-	-	33	250	310	2400	7100000	0%	0%	210000	0%	0%
Zone 2 - Category 1	SW8260B	TETRACHLOROETHYLENE(PCE)	127-18-4	ug/kg	55	27%	70.1	90.7	31	460	26	130	310	1500	930000	0%	0%	100000	0%	0%
Zone 2 - Category 1	SW8260B	TOLUENE	108-88-3	ug/kg	55	53%	241	471	37	2300	35	230	360	2400	1.6E+08	0%	0%	47000000	0%	0%
Zone 2 - Category 1	SW8260B	TRANS-1,2-DICHLOROETHENE	156-60-5	ug/kg	55	0%	-	-	-	-	44	340	310	2400	12000000	0%	0%	23000000	0%	0%
Zone 2 - Category 1	SW8260B	TRANS-1,3-DICHLOROPROPENE	10061-02-6	ug/kg	55	0%	-	-	-	-	19	150	310	2400	240000	0%	0%	8200	0%	0%

**Table 4.3-6. Zone 2 Category 1 Non-Dioxin Summary Statistics and Screening Comparison (Continued)**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Screening Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 1	SW8260B	TRICHLOROETHYLENE (TCE)	79-01-6	ug/kg	55	0%	-	-	-	-	46	360	310	2400	660000	0%	0%	6000	0%	0%
Zone 2 - Category 1	SW8260B	TRICHLOROFLUOROMETHANE	75-69-4	ug/kg	55	2%	53.8	26.8	98	98	43	330	310	2400	2.6E+08	0%	0%	3.5E+08	0%	0%
Zone 2 - Category 1	SW8260B	VINYL CHLORIDE	75-01-4	ug/kg	55	0%	-	-	-	-	21	170	310	2400	34000	0%	0%	1700	0%	0%
Zone 2 - Category 1	SW8260B	XYLENES, TOTAL	XYLENES	ug/kg	55	42%	431	910	38	4300	35	270	630	4900	1E+09	0%	0%	2500000	0%	0%
Zone 2 - Category 1	SW8270C	2,4,5-TRICHLOROPHENOL	95-95-4	ug/kg	55	9%	37.3	54.7	50	280	23	250	140	1500	73000000	0%	0%	82000000	0%	0%
Zone 2 - Category 1	SW8270C	2,4,6-TRICHLOROPHENOL	88-06-2	ug/kg	55	5%	11.0	16.6	17	120	8.3	88	140	1500	3300000	0%	0%	210000	0%	0%
Zone 2 - Category 1	SW8270C	2,4-DICHLOROPHENOL	120-83-2	ug/kg	55	2%	20.6	16.7	35	35	19	200	140	1500	3900000	0%	0%	2500000	0%	0%
Zone 2 - Category 1	SW8270C	2,4-DIMETHYLPHENOL	105-67-9	ug/kg	55	2%	22.8	25.1	160	160	19	200	140	1500	36000000	0%	0%	16000000	0%	0%
Zone 2 - Category 1	SW8270C	2,4-DINITROPHENOL	51-28-5	ug/kg	55	0%	-	-	-	-	20	210	310	3200	-	-	-	1600000	0%	0%
Zone 2 - Category 1	SW8270C	2,4-DINITROTOLUENE	121-14-2	ug/kg	55	0%	-	-	-	-	16	170	190	2000	220000	0%	0%	7400	0%	0%
Zone 2 - Category 1	SW8270C	2,6-DINITROTOLUENE	606-20-2	ug/kg	55	0%	-	-	-	-	20	210	190	2000	-	-	-	1500	0%	0%
Zone 2 - Category 1	SW8270C	2-CHLORONAPHTHALENE	91-58-7	ug/kg	55	0%	-	-	-	-	0.42	4.4	47	490	1.8E+08	0%	0%	60000000	0%	0%
Zone 2 - Category 1	SW8270C	2-CHLOROPHENOL	95-57-8	ug/kg	55	0%	-	-	-	-	7.7	81	47	490	4500000	0%	0%	5800000	0%	0%
Zone 2 - Category 1	SW8270C	2-METHYLNAPHTHALENE	91-57-6	ug/kg	55	96%	526	1108	13	5700	0.48	0.55	6.4	7.4	26000000	0%	0%	3000000	0%	0%
Zone 2 - Category 1	SW8270C	2-METHYLPHENOL (O-CRESOL)	95-48-7	ug/kg	55	11%	15.0	17.4	17	110	10	110	190	2000	-	-	-	41000000	0%	0%
Zone 2 - Category 1	SW8270C	2-NITROANILINE	88-74-4	ug/kg	55	0%	-	-	-	-	8.5	89	190	2000	-	-	-	8000000	0%	0%
Zone 2 - Category 1	SW8270C	2-NITROPHENOL	88-75-5	ug/kg	55	0%	-	-	-	-	7.8	82	47	490	2000000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	3 & 4 Methylphenol	15831-10-4	ug/kg	55	2%	21.6	19.0	89	89	19	200	380	3900	-	-	-	-	-	-
Zone 2 - Category 1	SW8270C	3,3'-DICHLOROBENZIDINE	91-94-1	ug/kg	55	0%	-	-	-	-	17	180	94	980	30000	0%	0%	5100	0%	0%
Zone 2 - Category 1	SW8270C	3-NITROANILINE	99-09-2	ug/kg	55	0%	-	-	-	-	15	160	190	2000	-	-	-	-	-	-
Zone 2 - Category 1	SW8270C	4,6-DINITRO-2-METHYLPHENOL	534-52-1	ug/kg	55	0%	-	-	-	-	8.6	90	140	1500	260000	0%	0%	66000	0%	0%
Zone 2 - Category 1	SW8270C	4-BROMOPHENYL PHENYL ETHER	101-55-3	ug/kg	55	0%	-	-	-	-	12	130	47	490	-	-	-	-	-	-
Zone 2 - Category 1	SW8270C	4-CHLORO-3-METHYLPHENOL	59-50-7	ug/kg	55	0%	-	-	-	-	20	210	140	1500	15000000	0%	0%	82000000	0%	0%
Zone 2 - Category 1	SW8270C	4-CHLOROANILINE	106-47-8	ug/kg	55	0%	-	-	-	-	16	170	140	1500	-	-	-	11000	0%	0%
Zone 2 - Category 1	SW8270C	4-CHLOROPHENYL PHENYL ETHER	7005-72-3	ug/kg	55	4%	15.6	16.7	61	96	12	130	47	490	-	-	-	-	-	-
Zone 2 - Category 1	SW8270C	4-NITROANILINE	100-01-6	ug/kg	55	0%	-	-	-	-	24	260	190	2000	-	-	-	110000	0%	0%
Zone 2 - Category 1	SW8270C	4-NITROPHENOL	100-02-7	ug/kg	55	0%	-	-	-	-	16	170	310	3200	-	-	-	-	-	-
Zone 2 - Category 1	SW8270C	ACENAPHTHENE	83-32-9	ug/kg	55	73%	25.7	35.0	4.8	190	0.71	7.5	6.3	66	1.3E+08	0%	0%	45000000	0%	0%
Zone 2 - Category 1	SW8270C	ACENAPHTHYLENE	208-96-8	ug/kg	55	85%	220	365	5	1300	0.33	2.2	6.3	42	5200000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	ACETOPHENONE	98-86-2	ug/kg	55	89%	105	133	11	650	8.9	90	96	980	1.5E+08	0%	0%	1.2E+08	0%	0%
Zone 2 - Category 1	SW8270C	ANTHRACENE	120-12-7	ug/kg	55	93%	102	129	5.2	530	0.75	3.3	6.4	29	7.3E+08	0%	0%	2.3E+08	0%	0%
Zone 2 - Category 1	SW8270C	ATRAZINE	1912-24-9	ug/kg	55	0%	-	-	-	-	8.5	89	190	2000	330000	0%	0%	10000	0%	0%
Zone 2 - Category 1	SW8270C	BENZALDEHYDE	100-52-7	ug/kg	55	56%	62.0	97.5	14	500	12	120	96	980	-	-	-	820000	0%	0%
Zone 2 - Category 1	SW8270C	BENZO(A)ANTHRACENE	56-55-3	ug/kg	55	95%	230	229	18	900	0.61	4	6.4	42	80000	0%	0%	2900	0%	0%
Zone 2 - Category 1	SW8270C	BENZO(A)PYRENE	50-32-8	ug/kg	55	95%	237	232	18	970	0.62	4.1	6.4	42	8000	0%	0%	290	24%	0%
Zone 2 - Category 1	SW8270C	BENZO(B)FLUORANTHENE	205-99-2	ug/kg	55	96%	344	309	37	1300	0.57	0.65	6.4	7.4	80000	0%	0%	2900	0%	0%
Zone 2 - Category 1	SW8270C	BENZO(G,H,I)PERYLENE	191-24-2	ug/kg	55	87%	137	137	22	530	0.34	2.2	6.4	42	7000000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	BENZO(K)FLUORANTHENE	207-08-9	ug/kg	55	91%	110	114	8.3	560	0.66	4.3	6.4	42	800000	0%	0%	29000	0%	0%
Zone 2 - Category 1	SW8270C	BENZYL BUTYL PHTHALATE	85-68-7	ug/kg	55	60%	101	221	13	1500	9.4	64	66	450	1.2E+08	0%	0%	1200000	0%	0%
Zone 2 - Category 1	SW8270C	BIPHENYL (DIPHENYL)	92-52-4	ug/kg	55	87%	93.1	211.6	4.1	1200	3.4	34	48	490	-	-	-	200000	0%	0%
Zone 2 - Category 1	SW8270C	BIS(2-CHLOROETHOXY) METHANE	111-91-1	ug/kg	55	0%	-	-	-	-	21	220	94	980	-	-	-	2500000	0%	0%
Zone 2 - Category 1	SW8270C	BIS(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	111-44-4	ug/kg	55	0%	-	-	-	-	1.9	20	94	980	58000	0%	0%	1000	0%	0%
Zone 2 - Category 1	SW8270C	BIS(2-CHLOROISOPROPYL) ETHER	108-60-1	ug/kg	55	2%	10.1	8.4	32	32	8.9	93	94	980	-	-	-	47000000	0%	0%
Zone 2 - Category 1	SW8270C	BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ug/kg	55	95%	745	1021	75	5400	18	120	68	450	12000000	0%	0%	160000	0%	0%
Zone 2 - Category 1	SW8270C	CAPROLACTAM	105-60-2	ug/kg	55	22%	43.7	29.7	37	77	35	360	310	3200	3.1E+08	0%	0%	4E+08	0%	0%
Zone 2 - Category 1	SW8270C	CARBAZOLE	86-74-8	ug/kg	55	16%	35.7	32.2	30	150	25	270	47	490	2400000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	CHRYSENE	218-01-9	ug/kg	55	96%	443	541	38	2500	1.1	1.2	6.4	7.4	8000000	0%	0%	290000	0%	0%
Zone 2 - Category 1	SW8270C	DIBENZ(A,H)ANTHRACENE	53-70-3	ug/kg	55	55%	42.3	54.1	12	190	0.62	6.5	6.3	66	8000	0%	0%	290	0%	0%
Zone 2 - Category 1	SW8270C	DIBENZOFURAN	132-64-9	ug/kg	55	78%	106	206	9.1	1000	0.64	6.5	48	490	-	-	-	1000000	0%	0%
Zone 2 - Category 1	SW8270C	DIETHYL PHTHALATE	84-66-2	ug/kg	55	2%	16.3	13.2	20	20	15	160	66	690	5.5E+08	0%	0%	6.6E+08	0%	0%
Zone 2 - Category 1	SW8270C	DIMETHYL PHTHALATE	131-11-3	ug/kg	55	11%	32.0	76.0	23	560	16	170	66	690	1E+09	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	DI-N-BUTYL PHTHALATE	84-74-2	ug/kg	55	38%	24.6	20.2	16	120	14	150	66	690	87000000	0%	0%	82000000	0%	0%
Zone 2 - Category 1	SW8270C	DI-N-OCTYL PHTHALATE	117-84-0	ug/kg	55	0%	-	-	-	-	7.4	78	66	690	20000000	0%	0%	8200000	0%	0%
Zone 2 - Category 1	SW8270C	FLUORANTHENE	206-44-0	ug/kg	55	96%	333	318	36	1300	0.53	0.61	6.4	7.4	1.3E+08	0%	0%	30000000	0%	0%
Zone 2 - Category 1	SW8270C	FLUORENE	86-73-7	ug/kg	55	67%	49.2	72.9	4.3	300	0.5	3.4	6.3	42	87000000	0%	0%	30000000	0%	0%

**Table 4.3-6. Zone 2 Category 1 Non-Dioxin Summary Statistics and Screening Comparison (Continued)**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Screening Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 1	SW8270C	HEXACHLOROBENZENE	118-74-1	ug/kg	55	73%	276	816	8.1	5100	2	8.1	6.4	26	37000	0%	0%	960	9%	0%
Zone 2 - Category 1	SW8270C	HEXACHLOROBUTADIENE	87-68-3	ug/kg	55	25%	80.9	247.0	16	1200	5.3	55	47	490	470000	0%	0%	5300	0%	0%
Zone 2 - Category 1	SW8270C	HEXACHLOROCYCLOPENTADIENE	77-47-4	ug/kg	55	0%	-	-	-	-	7.6	80	310	3200	6700000	0%	0%	7500	0%	0%
Zone 2 - Category 1	SW8270C	HEXACHLOROETHANE	67-72-1	ug/kg	55	2%	10.1	10.5	65	65	8.4	88	47	490	730000	0%	0%	8000	0%	0%
Zone 2 - Category 1	SW8270C	INDENO(1,2,3-C,D)PYRENE	193-39-5	ug/kg	55	85%	101	96	11	410	0.33	2.2	6.3	42	80000	0%	0%	2900	0%	0%
Zone 2 - Category 1	SW8270C	ISOPHORONE	78-59-1	ug/kg	55	31%	46.3	92.9	13	580	12	130	48	490	22000000	0%	0%	2400000	0%	0%
Zone 2 - Category 1	SW8270C	NAPHTHALENE	91-20-3	ug/kg	55	96%	488	977	17	4800	0.79	0.9	6.4	7.4	52000000	0%	0%	17000	0%	0%
Zone 2 - Category 1	SW8270C	NITROBENZENE	98-95-3	ug/kg	55	0%	-	-	-	-	2.1	22	94	980	340000	0%	0%	22000	0%	0%
Zone 2 - Category 1	SW8270C	N-NITROSODI-N-PROPYLAMINE	621-64-7	ug/kg	55	0%	-	-	-	-	5.9	62	47	490	5400	0%	0%	330	0%	0%
Zone 2 - Category 1	SW8270C	N-NITROSODIPHENYLAMINE	86-30-6	ug/kg	55	7%	24.2	24.4	21	150	20	210	47	490	7800000	0%	0%	470000	0%	0%
Zone 2 - Category 1	SW8270C	PENTACHLOROPHENOL	87-86-5	ug/kg	55	33%	44.9	119.6	16	870	8.5	89	140	1500	320000	0%	0%	4000	0%	0%
Zone 2 - Category 1	SW8270C	PHENANTHRENE	85-01-8	ug/kg	55	96%	388	452	34	2200	0.7	0.81	6.4	7.4	5200000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	PHENOL	108-95-2	ug/kg	55	56%	28.0	32.7	8.2	170	6.8	72	47	490	2.3E+08	0%	0%	2.5E+08	0%	0%
Zone 2 - Category 1	SW8270C	PYRENE	129-00-0	ug/kg	55	96%	538	634	45	2800	0.42	0.49	6.4	7.4	84000000	0%	0%	23000000	0%	0%
Zone 2 - Category 1	SW8270C	Total BaP TEQ		ug/kg	55	96%	349	334	16.9815	1384	-	-	-	-	8000	0%	0%	-	-	-
Zone 2 - Category 1	SW8270C	Total Cresols		ug/kg	55	11%	36.5	34.8	27	199	-	-	-	-	36000000	0%	0%	82000000	0%	0%

**Table 4.3-7. Zone 2 Dioxins and Furans TEQ Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	Unit	Number of Samples	Summary Statistics					Screening Comparison		
					Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Direct Contact Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - All	8280 MAS (Fast Analysis)	ETEQ (ND=0.5 LoD)	ng/kg	90	100%	3172	19161	30.9	180000	990	19%	0%
Zone 2 - Category 1	8280 MAS (Fast Analysis)	ETEQ (ND=0.5 LoD)	ng/kg	55	100%	4518	24433	39.7	180000	990	20%	0%
Zone 2 - Category 2	8280 MAS (Fast Analysis)	ETEQ (ND=0.5 LoD)	ng/kg	16	100%	2145	3156	46.5	12100	990	38%	0%
Zone 2 - Category 5	8280 MAS (Fast Analysis)	ETEQ (ND=0.5 LoD)	ng/kg	19	100%	138	154	30.9	702	990	0%	0%



**Table 4.3-8. Zone 2 Dioxins and Furans TEQ Results by DU**

Area	DU	Sample Description	Concentration	Units
Zone 2 - Category 1	1A	Z21A_060117SON	890	ng/kg
Zone 2 - Category 1	1AA1	Z21AA1-06192017	124	ng/kg
Zone 2 - Category 1	1AA2	Z21AA2-06192017	299	ng/kg
Zone 2 - Category 1	1BB2	Z21BB2_060117SON	895	ng/kg
Zone 2 - Category 1	1C	Z21C_060117SON	2040	ng/kg
Zone 2 - Category 1	1CC1	Z21CC1_060117SON	63.1	ng/kg
Zone 2 - Category 1	1CC2	Z21CC2_060117SON	602	ng/kg
Zone 2 - Category 1	1CC3	Z21CC3_060117SON	670	ng/kg
Zone 2 - Category 1	1DD1	Z21DD1_060117SON	220	ng/kg
Zone 2 - Category 1	1DD2	Z21DD2_060117SON	226	ng/kg
Zone 2 - Category 1	1E	Z21E_060117SON	504	ng/kg
Zone 2 - Category 1	1EE1	Z21EE1-06092017	39.7	ng/kg
Zone 2 - Category 1	1EE2	Z21EE2-06092017	55.9	ng/kg
Zone 2 - Category 1	1F	Z21F_060117SON	500	ng/kg
Zone 2 - Category 1	1FF	Z21FF-06092017	180	ng/kg
Zone 2 - Category 1	1G2	Z21G2_060117SON	407	ng/kg
Zone 2 - Category 1	1G3	Z21G3_060117SON	539	ng/kg
Zone 2 - Category 1	1GG1	Z21GG1_060117SON	189	ng/kg
Zone 2 - Category 1	1GG2	Z21GG2_060117SON	1730	ng/kg
Zone 2 - Category 1	1GG3	Z21GG3_060117SON	418	ng/kg
Zone 2 - Category 1	1GG4	Z21GG4_060117SON	112	ng/kg
Zone 2 - Category 1	1H	Z21H-06202017	162	ng/kg
Zone 2 - Category 1	1I	Z21I-06082017	354	ng/kg
Zone 2 - Category 1	1J	Z21J-06062017	275	ng/kg
Zone 2 - Category 1	1K	Z21K-06072017	418	ng/kg
Zone 2 - Category 1	1L1	Z21L1_060117SON	322	ng/kg
Zone 2 - Category 1	1L3	Z21L3_060117SON	220	ng/kg
Zone 2 - Category 1	1M	Z21M-06062017	95	ng/kg
Zone 2 - Category 1	1N	Z21N-06072017	472	ng/kg
Zone 2 - Category 1	1N2	Z21N2-06062017	463	ng/kg
Zone 2 - Category 1	1O	Z21O_060117SON	46.8	ng/kg
Zone 2 - Category 1	1P1	Z21P1_060117SON	371	ng/kg
Zone 2 - Category 1	1Q1	Z21Q1-06082017	503	ng/kg
Zone 2 - Category 1	1Q2	Z21Q2-06082017	67.1	ng/kg
Zone 2 - Category 1	1Q3	Z21Q3-06082017	210	ng/kg
Zone 2 - Category 1	1R1	Z21R1-06062017	519	ng/kg
Zone 2 - Category 1	1R2	Z21R2-06072017	72	ng/kg
Zone 2 - Category 1	1S1	Z21S1_060117SON	180000	ng/kg
Zone 2 - Category 1	1S2	Z21S2_060117SON	29400	ng/kg
Zone 2 - Category 1	1S3	Z21S3_060117SON	6310	ng/kg
Zone 2 - Category 1	1S4	Z21S4_060117SON	1810	ng/kg
Zone 2 - Category 1	1T1	Z21T1_060117N	1390	ng/kg
Zone 2 - Category 1	1T2	Z21T2-06212017	4510	ng/kg
Zone 2 - Category 1	1T3	Z21T3_060117N	2600	ng/kg
Zone 2 - Category 1	1U	Z21U_060117SON	533	ng/kg
Zone 2 - Category 1	1V1	Z21V1_060117SON	457	ng/kg
Zone 2 - Category 1	1V2	Z21V2-06202017	1240	ng/kg
Zone 2 - Category 1	1V3	Z21V3_060117SON	160	ng/kg
Zone 2 - Category 1	1V4	Z21V4_060117N	155	ng/kg
Zone 2 - Category 1	1W	Z21W_060117SON	369	ng/kg
Zone 2 - Category 1	1X3	Z21X3_060117SON	183	ng/kg
Zone 2 - Category 1	1Y1	Z21Y1_060117SON	624	ng/kg
Zone 2 - Category 1	1Y2	Z21Y2_060117SON	492	ng/kg
Zone 2 - Category 1	1Y3	Z21Y3_060117SON	634	ng/kg
Zone 2 - Category 1	1Z	Z21Z_060117SON	2370	ng/kg
Zone 2 - Category 2	2A	Z22A-05252017	4030	ng/kg
Zone 2 - Category 2	2B	Z22B-05252017	2490	ng/kg
Zone 2 - Category 2	2C	Z22C-05312017	5790	ng/kg
Zone 2 - Category 2	2D	Z22D-05252017	1770	ng/kg
Zone 2 - Category 2	2E	Z22E-05312017	941	ng/kg

**Table 4.3-8. Zone 2 Dioxins and Furans TEQ Results by DU (Continued)**

Area	DU	Sample Description	Concentration	Units
Zone 2 - Category 2	2F	Z22F-05312017	411	ng/kg
Zone 2 - Category 2	2G	Z22G_060117SON	3860	ng/kg
Zone 2 - Category 2	2H	Z22H-05252017	12100	ng/kg
Zone 2 - Category 2	2I	Z22I-05262017	243	ng/kg
Zone 2 - Category 2	2J	Z22J-06022017	274	ng/kg
Zone 2 - Category 2	2K	Z22K-05302017	46.5	ng/kg
Zone 2 - Category 2	2L	Z22L-05302017	349	ng/kg
Zone 2 - Category 2	2M	Z22M-05262017	639	ng/kg
Zone 2 - Category 2	2N	Z22N-05302017	749	ng/kg
Zone 2 - Category 2	2O	Z22O-06012017	102	ng/kg
Zone 2 - Category 2	2P	Z22P_060117SON	526	ng/kg
Zone 2 - Category 5	5A	Z25A-06152017	702	ng/kg
Zone 2 - Category 5	5B	Z25B-06152017	269	ng/kg
Zone 2 - Category 5	5C	Z25C-06152017	114	ng/kg
Zone 2 - Category 5	5D1	Z25D1-06152017	83.7	ng/kg
Zone 2 - Category 5	5D2	Z25D2_060117SON	92.3	ng/kg
Zone 2 - Category 5	5E	Z25E_060117SON	111	ng/kg
Zone 2 - Category 5	5F	Z25F_060117SON	186	ng/kg
Zone 2 - Category 5	5G1	Z25G1_060117SON	87.8	ng/kg
Zone 2 - Category 5	5G2	Z25G2_060117SON	210	ng/kg
Zone 2 - Category 5	5H	Z25H_060117SON	75	ng/kg
Zone 2 - Category 5	5I	Z25I-06192017	40.1	ng/kg
Zone 2 - Category 5	5J1	Z25J1-06202017	60	ng/kg
Zone 2 - Category 5	5J2	Z25J2-06202017	34.2	ng/kg
Zone 2 - Category 5	5J3	Z25J3-06202017	77.6	ng/kg
Zone 2 - Category 5	5K1	Z25K1_060117SON	107	ng/kg
Zone 2 - Category 5	5K2	Z25K2_060117SON	49.8	ng/kg
Zone 2 - Category 5	5L	Z25L-06192017	39.2	ng/kg
Zone 2 - Category 5	5M1	Z25M1-06162017	256	ng/kg
Zone 2 - Category 5	5M2	Z25M2-06142017	30.9	ng/kg

Analytical Method: 8280 MAS (Fast Analysis)  
Reported Concentration: ETEQ (ND=0.5 LoD)

**Table 4.3-9. Zone 2 Category 2 Arsenic Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Screening Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 2	SW6010B	ARSENIC	7440-38-2	mg/kg	16	100%	11.2	11.9	1.4	41	-	-	-	-	37	6%	0%	3	75%	0%

**Table 4.3-10. Zone 2 Category 4 Non-Dioxin Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Screening Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 4	SW6010B	ALUMINUM	7429-90-5	mg/kg	6	100%	8350	831	7300	9300	-	-	-	-	370000	0%	0%	1100000	0%	0%
Zone 2 - Category 4	SW6010B	ANTIMONY	7440-36-0	mg/kg	6	0%	-	-	-	-	0.25	0.27	0.53	0.56	670	0%	0%	470	0%	0%
Zone 2 - Category 4	SW6010B	ARSENIC	7440-38-2	mg/kg	6	100%	2.37	0.20	2.1	2.6	-	-	-	-	37	0%	0%	3	0%	0%
Zone 2 - Category 4	SW6010B	BARIUM	7440-39-3	mg/kg	6	100%	43.2	4.9	36	48	-	-	-	-	130000	0%	0%	220000	0%	0%
Zone 2 - Category 4	SW6010B	BERYLLIUM	7440-41-7	mg/kg	6	100%	0.358	0.034	0.32	0.41	-	-	-	-	1600	0%	0%	2300	0%	0%
Zone 2 - Category 4	SW6010B	CADMIUM	7440-43-9	mg/kg	6	100%	0.203	0.005	0.2	0.21	-	-	-	-	2100	0%	0%	980	0%	0%
Zone 2 - Category 4	SW6010B	CALCIUM	7440-70-2	mg/kg	6	100%	8900	4617	4200	16000	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	CHROMIUM, TOTAL	7440-47-3	mg/kg	6	100%	14.7	1.2	13	16	-	-	-	-	1000000	0%	0%	-	-	-
Zone 2 - Category 4	SW6010B	COBALT	7440-48-4	mg/kg	6	100%	4.32	0.56	3.6	4.9	-	-	-	-	9000	0%	0%	350	0%	0%
Zone 2 - Category 4	SW6010B	COPPER	7440-50-8	mg/kg	6	100%	7.52	0.56	6.7	8.2	-	-	-	-	73000	0%	0%	47000	0%	0%
Zone 2 - Category 4	SW6010B	IRON	7439-89-6	mg/kg	6	100%	9233	766	8200	10000	-	-	-	-	580000	0%	0%	820000	0%	0%
Zone 2 - Category 4	SW6010B	LEAD	7439-92-1	mg/kg	6	100%	7.27	0.42	6.8	8	-	-	-	-	900	0%	0%	800	0%	0%
Zone 2 - Category 4	SW6010B	LITHIUM	7439-93-2	mg/kg	6	100%	10.7	1.2	9.4	12	-	-	-	-	31000	0%	0%	2300	0%	0%
Zone 2 - Category 4	SW6010B	MAGNESIUM	7439-95-4	mg/kg	6	100%	2733	423	2300	3500	-	-	-	-	1000000	0%	0%	-	-	-
Zone 2 - Category 4	SW6010B	MANGANESE	7439-96-5	mg/kg	6	100%	198	13	180	220	-	-	-	-	90000	0%	0%	26000	0%	0%
Zone 2 - Category 4	SW6010B	MOLYBDENUM	7439-98-7	mg/kg	6	100%	0.337	0.054	0.27	0.42	-	-	-	-	9600	0%	0%	5800	0%	0%
Zone 2 - Category 4	SW6010B	NICKEL	7440-02-0	mg/kg	6	100%	11.5	1.7	9.2	14	-	-	-	-	150000	0%	0%	22000	0%	0%
Zone 2 - Category 4	SW6010B	POTASSIUM	7440-09-7	mg/kg	6	100%	1017	137	860	1200	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	SELENIUM	7782-49-2	mg/kg	6	100%	0.448	0.135	0.34	0.63	-	-	-	-	9600	0%	0%	5800	0%	0%
Zone 2 - Category 4	SW6010B	SILVER	7440-22-4	mg/kg	6	0%	-	-	-	-	0.033	0.035	0.26	0.28	9000	0%	0%	5800	0%	0%
Zone 2 - Category 4	SW6010B	SODIUM	7440-23-5	mg/kg	6	100%	165	77	74	270	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	STRONTIUM	7440-24-6	mg/kg	6	100%	15.0	2.9	11	19	-	-	-	-	1000000	0%	0%	700000	0%	0%
Zone 2 - Category 4	SW6010B	THALLIUM	7440-28-0	mg/kg	6	100%	0.317	0.042	0.27	0.39	-	-	-	-	130	0%	0%	12	0%	0%
Zone 2 - Category 4	SW6010B	TITANIUM	7440-32-6	mg/kg	6	100%	152	8	140	160	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 4	SW6010B	VANADIUM	7440-62-2	mg/kg	6	100%	17.5	1.4	16	19	-	-	-	-	5500	0%	0%	5800	0%	0%
Zone 2 - Category 4	SW6010B	ZINC	7440-66-6	mg/kg	6	100%	35.8	3.2	32	41	-	-	-	-	630000	0%	0%	350000	0%	0%
Zone 2 - Category 4	SW7471A	MERCURY	7439-97-6	mg/kg	6	67%	0.0189	0.0069	0.021	0.026	0.02	0.021	0.11	0.12	580	0%	0%	46	0%	0%
Zone 2 - Category 4	SW8081A	ALDRIN	309-00-2	ug/kg	6	0%	-	-	-	-	2.2	2.4	4.7	5.1	4300	0%	0%	180	0%	0%
Zone 2 - Category 4	SW8081A	ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	319-84-6	ug/kg	6	0%	-	-	-	-	1.5	1.6	4.7	5.1	12000	0%	0%	360	0%	0%
Zone 2 - Category 4	SW8081A	ALPHA ENDOSULFAN	959-98-8	ug/kg	6	0%	-	-	-	-	1.2	1.3	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	ALPHA-CHLORDANE	5103-71-9	ug/kg	6	0%	-	-	-	-	3.5	3.8	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	319-85-7	ug/kg	6	0%	-	-	-	-	3.6	3.9	4.7	5.1	25000	0%	0%	1300	0%	0%
Zone 2 - Category 4	SW8081A	BETA ENDOSULFAN	33213-65-9	ug/kg	6	0%	-	-	-	-	1.6	1.8	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	Chlordane Gamma	5103-74-2	ug/kg	6	0%	-	-	-	-	1.4	1.5	4.7	5.1	-	-	-	7700	0%	0%
Zone 2 - Category 4	SW8081A	DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	319-86-8	ug/kg	6	0%	-	-	-	-	1.2	1.3	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	DIELDRIN	60-57-1	ug/kg	6	0%	-	-	-	-	0.82	0.91	4.7	5.1	4700	0%	0%	140	0%	0%
Zone 2 - Category 4	SW8081A	ENDOSULFAN SULFATE	1031-07-8	ug/kg	6	0%	-	-	-	-	1.1	1.2	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	ENDRIN	72-20-8	ug/kg	6	0%	-	-	-	-	1.3	1.4	4.7	5.1	190000	0%	0%	250000	0%	0%
Zone 2 - Category 4	SW8081A	ENDRIN ALDEHYDE	7421-93-4	ug/kg	6	0%	-	-	-	-	1.6	1.8	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	ENDRIN KETONE	53494-70-5	ug/kg	6	0%	-	-	-	-	1	1.1	4.7	5.1	-	-	-	-	-	-
Zone 2 - Category 4	SW8081A	GAMMA BHC (LINDANE)	58-89-9	ug/kg	6	0%	-	-	-	-	2.6	2.9	4.7	5.1	42000	0%	0%	2500	0%	0%
Zone 2 - Category 4	SW8081A	HEPTACHLOR	76-44-8	ug/kg	6	0%	-	-	-	-	0.71	0.79	4.7	5.1	23000	0%	0%	630	0%	0%
Zone 2 - Category 4	SW8081A	HEPTACHLOR EPOXIDE	1024-57-3	ug/kg	6	0%	-	-	-	-	2.2	2.4	4.7	5.1	9500	0%	0%	330	0%	0%
Zone 2 - Category 4	SW8081A	METHOXYCHLOR	72-43-5	ug/kg	6	0%	-	-	-	-	1.1	1.2	9	10	5600000	0%	0%	4100000	0%	0%
Zone 2 - Category 4	SW8081A	P,P'-DDD	72-54-8	ug/kg	6	0%	-	-	-	-	3	3.3	4.7	5.1	400000	0%	0%	9600	0%	0%
Zone 2 - Category 4	SW8081A	P,P'-DDE	72-55-9	ug/kg	6	50%	1.18	0.66	1.5	2	1.2	1.2	5	5.1	190000	0%	0%	9300	0%	0%
Zone 2 - Category 4	SW8081A	P,P'-DDT	50-29-3	ug/kg	6	0%	-	-	-	-	1.3	1.4	4.7	5.1	280000	0%	0%	8500	0%	0%
Zone 2 - Category 4	SW8081A	Total Chlordanes		ug/kg	6	0%	-	-	-	-	-	-	-	-	150000	0%	0%	7700	0%	0%
Zone 2 - Category 4	SW8081A	Total Endosulfans		ug/kg	6	0%	-	-	-	-	-	-	-	-	4400000	0%	0%	7000000	0%	0%
Zone 2 - Category 4	SW8081A	Total Endrins		ug/kg	6	0%	-	-	-	-	-	-	-	-	190000	0%	0%	-	-	-
Zone 2 - Category 4	SW8081A	TOXAPHENE	8001-35-2	ug/kg	6	0%	-	-	-	-	34	37	91	100	85000	0%	0%	2100	0%	0%
Zone 2 - Category 4	SW8151A	2,4,5-T (TRICHLOROPHENOXYACETIC ACID)	93-76-5	ug/kg	6	0%	-	-	-	-	6.2	6.9	53	59	-	-	-	8200000	0%	0%
Zone 2 - Category 4	SW8151A	2,4-D (DICHLOROPHENOXYACETIC ACID)	94-75-7	ug/kg	6	0%	-	-	-	-	27	30	210	240	8600000	0%	0%	9600000	0%	0%
Zone 2 - Category 4	SW8151A	SILVEX (2,4,5-TP)	93-72-1	ug/kg	6	0%	-	-	-	-	5.3	5.9	53	59	5500000	0%	0%	6600000	0%	0%

**Table 4.3-11. Zone 2 Category 5 Non-Dioxin Summary Statistics and Screening Comparison**

Area	Test Method	Analyte	CAS Number	Unit	Number of Samples	Summary Statistics								Screening Comparison						
						Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min MDL of NDs	Max MDL of NDs	Min RL of NDs	Max RL of NDs	Direct Contact Criteria Non-residential	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)	EPA RSL Industrial Soil	Percent Exceed (Detect)	Percent Exceed (Non-detect MDL)
Zone 2 - Category 5	SW6010B	ALUMINUM	7429-90-5	mg/kg	19	100%	6221	2426	2400	8800	-	-	-	-	370000	0%	0%	1100000	0%	0%
Zone 2 - Category 5	SW6010B	ANTIMONY	7440-36-0	mg/kg	19	5%	0.140	0.032	0.27	0.27	0.25	0.28	0.53	0.58	670	0%	0%	470	0%	0%
Zone 2 - Category 5	SW6010B	ARSENIC	7440-38-2	mg/kg	19	100%	4.91	4.13	1.4	14	-	-	-	-	37	0%	0%	3	42%	0%
Zone 2 - Category 5	SW6010B	BARIUM	7440-39-3	mg/kg	19	100%	42.3	10.8	15	64	-	-	-	-	130000	0%	0%	220000	0%	0%
Zone 2 - Category 5	SW6010B	BERYLLIUM	7440-41-7	mg/kg	19	100%	0.305	0.115	0.092	0.44	-	-	-	-	1600	0%	0%	2300	0%	0%
Zone 2 - Category 5	SW6010B	CADMIUM	7440-43-9	mg/kg	19	100%	0.216	0.045	0.12	0.3	-	-	-	-	2100	0%	0%	980	0%	0%
Zone 2 - Category 5	SW6010B	CALCIUM	7440-70-2	mg/kg	19	100%	29726	27586	6600	110000	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	CHROMIUM, TOTAL	7440-47-3	mg/kg	19	100%	13.0	3.5	5.4	18	-	-	-	-	1000000	0%	0%	-	-	-
Zone 2 - Category 5	SW6010B	COBALT	7440-48-4	mg/kg	19	100%	3.48	1.51	0.8	5.7	-	-	-	-	9000	0%	0%	350	0%	0%
Zone 2 - Category 5	SW6010B	COPPER	7440-50-8	mg/kg	19	100%	9.75	2.79	3	14	-	-	-	-	73000	0%	0%	47000	0%	0%
Zone 2 - Category 5	SW6010B	IRON	7439-89-6	mg/kg	19	100%	8342	2189	3100	12000	-	-	-	-	580000	0%	0%	820000	0%	0%
Zone 2 - Category 5	SW6010B	LEAD	7439-92-1	mg/kg	19	100%	10.9	5.0	6.5	26	-	-	-	-	900	0%	0%	800	0%	0%
Zone 2 - Category 5	SW6010B	LITHIUM	7439-93-2	mg/kg	19	100%	8.64	3.56	2	13	-	-	-	-	31000	0%	0%	2300	0%	0%
Zone 2 - Category 5	SW6010B	MAGNESIUM	7439-95-4	mg/kg	19	100%	4824	1912	970	8000	-	-	-	-	1000000	0%	0%	-	-	-
Zone 2 - Category 5	SW6010B	MANGANESE	7439-96-5	mg/kg	19	100%	167	65	35	290	-	-	-	-	90000	0%	0%	26000	0%	0%
Zone 2 - Category 5	SW6010B	MOLYBDENUM	7439-98-7	mg/kg	19	100%	0.531	0.533	0.086	2	-	-	-	-	9600	0%	0%	5800	0%	0%
Zone 2 - Category 5	SW6010B	NICKEL	7440-02-0	mg/kg	19	100%	11.1	3.6	3.1	17	-	-	-	-	150000	0%	0%	22000	0%	0%
Zone 2 - Category 5	SW6010B	POTASSIUM	7440-09-7	mg/kg	19	100%	781	350	180	1200	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	SELENIUM	7782-49-2	mg/kg	19	84%	0.353	0.141	0.25	0.54	0.19	0.2	0.27	0.29	9600	0%	0%	5800	0%	0%
Zone 2 - Category 5	SW6010B	SILVER	7440-22-4	mg/kg	19	0%	-	-	-	-	0.033	0.037	0.26	0.29	9000	0%	0%	5800	0%	0%
Zone 2 - Category 5	SW6010B	SODIUM	7440-23-5	mg/kg	19	100%	85.8	58.8	32	300	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	STRONTIUM	7440-24-6	mg/kg	19	100%	31.4	26.9	8.7	100	-	-	-	-	1000000	0%	0%	700000	0%	0%
Zone 2 - Category 5	SW6010B	THALLIUM	7440-28-0	mg/kg	19	42%	0.101	0.084	0.13	0.29	0.07	0.076	0.54	0.58	130	0%	0%	12	0%	0%
Zone 2 - Category 5	SW6010B	TITANIUM	7440-32-6	mg/kg	19	100%	101	17	59	130	-	-	-	-	-	-	-	-	-	-
Zone 2 - Category 5	SW6010B	VANADIUM	7440-62-2	mg/kg	19	100%	13.7	4.2	6.6	19	-	-	-	-	5500	0%	0%	5800	0%	0%
Zone 2 - Category 5	SW6010B	ZINC	7440-66-6	mg/kg	19	100%	43.6	18.2	16	100	-	-	-	-	630000	0%	0%	350000	0%	0%
Zone 2 - Category 5	SW7196A	CHROMIUM, HEXAVALENT	18540-29-9	mg/kg	8	38%	0.524	0.370	0.37	0.75	0.24	2.5	0.82	8.2	9200	0%	0%	6.3	0%	0%
Zone 2 - Category 5	SW7471A	MERCURY	7439-97-6	mg/kg	19	95%	0.0588	0.0384	0.025	0.17	0.017	0.017	0.095	0.095	580	0%	0%	46	0%	0%
Zone 2 - Category 5	SW8081A	ALDRIN	309-00-2	ug/kg	19	0%	-	-	-	-	2.2	110	4.6	240	4300	0%	0%	180	0%	0%
Zone 2 - Category 5	SW8081A	ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	319-84-6	ug/kg	19	0%	-	-	-	-	1.5	76	4.6	240	12000	0%	0%	360	0%	0%
Zone 2 - Category 5	SW8081A	ALPHA ENDOSULFAN	959-98-8	ug/kg	19	0%	-	-	-	-	1.2	62	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	ALPHA-CHLORDANE	5103-71-9	ug/kg	19	0%	-	-	-	-	3.5	180	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	319-85-7	ug/kg	19	0%	-	-	-	-	3.5	190	4.6	240	25000	0%	0%	1300	0%	0%
Zone 2 - Category 5	SW8081A	BETA ENDOSULFAN	33213-65-9	ug/kg	19	11%	5.98	9.93	1.9	3.4	1.6	86	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	Chlordane Gamma	5103-74-2	ug/kg	19	5%	5.02	8.34	3.9	3.9	1.4	72	4.6	240	-	-	-	7700	0%	0%
Zone 2 - Category 5	SW8081A	DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	319-86-8	ug/kg	19	0%	-	-	-	-	1.2	62	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	DIELDRIN	60-57-1	ug/kg	19	5%	2.93	5.00	1	1	0.82	43	4.6	240	4700	0%	0%	140	0%	0%
Zone 2 - Category 5	SW8081A	ENDOSULFAN SULFATE	1031-07-8	ug/kg	19	0%	-	-	-	-	1.1	57	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	ENDRIN	72-20-8	ug/kg	19	5%	4.57	7.79	1.5	1.5	1.3	67	4.6	240	190000	0%	0%	250000	0%	0%
Zone 2 - Category 5	SW8081A	ENDRIN ALDEHYDE	7421-93-4	ug/kg	19	0%	-	-	-	-	1.6	86	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	ENDRIN KETONE	53494-70-5	ug/kg	19	5%	3.58	6.13	1.4	1.4	1	53	4.6	240	-	-	-	-	-	-
Zone 2 - Category 5	SW8081A	GAMMA BHC (LINDANE)	58-89-9	ug/kg	19	0%	-	-	-	-	2.6	140	4.6	240	42000	0%	0%	2500	0%	0%
Zone 2 - Category 5	SW8081A	HEPTACHLOR	76-44-8	ug/kg	19	0%	-	-	-	-	0.71	37	4.6	240	23000	0%	0%	630	0%	0%
Zone 2 - Category 5	SW8081A	HEPTACHLOR EPOXIDE	1024-57-3	ug/kg	19	0%	-	-	-	-	2.2	110	4.6	240	9500	0%	0%	330	0%	0%
Zone 2 - Category 5	SW8081A	METHOXYCHLOR	72-43-5	ug/kg	19	11%	4.27	6.55	3.5	5.9	1.1	57	9	470	5600000	0%	0%	4100000	0%	0%
Zone 2 - Category 5	SW8081A	P,P'-DDD	72-54-8	ug/kg	19	5%	11.3	18.5	14	14	3	160	4.6	240	400000	0%	0%	9600	0%	0%
Zone 2 - Category 5	SW8081A	P,P'-DDE	72-55-9	ug/kg	19	32%	4.75	6.51	2	8.1	1.1	57	4.6	240	190000	0%	0%	9300	0%	0%
Zone 2 - Category 5	SW8081A	P,P'-DDT	50-29-3	ug/kg	19	5%	4.56	7.79	1.3	1.3	1.3	67	4.6	240	280000	0%	0%	8500	0%	0%
Zone 2 - Category 5	SW8081A	Total Chlordanes		ug/kg	19	5%	17.2	29.3	5.65	5.65	-	-	-	-	150000	0%	0%	7700	0%	0%
Zone 2 - Category 5	SW8081A	Total Endosulfans		ug/kg	19	11%	14.0	23.8	3.05	4.65	-	-	-	-	4400000	0%	0%	7000000	0%	0%
Zone 2 - Category 5	SW8081A	Total Endrins		ug/kg	19	11%	13.9	23.9	2.95	3	-	-	-	-	190000	0%	0%	-	-	-
Zone 2 - Category 5	SW8081A	TOXAPHENE	8001-35-2	ug/kg	19	0%	-	-	-	-	34	1800	91	4800	85000	0%	0%	2100	0%	0%
Zone 2 - Category 5	SW8151A	2,4,5-T (TRICHLOROPHENOXYACETIC ACID)	93-76-5	ug/kg	19	0%	-	-	-	-	3.6	7.2	31	61	-	-	-	8200000	0%	0%
Zone 2 - Category 5	SW8151A	2,4-D (DICHLOROPHENOXYACETIC ACID)	94-75-7	ug/kg	19	0%	-	-	-	-	15	31	120	250	8600000	0%	0%	9600000	0%	0%
Zone 2 - Category 5	SW8151A	SILVEX (2,4,5-TP)	93-72-1	ug/kg	19	0%	-	-	-	-	3.1	6.1	31	61	5500000	0%	0%	6600000	0%	0%

## 4.4 Zone 2 Interim Measures

### 4.4.1 Completed Interim Measures

As described above, analysis of samples from DUs 1S1 through 1S4 and 1T1 through 1T3 for dioxins and furans TEQ yielded concentrations ranging from 1,310 – 180,000 ppt TEQ (see Figure 4.4-1). The results of the testing were communicated to workers in the area, and a plan to perform additional sampling and complete IMs was developed with the plant personnel.

Four additional DUs were established in gravel areas adjacent to the DUs with elevated concentrations of dioxin and furan TEQ (1S5 through 1S8); including areas under pipe trusses and above-ground utilities (see Figure 4.4-2). Results from these additional DUs range from 4,120 to 20,000 ppt. Depth-discrete samples obtained from these DUs were collected from 6-12 inches, 12-24 inches and 24-36 inches below the original ground surface as well. Results of the new DUs as well as the follow-up depth-discrete samples are presented in Table 4.4-1.

Interim actions for the area included restricting access by placing barricades around DU 1S3. Contact with the existing soil at DUS 1S1, 1S2, 1S3, and 1S5 through 1S8 was mitigated by placing 6 inches of new stone and/or gravel cover over the existing soil. For DUs 1S1, 1S2, 1S5, 1S6 and 1S8, a stone mix aggregate which includes a significant fine fraction was utilized and the cover was compacted to approximately 4 inches to protect the cover to allow for traffic and vehicle use. For DU 1S7, a stone aggregate was used to prevent contact and it was not compacted as little to no vehicle traffic or parking is anticipated in those areas. These actions were completed in August of 2017.

### 4.4.2 Interim Measures for 2018

There are two main areas for IMs for 2018 that can be broadly characterized as minor area treatments in the western Zone 2 area, and remedial construction of several acres in the eastern Zone 2 area. The results of the depth-discrete dioxin and furan testing from the eastern Zone 2 are summarized below. The results confirm that over most of the area, impacts continue to be present at a depth of at least three feet below the existing grade. During 2018, a long-term direct contact barrier will be installed at the DUs listed below, with the final cover being established according to the general sections shown in Figure 4.4-3. Each section for this area will include a minimum of six inches of new cover, with a marker layer consisting of a non-woven geotextile layer placed over the entire extent of each DU.

DU	Depth	Range of TEQ
1S1	Concentrations decrease with depth	94,000 - 207,000 ppt
1S2	No trend in concentrations	5,600 – 17,000 ppt
1S3	Concentrations decrease with depth	2,300 – 12,000 ppt
1S4	Concentrations increase with depth	420 – 3,600 ppt
1S5	Concentrations increase with depth	19,000 – 33,000 ppt
1S6	Concentrations increase with depth	20,000 – 106,000 ppt
1S7	Concentrations decrease with depth, and are below Generic DCC from 1-3 ft	810 – 3,900 ppt
1S8	Concentrations decrease with depth	2,400 – 37,000 ppt
1T1	Concentrations increase with depth	2,000 – 11,000 ppt
1T2	Concentrations decrease with depth, and are below Generic DCC from 2-3 ft	690 – 13,000 ppt
1T3	Concentrations decrease with depth, and are below Generic DCC from 2-3 ft	190 – 10,600 ppt

A small number of DUs in the western portions of Zone 2 (2C, 2H and 2G) were identified with elevated dioxin and furan TEQ, as well as one DU (2A) that included both elevated dioxin and furan TEQ and a concentration of arsenic above the Generic DCC (see Figure 4.4-4). These areas will be remedied during 2018, consistent with the remedy established for the other areas, and construction drawings for these areas will also be provided to MDEQ prior to implementation.

In some areas, it may be necessary for some of the existing materials to be excavated prior to placement of a marker layer and establishment of final cover. Because this material has been tested for a wide array of substances, and the only significant impacts are related to dioxins and furans this material could be removed and relocated to the 6 Pond area currently being used to manage soils removed from the floodplain (see Figure 4.2-6) that exceed the Generic Non-Residential Direct Contact Criteria for dioxins and furans. The soils from this area would be managed consistently with the floodplain soils and would be included in the summary of relocated soil provided to MDEQ.

A set of construction drawings and a soil management plan, which will include a dust and track-out control plan for the area will be provided to MDEQ prior to start of work; and a set of as-built drawings will be provided to MDEQ upon completion which will identify the final dimensions of the corrective actions, marker layer layout, thickness and makeup of the final cover layers within each DU (see Section 10.0).

## 4.5 Zone 2 On-site Outdoor Air Evaluation

The soil volatilization to ambient air and particulate soil inhalation exposure pathways were evaluated using the surface soil direct contact sample results. The MDEQ Part 201 non-residential criteria, specifically the Volatile Soil Inhalation Criteria (VSIC) and Particulate Soil Inhalation Criteria, were used for the screening evaluation. Based on this evaluation, no results exceed the criteria; therefore, no further evaluation is proposed at this time in Zone 2 for the soil volatilization to ambient air and particulate soil inhalation exposure pathways. Dow will maintain current ambient air and fugitive dust monitoring programs. Table 4.3-12 presents summary statistics and the screening results.

## 4.6 Summary and Recommendations

All non-dioxin results in Categories 1, 4 and 5 are below non-residential direct contact and ambient air criteria. All dioxins and furans TEQ results for Category 5 are below the non-residential direct contact criterion. Therefore, no further action is proposed at this time to address non-dioxin analytes in Categories 1 and 4. No further action is proposed at this time for Category 5.

In Zone 2, out of the 54 DUs sampled, the dioxins and furans TEQ results were below the non-residential direct contact criterion (990 ppt) in 37 DUs. Therefore, no further action is proposed for those 37 DUs (see Figures 4.3-8 and 4.3-9). Based on dioxins and furans TEQ results, the following Zone 2 DUs warrant further evaluation: 1C, 1GG2, 1V2, 1Z, 2B, and 2D; which may include development of a site-specific DCC.

IMs have been undertaken for the following six DUs in Zone 2 to limit exposure to the dioxin and furan TEQ from historic releases: 1S1, 1S2, 1S3, 1S5, 1S6, 1S7, and 1S8. Section 4.3.1 presented the IM activities completed to date to address these DUs. In 2018, IMs will be undertaken for the following ten DUs in Zone 2 to limit exposure to the dioxin and furan TEQ from historic releases: 1S1 through 1S8, and 1T1 through 1T3. These IMs were described in Section 4.3.2, and the anticipated schedule is included in Section 10.0. In addition, Dow will continue to work with MDEQ to implement sampling techniques and analyses to characterize variability within Zone 2.

## 4.7 Year 3 Direct Contact Goals

In 2018, the direct contact pathway will be evaluated in Zone 3. Figure 4.7-1 presents the location of Zone 3 within the facility. Zone 3 covers approximately 284 acres within the facility complex. The Year 3 direct contact pathway evaluation will follow the same approach as Years 1 and 2 which includes: review

of historical information on practices and use in Zone 3; identify land use categories and verify TALs that are applicable for those land uses; organize Zone 3 areas into specific land use categories; conduct direct contact sampling utilizing the methods described above for Zone 2, results review and recommendations for the path forward.



## 5.0 Midland Plant Facility-Wide Vapor Intrusion Pathway

The facility has approximately 700 existing buildings and structures on-site. Vapor intrusion (VI) at the facility is being evaluated in a phased approach during the corrective action implementation effort. The evaluation efforts presented in this section are intended to achieve an “under control” status for the EI in indoor air. In order to simplify reporting, the general methods applicable to the VI evaluation are presented in the first subsection and then building-specific results evaluations are presented by Zone.

This section summarizes and presents the following information for the Midland Plant VI Pathway:

- Section 5.1 VI Pathway Methodologies
- Section 5.2 Zone 1 VI Pathway Review and Results Evaluation
- Section 5.3 Zone 1 VI Pathway Additional Sampling
- Section 5.4 Zone 2 Phase 1 VI Pathway Building Categorization and Results Evaluation
- Section 5.5 Zone 2 Phase 2 VI Pathway Building Categorization
- Section 5.6 Year 3 VI Goals

Key attachments relevant to VI include:

- Appendix C Building Surveys
- Appendix D Zone 1 VI Analytical Results
- Appendix E Zone 1 VI Additional Sampling Analytical Results
- Appendix F Zone 2 Phase 1 VI Analytical Results

## 5.1 Vapor Intrusion Pathway Methodologies

VI is an exposure pathway that results from the migration of volatilized chemicals from the subsurface to indoor air in overlying occupied buildings. A source, migration route and a human receptor must be present for the VI pathway to be complete. The focus of this on-site investigation is to evaluate the potential VI exposure pathway for Dow employees and contractors.

Dow completed the RCRA Corrective Action EI Form for Human Health as part of the License Reapplication. At that time, it was unknown if indoor air was impacted by subsurface vapors, and it was concluded that more information was needed to make a determination. In order to achieve an “under control” status for the EI for indoor air, further evaluation of this pathway at the facility is necessary. These efforts are not necessarily intended to achieve final remedy at this time and in some cases, Dow recognizes that further steps may be required to achieve final remedy. Dow acknowledges that at the end of the corrective action implementation efforts, on-going monitoring for indoor air through Dow’s Industrial Hygiene program will continue, as appropriate, as well as monitoring to identify any building use change or new construction.

Currently, the facility has approximately 700 buildings and structures on-site. Indoor air at the facility is being evaluated in a phased approach by zone. The Site has been divided into zones and each year a new zone is evaluated. The zones identified to date are shown on Figure 5-1. General sampling and evaluation methodology is documented below. Any deviations are discussed in the building-specific summary sections that follow. In the event of change in building use or new construction, the VI pathway will be reevaluated.

### 5.1.1 Building Categorization

Within each zone, buildings are categorized based on structure type and occupancy. Figure 5-2 presents the building categorization flowchart. The flowchart identifies the different building and structure types encountered at the Midland Plant and establishes a method to prioritize those buildings where occupancy is occurring regularly in enclosed offices and laboratories.

#### Structure Type

There are sixteen different types of buildings and structures at the facility (see Figure 5-2) and each of these building types can be divided into the following five categories:

- Category 1 – Includes Midland Plant general office space, research and development and laboratories;
- Category 2 – Large enclosed areas with enhanced ventilation that include office space; however, office space is not the primary use;
- Category 3 – Large enclosed areas with enhanced ventilation and no office space;
- Category 4 – Active open air process areas; and
- Category 5 – Includes buildings that have no occupancy. These buildings may be unused and/or listed for demolition. Some of these buildings provide equipment protection or contain switch rooms. Where there are known breathing hazards due to manufacturing process, Dow’s IH program limits access to these buildings by utilizing automated instruments that provide a visual warning to control and prevent inadvertent entry into a hazardous area.

The facility buildings that have been identified and categorized to date are listed by zone and category in Table 5-1. Categories 1 and 2 are priority buildings and will be sampled throughout the facility during the

phased approach. Category 3 buildings are being deferred until all of the priority buildings are sampled and evaluated. Category 4 and 5 buildings will not be sampled or included in the VI investigation.

## Occupancy

In order for VI to be a complete pathway, a human receptor must be present. The purpose of further categorizing the facility buildings based on occupancy is to focus efforts on the buildings most likely to be of potential VI concern, while minimizing efforts spent on buildings with no VI concern. The buildings at the facility will be categorized into one of the following three groups based on frequency and duration of building occupancy:

- Group A – Regular occupancy;
- Group B – Limited or intermittent occupancy; and
- Group C – Unoccupied.

Regular occupancy (Group A) includes buildings that have office space and provide a primary work space (e.g., laboratories, maintenance shops). Limited or intermittent occupancy (Group B) refers to buildings that are not primary work spaces but include areas that are visited or occupied on a limited daily, weekly, or monthly basis. Buildings that are categorized as unoccupied (Group C) include buildings such as storage areas and sheds, some of which may have rare occupancy (e.g., much less frequent than monthly and for short durations).

### 5.1.2 Target Analyte List and Verification Sampling Methodology

The VI target analyte list (TAL) was developed considering a combination of RGIS detections, pressed solids detections, and availability of gas-phase laboratory standards. The RGIS analyte detections are representative of any releases to groundwater that may have occurred on-site. Detected analytes from the pressed solids represent any other water or waste that may enter the sewer system and flow into the wastewater treatment plant, including stormwater. The pressed solids are wastewater solids that have accumulated in the wastewater treatment plant that were collected in RGIS, as well as the facility sewer system. The combination of this data is a reasonable proxy of detected analytes in soil and groundwater throughout the facility and is a conservative approach to the VI evaluation since it includes discharge from active plants and not just historical activities.

The goal of the VI TAL Verification activities is to demonstrate that the VI TAL is representative and appropriate for VI sampling within each Zone of the Midland Plant. Therefore, in order to verify the accuracy of the VI TAL, verification sampling is conducted prior to VI sampling in each zone. Approximately five soil-gas samples will be collected either near building clusters or to achieve spatial distribution across the Zone. Approximately five groundwater samples will also be collected from nearby wells for comparison. Soil gas sample identifications (IDs) correspond to the groundwater monitoring well name. Eurofins Air Toxics was selected as the contract laboratory and the samples are analyzed for the lab's extended U.S. Environmental Protection Agency (EPA) Method TO-15 list of 65 analytes as shown on Table 5-2. Results are discussed in the Zone-specific sub-sections.

#### 5.1.2.1 Soil-Gas Verification Sampling

Evacuated stainless steel canisters are used to collect the soil gas samples. Prior to sampling, each canister is evacuated to approximately -29"Hg by the contract laboratory. The sampling system consists of a canister, vacuum gauge and a flow controller, meeting the basic requirements contained in the EPA Method TO-15. The sample air is drawn into the canister via the vacuum inside the canister.

The vacuum of each canister is checked prior to use to verify the initial vacuum of the canister. Each sampling train is also verified and leak checked prior to sampling and monitored throughout the integrated

sampling process. Dedicated flow controllers are used for each sample and then returned to the contract lab to be cleaned prior to re-use. Samples are not collected in any extreme temperature ranges known to affect flow rates.

A soil gas vapor probe is installed using a hammer drill down through the soil to a target depth of 5 feet. If groundwater elevation prohibits installation of the probe to 5 feet below grade, the soil gas probe was installed to the lowest feasible depth. The probes terminated in stainless steel retractable tip connected to the surface with fluoropolymer tubing. The sampler is opened by retracting the gas vapor probe extension string an inch or so. When open, the sampling ports are exposed which are protected by a mesh screen. Photoionization detector (PID) measurements are recorded throughout the installation process. Lines are purged of three volumes before the start of sample collection. The canisters are set to collect the samples at a rate of slightly less than 200 ml/min and are left in place for a minimum of 30 minutes, resulting in collection of approximately 6 liters of sample. Each well location is abandoned immediately after the completion of sampling activities.

### 5.1.2.2 Groundwater Verification Sampling

Groundwater samples are collected and analyzed for Volatile Organic Compounds (VOCs) by EPA Method 8260b and Semi-Volatile Organic Compounds (SVOCs) by 8270c (EPA 1996a, 1996b). Static water levels (SWLs) are recorded at each groundwater monitoring well prior to sampling. After collecting a SWL measurement and before sampling a well, the stagnant water in the well casing is removed to ensure that a representative sample is collected. Purging is conducted with the pump intake at the middle or toward the top of the screened interval. While purging, in-situ measurements of pH, specific conductivity, oxidation-reduction potential, dissolved oxygen, turbidity, and temperature values are collected using a multi-parameter probe and flow thru cell to help determine when the well stabilized and formation water is being obtained.

Samples for VOCs are collected prior to the SVOCs and no headspace is left in the 40-milliter (ml) glass vials. New gloves are used at each sampling location and anytime items other than the clean sampling tools/bottles are handled. Care is used while handling sample containers and caps so that contamination is not introduced during the collection process. Sample tubing is dedicated to a single well and disposed of after each well is sampled. Sample containers are packed in ice-filled coolers immediately after collection, preserved as necessary, and labeled. Coolers are sealed with tape and chain of custody seals and shipped to the laboratory for analysis.

### 5.1.3 Vapor Intrusion Sampling Activities and Methodology

In preparation for VI sampling, a building survey is conducted for Category 1 and 2 priority buildings and includes a PID screening that focuses on potential migration pathways. Building maps or blue prints are used to develop building sampling plans. The minimum number of indoor air and sub-slab soil gas samples collected in each building is determined based on square footage, in accordance with the MDEQ May 2013 *Guidance Document for the Vapor Intrusion Pathway*, as shown below.

Building Size	Sample Density	Minimum Number of Samples
Less than 1,000 ft <sup>2</sup>	Not Applicable	2
1,000 ft <sup>2</sup> - 10,000 ft <sup>2</sup>	One per 1,500 ft <sup>2</sup>	3
Greater than 10,000 ft <sup>2</sup>	One per 2,500 ft <sup>2</sup>	9

For each building, an equal number of co-located indoor air and sub-slab soil gas samples are collected. In addition, at least one outdoor air sample is collected at each building.

When identifying sample locations, there is an emphasis on first floor (ground floor) sample collection for multistory buildings. Sample locations are selected based on the following:

- Heating, ventilation, and air conditioning (HVAC) Zones;
- Office and congregation areas (e.g., conference rooms, breakrooms, kitchens, etc.);
- Best spatial coverage;
- Bias towards worst-case locations based on PID screening;
- Background contribution from on-site outdoor air and process areas; and
- Logistics, safety, and other considerations.

Building sampling utilizes the following methodology.

### **5.1.3.1 Pre-Sampling Methodology**

Building owners and managers are informed regarding their role in the investigation from the initial stages of planning and throughout the completion of the building surveys. General instructions to building occupants are issued to management teams to disseminate to employees prior to sampling activities and flyers containing pertinent information are posted around each building at least 72 hours in advance of sampling activities. General guidance to occupants included activity restrictions for at least 48 hours prior to and during the indoor air sampling event such as:

- No use of air fresheners or odor eliminators;
- No use of paints or varnishes;
- No use of cleaning products such as bathroom cleaners, furniture polish, appliance cleaners, all-purpose cleaners, or floor cleaners;
- No pesticide application;
- No storage of gasoline, oil, or petroleum based or other solvents - if possible;
- No operation of gasoline powered equipment or vehicles within the building, or around the immediate perimeter of the building;
- Normal operation of the building's furnace and air conditioner;
- No excess ventilation by opening windows or keeping doors open; and
- Keep bay doors closed.

Evacuated stainless steel canisters are used to collect the indoor air, outdoor air and soil-gas samples. Prior to sampling, each canister is evacuated to approximately -29"Hg by the contract laboratory. The sampling system consists of a canister, vacuum gauge and a flow controller, meeting the basic requirements contained in the EPA Method TO-15. The sample air is drawn into the canister via the vacuum inside the canister.

The vacuum of each canister is checked prior to use to verify the initial vacuum of the canister. Each sampling train is also verified and leak checked prior to sampling and monitored throughout the integrated sampling process. Dedicated flow controllers are used for each sample and then returned to the contract lab to be cleaned prior to re-use. Samples are not collected in any extreme temperature ranges known to affect flow rates.

### 5.1.3.2 Indoor Air and On-Site Outdoor Air Sampling

For both the indoor air and on-site outdoor air sample collection, the sampling rate is set to approximately 11.5 mL/min, resulting in collection of about 6 liters of sample for an 8-hour sampling period. This leaves a small, residual vacuum (e.g., 6-8"Hg) within each sampling canister.

The indoor air samples are collected near breathing zone height, approximately 4 feet above floor level. The indoor air sampling locations are co-located with the sub-slab sampling locations and are free of nearby obstructions and allow free airflow to the extent feasible. External building doors and bays are generally kept closed during the sampling and no windows are left open. The buildings are occupied during sampling events and overall building operations are not interrupted for purposes of sampling.

At least one outdoor air sample is collected near air intakes to the building air handling system during the building sampling event. More than one outdoor ambient sample is collected at specific buildings if multiple intakes requiring additional characterization are present.

### 5.1.3.3 Sub-Slab Soil-Gas Sampling

Sub-slab probes are installed to allow collection of soil gas from immediately beneath the slabs of the buildings. A hole is drilled using a hammer drill with a 1-inch drill bit down through the slab and at least 6 inches into the underlying soil to form a void in the sub-slab material. PID measurements are recorded throughout the installation process. The probes consist of a ¼-inch (0.64 centimeter [cm]) Swagelok union connected to stainless steel tubing that extends to near the bottom of the slab. The probes are placed in the drilled hole and sealed in place using VOC-free modeling clay.

Fluoropolymer tubing is used to connect the canister to the sub-slab probe. Immediately after placement, the probes are tested using a hand pump to ensure that soil gas can be drawn through the probe and lines are purged of three volumes before the start of sample collection. The flow controllers are set to a rate of slightly less than 200 mL/min and then left in place for a minimum of 30 minutes, resulting in collection of approximately 6 liters of sample.

All soil gas monitoring well locations are immediately abandoned upon completion of the sampling activities. Vapor points are extracted and boreholes are sealed with quick-drying cement.

### 5.1.3.4 Sampling at Temporary and Raised Structures

Dow utilizes temporary and/or raised structures on the Midland Plant that have space between the floor of the building and the ground surface. Due to the unique characteristic of these types of buildings, samples are collected from the crawl space under the building. These sample results are evaluated to determine if collection of indoor and outdoor air samples are warranted.

### 5.1.3.5 Sample Identification

Field operation records include field logs and sample chain-of-custody records. Identification of the samples followed the protocols listed below:

#### **Building-XX-##**

Where:

Building – Identifies the building number

XX – Identifies the sample type as soil gas (SG), sub-slab (SS), indoor air (IA), outdoor air (OA), or under trailer (UT)

## – Identifies the number of the sample which corresponds to a specific location.

## 5.1.4 Results Evaluation Methodology

VI sampling results includes sub-slab soil gas, indoor air, and outdoor air. VI data evaluation includes a comparison of detect and non-detect (ND) analytical results to relevant screening criteria. In order to address the goal of “EI Met,” the VI data is evaluated focused on the current VI status of the building. The potential for VI in the future is also considered. Figure 5-3 presents the process for evaluating VI and determination of the path forward for each priority building.

### 5.1.4.1 Sub-Slab Soil-Gas

The potential for VI for a given analyte only exists if that analyte is present in sub-slab soil gas. Therefore, sub-slab soil gas results are compared to Appendix D.2 Non-Residential Vapor Intrusion Screening Values from the Michigan Department of Environmental Quality (MDEQ) May 2013 *Guidance Document for the Vapor Intrusion Pathway*, specifically to the Shallow Soil-Gas (sub-slab) Screening Levels. Sub-slab soil gas analytes of interest (AOIs) for the VI exposure pathway include any analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels. Any analyte with all ND results for a given building and reporting limits below the appropriate screening level is eliminated from further evaluation for that building. A detected concentration of an analyte at a *de minimus* level is excluded from further evaluation. For purposes of this project, *de minimus* levels in shallow soil-gas are defined as <100 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Any analyte detected above a *de minimus* level but below the relevant screening level is very unlikely to be a significant VI issue. However, the results for these analytes merit further discussion due to the possibility of sampling variability.

### 5.1.4.2 Indoor and Outdoor Air

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Numerous VOCs will be detected in any indoor or outdoor air sample if the analytical detection limits are sufficiently sensitive. This is due, in part, to the presence of VOCs at background concentrations in ambient air. In addition, VOCs may be present in products used or stored within a building. Most importantly, the Midland facility is an active chemical plant and has many potential emission sources distributed across the plant. Therefore, as previously discussed, not all analytes detected in indoor air in this evaluation are due to VI. Outdoor air is collected for comparison purposes only and compared to indoor air sample results to determine if the analyte is present in indoor air due to migration from outdoor air.

Any analyte with a detected result in sub-slab soil gas is carried forward into the indoor air evaluation. Indoor air results are compared to the Indoor Air screening levels presented in Appendix D.2 Non-Residential Vapor Intrusion Screening Values from the MDEQ May 2013 *Guidance Document for the Vapor Intrusion Pathway*. Indoor air AOIs for the VI exposure pathway include any analytes detected in indoor air at a level greater than the non-residential screening levels. An analyte that is only detected in indoor air and not in sub-slab soil-gas is eliminated from further VI evaluation. Any analyte with an ND result and a reporting limit below the appropriate screening level is eliminated from further evaluation. Only detected analytes that exceed both the sub-slab soil gas and indoor air screening levels show evidence of potential VI and will be further evaluated (see Figure 5-3).

#### 5.1.4.2.1 Attenuation Factors

Analytes detected in soil gas but with an ND reporting limit exceedance in indoor air are evaluated using building-specific attenuation factors ( $\alpha$ ). Attenuation factors are a ratio of the indoor air concentrations to shallow soil-gas concentrations. This allows an estimate of a building-specific VI rate that can be used to estimate indoor air concentrations for an analyte that may be present in the indoor air below the analytical

reporting limits or an analyte of concern not included on the VI TAL. The evaluation of these analytes is discussed in the building-specific results summary sections.

#### **5.1.4.3 Further Criteria for Elimination**

TO-15 is not well suited for certain analytes and suspect results are often obtained for methylene chloride, acetone, 2-butanone (MEK), and certain other polar analytes (Eklund & Kremesec, 2006). These analytes will be excluded from further consideration if detected at concentrations in the subsurface at low (e.g., sub-parts per million [ppm]) levels.

It is not unusual to detect dozens of VOCs in either indoor or outdoor air samples. Analytes such as benzene, toluene, ethylbenzene, and xylenes (BTEX) along with trimethylbenzenes are commonly present in air samples due to mobile sources (e.g., automobiles). Analytes such as chloroform and other trihalomethanes are commonly present in indoor air samples due to off-gassing from tap water. The data set will be compared with typical background values provided in *Recommended Practices Manual for Decision Making in Vapor Intrusion Evaluation* (Eklund & Kremesec, 2006) manual and other published sources.



## 5.2 Zone 1 Vapor Intrusion Pathway Review and Results Evaluation

The following sections present the VI pathway sampling activities completed in October and November 2016 and data evaluation completed in 2017 for Zone 1. The data was not received in time to be included in the 2016 CA Report and 2017 Work Plan. However, the results were shared with the MDEQ in January 2017 and are discussed further in this section. The categorization efforts for Zone 1 were reported in the 2016 CA Report and 2017 Work Plan and are summarized below. The sampling procedures and evaluation methodology were detailed in the previous section.

Zone 1 contains 70 buildings and structures that were visited and evaluated for the potential for exposure via VI. Following the VI Categorization Flowchart (Figure 5-2), 11 out of the 70 buildings in Zone 1 were categorized as priority buildings (Category 1 and 2 buildings). These buildings were identified for further evaluation, including surveying the building and conducting indoor air, sub-slab soil-gas, and outdoor air sampling activities. Figure 5-4 presents the Priority Buildings in Zone 1.

The 10 priority buildings in Zone 1 are as follows:

### Category 1:

- Building 34 – Administrative and Control Room of the Rotary Kiln Incinerator includes multiple offices;
- Building 1078 – Environmental Operations (EVO) Laboratory Building includes multiple offices and laboratory space;
- Building 1100 – Security and Emergency Services. This is a large building with multiple office areas, locker rooms, and a large garage where security and emergency vehicles are stored and maintained when not in use;
- Building 1335 – 23 Gatehouse (Contractor Gate) is the guard house and has regular occupancy;
- Building 1358 – EVO Maintenance Building has one lunch room and two offices; and
- Building 3303 – 1159 Breakroom includes one office for checking emails.

### Category 2:

- Building 462 – MRO / Investment Recovery building includes office space;
- Building 680 – Sulfonamides Agricultural products production building includes office and laboratory space;
- Building 838 – Sulfonamides Shop includes a shop and an office;
- Building 1098 – EVO Maintenance Shop includes 2 offices; and
- Building T-1561 – Temporary building with office space and extensive crawl space between the ground surface and the floor of the building.

The Zone 1 VI sampling results are presented in the following subsections as follows:

Category 1:

- Section 5.2.1 Building 34
- Section 5.2.2 Building 1078
- Section 5.2.3 Building 1100
- Section 5.2.4 Building 1335
- Section 5.2.5 Building 1358
- Section 5.2.6 Building 3303

Category 2:

- Section 5.2.7 Building 462
- Section 5.2.8 Building 680
- Section 5.2.9 Building 838
- Section 5.2.10 Building 1098
- Section 5.2.11 Building T-1561

## 5.2.1 Vapor Intrusion Evaluation for Building 34

### BACKGROUND

Building 34 is a Category 1 building in Zone 1. It is a large building that includes a control room with office space and is connected to process areas. It is known as the Rotary Kiln Incinerator Admin /Control Room (see Figure 5.2.1-1) and is located within the southwest portion of the facility designated as Zone 1. The building is single story tall. The building is slab-on-grade construction with a footprint of approximately 15,400 square feet (ft<sup>2</sup>) (1,430 square meters [m<sup>2</sup>]). The depth to groundwater in this area of the facility is approximately 5 feet (ft) below ground surface (bgs) and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 21, 2016 and the results can be found in Appendix C. The building has central air conditioning with the air intake at roof level. The land surrounding the building is covered in asphalt and concrete.

Drains and other openings were screened with a PID and no soil gas entry points were identified. A chemical inventory was completed during the building survey and the chemicals found to be stored within the building, each listed in the survey, primarily included bleach and various cleaners.

### DATA SUMMARY

On November 16, 2016, sub-slab soil gas samples were collected from nine locations from within the building. Indoor air samples were collected on November 17, 2016 at nine locations, corresponding to the soil gas sample locations, along with two outdoor air samples from the main air intakes. The sampling locations are shown on Figure 5.2.1-2. Summary statistics of the analytical results for sub-slab soil gas for Building 34 are presented on Table 5.2.1-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.1-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 33 of the 65 target analytes were ND in each of the 9 samples collected at Building 34 and eliminated from further VI evaluation (1,2-dibromoethane [EDB] had two ND reporting limit exceedances and will be discussed further below). A total of 32 analytes were detected in one or more of the nine sub-slab soil gas samples. In terms of measured concentrations, the detected compounds were divided into three categories:

1. Eleven analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
2. Twenty analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
3. One analyte that was detected above nonresidential screening levels.

The sub-slab soil gas results are summarized in Table 34-1. There were no analytes in sub-slab soil gas at Building 34 that were detected at 100% detection frequency. Only the analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI. Therefore, the AOI in soil gas at Building 34 is 1,2,4-trichlorobenzene. This analyte was only detected in four of nine samples and had two results exceed the sub-slab soil gas screening level.

**Table 34-1. Summary of Sub-Slab Soil Gas Detects for Building 34**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detects > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
1,2,4-Trichlorobenzene	44%	53 - 13000	22%	2300
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,2,4-Trimethylbenzene	67%	4.2 - 140	0%	130000
1,2-Dichlorobenzene	33%	6.6 - 4800	0%	180000
1,3-Dichlorobenzene	33%	5.9 - 400	0%	1800
1,4-Dichlorobenzene	33%	64 - 2000	0%	2600
2,2,4-Trimethylpentane	11%	110	0%	2000000
Acetone	78%	21 - 420	0%	3400000
Benzene	89%	3.3 - 130	0%	2200
Bromomethane	11%	390	0%	2900
Chlorobenzene	11%	150	0%	41000
Cyclohexane	89%	3.9 - 220	0%	3500000
Ethanol	89%	10 - 160	N/A	N/A
Ethylbenzene	78%	4.2 - 170	0%	59000
Heptane	89%	5.4 - 450	0%	2000000
Hexachlorobutadiene (HCB)	11%	280	0%	830
Hexane	89%	8.6 - 540	0%	410000
Naphthalene	22%	10 - 300	0%	1500
Tetrachloroethene (PCE)	89%	12 - 1500	0%	23000
Toluene	89%	7.8 - 560	0%	2900000
Total Xylenes	89%	5.8 - 470	0%	58000
Trichloroethene (TCE)	33%	18 - 260	0%	1200
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	11%	67	0%	3500000
1,1-Dichloroethene	11%	68	0%	120000
1,3,5-Trimethylbenzene	22%	31 - 66	0%	130000
2-Butanone (Methyl Ethyl Ketone)	11%	38	0%	2900000
2-Propanol	33%	9.2 - 24	N/A	N/A
4-Ethyltoluene	44%	5.3 - 98	N/A	N/A
Carbon Disulfide	11%	18	0%	410000
Carbon Tetrachloride	11%	43	0%	3000
Cumene	22%	15 - 74	0%	1700
Propylbenzene	22%	11 - 24	0%	12000
Styrene	11%	39	0%	32000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes.

Additionally, two outdoor air samples were collected immediately upwind of the building. Table 34-2 below shows the analytes detected in each of the three media sampled.

**Table 34-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
Hexane	•	•	•
Ethanol	•	•	•
Acetone	•	•	•
Toluene	•	•	
Cyclohexane	•	•	
<i>2-Propanol</i>	•	•	
1,2,4-Trichlorobenzene	X		
<i>1,1-Dichloroethene</i>	•		
<i>1,1,1-Trichloroethane</i>	•		
<i>Carbon tetrachloride</i>	•		
PCE	•		
1,2-Dichlorobenzene	•		
TCE	•		
1,3-Dichlorobenzene	•		
1,4-Dichlorobenzene	•		
Chlorobenzene	•		
Hexachlorobutadiene (HCB)	•		
Benzene	•		
Ethylbenzene	•		
Xylenes	•		
1,2,4-Trimethylbenzene	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>Propylbenzene</i>	•		
<i>Cumene</i>	•		
<i>4-Ethyltoluene</i>	•		
Heptane	•		
Naphthalene	•		
2,2,4-Trimethylpentane	•		
<i>2-Butanone</i>	•		
<i>Styrene</i>	•		
Bromomethane	•		
<i>Carbon disulfide</i>	•		

• = Detect

= Non-detect

X = Detection exceeds screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Fifty-nine of the 65 indoor air analytes were ND in each of the samples. Seven of these 59 ND analytes had reporting limits that exceeded screening levels and are discussed further below. The 52 ND analytes with adequate reporting limits were eliminated from further evaluation. The six analytes detected in indoor air were 2-propanol, acetone, cyclohexane, ethanol, hexane, and toluene. None of the detected values for indoor air exceed applicable screening levels (ethanol and 2-propanol do not have screening levels available). Two outdoor air samples were collected immediately upwind of the building and three analytes were detected (acetone, ethanol and hexane).

Table 34-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 34-3. Vapor Intrusion Evaluation for Building 34**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
1,2,4-Trichlorobenzene	0%	<21 - <26	18	<25
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,2,4-Trimethylbenzene	0%	<3.5 - <4.3	960	<4.1 - <4.2
1,2-Dichlorobenzene	0%	<4.3 - <5.3	1300	<5 - <5.1
1,3-Dichlorobenzene	0%	<4.3 - <5.3	13	<5 - <5.1
1,4-Dichlorobenzene	0%	<4.3 - <5.3	20	<5 - <5.1
2,2,4-Trimethylpentane	0%	<3.3 - <4.1	15000	<3.9 - <4
Acetone	78%	19 - 170	26000	22
Benzene	0%	<2.3 - <2.8	16	<2.7
Bromomethane	0%	<28 - 34	22	<32 - <33
Chlorobenzene	0%	<3.3 - <4	310	<3.8 - <3.9
Cyclohexane	11%	4.2	26000	<2.9
Ethanol	100%	31 - 350	N/A	8.4
Ethylbenzene	0%	<3.1 - <3.8	440	<3.6 - <3.7
Heptane	0%	<2.9 - <3.6	15000	<3.4 - <3.5
Hexachlorobutadiene (HCB)	0%	<30 - 38	6.2	<36
Hexane	11%	2.9	3100	3.5
Naphthalene	0%	<7.4 - <9.2	11	<8.8 - <9
Tetrachloroethene (PCE)	0%	<4.8 - <6	180	<5.7 - <5.8
Toluene	33%	3.8 - 5.4	22000	<3.1 - <3.2
Total Xylenes	0%	<6.2 - <7.6	440	<7.2 - <7.4
Trichloroethene (TCE)	0%	<3.8 - <4.7	8.8	<4.5 - <4.6
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	0%	<3.9 - <4.8	26000	<4.6 - <4.7
1,1-Dichloroethene	0%	<2.8 - <3.5	880	<3.3 - <3.4
1,3,5-Trimethylbenzene	0%	<3.5 - <4.3	960	<4.1 - <4.2
2-Butanone (Methyl Ethyl Ketone)	0%	<8.4 - <10	22000	<9.8 - 10
2-Propanol	22%	11 - 18	N/A	<8.2 - <8.4
4-Ethyltoluene	0%	<3.5 - <4.3	N/A	<4.1 - <4.2
Carbon Disulfide	0%	<8.8 - 11	3100	<10 - <11
Carbon Tetrachloride	0%	<4.5 - <5.5	23	<5.2 - <5.4
Cumene	0%	<3.5 - <4.3	13	<4.1 - <4.2
Propylbenzene	0%	<3.5 - <4.3	88	<4.1 - <4.2
Styrene	0%	<3 - <3.7	240	<3.6

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

Of those six analytes detected in indoor air, three were detected in outdoor air (hexane, acetone, and ethanol). Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these three analytes. Hexane was detected at  $3.5 \mu\text{g}/\text{m}^3$  in both outdoor air samples and only detected once indoors at  $2.9 \mu\text{g}/\text{m}^3$ . Acetone was detected in one of the outdoor air samples ( $22 \mu\text{g}/\text{m}^3$ ) and detected at

similar concentrations in six of the indoor air samples (detected results range from 19 - 23  $\mu\text{g}/\text{m}^3$ ). One indoor air sample for acetone (sample 8) had a result of 170  $\mu\text{g}/\text{m}^3$ , which likely indicates an indoor source at that location. However, it is important to point out that all of the results for hexane and acetone were well below screening levels.

While ethanol does not have a screening level, it was detected in eight of nine sub-slab soil gas at low levels ranging from 6 - 48  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from 31 - 350  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: disinfectants, toilet bowl cleaner, Purex, etc.

There were seven ND analytes in indoor air with reporting limits that exceeded the indoor air screening level. Of these seven ND analytes, only 1,2,4-trichlorobenzene was detected in sub-slab soil gas. The remaining six ND analytes with reporting limit issues that were not detected in sub-slab soil gas were eliminated from further evaluation since there was no evidence of VI. 1,2,4-Trichlorobenzene has already been identified as an AOI in sub-slab soil gas, as it exceeded the screening level in two of nine samples. The indoor air screening level for 1,2,4-trichlorobenzene is 18  $\mu\text{g}/\text{m}^3$  and all of the indoor air results were ND with slightly elevated reporting limits that ranged from 21 - 26  $\mu\text{g}/\text{m}^3$ .

EDB was ND in all media; however, all of the ND reporting limits exceed the indoor air screening level; however, seven of the nine ND soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB. Therefore, the ND reporting limit exceedances for EDB were eliminated from further evaluation for Building 34.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 34 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results for 1,2,4-trichlorobenzene and given the potential for future VI, Building 34 was placed in VI Path Forward Building Group 2 (see Figure 5-3) and was resampled in August 2017. The second round of sampling is evaluated and discussed in Section 5.3.1. Additionally, 1,2,4-trichlorobenzene will be added to Industrial Hygiene monitoring for the building.

**Figure 5.2.1-1. Building 34 Location**

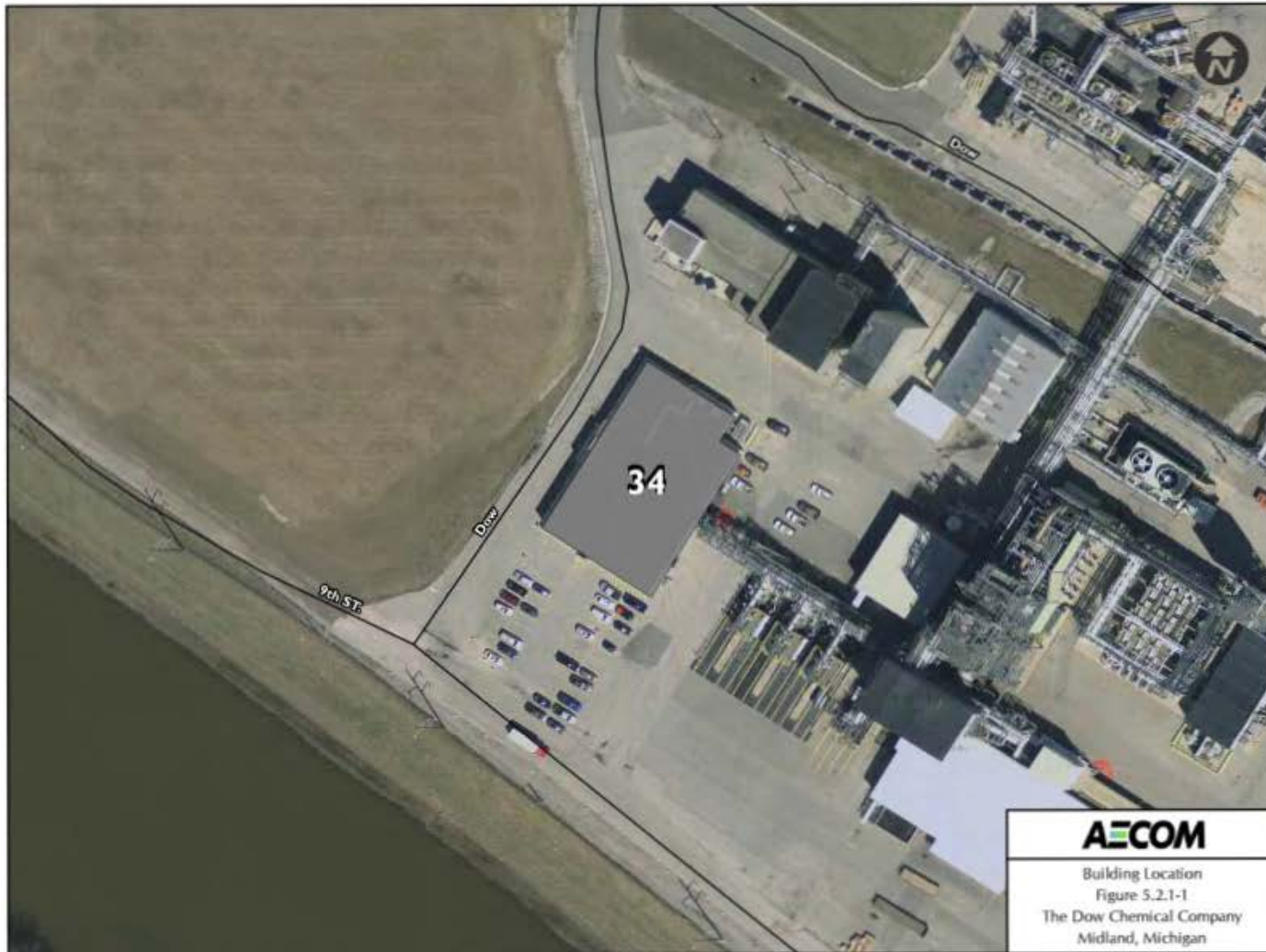
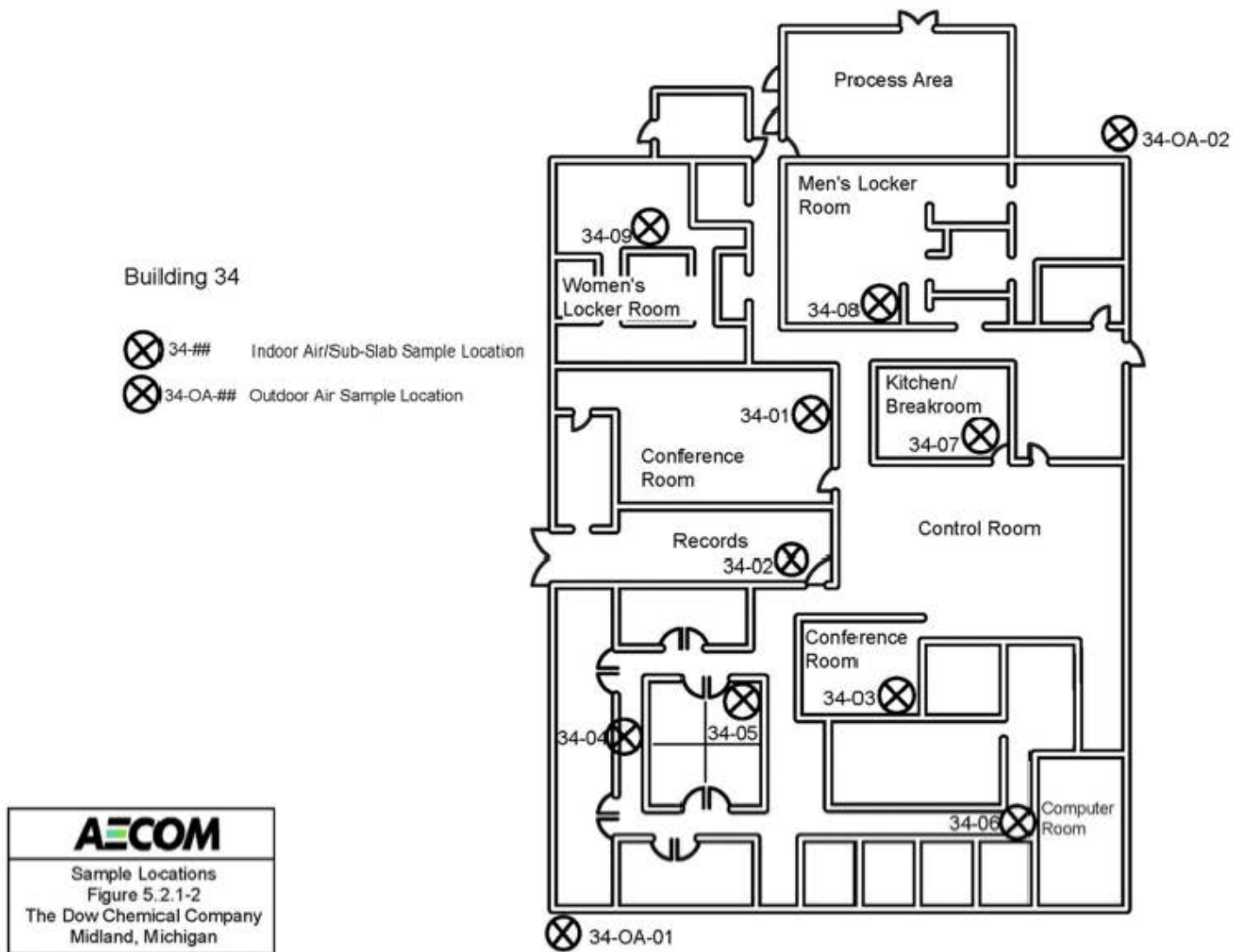




Figure 5.2.1-2. Building 34 Sample Locations



**AECOM**  
Sample Locations  
Figure 5.2.1-2  
The Dow Chemical Company  
Midland, Michigan

**Table 5.2.1-1. Building 34 Sub-Slab Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	11%	11.7	21.3	67	67	4.2	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	34	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.4	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	34	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.2	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	34	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	3.2	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	34	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	11%	10.6	21.8	68	68	3.1	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	34	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	44%	2582	4812	53	13000	23	64	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	22%	0%
Category 1	34	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	67%	27.5	44.5	4.2	140	3.9	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	34	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	6	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	22%
Category 1	34	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	33%	552	1594	6.6	4800	4.7	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	34	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	3.2	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	34	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.6	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	34	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	22%	14.9	21.5	31	66	3.8	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	34	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.7	14	No Screening Value Available	-	-	-
Category 1	34	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	33%	54.7	131.2	5.9	400	4.7	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	34	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	33%	330	690	64	2000	4.7	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	34	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	11	92	No Screening Value Available	-	-	-
Category 1	34	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	11%	15.8	35.6	110	110	3.6	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	200000	0%	0%
Category 1	34	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	11%	15.4	14.3	38	38	9.2	75	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	34	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	13	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	34	SS	2-Propanol	67-63-0	UG/M3	9	33%	13.4	10.3	9.2	24	7.8	63	No Screening Value Available	-	-	-
Category 1	34	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.8	80	No Screening Value Available	-	-	-
Category 1	34	SS	4-Ethyltoluene	622-96-8	UG/M3	9	44%	23.0	32.5	5.3	98	3.8	31	No Screening Value Available	-	-	-
Category 1	34	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	3.2	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	34	SS	Acetone	67-64-1	UG/M3	9	78%	131	157	21	420	100	150	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	34	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	4	33	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	34	SS	Benzene	71-43-2	UG/M3	9	89%	37.4	53.5	3.3	130	20	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	34	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	15	140	No Screening Value Available	-	-	-
Category 1	34	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	5.2	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	34	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	8.1	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	34	SS	Bromomethane	74-83-9	UG/M3	9	11%	68.9	122.5	390	390	30	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	34	SS	Carbon Disulfide	75-15-0	UG/M3	9	11%	13.9	12.4	18	18	9.7	80	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	34	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	11%	9.64	13.73	43	43	4.9	40	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	34	SS	Chlorobenzene	108-90-7	UG/M3	9	11%	20.2	48.9	150	150	3.6	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	34	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	8.2	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	34	SS	Chloroform	67-66-3	UG/M3	9	0%	-	-	-	-	3.8	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	34	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	16	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	34	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	3.1	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	34	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.5	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	34	SS	Cumene	98-82-8	UG/M3	9	22%	13.4	23.4	15	74	3.8	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	34	SS	Cyclohexane	110-82-7	UG/M3	9	89%	55.2	85.9	3.9	220	22	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	34	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.6	54	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	34	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	20	180	No Screening Value Available	-	-	-
Category 1	34	SS	Ethanol	64-17-5	UG/M3	9	89%	63.0	59.3	10	160	32	32	No Screening Value Available	-	-	-
Category 1	34	SS	Ethylbenzene	100-41-4	UG/M3	9	78%	43.7	60.7	4.2	170	3.4	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	34	SS	CFC-11	75-69-4	UG/M3	9	0%	-	-	-	-	4.4	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 1	34	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	6	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
Category 1	34	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.4	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
Category 1	34	SS	CFC-12	75-71-8	UG/M3	9	0%	-	-	-	-	3.8	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	34	SS	Heptane	142-82-5	UG/M3	9	89%	109	167	5.4	450	26	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	34	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	11%	63.8	89.6	280	280	33	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	34	SS	Hexane	110-54-3	UG/M3	9	89%	139	223	8.6	540	22	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	34	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	89%	78.6	117.2	4.1	350	28	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	34	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	34	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	27	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	34	SS	Naphthalene	91-20-3	UG/M3	9	22%	42.0	97.2	10	300	8.2	67	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	34	SS	o-Xylene	95-47-6	UG/M3	9	56%	34.5	48.2	4.2	120	3.4	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.1-1 Building 34 Sub-Slab Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	SS	Propylbenzene	103-65-1	UG/M3	9	22%	7.97	7.90	11	24	3.8	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	34	SS	Styrene	100-42-5	UG/M3	9	11%	7.61	12.38	39	39	3.3	27	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	34	SS	Tetrachloroethene	127-18-4	UG/M3	9	89%	193	491	12	1500	15	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	34	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	34	SS	Toluene	108-88-3	UG/M3	9	89%	136	207	7.8	560	24	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	34	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	7	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	34	SS	Total Xylenes	1330-20-7	UG/M3	9	89%	113	162	5.8	470	56	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	34	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3.1	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	34	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.5	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	34	SS	Trichloroethene	79-01-6	UG/M3	9	33%	37.0	84.5	18	260	4.2	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	34	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	2	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.2.1-2. Building 34 Indoor Air and Outdoor Air Summary Results**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
34	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	3.9	4.8	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
34	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	4.9	6	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
34	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	3.9	4.8	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
34	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	2.9	3.6	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
34	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	2.8	3.5	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
34	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	21	26	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
34	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	0%	-	-	-	-	3.5	4.3	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
34	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	5.4	6.8	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
34	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.3	5.3	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
34	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	2.9	3.6	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
34	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.3	4.1	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
34	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	3.5	4.3	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
34	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.6	1.9	No Screening Value Available	-	-	-
34	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.3	5.3	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
34	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.3	5.3	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
34	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	10	13	No Screening Value Available	-	-	-
34	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.3	4.1	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
34	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	0%	-	-	-	-	8.4	10	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
34	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	12	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
34	IA	2-Propanol	67-63-0	UG/M3	9	22%	6.30	4.97	11	18	7	8.4	No Screening Value Available	-	-	-
34	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	8.9	11	No Screening Value Available	-	-	-
34	IA	4-Ethyltoluene	622-96-8	UG/M3	9	0%	-	-	-	-	3.5	4.3	No Screening Value Available	-	-	-
34	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	2.9	3.6	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
34	IA	Acetone	67-64-1	UG/M3	9	78%	35.3	50.8	19	170	18	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
34	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	3.7	4.6	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
34	IA	Benzene	71-43-2	UG/M3	9	0%	-	-	-	-	2.3	2.8	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
34	IA	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	15	19	No Screening Value Available	-	-	-
34	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	4.8	5.9	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
34	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	7.3	9.1	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
34	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	28	34	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
34	IA	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	8.8	11	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
34	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	4.5	5.5	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
34	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.3	4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
34	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	7.5	9.3	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
34	IA	Chloroform	67-66-3	UG/M3	9	0%	-	-	-	-	3.5	4.3	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
34	IA	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	15	18	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
34	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	2.8	3.5	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
34	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.2	4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
34	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	3.5	4.3	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
34	IA	Cyclohexane	110-82-7	UG/M3	9	11%	1.71	0.94	4.2	4.2	2.4	3	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
34	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6	7.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
34	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	20	25	No Screening Value Available	-	-	-
34	IA	Ethanol	64-17-5	UG/M3	9	100%	109	124	31	350	-	-	No Screening Value Available	-	-	-
34	IA	Ethylbenzene	100-41-4	UG/M3	9	0%	-	-	-	-	3.1	3.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
34	IA	CFC-11	75-69-4	UG/M3	9	0%	-	-	-	-	4	4.9	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
34	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	5.4	6.7	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
34	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5	6.2	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
34	IA	CFC-12	75-71-8	UG/M3	9	0%	-	-	-	-	3.5	4.4	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
34	IA	Heptane	142-82-5	UG/M3	9	0%	-	-	-	-	2.9	3.6	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
34	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	30	38	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
34	IA	Hexane	110-54-3	UG/M3	9	11%	1.61	0.50	2.9	2.9	2.5	3.1	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
34	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	0%	-	-	-	-	3.1	3.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
34	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	10	13	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
34	IA	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	25	30	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
34	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	7.4	9.2	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
34	IA	o-Xylene	95-47-6	UG/M3	9	0%	-	-	-	-	3.1	3.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
34	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	3.5	4.3	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
34	IA	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3	3.7	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.2.1-2. Building 34 Indoor Air and Outdoor Air Summary Results (Continued)**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
34	IA	Tetrachloroethene	127-18-4	UG/M3	9	0%	-	-	-	-	4.8	6	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
34	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.1	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
34	IA	Toluene	108-88-3	UG/M3	9	33%	2.60	1.63	3.8	5.4	2.7	3.2	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
34	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	6.4	8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
34	IA	Total Xylenes	1330-20-7	UG/M3	9	0%	-	-	-	-	6.2	7.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
34	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	2.8	3.5	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
34	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.2	4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
34	IA	Trichloroethene	79-01-6	UG/M3	9	0%	-	-	-	-	3.8	4.7	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
34	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	1.8	2.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
34	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	4.6	4.7	-	-	-	-
34	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	5.7	5.9	-	-	-	-
34	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	4.6	4.7	-	-	-	-
34	OA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-
34	OA	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	3.3	3.4	-	-	-	-
34	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	25	25	-	-	-	-
34	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	6.4	6.6	-	-	-	-
34	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	5	5.1	-	-	-	-
34	OA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-
34	OA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
34	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	1.8	1.9	-	-	-	-
34	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	5	5.1	-	-	-	-
34	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	5	5.1	-	-	-	-
34	OA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	12	12	-	-	-	-
34	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.9	4	-	-	-	-
34	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	9.8	10	-	-	-	-
34	OA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	14	14	-	-	-	-
34	OA	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	8.2	8.4	-	-	-	-
34	OA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	10	11	-	-	-	-
34	OA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-
34	OA	Acetone	67-64-1	UG/M3	2	50%	16.0	8.5	22	22	20	20	-	-	-	-
34	OA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	4.3	4.4	-	-	-	-
34	OA	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	2.7	2.7	-	-	-	-
34	OA	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	18	18	-	-	-	-
34	OA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	5.6	5.7	-	-	-	-
34	OA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	8.6	8.8	-	-	-	-
34	OA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	32	33	-	-	-	-
34	OA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	10	11	-	-	-	-
34	OA	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	5.2	5.4	-	-	-	-
34	OA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	3.8	3.9	-	-	-	-
34	OA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	8.8	9	-	-	-	-
34	OA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	17	18	-	-	-	-
34	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	3.3	3.4	-	-	-	-
34	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	3.8	3.9	-	-	-	-
34	OA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	2.9	2.9	-	-	-	-
34	OA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	7.1	7.3	-	-	-	-
34	OA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	24	24	-	-	-	-
34	OA	Ethanol	64-17-5	UG/M3	2	50%	5.80	3.68	8.4	8.4	6.4	6.4	-	-	-	-
34	OA	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	3.6	3.7	-	-	-	-
34	OA	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	4.7	4.8	-	-	-	-
34	OA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	6.4	6.6	-	-	-	-
34	OA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	5.8	6	-	-	-	-
34	OA	CFC-12	75-71-8	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-

**Table 5.2.1-2. Building 34 Indoor Air and Outdoor Air Summary Results (Continued)**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
34	OA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	36	36	-	-	-	-
34	OA	Hexane	110-54-3	UG/M3	2	100%	3.50	0.00	3.5	3.5	-	-	-	-	-	-
34	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	3.6	3.7	-	-	-	-
34	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	12	12	-	-	-	-
34	OA	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	29	30	-	-	-	-
34	OA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	8.8	9	-	-	-	-
34	OA	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	3.6	3.7	-	-	-	-
34	OA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	4.1	4.2	-	-	-	-
34	OA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	3.6	3.6	-	-	-	-
34	OA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	5.7	5.8	-	-	-	-
34	OA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.5	2.5	-	-	-	-
34	OA	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	3.1	3.2	-	-	-	-
34	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	7.6	7.8	-	-	-	-
34	OA	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	7.2	7.4	-	-	-	-
34	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	3.3	3.4	-	-	-	-
34	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	3.8	3.9	-	-	-	-
34	OA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	4.5	4.6	-	-	-	-
34	OA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	2.1	2.2	-	-	-	-

## 5.2.2 Vapor Intrusion Evaluation for Building 1078

### BACKGROUND

Building 1078 is a Category 1 building in Zone 1. It is a large, single story building that includes both office and laboratory space. It is known as the EVO Lab (see Figure 5.2.2-1) and is located within the southern-most portion of the facility designated as Zone 1. The building was constructed in 1978 and is slab-on-grade construction with a footprint of approximately 10,000 ft<sup>2</sup> (929 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 21, 2016 and the results can be found in Appendix C. Building 1078 contains laboratory space, a breakroom, and office space. The building has central air conditioning with the air intake at roof level and a steam radiation heating system. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified. A chemical inventory was completed during the building survey and a wide variety of chemicals was found to be stored within the building and each is listed in the survey (e.g., bleach, various cleaners, and air freshener).

A VI pilot study was also performed at Building 1078 in November 2010 and the results of this study are summarized further below.

### DATA SUMMARY

On November 14, 2016, sub-slab soil gas samples were collected from seven locations from within the building. Indoor air samples were collected on November 15, 2016 at seven locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.2.2-2. The summary statistics of the analytical results for sub-slab soil gas for Building 1078 are presented on Table 5.2.2-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.2-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 44 of the 65 target analytes were ND in each of the seven samples collected at Building 1078. All 44 ND analytes had adequate reporting limits and were eliminated from further VI evaluation. A total of 21 analytes were detected in one or more of the seven sub-slab soil gas samples. These included seven chlorinated VOCs and seven petroleum hydrocarbons, along with a few common solvents (e.g., ethanol and acetone). In terms of measured concentrations, the detected compounds were divided into two categories:

1. Twenty analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
2. One analyte was detected above *de minimus* levels but below screening levels and was eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1078-1. There were no analytes with detections greater than screening levels. Only CFC-12 had a detection frequency of 100% and it was also the only analyte detected above *de minimus* levels but below screening levels. Only the analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI. Therefore,

since all detections were below the sub-slab soil gas screening levels, there were no AOIs identified at Building 1078.

**Table 1078-1. Summary of Sub-Slab Soil Gas Detects for Building 1078**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	100%	4.4 - 2,000	0%	29000000
<b>Below <i>de minimus</i> levels</b>				
1,2-Dichlorobenzene	14%	6.2	0%	180000
1,2-Dichloropropane	14%	4.1	0%	2300
1,3-Dichlorobenzene	14%	4.7	0%	1800
1,4-Dichlorobenzene	14%	32	0%	2600
1,4-Dioxane	14%	23	N/A	N/A
Acetone	29%	18 - 26	0%	3400000
Benzene	14%	8.8	0%	2200
Chlorobenzene	14%	8.4	0%	41000
Chloroform	29%	5.4 - 17	0%	7600
cis-1,2-Dichloroethene	14%	4.8	0%	4100
Cumene	14%	8.6	0%	1700
Ethanol	86%	6.2 - 16	N/A	N/A
Ethylbenzene	57%	4.1 - 73	0%	59000
Heptane	29%	3.9 - 5.9	0%	2000000
Hexane	14%	2.8	0%	410000
Styrene	14%	23	0%	32000
Tetrachloroethene	86%	14 - 56	0%	23000
Toluene	43%	3.6 - 12	0%	2900000
Total Xylenes	43%	6.8 - 63	0%	58000
Trichloroethene	29%	6.1 - 6.4	0%	1200

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, seven indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1078-2 below shows the analytes detected in each of the three media sampled.



**Table 1078-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>Toluene</i>	•	•	•
<i>Ethanol</i>	•	•	•
<i>Acetone</i>	•	•	
<i>Chlorobenzene</i>	•	•	
<i>Benzene</i>	•	•	
<i>Xylenes</i>	•	•	
<i>CFC-12</i>	•	•	
<i>Hexane</i>	•		•
<i>Tetrachloroethene</i>	•		
<i>Trichloroethene</i>	•		
<i>cis-1,2-Dichloroethene</i>	•		
<i>1,2-Dichloropropane</i>	•		
<i>1,2-Dichlorobenzene</i>	•		
<i>1,3-Dichlorobenzene</i>	•		
<i>1,4-Dichlorobenzene</i>	•		
<i>Ethylbenzene</i>	•		
<i>Cumene</i>	•		
<i>Heptane</i>	•		
<i>1,4-Dioxane</i>	•		
<i>Chloroform</i>	•		
<i>Styrene</i>	•		
2,2,4-Trimethylpentane		•	

• = Detected

= Non-detect

*Italics = de minimus detect(s) in sub-slab soil gas*

Fifty-seven of the 65 indoor air analytes were ND in each of the samples and were eliminated from further evaluation. Seven of the 57 ND analytes in indoor air had reporting limits that exceeded the indoor air screening levels; however, none of the analytes were detected in sub-slab soil gas and each of these seven analytes had adequate reporting limits in the sub-slab soil gas samples. The eight analytes detected in indoor air were 2,2,4-trimethylpentane, acetone, benzene, chlorobenzene, ethanol, CFC-12, toluene and total xylenes. None of the detected results in indoor air exceeded applicable indoor air screening levels so the eight detected analytes were eliminated from further evaluation (ethanol does not have a screening level available). Three analytes were detected in the outdoor air sample collected immediately upwind of the building (ethanol, hexane, and toluene).

Table 1078-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1078-3. Vapor Intrusion Evaluation for Building 1078**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	14%	4.1	220000	<4.6
<b>Below <i>de minimus</i> levels</b>				
1,2-Dichlorobenzene	0%	<4.2 - <5.2	1300	<5.6
1,2-Dichloropropane	0%	<3.2 - <4	18	<4.3
1,3-Dichlorobenzene	0%	<4.2 - <5.2	13	<5.6
1,4-Dichlorobenzene	0%	<4.2 - <5.2	20	<5.6
1,4-Dioxane	0%	<10 - <12	N/A	<13
Acetone	14%	25	26000	<22
Benzene	14%	2.9	16	<3
Chlorobenzene	14%	3.4	310	<4.3
Chloroform	0%	<3.4 - <4.2	57	<4.5
cis-1,2-Dichloroethene	0%	<2.8 - <3.4	31	<3.7
Cumene	0%	<3.5 - <4.2	13	<4.6
Ethanol	100%	8 - 12	N/A	12
Ethylbenzene	0%	<3.1 - <3.7	440	<4
Heptane	0%	<2.9 - <3.5	15000	<3.8
Hexane	0%	<2.5 - <3	3100	3.4
Styrene	0%	<3 - <3.7	240	<4
Tetrachloroethene	0%	<4.8 - <5.8	180	<6.3
Toluene	100%	4.6 - 7.3	22000	7.6
Total Xylenes	29%	4.65 - 5.6	440	<8
Trichloroethene	0%	<3.8 - <4.6	8.8	<5

N/A = No screening level

&lt; = Non-detect at the reporting limit provided

Ethanol and toluene were detected in the outdoor air sample at concentrations similar to those detected in indoor air. For those two analytes, the outdoor air could be influencing indoor air concentrations. Of the eight analytes detected indoors, ethanol and petroleum distillates were the only analytes found to be components of items stored or used indoors during the chemical inventory conducted as part of the building survey.

## VI INVESTIGATION HISTORY AT BUILDING 1078

Dow conducted a VI pilot investigation for Building 1078 in November 2010. The resulting data was submitted in the 4<sup>th</sup> Quarter 2010 Facility Environmental Monitoring Report. Dow reviewed the results of the 1078 VI Pilot Investigation with MDEQ during the April 2016 Corrective Action Monthly meeting.

In this pilot investigation, there were 39 target analytes, including chlorinated analytes, brominated analytes, petroleum hydrocarbons, and Freon analytes. All samples were analyzed by EPA Method TO-15. The results were compared both to occupational standards and EPA RSLs (for indoor air at industrial sites).

Similar to the current VI evaluation, a building survey was performed prior to sample collection. Six sub-slab soil gas samples were collected and six indoor air samples were collected and co-located with the sub-slab soil gas sample locations and analyzed for the same 39 target analytes. One outdoor air sample was collected at the inlet to the building air handling system.

Table 1078-4 below shows the analytes detected in each of the three media sampled in the 2010 VI Pilot Investigation.

**Table 1078-4. Building 1078 VI Pilot Investigation (2010) Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Tetrachloroethene <sup>1</sup>	•	•	•
Carbon tetrachloride	•	•	•
Chloroform <sup>1</sup>	•	•	•
Chloromethane	•	•	•
Chloroethane	•	•	•
Methylene chloride	•	•	•
CFC 11	•	•	•
CFC 12	•	•	•
Benzene <sup>1</sup>	•	•	•
Toluene	•	•	•
Ethylbenzene	•	•	•
m/p-Xylene	•	•	•
o-Xylene	•	•	•
Trichloroethene	•	•	
cis-1,2-Dichloroethene	•	•	
Vinyl chloride	•	•	
1,2-Dichloroethane	•	•	
CFC 114	•	•	
1,1-Dichloroethene	•		•
1,1-Dichloroethane	•		
1,2-Dichloropropane	•		
Hexachlorobutadiene	•		
1,2,4-Trimethylbenzene	•		
1,3,5-Trimethylbenzene	•		
Chlorobenzene		•	•
1,2-Dichlorobenzene		•	•
1,4-Dichlorobenzene <sup>1</sup>		•	•
CFC 113		•	•
Styrene		•	•
1,3-Dichlorobenzene		•	
1,2,4-Trchlorobenzene		•	
1,1,1-Trichloroethane		•	

<sup>1</sup> This analyte had at least one result that exceeded the EPA RSLs for Indoor Air at Industrial Sites.

Twenty-four of 39 analytes were detected in one or more of the six sub-slab soil gas samples, which included chlorinated VOCs and hydrocarbons. The highest detected soil gas concentration was for m- and p-xylenes (1,400 parts per billion by volume [ppbv]). Only a few VOCs were present at concentrations above 10 ppbv. Soil gas data was used to make a conservative estimate of potential future VI impacts and in all cases, estimated concentrations were below applicable EPA screening levels. For sub-slab soil gas analytes, only those analytes that were detected in one or more sub-slab soil gas samples at a concentration of greater than 5 ppbv were evaluated further. For the pilot investigation, 5 ppbv was considered *de minimus* based on the soil gas measurement results, indoor air screening levels and assumed rates of attenuation.

In indoor air, 26 analytes of 39 analytes were detected in one or more samples. Nineteen analytes were detected in the outdoor air samples. All nineteen of the analytes that were detected in outdoor air were

detected in indoor air, indicating that there was communication between indoor air and outdoor air. All results were less than Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs). Only four analytes detected in indoor air exceeded the EPA screening levels, including PCE, chloroform, benzene, and 1,4-dichlorobenzene.

In indoor air, only the four analytes that exceeded the indoor air screening levels were evaluated further. Other analytes detected in indoor air at concentrations less than screening levels were considered to have insignificant VI potential. Of the four analytes detected at concentrations greater than the EPA screening levels, 1,4-dichlorobenzene was not detected in sub-slab soil gas and was eliminated from further evaluation.

Average values measured in indoor air for PCE, chloroform, benzene, and 1,4-dichlorobenzene were very similar to what was measured at the building air intake. The close agreement between indoor and outdoor samples suggested that outdoor air was a major contributor to what was measured indoors. In addition, during sampling efforts, it was noted that various potential indoor air emission sources were present within the buildings, including dry cleaning materials, various degreasers, chlorinated water, disinfectants, deodorants, and vehicle tailpipe emissions.

Attenuation factors for analytes that exceeded EPA screening levels were calculated and consistently in the range of 1E-04 to 1E-03. Therefore, a building-specific attenuation factor of 1E-03 was selected as a reasonable, conservative estimate. Indoor air concentration due to VI is expected to be 1,000 times less than the soil gas concentration. The potential for future VI was evaluated by estimating potential indoor air impacts based on the maximum sub-slab soil gas and the building-specific attenuation factor. If the predicted concentration was less than the indoor air screening level, VI was considered to be insignificant.

As a result, the amount of PCE, chloroform, and benzene estimated to be present in indoor air due to VI was less than the applicable EPA screening levels. Therefore, current VI was deemed not to be significant for each of these analytes and there was no evidence that subsurface contamination adversely affected the air quality within the building.

Soil gas data was used to make a conservative estimate of potential future VI impacts and in all cases, estimated concentration were below applicable EPA screening levels. Therefore, future VI is not expected to result in any adverse indoor air quality impacts and is deemed to not be significant. No further sampling or other actions were recommended.

The Building 1078 VI Pilot Study concluded that no further sampling or other actions were recommended since the measured values in both indoor air and sub-slab soil gas were sufficiently low that further rounds of sampling were very unlikely to result in different outcomes in terms of VI decision making. Although different screening levels were used for the pilot investigation, the conclusions of both investigations yielded similar results. EPA Method TO-15 was used for both investigations and other similarities between the two investigations included the number of samples collected and the target analytes evaluated. As discussed in the most recent evaluation, PCE, chloroform, and benzene were detected in the 2016 Zone 1 VI evaluation at concentrations that were below screening levels. Only benzene was detected in both sub-slab soil gas and indoor air. PCE and chloroform were both detected only in sub-slab soil gas. There are no identified AOlS for Building 1078 based on the Zone 1 VI evaluation.

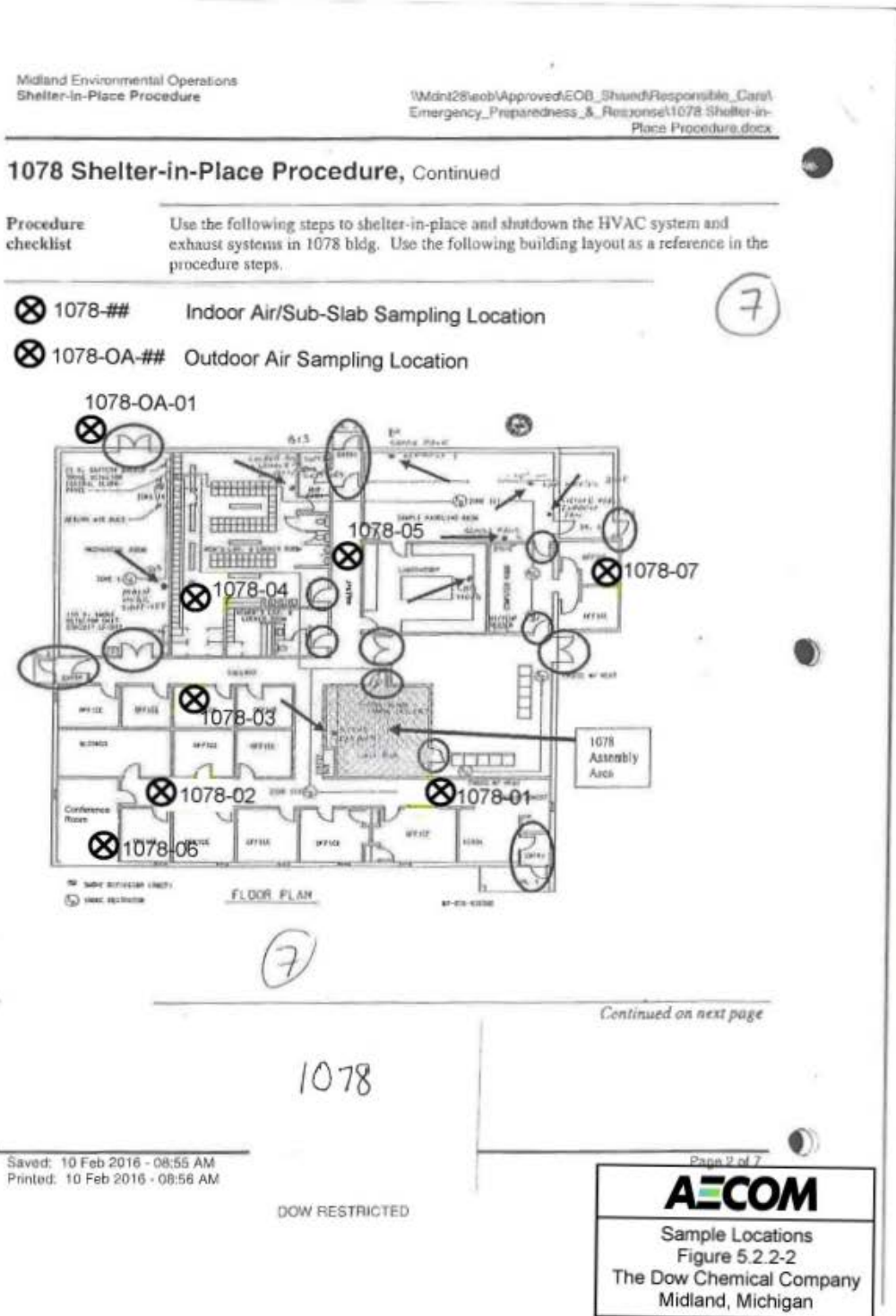
## **CONCLUSIONS AND RECOMMENDATIONS**

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to occupants of the building. Based on the sampling results, the VI pathway at Building 1078 is an insignificant exposure pathway based on current use. Building 1078 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.2.2-1. Building 1078 Location**



**Figure 5.2.2-2. Building 1078 Sample Locations**



**Table 5.2.2-1. Building 1078 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1078	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	7	0%	-	-	-	-	4.1	8.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1078	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	7	0%	-	-	-	-	5.2	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	1078	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	7	0%	-	-	-	-	4.1	8.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	1078	SS	1,1-Dichloroethane	75-34-3	UG/M3	7	0%	-	-	-	-	3.1	6.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1078	SS	1,1-Dichloroethene	75-35-4	UG/M3	7	0%	-	-	-	-	3	6.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1078	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	7	0%	-	-	-	-	22	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1078	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	7	0%	-	-	-	-	3.7	7.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1078	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	7	0%	-	-	-	-	5.8	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 1	1078	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	7	14%	3.23	1.56	6.2	6.2	4.6	9.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1078	SS	1,2-Dichloroethane	107-06-2	UG/M3	7	0%	-	-	-	-	3.1	6.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	1078	SS	1,2-Dichloropropane	78-87-5	UG/M3	7	14%	2.40	0.99	4.1	4.1	3.5	7.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1078	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	7	0%	-	-	-	-	3.7	7.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1078	SS	1,3-Butadiene	106-99-0	UG/M3	7	0%	-	-	-	-	1.7	3.4	No Screening Value Available	-	-	-
Category 1	1078	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	7	14%	3.01	1.12	4.7	4.7	4.6	9.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	1078	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	7	14%	6.91	11.09	32	32	4.6	9.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	1078	SS	1,4-Dioxane	123-91-1	UG/M3	7	14%	8.86	6.56	23	23	11	22	No Screening Value Available	-	-	-
Category 1	1078	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	7	0%	-	-	-	-	3.6	7.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1078	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	7	0%	-	-	-	-	9	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1078	SS	2-Hexanone	591-78-6	UG/M3	7	0%	-	-	-	-	12	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1078	SS	2-Propanol	67-63-0	UG/M3	7	0%	-	-	-	-	7.5	15	No Screening Value Available	-	-	-
Category 1	1078	SS	3-Chloropropene	107-05-1	UG/M3	7	0%	-	-	-	-	9.5	19	No Screening Value Available	-	-	-
Category 1	1078	SS	4-Ethyltoluene	622-96-8	UG/M3	7	0%	-	-	-	-	3.7	7.5	No Screening Value Available	-	-	-
Category 1	1078	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	7	0%	-	-	-	-	3.1	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1078	SS	Acetone	67-64-1	UG/M3	7	29%	14.1	6.7	18	26	18	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1078	SS	alpha-Chlorotoluene	100-44-7	UG/M3	7	0%	-	-	-	-	3.9	7.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	1078	SS	Benzene	71-43-2	UG/M3	7	14%	2.50	2.81	8.8	8.8	2.4	4.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	1078	SS	Bromochloromethane	74-97-5	UG/M3	7	0%	-	-	-	-	16	32	No Screening Value Available	-	-	-
Category 1	1078	SS	Bromodichloromethane	75-27-4	UG/M3	7	0%	-	-	-	-	5.1	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	1078	SS	Bromoform	75-25-2	UG/M3	7	0%	-	-	-	-	7.8	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1078	SS	Bromomethane	74-83-9	UG/M3	7	0%	-	-	-	-	30	59	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	1078	SS	Carbon Disulfide	75-15-0	UG/M3	7	0%	-	-	-	-	9.5	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1078	SS	Carbon Tetrachloride	56-23-5	UG/M3	7	0%	-	-	-	-	4.8	9.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	1078	SS	Chlorobenzene	108-90-7	UG/M3	7	14%	2.99	2.47	8.4	8.4	3.5	7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1078	SS	Chloroethane	75-00-3	UG/M3	7	0%	-	-	-	-	8	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	580000	0%	0%
Category 1	1078	SS	Chloroform	67-66-3	UG/M3	7	29%	4.84	5.52	5.4	17	3.7	7.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1078	SS	Chloromethane	74-87-3	UG/M3	7	0%	-	-	-	-	16	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1078	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	7	14%	2.24	1.26	4.8	4.8	3	6.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1078	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	7	0%	-	-	-	-	3.4	6.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1078	SS	Cumene	98-82-8	UG/M3	7	14%	3.14	2.50	8.6	8.6	3.7	7.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	1078	SS	Cyclohexane	110-82-7	UG/M3	7	0%	-	-	-	-	2.6	5.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1078	SS	Dibromochloromethane	124-48-1	UG/M3	7	0%	-	-	-	-	6.5	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	1078	SS	Dibromomethane	74-95-3	UG/M3	7	0%	-	-	-	-	22	44	No Screening Value Available	-	-	-
Category 1	1078	SS	Ethanol	64-17-5	UG/M3	7	86%	10.5	3.7	6.2	16	12	12	No Screening Value Available	-	-	-
Category 1	1078	SS	Ethylbenzene	100-41-4	UG/M3	7	57%	14.3	26.1	4.1	73	3.3	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1078	SS	CFC-11	75-69-4	UG/M3	7	0%	-	-	-	-	4.3	8.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 1	1078	SS	CFC-113	76-13-1	UG/M3	7	0%	-	-	-	-	5.8	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1078	SS	CFC-114	76-14-2	UG/M3	7	0%	-	-	-	-	5.3	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1078	SS	CFC-12	75-71-8	UG/M3	7	100%	310	746	4.4	2000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	1078	SS	Heptane	142-82-5	UG/M3	7	29%	2.76	1.67	3.9	5.9	3.1	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1078	SS	Hexachlorobutadiene	87-68-3	UG/M3	7	0%	-	-	-	-	32	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	1078	SS	Hexane	110-54-3	UG/M3	7	14%	1.77	0.67	2.8	2.8	2.7	5.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1078	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	7	43%	11.1	15.9	3.4	42	3.3	6.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1078	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	7	0%	-	-	-	-	11	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1078	SS	Methylene Chloride	75-09-2	UG/M3	7	0%	-	-	-	-	26	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1078	SS	Naphthalene	91-20-3	UG/M3	7	0%	-	-	-	-	8	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	1078	SS	o-Xylene	95-47-6	UG/M3	7	43%	6.39	7.42	3.4	21	3.3	6.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1078	SS	Propylbenzene	103-65-1	UG/M3	7	0%	-	-	-	-	3.7	7.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%



**Table 5.2.2-1. Building 1078 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1078	SS	Styrene	100-42-5	UG/M3	7	14%	4.94	7.98	23	23	3.2	6.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1078	SS	Tetrachloroethene	127-18-4	UG/M3	7	86%	31.7	20.2	14	56	5.2	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1078	SS	Tetrahydrofuran	109-99-9	UG/M3	7	0%	-	-	-	-	2.2	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1078	SS	Toluene	108-88-3	UG/M3	7	43%	4.38	4.05	3.6	12	2.9	5.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1078	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	7	0%	-	-	-	-	6.8	13.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1078	SS	Total Xylenes	1330-20-7	UG/M3	7	43%	17.5	23.3	6.8	63	6.6	13.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1078	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	7	0%	-	-	-	-	3	6.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1078	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	7	0%	-	-	-	-	3.4	6.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1078	SS	Trichloroethene	79-01-6	UG/M3	7	29%	3.59	1.96	6.1	6.4	4.1	8.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	1078	SS	Vinyl Chloride	75-01-4	UG/M3	7	0%	-	-	-	-	1.9	3.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.2.2-2. Building 1078 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1078	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	7	0%	-	-	-	-	3.8	4.7	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1078	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	7	0%	-	-	-	-	4.8	5.9	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	1078	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	7	0%	-	-	-	-	3.8	4.7	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	1078	IA	1,1-Dichloroethane	75-34-3	UG/M3	7	0%	-	-	-	-	2.8	3.5	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1078	IA	1,1-Dichloroethene	75-35-4	UG/M3	7	0%	-	-	-	-	2.8	3.4	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1078	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	7	0%	-	-	-	-	21	26	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	1078	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	7	0%	-	-	-	-	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1078	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	7	0%	-	-	-	-	5.4	6.6	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1078	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	7	0%	-	-	-	-	4.2	5.2	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1078	IA	1,2-Dichloroethane	107-06-2	UG/M3	7	0%	-	-	-	-	2.8	3.5	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	1078	IA	1,2-Dichloropropane	78-87-5	UG/M3	7	0%	-	-	-	-	3.2	4	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1078	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	7	0%	-	-	-	-	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1078	IA	1,3-Butadiene	106-99-0	UG/M3	7	0%	-	-	-	-	1.6	1.9	No Screening Value Available	-	-	-
Category 1	1078	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	7	0%	-	-	-	-	4.2	5.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1078	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	7	0%	-	-	-	-	4.2	5.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1078	IA	1,4-Dioxane	123-91-1	UG/M3	7	0%	-	-	-	-	10	12	No Screening Value Available	-	-	-
Category 1	1078	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	7	100%	9.30	2.57	7.7	15	-	-	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1078	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	7	0%	-	-	-	-	8.3	10	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1078	IA	2-Hexanone	591-78-6	UG/M3	7	0%	-	-	-	-	12	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1078	IA	2-Propanol	67-63-0	UG/M3	7	0%	-	-	-	-	6.9	8.4	No Screening Value Available	-	-	-
Category 1	1078	IA	3-Chloropropene	107-05-1	UG/M3	7	0%	-	-	-	-	8.8	11	No Screening Value Available	-	-	-
Category 1	1078	IA	4-Ethyltoluene	622-96-8	UG/M3	7	0%	-	-	-	-	3.5	4.2	No Screening Value Available	-	-	-
Category 1	1078	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	7	0%	-	-	-	-	2.9	3.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1078	IA	Acetone	67-64-1	UG/M3	7	14%	11.9	5.8	25	25	17	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1078	IA	alpha-Chlorotoluene	100-44-7	UG/M3	7	0%	-	-	-	-	3.6	4.4	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	1078	IA	Benzene	71-43-2	UG/M3	7	14%	1.55	0.60	2.9	2.9	2.6	2.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1078	IA	Bromochloromethane	74-97-5	UG/M3	7	0%	-	-	-	-	15	18	No Screening Value Available	-	-	-
Category 1	1078	IA	Bromodichloromethane	75-27-4	UG/M3	7	0%	-	-	-	-	4.7	5.8	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	1078	IA	Bromoform	75-25-2	UG/M3	7	0%	-	-	-	-	7.3	8.9	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1078	IA	Bromomethane	74-83-9	UG/M3	7	0%	-	-	-	-	27	33	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	1078	IA	Carbon Disulfide	75-15-0	UG/M3	7	0%	-	-	-	-	8.8	11	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1078	IA	Carbon Tetrachloride	56-23-5	UG/M3	7	0%	-	-	-	-	4.4	5.4	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1078	IA	Chlorobenzene	108-90-7	UG/M3	7	14%	2.12	0.57	3.4	3.4	3.7	4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1078	IA	Chloroethane	75-00-3	UG/M3	7	0%	-	-	-	-	7.4	9.1	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1078	IA	Chloroform	67-66-3	UG/M3	7	0%	-	-	-	-	3.4	4.2	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1078	IA	Chloromethane	74-87-3	UG/M3	7	0%	-	-	-	-	14	18	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1078	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	7	0%	-	-	-	-	2.8	3.4	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1078	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	7	0%	-	-	-	-	3.2	3.9	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1078	IA	Cumene	98-82-8	UG/M3	7	0%	-	-	-	-	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1078	IA	Cyclohexane	110-82-7	UG/M3	7	0%	-	-	-	-	2.4	3	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1078	IA	Dibromochloromethane	124-48-1	UG/M3	7	0%	-	-	-	-	6	7.3	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	1078	IA	Dibromomethane	74-95-3	UG/M3	7	0%	-	-	-	-	20	24	No Screening Value Available	-	-	-
Category 1	1078	IA	Ethanol	64-17-5	UG/M3	7	100%	9.66	1.45	8	12	-	-	No Screening Value Available	-	-	-
Category 1	1078	IA	Ethylbenzene	100-41-4	UG/M3	7	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1078	IA	CFC-11	75-69-4	UG/M3	7	0%	-	-	-	-	4	4.8	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1078	IA	CFC-113	76-13-1	UG/M3	7	0%	-	-	-	-	5.4	6.6	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1078	IA	CFC-114	76-14-2	UG/M3	7	0%	-	-	-	-	4.9	6	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1078	IA	CFC-12	75-71-8	UG/M3	7	14%	2.29	0.80	4.1	4.1	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1078	IA	Heptane	142-82-5	UG/M3	7	0%	-	-	-	-	2.9	3.5	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1078	IA	Hexachlorobutadiene	87-68-3	UG/M3	7	0%	-	-	-	-	30	37	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1078	IA	Hexane	110-54-3	UG/M3	7	0%	-	-	-	-	2.5	3	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1078	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	7	29%	2.27	0.83	3.1	3.8	3.5	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1078	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	7	0%	-	-	-	-	10	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1078	IA	Methylene Chloride	75-09-2	UG/M3	7	0%	-	-	-	-	24	30	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1078	IA	Naphthalene	91-20-3	UG/M3	7	0%	-	-	-	-	7.4	9	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	1078	IA	o-Xylene	95-47-6	UG/M3	7	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1078	IA	Propylbenzene	103-65-1	UG/M3	7	0%	-	-	-	-	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.2.2-2. Building 1078 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1078	IA	Styrene	100-42-5	UG/M3	7	0%	-	-	-	-	3	3.7	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	1078	IA	Tetrachloroethene	127-18-4	UG/M3	7	0%	-	-	-	-	4.8	5.8	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1078	IA	Tetrahydrofuran	109-99-9	UG/M3	7	0%	-	-	-	-	2.1	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1078	IA	Toluene	108-88-3	UG/M3	7	100%	5.44	0.91	4.6	7.3	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1078	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	7	0%	-	-	-	-	6.4	7.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1078	IA	Total Xylenes	1330-20-7	UG/M3	7	29%	4.04	0.80	4.65	5.6	7	7.4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1078	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	7	0%	-	-	-	-	2.8	3.4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1078	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	7	0%	-	-	-	-	3.2	3.9	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1078	IA	Trichloroethene	79-01-6	UG/M3	7	0%	-	-	-	-	3.8	4.6	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1078	IA	Vinyl Chloride	75-01-4	UG/M3	7	0%	-	-	-	-	1.8	2.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1078	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	5.1	5.1	-	-	-	-
Category 1	1078	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 1	1078	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	5.1	5.1	-	-	-	-
Category 1	1078	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1078	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 1	1078	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	28	28	-	-	-	-
Category 1	1078	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1078	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	7.1	7.1	-	-	-	-
Category 1	1078	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 1	1078	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1078	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 1	1078	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1078	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 1	1078	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 1	1078	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 1	1078	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	13	13	-	-	-	-
Category 1	1078	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 1	1078	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 1	1078	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 1	1078	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	9.1	9.1	-	-	-	-
Category 1	1078	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 1	1078	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1078	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1078	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	22	22	-	-	-	-
Category 1	1078	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 1	1078	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	1078	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 1	1078	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 1	1078	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	9.6	9.6	-	-	-	-
Category 1	1078	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	36	36	-	-	-	-
Category 1	1078	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 1	1078	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	5.8	5.8	-	-	-	-
Category 1	1078	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 1	1078	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	9.8	9.8	-	-	-	-
Category 1	1078	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	4.5	4.5	-	-	-	-
Category 1	1078	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	19	19	-	-	-	-
Category 1	1078	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 1	1078	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	1078	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1078	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1078	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	7.9	7.9	-	-	-	-
Category 1	1078	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	20	20	-	-	-	-
Category 1	1078	OA	Ethanol	64-17-5	UG/M3	1	100%	12.0	-	12	12	-	-	-	-	-	-
Category 1	1078	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	1078	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	5.2	5.2	-	-	-	-
Category 1	1078	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	7.1	7.1	-	-	-	-
Category 1	1078	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	6.5	6.5	-	-	-	-

**Table 5.2.2-2. Building 1078 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1078	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1078	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1078	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	40	40	-	-	-	-
Category 1	1078	OA	Hexane	110-54-3	UG/M3	1	100%	3.40	-	3.4	3.4	-	-	-	-	-	-
Category 1	1078	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	1078	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	13	13	-	-	-	-
Category 1	1078	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	32	32	-	-	-	-
Category 1	1078	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	9.7	9.7	-	-	-	-
Category 1	1078	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	1078	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1078	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	1078	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	6.3	6.3	-	-	-	-
Category 1	1078	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 1	1078	OA	Toluene	108-88-3	UG/M3	1	100%	7.60	-	7.6	7.6	-	-	-	-	-	-
Category 1	1078	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	8.4	8.4	-	-	-	-
Category 1	1078	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	8	8	-	-	-	-
Category 1	1078	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 1	1078	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	1078	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 1	1078	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-

## 5.2.3 Vapor Intrusion Evaluation for Building 1100

### BACKGROUND

Building 1100 is a Category 1 building in Zone 1. It is a large building that includes a large garage for housing emergency vehicles, office space, and locker rooms. It is known as the Security and Emergency Services building (see Figure 5.2.3-1). The building is located to the northwest of the Waste Water Treatment Plant (WWTP) within the southern portion of the facility designated as Zone 1. The large building is single storied and is approximately 27,460 ft<sup>2</sup> (2,550 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 28, 2016 and the results can be found in Appendix C. The building has two HVAC units. One is located outside of Door #5 and the second is dedicated to the Dispatch area of the building and is located outside of Door #3. There are four bay doors that are left open in good weather and closed when it is cold. The land surrounding the building is covered in a mix of asphalt and concrete.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey and a wide variety of chemicals were found to be stored in the building. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

Sub-slab soil gas samples were collected on November 9 and 10, 2016 from 10 locations within the building. Indoor air samples were collected on November 11, 2016 at 10 locations, corresponding to the soil gas sample locations, along with two outdoor air samples from the main air intakes. The sampling locations are shown on Figure 5.2.3-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1100 are presented on Table 5.2.3-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.3-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 44 of the 65 target analytes were ND in the 10 samples collected at Building 1100. All of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, the 44 ND analytes were eliminated from further VI evaluation. A total of 21 VOCs were detected in one or more of the 10 sub-slab soil gas samples. These analytes include but are not limited to chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and methyl ethyl ketone [MEK]). In terms of measured concentrations, the detected compounds were divided into two categories:

- Sixteen VOCs were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Five VOCs were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1100-1. Four of the five analytes detected at concentrations greater than *de minimus* levels were detected at a 100% frequency (acetone, CFC-12, heptane, and hexane). Tetrachloroethene (PCE) was detected in nine of the 10 samples. Only analytes present in the sub-slab soil gas at a concentration above the non-residential screening levels are identified as AOIs for VI. Since there are no analytes detected at concentrations greater than sub-slab soil gas screening levels, there are no sub-slab soil gas AOIs identified at Building 1100.

**Table 1100-1. Summary of Sub-Slab Soil Gas Detects for Building 1100**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
Acetone	100%	31 - 160	0%	3400000
CFC 12	100%	4.5 - 1000	0%	29000000
Heptane	100%	5.4 - 110	0%	2000000
Hexane	100%	4.8 - 150	0%	410000
Tetrachloroethene	90%	14 - 180	0%	23000
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	10%	12	0%	3500000
1,2,4-Trimethylbenzene	30%	6.2 - 8.9	0%	130000
1,2-Dichlorobenzene	10%	19	0%	180000
1,3,5-Trimethylbenzene	10%	5.8	0%	130000
1,4-Dichlorobenzene	10%	12	0%	2600
2-Butanone (Methyl Ethyl Ketone)	30%	10 - 21	0%	2900000
2-Propanol	50%	10 - 47	N/A	N/A
4-Ethyltoluene	10%	6.6	N/A	N/A
Benzene	70%	2.5 - 18	0%	2200
Carbon Tetrachloride	30%	12 - 21	0%	3000
Cyclohexane	90%	3.2 - 54	0%	3500000
Ethanol	80%	8 - 66	N/A	N/A
Ethylbenzene	50%	4.2 - 19	0%	59000
Naphthalene	10%	34	0%	1500
Toluene	100%	6.2 - 81	0%	2900000
Total Xylenes	60%	5.55 - 45	0%	58000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, 10 indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 VOCs. Additionally, two outdoor air samples were collected immediately upwind of the building. Table 1100-2 below shows the analytes detected in each of the three media sampled.

**Table 1100-2. Detections Matrix**

Compound	Sub-Slab	Indoor Air	Outdoor Air
PCE	•	•	
<i>Toluene</i>	•	•	
Heptane	•	•	
<i>Cyclohexane</i>	•	•	
<i>Ethanol</i>	•	•	
<i>2-Propanol</i>	•	•	
Acetone	•	•	
CFC 12	•	•	
<i>1,1,1-Trichloroethane</i>	•		
<i>Carbon Tetrachloride</i>	•		
<i>1,2-Dichlorobenzene</i>	•		
<i>1,4-Dichlorobenzene</i>	•		
<i>Benzene</i>	•		
<i>Ethylbenzene</i>	•		
<i>Total Xylenes</i>	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>4-Ethyltoluene</i>	•		
Hexane	•		
<i>2-Butanone</i>	•		
<i>Naphthalene</i>	•		

• = Detect

= Non-detect

*Italics = de minimus detect(s) in sub-slab soil gas*

Fifty-seven of the 65 indoor air analytes were ND in each of the samples. Seven of these ND indoor air analytes had at least one ND reporting limit above the respective indoor air screening level. None of these analytes were detected in sub-slab soil gas and all sub-slab soil gas sample reporting limits met the sub-slab soil gas screening levels. Therefore, these seven ND indoor air analytes with reporting limit exceedances were eliminated from further evaluation. Those 50 ND analytes with reporting limits that met the respective indoor air screening levels were eliminated from further VI evaluation. The eight VOCs detected in indoor air were 2-propanol, acetone, cyclohexane, ethanol, CFC 12, heptane, PCE, and toluene. None of the detected results in indoor air exceed applicable screening levels and were eliminated from further evaluation (ethanol and 2-propanol do not have screening levels available). All results for the two outdoor air samples collected were ND.

Table 1100-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1100-3. Vapor Intrusion Evaluation for Building 1100**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
Acetone	40%	19 - 28	26000	<18 - <19
CFC 12	80%	3.6 - 5.9	220000	<3.8 - <4
Heptane	20%	6.4 - 10	15000	<3.2 - <3.3
Hexane	0%	<2.6 - <3	3100	<2.7 - <2.8
Tetrachloroethene	10%	26	180	<5.2 - <5.5
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	0%	<4 - <4.6	26000	<4.2 - <4.4
1,2,4-Trimethylbenzene	0%	<3.6 - <4.2	960	<3.8 - <4
1,2-Dichlorobenzene	0%	<4.4 - <5.1	1300	<4.6 - <4.8
1,3,5-Trimethylbenzene	0%	<3.6 - <4.2	960	<3.8 - <4
1,4-Dichlorobenzene	0%	<4.4 - <5.1	20	<4.6 - <4.8
2-Butanone (Methyl Ethyl Ketone)	0%	<8.6 - <10	22000	<9.1 - <9.5
2-Propanol	30%	9.4 - 25	N/A	<7.6 - <7.9
4-Ethyltoluene	0%	<3.6 - <4.2	N/A	<3.8 - <4
Benzene	0%	<2.3 - <2.7	16	<2.5 - <2.6
Carbon Tetrachloride	0%	<4.6 - <5.3	23	<4.9 - <5.1
Cyclohexane	20%	2.9 - 8.4	26000	<2.7 - <2.8
Ethanol	100%	13 - 28	N/A	<5.8 - <6.1
Ethylbenzene	0%	<3.1 - <3.7	440	<3.4 - <3.5
Naphthalene	0%	<7.6 - <8.9	11	<8.1 - <8.4
Toluene	50%	4.5 - 37	22000	<2.9 - <3
Total Xylenes	0%	<6.2 - <7.4	440	<6.8 - <7

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

Where screening levels were available, the detected results of the indoor air analytes were orders of magnitude below the applicable screening levels. Ethanol and 2-propanol were detected below *de minimus* levels in sub-slab soil gas and at very low concentrations indoors. The fact that ethanol was detected in 100% of the indoor air samples (the only constituent detected indoors at 100% frequency) is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Purex, Scrubbing Bubbles, multiple disinfectants, etc.

The results of the outdoor air samples collected indicated that all analytes were ND in outdoor air. Therefore, the eight analytes detected in indoor air (PCE, toluene, heptane, cyclohexane, acetone, ethanol, CFC 12, and 2-propanol) do not appear to be present due to migration from outdoor air.

While all eight of the analytes detected in indoor air were also detected in sub-slab soil gas, none of the detections in either media exceeded screening levels. Ethanol, cyclohexane, 2-propanol and toluene were detected in sub-slab soil gas below *de minimus* levels and detected in indoor air well below screening levels where available. While acetone, CFC 12, heptane, cyclohexane, and PCE were detected in soil gas at concentrations greater than *de minimus* but less than screening levels, all of the detected results ranged from one order of magnitude to several orders of magnitude below their

respective screening levels. Therefore, the VI pathway at Building 1100 is considered insignificant at this time.

## **CONCLUSIONS AND RECOMMENDATIONS**

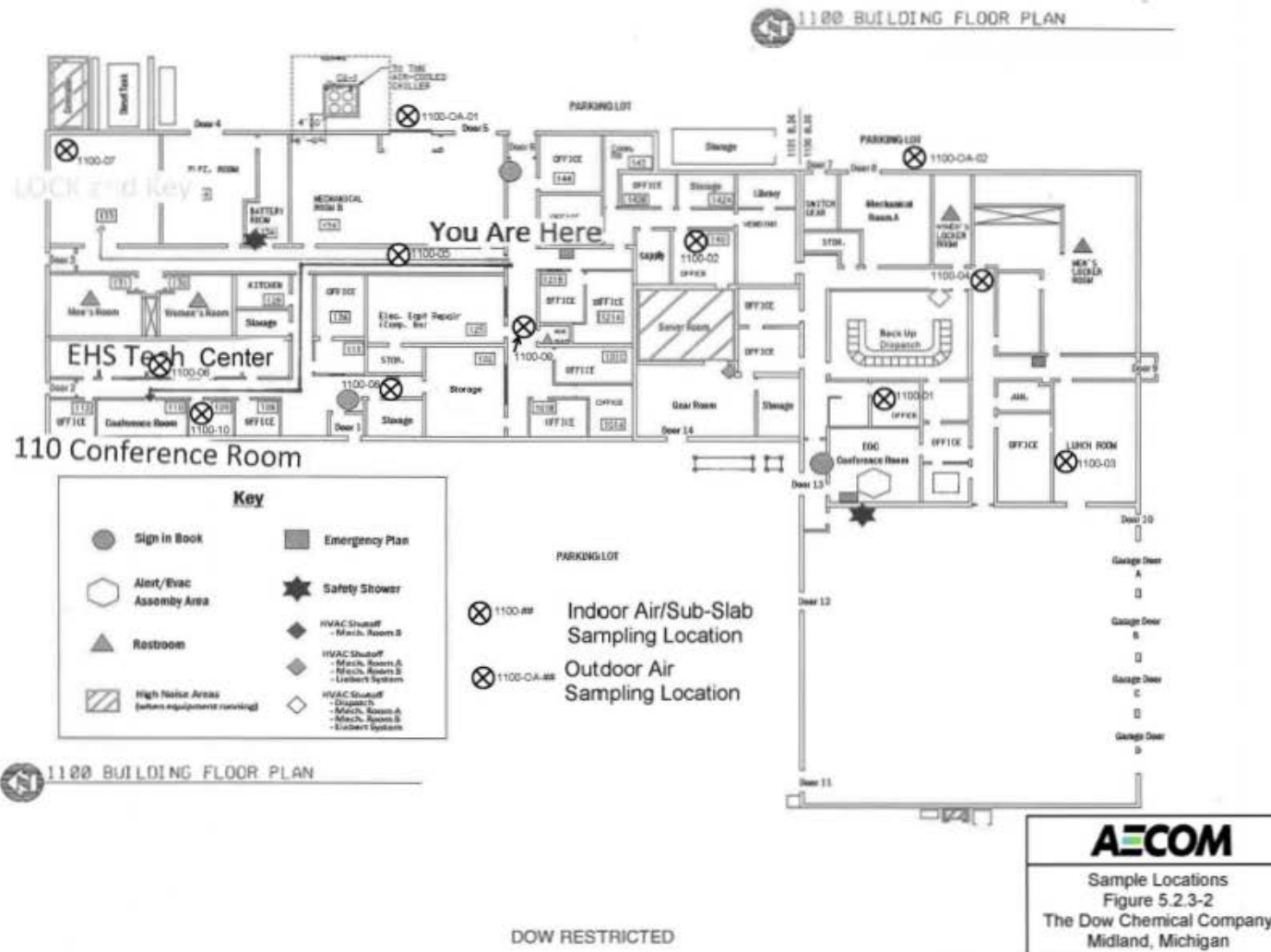
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1100 is an insignificant exposure pathway based on current use. Building 1100 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.



**Figure 5.2.3-1. Building 1100 Location**



**Figure 5.2.3-2. Building 1100 Sample Locations**



**Table 5.2.3-1. Building 1100 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1100	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	10	10%	3.24	3.08	12	12	4.1	5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1100	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	10	0%	-	-	-	-	5.1	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	1100	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	10	0%	-	-	-	-	4.1	5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	1100	SS	1,1-Dichloroethane	75-34-3	UG/M3	10	0%	-	-	-	-	3	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1100	SS	1,1-Dichloroethene	75-35-4	UG/M3	10	0%	-	-	-	-	3	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1100	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	10	0%	-	-	-	-	22	27	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1100	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	10	30%	3.66	2.67	6.2	8.9	3.7	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1100	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	10	0%	-	-	-	-	5.7	7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 1	1100	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	10	10%	4.15	5.22	19	19	4.5	5.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1100	SS	1,2-Dichloroethane	107-06-2	UG/M3	10	0%	-	-	-	-	3	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	1100	SS	1,2-Dichloropropane	78-87-5	UG/M3	10	0%	-	-	-	-	3.4	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1100	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	10	10%	2.41	1.20	5.8	5.8	3.7	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1100	SS	1,3-Butadiene	106-99-0	UG/M3	10	0%	-	-	-	-	1.6	2	No Screening Value Available	-	-	-
Category 1	1100	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	10	0%	-	-	-	-	4.5	5.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	1100	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	10	10%	3.45	3.01	12	12	4.5	5.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	1100	SS	1,4-Dioxane	123-91-1	UG/M3	10	0%	-	-	-	-	11	13	No Screening Value Available	-	-	-
Category 1	1100	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	10	0%	-	-	-	-	3.5	4.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1100	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	10	30%	8.03	5.88	10	21	8.8	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1100	SS	2-Hexanone	591-78-6	UG/M3	10	0%	-	-	-	-	12	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1100	SS	2-Propanol	67-63-0	UG/M3	10	50%	13.5	14.3	10	47	7.5	8.8	No Screening Value Available	-	-	-
Category 1	1100	SS	3-Chloropropene	107-05-1	UG/M3	10	0%	-	-	-	-	9.3	11	No Screening Value Available	-	-	-
Category 1	1100	SS	4-Ethyltoluene	622-96-8	UG/M3	10	10%	2.49	1.45	6.6	6.6	3.7	4.5	No Screening Value Available	-	-	-
Category 1	1100	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	10	0%	-	-	-	-	3	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1100	SS	Acetone	67-64-1	UG/M3	10	100%	71.9	40.6	31	160	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1100	SS	alpha-Chlorotoluene	100-44-7	UG/M3	10	0%	-	-	-	-	3.8	4.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	1100	SS	Benzene	71-43-2	UG/M3	10	70%	4.83	5.13	2.5	18	2.6	2.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	1100	SS	Bromochloromethane	74-97-5	UG/M3	10	0%	-	-	-	-	16	19	No Screening Value Available	-	-	-
Category 1	1100	SS	Bromodichloromethane	75-27-4	UG/M3	10	0%	-	-	-	-	5	6.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	1100	SS	Bromoform	75-25-2	UG/M3	10	0%	-	-	-	-	7.7	9.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1100	SS	Bromomethane	74-83-9	UG/M3	10	0%	-	-	-	-	29	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	1100	SS	Carbon Disulfide	75-15-0	UG/M3	10	0%	-	-	-	-	9.3	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1100	SS	Carbon Tetrachloride	56-23-5	UG/M3	10	30%	6.84	7.11	12	21	4.7	5.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	1100	SS	Chlorobenzene	108-90-7	UG/M3	10	0%	-	-	-	-	3.4	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1100	SS	Chloroethane	75-00-3	UG/M3	10	0%	-	-	-	-	7.9	9.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	1100	SS	Chloroform	67-66-3	UG/M3	10	0%	-	-	-	-	3.6	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1100	SS	Chloromethane	74-87-3	UG/M3	10	0%	-	-	-	-	15	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1100	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	10	0%	-	-	-	-	3	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1100	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	10	0%	-	-	-	-	3.4	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1100	SS	Cumene	98-82-8	UG/M3	10	0%	-	-	-	-	3.7	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	1100	SS	Cyclohexane	110-82-7	UG/M3	10	90%	9.85	15.80	3.2	54	3	3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1100	SS	Dibromochloromethane	124-48-1	UG/M3	10	0%	-	-	-	-	6.3	7.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	1100	SS	Dibromomethane	74-95-3	UG/M3	10	0%	-	-	-	-	21	26	No Screening Value Available	-	-	-
Category 1	1100	SS	Ethanol	64-17-5	UG/M3	10	80%	22.5	20.0	8	66	5.7	6	No Screening Value Available	-	-	-
Category 1	1100	SS	Ethylbenzene	100-41-4	UG/M3	10	50%	5.94	5.88	4.2	19	3.3	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1100	SS	CFC-11	75-69-4	UG/M3	10	0%	-	-	-	-	4.2	5.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	1100	SS	CFC-113	76-13-1	UG/M3	10	0%	-	-	-	-	5.7	7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1100	SS	CFC-114	76-14-2	UG/M3	10	0%	-	-	-	-	5.2	6.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1100	SS	CFC-12	75-71-8	UG/M3	10	100%	409	312	4.5	1000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	1100	SS	Heptane	142-82-5	UG/M3	10	100%	20.8	31.8	5.4	110	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1100	SS	Hexachlorobutadiene	87-68-3	UG/M3	10	0%	-	-	-	-	32	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	1100	SS	Hexane	110-54-3	UG/M3	10	100%	25.9	44.1	4.8	150	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1100	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	10	60%	10.1	12.7	3.8	35	3.3	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1100	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	10	0%	-	-	-	-	11	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1100	SS	Methylene Chloride	75-09-2	UG/M3	10	0%	-	-	-	-	26	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1100	SS	Naphthalene	91-20-3	UG/M3	10	10%	7.33	9.38	34	34	7.8	9.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	1100	SS	o-Xylene	95-47-6	UG/M3	10	30%	3.98	3.87	5.1	12	3.2	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.3-1. Building 1100 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1100	SS	Propylbenzene	103-65-1	UG/M3	10	0%	-	-	-	-	3.7	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	1100	SS	Styrene	100-42-5	UG/M3	10	0%	-	-	-	-	3.2	3.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1100	SS	Tetrachloroethene	127-18-4	UG/M3	10	90%	95.0	66.6	14	180	5.2	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1100	SS	Tetrahydrofuran	109-99-9	UG/M3	10	0%	-	-	-	-	2.2	2.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1100	SS	Toluene	108-88-3	UG/M3	10	100%	26.3	22.2	6.2	81	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1100	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	10	0%	-	-	-	-	6.8	8.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1100	SS	Total Xylenes	1330-20-7	UG/M3	10	60%	14.1	16.5	5.55	45	6.6	8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1100	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	10	0%	-	-	-	-	3	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1100	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	10	0%	-	-	-	-	3.4	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1100	SS	Trichloroethene	79-01-6	UG/M3	10	0%	-	-	-	-	4	4.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	1100	SS	Vinyl Chloride	75-01-4	UG/M3	10	0%	-	-	-	-	1.9	2.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.2.3-2. Building 1100 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1100	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	10	0%	-	-	-	-	4	4.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1100	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	10	0%	-	-	-	-	5	5.8	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	1100	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	10	0%	-	-	-	-	4	4.6	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	1100	IA	1,1-Dichloroethane	75-34-3	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1100	IA	1,1-Dichloroethene	75-35-4	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1100	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	10	0%	-	-	-	-	22	25	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	1100	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1100	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	10	0%	-	-	-	-	5.6	6.5	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1100	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	10	0%	-	-	-	-	4.4	5.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1100	IA	1,2-Dichloroethane	107-06-2	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	1100	IA	1,2-Dichloropropane	78-87-5	UG/M3	10	0%	-	-	-	-	3.4	3.9	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1100	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1100	IA	1,3-Butadiene	106-99-0	UG/M3	10	0%	-	-	-	-	1.6	1.9	No Screening Value Available	-	-	-
Category 1	1100	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	10	0%	-	-	-	-	4.4	5.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1100	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	10	0%	-	-	-	-	4.4	5.1	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1100	IA	1,4-Dioxane	123-91-1	UG/M3	10	0%	-	-	-	-	10	12	No Screening Value Available	-	-	-
Category 1	1100	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	10	0%	-	-	-	-	3.4	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1100	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	10	0%	-	-	-	-	8.6	10	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1100	IA	2-Hexanone	591-78-6	UG/M3	10	0%	-	-	-	-	12	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1100	IA	2-Propanol	67-63-0	UG/M3	10	30%	8.36	8.19	9.4	25	7.2	8.4	No Screening Value Available	-	-	-
Category 1	1100	IA	3-Chloropropene	107-05-1	UG/M3	10	0%	-	-	-	-	9.1	11	No Screening Value Available	-	-	-
Category 1	1100	IA	4-Ethyltoluene	622-96-8	UG/M3	10	0%	-	-	-	-	3.6	4.2	No Screening Value Available	-	-	-
Category 1	1100	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	10	0%	-	-	-	-	3	3.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1100	IA	Acetone	67-64-1	UG/M3	10	40%	15.0	7.7	19	28	17	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1100	IA	alpha-Chlorotoluene	100-44-7	UG/M3	10	0%	-	-	-	-	3.8	4.4	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	1100	IA	Benzene	71-43-2	UG/M3	10	0%	-	-	-	-	2.3	2.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1100	IA	Bromochloromethane	74-97-5	UG/M3	10	0%	-	-	-	-	15	18	No Screening Value Available	-	-	-
Category 1	1100	IA	Bromodichloromethane	75-27-4	UG/M3	10	0%	-	-	-	-	4.8	5.7	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	1100	IA	Bromoform	75-25-2	UG/M3	10	0%	-	-	-	-	7.5	8.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1100	IA	Bromomethane	74-83-9	UG/M3	10	0%	-	-	-	-	28	33	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	1100	IA	Carbon Disulfide	75-15-0	UG/M3	10	0%	-	-	-	-	9	10	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1100	IA	Carbon Tetrachloride	56-23-5	UG/M3	10	0%	-	-	-	-	4.6	5.3	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1100	IA	Chlorobenzene	108-90-7	UG/M3	10	0%	-	-	-	-	3.3	3.9	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1100	IA	Chloroethane	75-00-3	UG/M3	10	0%	-	-	-	-	7.6	9	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1100	IA	Chloroform	67-66-3	UG/M3	10	0%	-	-	-	-	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1100	IA	Chloromethane	74-87-3	UG/M3	10	0%	-	-	-	-	15	18	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1100	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1100	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	10	0%	-	-	-	-	3.3	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1100	IA	Cumene	98-82-8	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1100	IA	Cyclohexane	110-82-7	UG/M3	10	20%	2.21	2.23	2.9	8.4	2.5	2.9	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1100	IA	Dibromochloromethane	124-48-1	UG/M3	10	0%	-	-	-	-	6.2	7.2	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	1100	IA	Dibromomethane	74-95-3	UG/M3	10	0%	-	-	-	-	21	24	No Screening Value Available	-	-	-
Category 1	1100	IA	Ethanol	64-17-5	UG/M3	10	100%	19.2	4.8	13	28	-	-	No Screening Value Available	-	-	-
Category 1	1100	IA	Ethylbenzene	100-41-4	UG/M3	10	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1100	IA	CFC-11	75-69-4	UG/M3	10	0%	-	-	-	-	4.1	4.8	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1100	IA	CFC-113	76-13-1	UG/M3	10	0%	-	-	-	-	5.6	6.5	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1100	IA	CFC-114	76-14-2	UG/M3	10	0%	-	-	-	-	5.1	5.9	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1100	IA	CFC-12	75-71-8	UG/M3	10	80%	4.06	1.32	3.6	5.9	4	4.2	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1100	IA	Heptane	142-82-5	UG/M3	10	20%	2.93	2.91	6.4	10	3	3.5	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1100	IA	Hexachlorobutadiene	87-68-3	UG/M3	10	0%	-	-	-	-	31	36	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1100	IA	Hexane	110-54-3	UG/M3	10	0%	-	-	-	-	2.6	3	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1100	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	10	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1100	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	10	0%	-	-	-	-	10	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1100	IA	Methylene Chloride	75-09-2	UG/M3	10	0%	-	-	-	-	25	30	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1100	IA	Naphthalene	91-20-3	UG/M3	10	0%	-	-	-	-	7.6	8.9	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	1100	IA	o-Xylene	95-47-6	UG/M3	10	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1100	IA	Propylbenzene	103-65-1	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.2.3-2. Building 1100 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1100	IA	Styrene	100-42-5	UG/M3	10	0%	-	-	-	-	3.1	3.6	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	1100	IA	Tetrachloroethene	127-18-4	UG/M3	10	10%	5.03	7.37	26	26	5	5.8	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1100	IA	Tetrahydrofuran	109-99-9	UG/M3	10	0%	-	-	-	-	2.1	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1100	IA	Toluene	108-88-3	UG/M3	10	50%	8.58	11.70	4.5	37	3	3.2	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1100	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	10	0%	-	-	-	-	6.6	7.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1100	IA	Total Xylenes	1330-20-7	UG/M3	10	0%	-	-	-	-	6.2	7.4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1100	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1100	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	10	0%	-	-	-	-	3.3	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1100	IA	Trichloroethene	79-01-6	UG/M3	10	0%	-	-	-	-	3.9	4.6	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1100	IA	Vinyl Chloride	75-01-4	UG/M3	10	0%	-	-	-	-	1.8	2.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1100	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	4.2	4.4	-	-	-	-
Category 1	1100	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	5.3	5.5	-	-	-	-
Category 1	1100	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	4.2	4.4	-	-	-	-
Category 1	1100	OA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	3.1	3.2	-	-	-	-
Category 1	1100	OA	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	3.1	3.2	-	-	-	-
Category 1	1100	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	23	24	-	-	-	-
Category 1	1100	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
Category 1	1100	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	6	6.2	-	-	-	-
Category 1	1100	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	4.6	4.8	-	-	-	-
Category 1	1100	OA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	3.1	3.2	-	-	-	-
Category 1	1100	OA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	3.6	3.7	-	-	-	-
Category 1	1100	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
Category 1	1100	OA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	1.7	1.8	-	-	-	-
Category 1	1100	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	4.6	4.8	-	-	-	-
Category 1	1100	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	4.6	4.8	-	-	-	-
Category 1	1100	OA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	11	12	-	-	-	-
Category 1	1100	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.6	3.8	-	-	-	-
Category 1	1100	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	9.1	9.5	-	-	-	-
Category 1	1100	OA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	13	13	-	-	-	-
Category 1	1100	OA	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	7.6	7.9	-	-	-	-
Category 1	1100	OA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	9.7	10	-	-	-	-
Category 1	1100	OA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
Category 1	1100	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	3.2	3.3	-	-	-	-
Category 1	1100	OA	Acetone	67-64-1	UG/M3	2	0%	-	-	-	-	18	19	-	-	-	-
Category 1	1100	OA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	4	4.2	-	-	-	-
Category 1	1100	OA	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	2.5	2.6	-	-	-	-
Category 1	1100	OA	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	16	17	-	-	-	-
Category 1	1100	OA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	5.2	5.4	-	-	-	-
Category 1	1100	OA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	8	8.3	-	-	-	-
Category 1	1100	OA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	30	31	-	-	-	-
Category 1	1100	OA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	9.6	10	-	-	-	-
Category 1	1100	OA	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	4.9	5.1	-	-	-	-
Category 1	1100	OA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	3.6	3.7	-	-	-	-
Category 1	1100	OA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	8.2	8.5	-	-	-	-
Category 1	1100	OA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	3.8	3.9	-	-	-	-
Category 1	1100	OA	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	16	17	-	-	-	-
Category 1	1100	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	3.1	3.2	-	-	-	-
Category 1	1100	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	3.5	3.6	-	-	-	-
Category 1	1100	OA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
Category 1	1100	OA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	2.7	2.8	-	-	-	-
Category 1	1100	OA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	6.6	6.8	-	-	-	-
Category 1	1100	OA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	22	23	-	-	-	-
Category 1	1100	OA	Ethanol	64-17-5	UG/M3	2	0%	-	-	-	-	5.8	6.1	-	-	-	-
Category 1	1100	OA	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-
Category 1	1100	OA	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	4.4	4.5	-	-	-	-
Category 1	1100	OA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	5.9	6.2	-	-	-	-
Category 1	1100	OA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	5.4	5.6	-	-	-	-

**Table 5.2.3-2. Building 1100 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1100	OA	CFC-12	75-71-8	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
Category 1	1100	OA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	3.2	3.3	-	-	-	-
Category 1	1100	OA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	33	34	-	-	-	-
Category 1	1100	OA	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	2.7	2.8	-	-	-	-
Category 1	1100	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-
Category 1	1100	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	11	12	-	-	-	-
Category 1	1100	OA	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	27	28	-	-	-	-
Category 1	1100	OA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	8.1	8.4	-	-	-	-
Category 1	1100	OA	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	3.4	3.5	-	-	-	-
Category 1	1100	OA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	3.8	4	-	-	-	-
Category 1	1100	OA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	3.3	3.4	-	-	-	-
Category 1	1100	OA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	5.2	5.5	-	-	-	-
Category 1	1100	OA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.3	2.4	-	-	-	-
Category 1	1100	OA	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	2.9	3	-	-	-	-
Category 1	1100	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	7	7.2	-	-	-	-
Category 1	1100	OA	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	6.8	7	-	-	-	-
Category 1	1100	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	3.1	3.2	-	-	-	-
Category 1	1100	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	3.5	3.6	-	-	-	-
Category 1	1100	OA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	4.2	4.3	-	-	-	-
Category 1	1100	OA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	2	2	-	-	-	-



## 5.2.4 Vapor Intrusion Evaluation for Building 1335

### BACKGROUND

Building 1335 is a Category 1 building in Zone 1. It is a small building that includes space utilized by security personnel and visitors checking into the facility. It is known as the 23 Gatehouse or Contractor Gate (see Figure 5.2.4-1) and is located within the southeast portion of the facility designated as Zone 1. The building is single story and is approximately 630 ft<sup>2</sup> (59 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 28, 2016 and the results can be found in Appendix C. Building 1335 contains desk space for security personnel and a small lobby. The building has central air conditioning and steam radiation for heat. The air conditioning air intake is at the back of the building. There is not a bay door or garage present. The land surrounding the building is covered in asphalt and concrete.

Drains and other openings were screened with a PID during the building survey and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey and only common household cleaning products were identified (disinfectant, glass cleaner, drain cleaner, cinnamon air freshener, etc.).

### DATA SUMMARY

On November 7, 2016, sub-slab soil gas samples were collected from two locations from within the building. Indoor air samples were collected on November 8, 2016 at two locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.2-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1335 are presented on Table 5.2.4-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.4-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 61 of the 65 target analytes were ND in each of the two sub-slab soil gas samples collected at Building 1335. Nine of the ND soil gas analytes had at least one ND reporting limit above the respective screening level and these ND reporting limit exceedances are discussed further in the VI evaluation below. The remaining 52 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation.

A total of four analytes were detected in one or both of the two sub-slab soil gas samples (CFC-12, PCE, trichloroethene [TCE], and hexachlorobutadiene [HCB]). In terms of measured concentrations, the detected compounds were divided into two categories:

- Three analytes were detected above *de minimus* levels (<100 µg/m<sup>3</sup>) but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above nonresidential screening levels.

The sub-slab soil gas results are summarized in Table 1335-1. Of the four analytes detected, only CFC-12 had a detection frequency of 100%. Only analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI. Therefore, the AOI in soil gas at Building 1335 is HCB.



**Table 1335-1. Summary of Sub-Slab Soil Gas Detects for Building 1335**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detects > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analyte of interest)</b>				
Hexachlorobutadiene (HCB)	50%	3,600	50%	830
<b>Above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	100%	18,000 - 300,000	0%	29,000,000
Tetrachloroethene (PCE)	50%	1,200	0%	23,000
Trichloroethene (TCE)	50%	170	0%	1,200

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, two indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1335-2 below shows the detections in each of the three media sampled.

**Table 1335-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
Hexachlorobutadiene (HCB)	X		
CFC 12	•	•	
Tetrachloroethene (PCE)	•		
Trichloroethene (TCE)	•		
Toluene		•	•
Ethanol		•	•
2-Propanol		•	•
Acetone		•	
Heptane			•
Cyclohexane			•

- = Detect
- = Non-detect
- X = Detect exceeds screening level

Sixty of the 65 indoor air analytes were ND in each of the samples. Forty-nine of these analytes had reporting limits that met the screening level and were eliminated from further evaluation. Eleven analytes had ND reporting limits that exceeded the screening level and are discussed further in the VI evaluation below. The five analytes detected in indoor air were 2-propanol, acetone, ethanol, CFC-12, and toluene. None of the detected concentrations in indoor air exceed screening levels (screening levels are not available for 2-propanol and ethanol). Five analytes were detected in the outdoor air sample (2-propanol, cyclohexane, ethanol, heptane, and toluene).

Table 1335-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1335-3. Vapor Intrusion Evaluation for Building 1335**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above screening levels (analyte of interest)</b>				
Hexachlorobutadiene (HCB)	0%	<35 - <68	6.2	<33
<b>Above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	100%	11 - 12	220,000	<3.8
Tetrachloroethene (PCE)	0%	<5.6 - <11	180	<5.2
Trichloroethene (TCE)	0%	<4.5 - <8.5	8.8	<4.1

< = Non-detect at the reporting limit provided

As shown in Table 1335-3, CFC-12 was the only analyte detected in both sub-slab soil gas and indoor air. It was detected at concentrations at least two orders of magnitude less than the screening level in both media and was eliminated from further evaluation.

A review of the indoor and outdoor air results indicates it is possible that outdoor air concentrations could be contributing to the presence of toluene and 2-propanol in indoor air. Additionally, these analytes are commonly found in household cleaning products such as those stored in Building 1335.

While ethanol does not have a screening level for indoor air, it was ND in both sub-slab soil gas samples and was eliminated from further VI evaluation. In indoor air, ethanol was detected in both samples and ranged from 680-1100  $\mu\text{g}/\text{m}^3$  and was detected at 20  $\mu\text{g}/\text{m}^3$  in outdoor air. Ethanol is not likely present indoors due to migration from outdoor air since the result of the outdoor air sample collected was significantly lower. The fact that indoor air has far more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Scrubbing Bubbles, toilet-bowl cleaner, disinfectants, etc.

There were 11 ND analytes in indoor air with reporting limits that exceeded the indoor air screening levels. Of those, HCB was detected in sub-slab soil gas and was already identified as an AOI. 1,1,2-Trichloroethane was eliminated from further VI evaluation since it was ND in sub-slab soil gas with reporting limits that met the sub-slab soil gas screening level. The remaining nine ND analytes with indoor air reporting limit exceedances were also ND in sub-slab soil gas with reporting limits that exceeded screening levels. Therefore, these nine ND analytes are discussed and evaluated in the section below.

## BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION

VI evaluations utilize attenuation factors, which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 1335-1, CFC-12 was the only analyte detected at a 100% detection frequency. The data for CFC-12 is provided in Table 1335-4. Attenuation factors based on both average and maximum concentrations are shown.

**Table 1335-4. VI Attenuation Factors for Building 1335**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )
		CFC-12
Indoor Air	1335-IA-01	12
	1335-IA-02	11
	Average	11.5
Sub-slab Soil Gas	1335-SS-01	300,000
	1335-SS-02	18,000
	Average	159,000
Attenuation Factors	Average	7.2E-05
	Maximum	4.0E-05

1. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

As expected and shown in Table 1335-4, the sub-slab soil gas data exhibited more spatial variability than the indoor air data. The sub-slab soil gas concentrations exhibit approximately one order of magnitude of spatial variability, whereas the indoor air data is very similar. The most conservative attenuation factor calculated for CFC-12 is based on the average value. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 1335 is 7.2E-05.

This building-specific attenuation factor is used to estimate indoor air concentrations where:

$$\text{Estimated Indoor air concentration} = (\text{sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 1335-5. Estimated Indoor Air Concentrations for Non-Detect Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas but RLs Exceed Screening Levels</b>					
1,1,2,2-Tetrachloroethane	<1,400	7.20E-05	0.10	2.4	No
1,2,4-Trichlorobenzene	<6,000	7.20E-05	0.43	18	No
1,2-Dibromoethane (EDB)	<1,500	7.20E-05	0.11	0.23	No
1,2-Dichloroethane	<810	7.20E-05	0.06	5.3	No
alpha-Chlorotoluene	<1,000	7.20E-05	0.07	2.8	No
Bromodichloromethane	<1,300	7.20E-05	0.09	7.6	No
Bromomethane	<7,800	7.20E-05	0.56	22	No
Dibromochloromethane	<1,700	7.20E-05	0.12	5.6	No
Naphthalene	<2,100	7.20E-05	0.15	11	No

As shown in Table 1335-5, estimated indoor air concentrations were compared to the applicable indoor air screening levels. Based on the maximum ND sub-slab soil gas reporting limits for the nine analytes, each had an estimated indoor air concentration well below relevant indoor air screening levels. However, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels

for EDB, further investigation will be conducted once the facility-wide priority buildings have been sampled and evaluated.

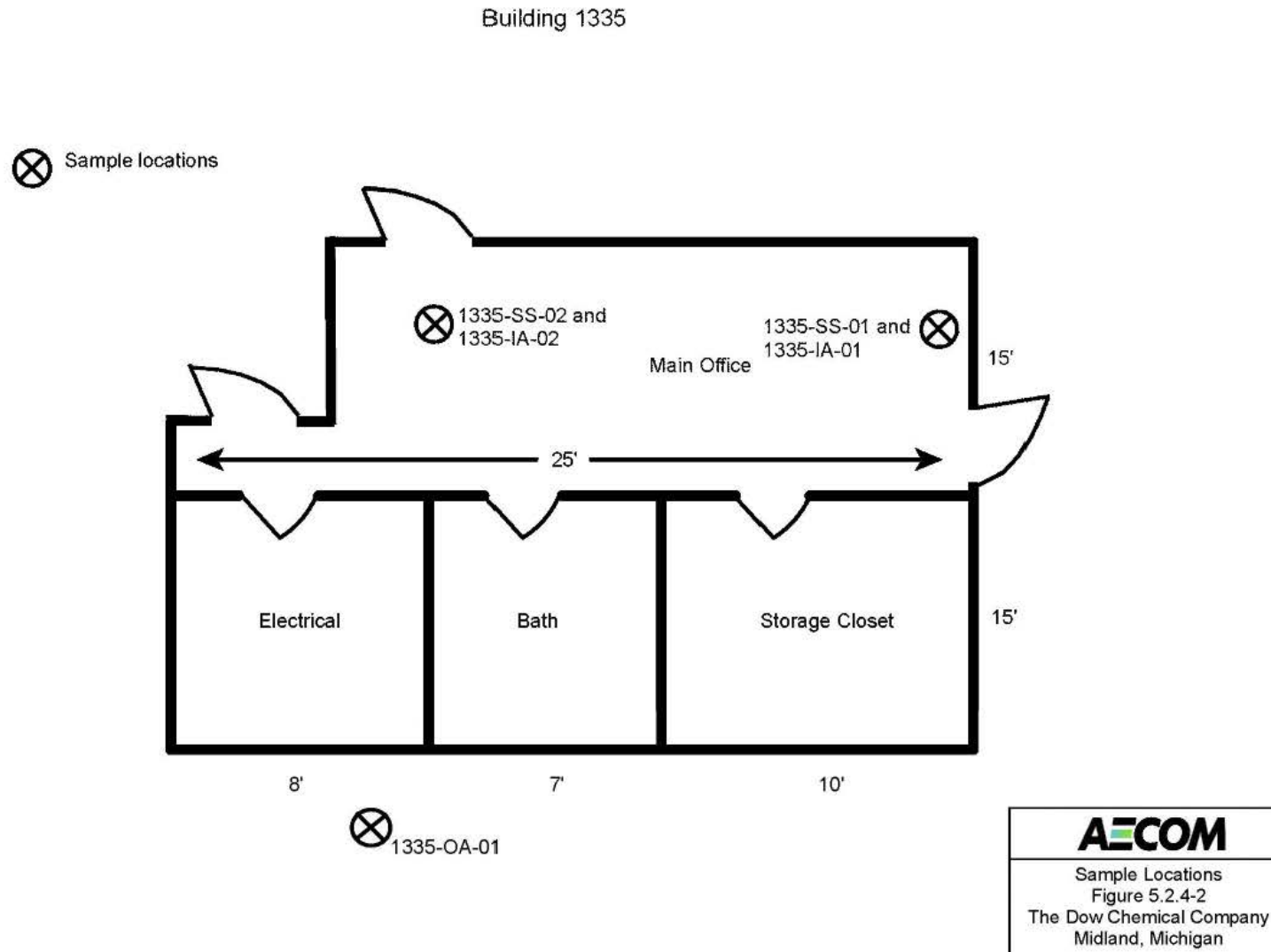
## **CONCLUSIONS AND RECOMMENDATIONS**

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 1335 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results for HCB and given the potential for future VI, Building 1335 was placed in VI Path Forward Building Group 2 (see Figure 5-3) and was resampled in August 2017. The second round of sampling is evaluated and discussed in Section 5.3.2. Additionally, HCB will be added to the Industrial Hygiene monitoring for the building.

**Figure 5.2.4-1. Building 1335 Location**



**Figure 5.2.4-2. Building 1335 Sample Locations**



**Table 5.2.4-1. Building 1335 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	86	1100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1335	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	110	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	50%
Category 1	1335	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	86	1100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	1335	SS	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	64	810	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1335	SS	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	62	800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1335	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	470	6000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 1	1335	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	77	980	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1335	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	120	1500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	100%
Category 1	1335	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	95	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1335	SS	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	64	810	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	50%
Category 1	1335	SS	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	73	930	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1335	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	77	980	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1335	SS	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	35	440	No Screening Value Available	-	-	-
Category 1	1335	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	95	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	1335	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	95	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	1335	SS	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	230	2900	No Screening Value Available	-	-	-
Category 1	1335	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	74	940	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1335	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	180	2400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1335	SS	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	260	3300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1335	SS	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	150	2000	No Screening Value Available	-	-	-
Category 1	1335	SS	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	200	2500	No Screening Value Available	-	-	-
Category 1	1335	SS	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	77	980	No Screening Value Available	-	-	-
Category 1	1335	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	64	820	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1335	SS	Acetone	67-64-1	UG/M3	2	0%	-	-	-	-	370	4800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1335	SS	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	82	1000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	50%
Category 1	1335	SS	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	50	640	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	1335	SS	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	330	4200	No Screening Value Available	-	-	-
Category 1	1335	SS	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	100	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	50%
Category 1	1335	SS	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	160	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1335	SS	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	610	7800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	50%
Category 1	1335	SS	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	200	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1335	SS	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	99	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	1335	SS	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	72	920	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1335	SS	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	170	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	1335	SS	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	77	980	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1335	SS	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	320	4100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1335	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	62	790	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1335	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	71	910	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1335	SS	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	77	980	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	1335	SS	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	54	690	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1335	SS	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	130	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	50%
Category 1	1335	SS	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	450	5700	No Screening Value Available	-	-	-
Category 1	1335	SS	Ethanol	64-17-5	UG/M3	2	0%	-	-	-	-	120	1500	No Screening Value Available	-	-	-
Category 1	1335	SS	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	68	870	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1335	SS	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	88	1100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 1	1335	SS	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	120	1500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
Category 1	1335	SS	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	110	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
Category 1	1335	SS	CFC-12	75-71-8	UG/M3	2	100%	159000	199404	18000	300000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1335	SS	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	64	820	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1335	SS	Hexachlorobutadiene	87-68-3	UG/M3	2	50%	3950	495	3600	3600	8600	8600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	50%	50%
Category 1	1335	SS	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	56	710	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1335	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	68	870	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1335	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	230	2900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1335	SS	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	550	7000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1335	SS	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	160	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	50%
Category 1	1335	SS	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	68	870	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.4-1. Building 1335 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	SS	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	77	980	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	1335	SS	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	67	850	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1335	SS	Tetrachloroethene	127-18-4	UG/M3	2	50%	950	354	1200	1200	1400	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1335	SS	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	46	590	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1335	SS	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	59	760	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1335	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	142	1820	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1335	SS	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	136	1740	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1335	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	62	790	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1335	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	71	910	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1335	SS	Trichloroethene	79-01-6	UG/M3	2	50%	360	269	170	170	1100	1100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	1335	SS	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	40	510	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.2.4-2. Building 1335 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	4.5	8.7	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1335	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	5.7	11	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	1335	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	4.5	8.7	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	50%
Category 1	1335	IA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	3.4	6.4	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1335	IA	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	3.3	6.3	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1335	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	25	47	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	1335	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	4.1	7.8	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1335	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	6.4	12	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1335	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	5	9.6	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1335	IA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	3.4	6.4	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	50%
Category 1	1335	IA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	3.8	7.3	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1335	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	4.1	7.8	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1335	IA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	1.8	3.5	No Screening Value Available	-	-	-
Category 1	1335	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	5	9.6	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1335	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	5	9.6	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1335	IA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	12	23	No Screening Value Available	-	-	-
Category 1	1335	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.9	7.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1335	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	9.8	19	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1335	IA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	14	26	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1335	IA	2-Propanol	67-63-0	UG/M3	2	100%	38.0	17.0	26	50	-	-	No Screening Value Available	-	-	-
Category 1	1335	IA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	10	20	No Screening Value Available	-	-	-
Category 1	1335	IA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	4.1	7.8	No Screening Value Available	-	-	-
Category 1	1335	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	3.4	6.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1335	IA	Acetone	67-64-1	UG/M3	2	100%	95.5	20.5	81	110	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1335	IA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	4.3	8.2	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	1335	IA	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	2.6	5.1	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1335	IA	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	18	34	No Screening Value Available	-	-	-
Category 1	1335	IA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	5.6	11	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	50%
Category 1	1335	IA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	8.6	16	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1335	IA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	32	62	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	1335	IA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	10	20	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1335	IA	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	5.2	10	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1335	IA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	3.8	7.3	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1335	IA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	8.8	17	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1335	IA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	4	7.8	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1335	IA	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	17	33	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1335	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	3.3	6.3	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1335	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	3.8	7.2	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1335	IA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	4.1	7.8	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1335	IA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	2.8	5.5	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1335	IA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	7.1	14	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	1335	IA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	24	45	No Screening Value Available	-	-	-
Category 1	1335	IA	Ethanol	64-17-5	UG/M3	2	100%	890	297	680	1100	-	-	No Screening Value Available	-	-	-
Category 1	1335	IA	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	3.6	6.9	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	4.7	8.9	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1335	IA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	6.4	12	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1335	IA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	5.8	11	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1335	IA	CFC-12	75-71-8	UG/M3	2	100%	11.5	0.7	11	12	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1335	IA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	3.4	6.5	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1335	IA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	35	68	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1335	IA	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	2.9	5.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1335	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	3.6	6.9	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	12	23	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1335	IA	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	29	55	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1335	IA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	8.7	17	Vapor Intrusion Indoor Air Screening Levels	11	0%	50%
Category 1	1335	IA	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	3.6	6.9	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	4.1	7.8	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.2.4-2. Building 1335 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	IA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	3.5	6.8	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	1335	IA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	5.6	11	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1335	IA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.4	4.7	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1335	IA	Toluene	108-88-3	UG/M3	2	50%	4.48	4.14	7.4	7.4	3.1	3.1	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1335	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	7.6	14.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1335	IA	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	7.2	13.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	3.3	6.3	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1335	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	3.8	7.2	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1335	IA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	4.5	8.5	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1335	IA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	2.1	4.1	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1335	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	1335	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5.2	5.2	-	-	-	-
Category 1	1335	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	1335	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1335	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	1335	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	23	23	-	-	-	-
Category 1	1335	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 1	1335	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1335	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1335	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	1335	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 1	1335	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1335	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	1335	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 1	1335	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	1335	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	9	9	-	-	-	-
Category 1	1335	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 1	1335	OA	2-Propanol	67-63-0	UG/M3	1	100%	23.0	-	23	23	-	-	-	-	-	-
Category 1	1335	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	9.6	9.6	-	-	-	-
Category 1	1335	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1335	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	18	18	-	-	-	-
Category 1	1335	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	1335	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1335	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 1	1335	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	5.1	5.1	-	-	-	-
Category 1	1335	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	7.9	7.9	-	-	-	-
Category 1	1335	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	30	30	-	-	-	-
Category 1	1335	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	9.5	9.5	-	-	-	-
Category 1	1335	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 1	1335	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	1335	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	8.1	8.1	-	-	-	-
Category 1	1335	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 1	1335	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 1	1335	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	1335	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	1335	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	Cyclohexane	110-82-7	UG/M3	1	100%	6.40	-	6.4	6.4	-	-	-	-	-	-
Category 1	1335	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.5	6.5	-	-	-	-
Category 1	1335	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	22	22	-	-	-	-
Category 1	1335	OA	Ethanol	64-17-5	UG/M3	1	100%	20.0	-	20	20	-	-	-	-	-	-
Category 1	1335	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	1335	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 1	1335	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 1	1335	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.3	5.3	-	-	-	-

**Table 5.2.4-2. Building 1335 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	Heptane	142-82-5	UG/M3	1	100%	10.0	-	10	10	-	-	-	-	-	-
Category 1	1335	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	33	33	-	-	-	-
Category 1	1335	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 1	1335	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	1335	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 1	1335	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	26	26	-	-	-	-
Category 1	1335	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	8	8	-	-	-	-
Category 1	1335	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	1335	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1335	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5.2	5.2	-	-	-	-
Category 1	1335	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 1	1335	OA	Toluene	108-88-3	UG/M3	1	100%	31.0	-	31	31	-	-	-	-	-	-
Category 1	1335	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	7	7	-	-	-	-
Category 1	1335	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	6.6	6.6	-	-	-	-
Category 1	1335	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	1335	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	1335	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 1	1335	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-

## 5.2.5 Vapor Intrusion Evaluation for Building 1358

### BACKGROUND

Building 1358 is a Category 1 building in Zone 1. It is a small metal frame building that includes limited office space. It is known as the EVO Maintenance building (see Figure 5.2.5-1) and is located within the southeast portion of the facility designated as Zone 1. The building is single story and is approximately 300 ft<sup>2</sup> (28 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 19, 2016 and the results can be found in Appendix C. Building 1358 contains one lunch room and two offices. The building has central air conditioning. There is not a bay door or garage present. The land surrounding the building is covered in asphalt, concrete, and grass.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey and only three products were identified (pipe wrap primer, starter fluid and cinnamon air freshener).

### DATA SUMMARY

Indoor air samples were collected on November 21, 2016 at two locations, along with a single outdoor air sample from the main air intake. On November 22, 2016, sub-slab soil gas samples were collected within the building from two locations that corresponded to the indoor air samples. The sampling locations are shown on Figure 5.2.5-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1358 are presented on Table 5.2.5-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.5-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 64 of the 65 target analytes were ND in each of the two samples collected at Building 1358. Eighteen of these ND soil gas analytes had at least one ND reporting limit above the respective screening level. These reporting limit exceedances are discussed further in the VI evaluation below. Those 46 ND analytes with reporting limits that met their respective screening levels were eliminated from further VI evaluation. One VOC, CFC-12, was detected in both sub-slab soil gas samples at concentrations less than the screening level.

The sub-slab soil gas results are summarized in Table 1358-1. Only the analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI. Therefore, since the detected results for CFC-12 were below the sub-slab soil gas screening level, there were no AOIs identified for Building 1358.

**Table 1358-1. Summary of Sub-Slab Soil Gas Detects for Building 1358**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	100%	540,000 - 700,000	0%	29,000,000

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, two indoor air samples were collected within a day of when the sub-slab soil gas samples. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1358-2 below shows the analytes detected in each of the three media sampled.

**Table 1358-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
CFC 12	•		
Ethanol		•	•
2-Propanol		•	

- = Detect
- = Non-detect

Sixty-three of the 65 indoor air analytes were ND in each of the two indoor air samples and eliminated from further evaluation. The two analytes detected in indoor air were ethanol and 2-propanol. Ethanol was the only analyte detected in outdoor air.

Table 1358-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides the analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1358-3. Vapor Intrusion Evaluation for Building 1358**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in Soil Gas Below Screening Levels</b>				
CFC-12	0%	<4.25 - <8	220,000	<1.95

< = Non-detect at the reporting limit provided

There are no available screening levels for the two analytes detected indoors (ethanol and 2-propanol). However, neither of these indoor air analytes was detected in sub-slab soil gas and each had reporting limits that met the soil gas screening levels. In addition, these two indoor air analytes are typically used in air freshener, which was listed in the chemical inventory completed during the building survey. Therefore, ethanol and 2-propanol were eliminated from further evaluation.

While CFC-12 was detected in sub-slab soil gas, neither of the results exceeded the soil gas screening level and it was not detected in indoor air. Therefore, it was not carried forward for further VI evaluation.

There were 14 ND indoor air analytes with reporting limits that exceeded the indoor air screening levels. While none of the 14 ND analytes were detected in sub-slab soil gas, each of them had at least one ND reporting limit in sub-slab soil gas that exceeded applicable screening levels. Therefore, these 14 indoor air ND analytes, as well as the additional 4 sub-slab soil gas ND analytes that had at least one ND reporting limit above the respective screening level (18 total), are further discussed and evaluated in the section below.

## BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION

VI evaluations utilize attenuation factors, which are the ratio of indoor air concentrations to shallow soil-gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 1358-1, CFC-12 was the only analyte detected at 100% frequency in sub-slab soil gas. The data for CFC-12 is provided in Table 1358-4. Attenuation factors based on both average and maximum concentrations are shown.

**Table 1358-4. VI Attenuation Factors for Building 1358**

Data Set	Sample ID	Measured Concentration ( $\mu\text{g}/\text{m}^3$ )
		CFC-12
Indoor Air	1358-IA-01	<8.5
	1358-IA-02	<16
	Average	<12.3
Sub-Slab Soil Gas	1358-SS-01	700,000
	1358-SS-02	540,000
	Average	620,000
Attenuation Factors ( $\alpha$ )	Average	<2.0E-05
	Maximum	<2.3E-05

1. Non-detect values were used to calculate the attenuation factor (the full RL value was used).
2. The indoor air values were not adjusted for the outdoor air results.
3. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

The most conservative attenuation factor calculated for CFC-12 is the attenuation factor based on maximum value. If the average value is used, the attenuation factor is slightly smaller and less conservative. Furthermore, since CFC-12 was detected in sub-slab soil gas but was ND in indoor air, the estimated attenuation factor is even more conservative than an attenuation factor calculated based on an analyte with detected results in both sub-slab soil gas and indoor air. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 1358 is 2.3E-05.

This building-specific attenuation factor is used to estimate indoor air concentrations where:

$$\text{Estimated indoor air concentration} = (\text{Sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

The estimated indoor air concentrations for the 18 ND soil gas analytes are shown in Table 1358-5. The fourteen ND analytes in indoor air with reporting limits that exceeded applicable screening levels are included in the table since each of these analytes also had reporting limit exceedances in sub-slab soil gas.

**Table 1358-5. Estimated Indoor Air Concentrations for Non-Detect Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
1,1,2,2-Tetrachloroethane	<4,300	<2.3E-05	0.1	2.4	No
1,1,2-Trichloroethane	<3,400	<2.3E-05	0.08	8.5	No
1,2,4-Trichlorobenzene	<19,000	<2.3E-05	0.4	18	No
1,2-Dibromoethane (EDB)	<4,800	<2.3E-05	0.1	0.23	No
1,2-Dichloroethane	<2,500	<2.3E-05	0.06	5.3	No
1,2-Dichloropropane	<2,900	<2.3E-05	0.07	18	No
1,3-Dichlorobenzene	<3,800	<2.3E-05	0.09	13	No
1,4-Dichlorobenzene	<3,800	<2.3E-05	0.09	20	No
alpha-Chlorotoluene	<3,300	<2.3E-05	0.08	2.8	No
Bromodichloromethane	<4,200	<2.3E-05	0.1	7.6	No
Bromomethane	<24,000	<2.3E-05	0.6	22	No
Carbon Tetrachloride	<4,000	<2.3E-05	0.09	23	No
Cumene	<3,100	<2.3E-05	0.07	13	No
Dibromochloromethane	<5,400	<2.3E-05	0.1	5.6	No
Hexachlorobutadiene (HCB)	<27,000	<2.3E-05	0.6	6.2	No
Naphthalene	<6,600	<2.3E-05	0.2	11	No
Total 1,3-Dichloropropene	<5,600	<2.3E-05	0.1	34	No
Trichloroethene	<3,400	<2.3E-05	0.08	8.8	No

Estimated indoor air concentrations were compared to the applicable indoor air screening levels. Based on the maximum ND sub-slab soil gas reporting limit for the 18 ND analytes, each of the estimated indoor air concentrations is well below the applicable indoor air screening level.

## CONCLUSIONS AND RECOMMENDATIONS

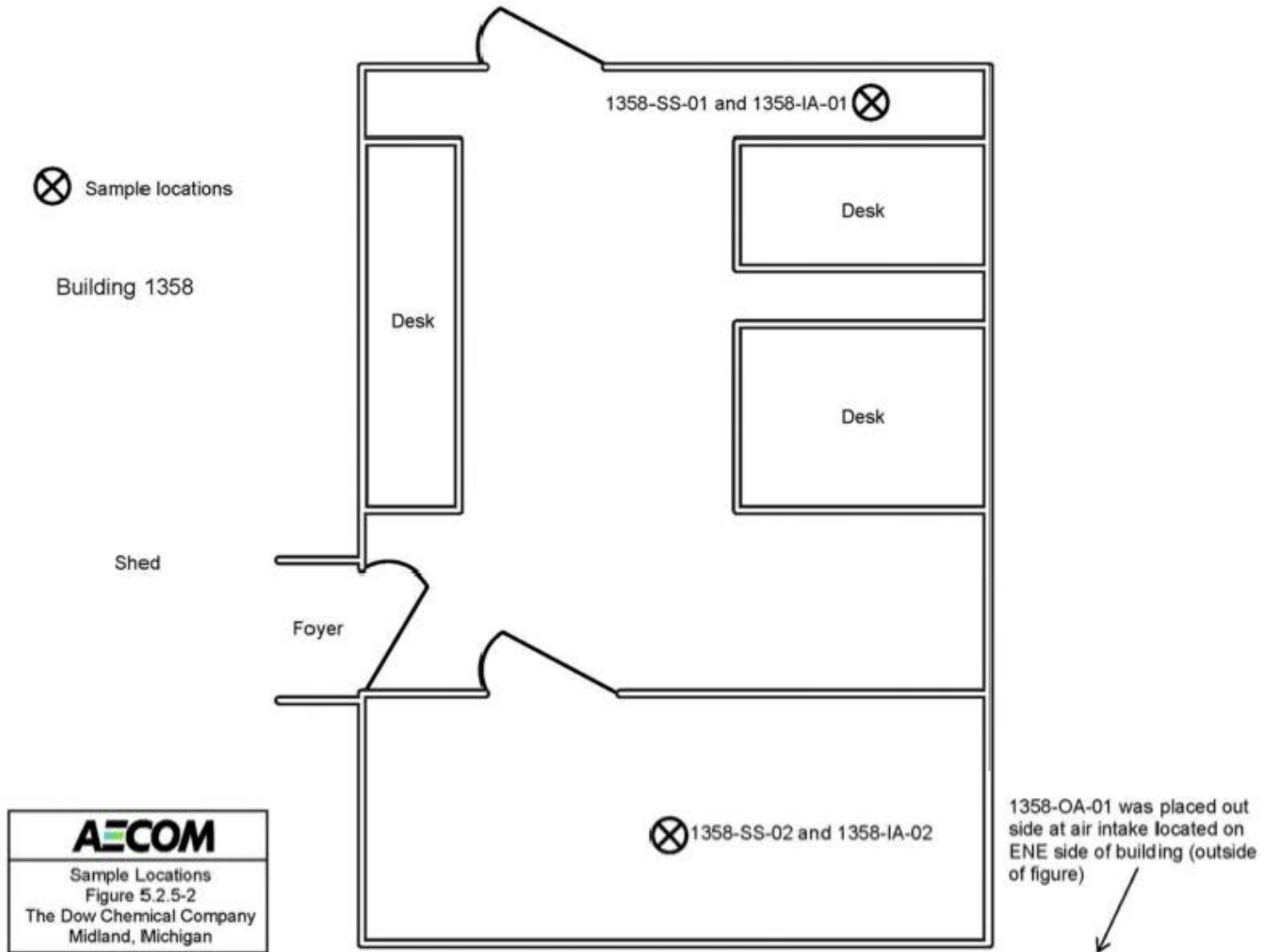
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1358 is an insignificant exposure pathway based on current use. Building 1358 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.2.5-1. Building 1358 Location**





**Figure 5.2.5-2. Building 1358 Sample Locations**



**Table 5.2.5-1. Building 1358 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1358	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	2200	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1358	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	2800	4300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	100%
Category 1	1358	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	2200	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	100%
Category 1	1358	SS	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	1600	2600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1358	SS	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	1600	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1358	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	12000	19000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	100%
Category 1	1358	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	2000	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1358	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	3200	4800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	100%
Category 1	1358	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	2500	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1358	SS	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	1600	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	100%
Category 1	1358	SS	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	1900	2900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 1	1358	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	2000	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1358	SS	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	910	1400	No Screening Value Available	-	-	-
Category 1	1358	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	2500	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	100%
Category 1	1358	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	2500	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	50%
Category 1	1358	SS	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	5900	9100	No Screening Value Available	-	-	-
Category 1	1358	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	1900	2900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1358	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	4800	7400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1358	SS	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	6700	10000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1358	SS	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	4000	6200	No Screening Value Available	-	-	-
Category 1	1358	SS	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	5100	7900	No Screening Value Available	-	-	-
Category 1	1358	SS	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	2000	3100	No Screening Value Available	-	-	-
Category 1	1358	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	1700	2600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1358	SS	Acetone	67-64-1	UG/M3	2	0%	-	-	-	-	9700	15000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1358	SS	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	2100	3300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	100%
Category 1	1358	SS	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	1300	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	1358	SS	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	8700	13000	No Screening Value Available	-	-	-
Category 1	1358	SS	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	2700	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	100%
Category 1	1358	SS	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	4200	6500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1358	SS	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	16000	24000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	100%
Category 1	1358	SS	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	5100	7800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1358	SS	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	2600	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	50%
Category 1	1358	SS	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	1900	2900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1358	SS	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	4300	6600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	1358	SS	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	2000	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1358	SS	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	8500	13000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1358	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	1600	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1358	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	1900	2800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1358	SS	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	2000	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	100%
Category 1	1358	SS	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	1400	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1358	SS	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	3500	5400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	100%
Category 1	1358	SS	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	12000	18000	No Screening Value Available	-	-	-
Category 1	1358	SS	Ethanol	64-17-5	UG/M3	2	0%	-	-	-	-	3100	4700	No Screening Value Available	-	-	-
Category 1	1358	SS	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	1800	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1358	SS	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	2300	3500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	1358	SS	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	3100	4800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1358	SS	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	2900	4400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1358	SS	CFC-12	75-71-8	UG/M3	2	100%	620000	113137	540000	700000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	1358	SS	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	1700	2600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1358	SS	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	17000	27000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	100%
Category 1	1358	SS	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	1400	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1358	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	1800	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1358	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	5900	9100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1358	SS	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	14000	22000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1358	SS	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	4300	6600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	100%
Category 1	1358	SS	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	1800	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.5-1. Building 1358 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1358	SS	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	2000	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	1358	SS	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	1700	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1358	SS	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	2800	4300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1358	SS	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	1200	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1358	SS	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	1500	2400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1358	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	3800	5600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	50%
Category 1	1358	SS	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	3600	5400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1358	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	1600	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1358	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	1900	2800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1358	SS	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	2200	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	100%
Category 1	1358	SS	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	1000	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.2.5-2. Building 1358 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1358	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	9.4	18	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1358	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	12	22	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	1358	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	9.4	18	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	100%
Category 1	1358	IA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	7	13	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1358	IA	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	6.8	13	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1358	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	51	97	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	1358	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	8.5	16	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1358	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	13	25	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1358	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	10	20	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1358	IA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	7	13	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	100%
Category 1	1358	IA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	8	15	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1358	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	8.5	16	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1358	IA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	3.8	7.2	No Screening Value Available	-	-	-
Category 1	1358	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	10	20	Vapor Intrusion Indoor Air Screening Levels	13	0%	50%
Category 1	1358	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	10	20	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1358	IA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	25	47	No Screening Value Available	-	-	-
Category 1	1358	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	8	15	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1358	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	20	38	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1358	IA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	28	54	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1358	IA	2-Propanol	67-63-0	UG/M3	2	100%	190	127	100	280	-	-	No Screening Value Available	-	-	-
Category 1	1358	IA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	22	41	No Screening Value Available	-	-	-
Category 1	1358	IA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	8.5	16	No Screening Value Available	-	-	-
Category 1	1358	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	7.1	13	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1358	IA	Acetone	67-64-1	UG/M3	2	0%	-	-	-	-	41	78	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1358	IA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	8.9	17	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	1358	IA	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	5.5	10	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1358	IA	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	36	69	No Screening Value Available	-	-	-
Category 1	1358	IA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	12	22	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	100%
Category 1	1358	IA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	18	34	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1358	IA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	67	130	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	1358	IA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	21	41	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1358	IA	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	11	20	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1358	IA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	7.9	15	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1358	IA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	18	34	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1358	IA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	8.4	16	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1358	IA	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	36	67	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1358	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	6.8	13	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1358	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	7.8	15	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1358	IA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	8.5	16	Vapor Intrusion Indoor Air Screening Levels	13	0%	50%
Category 1	1358	IA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	5.9	11	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1358	IA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	15	28	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	1358	IA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	49	93	No Screening Value Available	-	-	-
Category 1	1358	IA	Ethanol	64-17-5	UG/M3	2	100%	1450	71	1400	1500	-	-	No Screening Value Available	-	-	-
Category 1	1358	IA	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	7.5	14	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1358	IA	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	9.7	18	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1358	IA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	13	25	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1358	IA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	12	23	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1358	IA	CFC-12	75-71-8	UG/M3	2	0%	-	-	-	-	8.5	16	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1358	IA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	7.1	13	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1358	IA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	74	140	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1358	IA	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	6.1	12	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1358	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	7.5	14	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1358	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	25	47	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1358	IA	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	60	110	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1358	IA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	18	34	Vapor Intrusion Indoor Air Screening Levels	11	0%	100%

**Table 5.2.5-2. Building 1358 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1358	IA	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	7.5	14	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1358	IA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	8.5	16	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	1358	IA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	7.3	14	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	1358	IA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	12	22	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1358	IA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	5.1	9.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1358	IA	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	6.5	12	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1358	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	15.6	30	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1358	IA	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	15	28	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1358	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	6.8	13	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1358	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	7.8	15	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1358	IA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	9.3	18	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	100%
Category 1	1358	IA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	4.4	8.3	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1358	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 1	1358	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 1	1358	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 1	1358	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1358	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1358	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	23	23	-	-	-	-
Category 1	1358	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1358	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 1	1358	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 1	1358	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1358	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	1358	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1358	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 1	1358	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 1	1358	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 1	1358	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 1	1358	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 1	1358	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	9.3	9.3	-	-	-	-
Category 1	1358	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	13	13	-	-	-	-
Category 1	1358	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	7.8	7.8	-	-	-	-
Category 1	1358	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	9.9	9.9	-	-	-	-
Category 1	1358	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1358	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1358	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	19	19	-	-	-	-
Category 1	1358	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 1	1358	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 1	1358	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 1	1358	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	5.3	5.3	-	-	-	-
Category 1	1358	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	8.2	8.2	-	-	-	-
Category 1	1358	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	31	31	-	-	-	-
Category 1	1358	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	9.8	9.8	-	-	-	-
Category 1	1358	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 1	1358	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	1358	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	8.3	8.3	-	-	-	-
Category 1	1358	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1358	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 1	1358	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1358	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	1358	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1358	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 1	1358	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.7	6.7	-	-	-	-
Category 1	1358	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	22	22	-	-	-	-
Category 1	1358	OA	Ethanol	64-17-5	UG/M3	1	100%	7.20	-	-	7.2	-	-	-	-	-	-
Category 1	1358	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	1358	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-

**Table 5.2.5-2. Building 1358 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1358	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 1	1358	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.5	5.5	-	-	-	-
Category 1	1358	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1358	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1358	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	34	34	-	-	-	-
Category 1	1358	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	1358	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	1358	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 1	1358	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	27	27	-	-	-	-
Category 1	1358	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	8.3	8.3	-	-	-	-
Category 1	1358	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	1358	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1358	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	1358	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 1	1358	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 1	1358	OA	Toluene	108-88-3	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	1358	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	7.2	7.2	-	-	-	-
Category 1	1358	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	6.8	6.8	-	-	-	-
Category 1	1358	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1358	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	1358	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	1358	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-

## 5.2.6 Vapor Intrusion Evaluation for Building 3303

### BACKGROUND

Building 3303 is a Category 1 building in Zone 1. It is a small building that includes a lunch room and a small office. It is known as the 1159 Breakroom (see Figure 5.2.6-1) and is located within the southeast portion of the facility designated as Zone 1. The building is single story and is approximately 885 ft<sup>2</sup> (82 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 19, 2016 and the results can be found in Appendix C. The building is a raised structure with central air conditioning and it has a gas furnace for heat. The air conditioning air intake is on the X side of the building. There is not a bay door or garage present. The land surrounding the building is covered in asphalt and the building is connected to Building 1159 through a covered but open breezeway.

Drains and other openings were screened with a PID during the building survey and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey and a can of spray paint, common household cleaning products, and an air freshener were found in the building.

### DATA SUMMARY

During the planned sampling event on November 21, 2016, it was discovered that this building is not only a raised structure but it was built on a platform approximately 5 inches thick. The two planned sub-slab soil gas samples were instead collected as air samples from underneath the building between the floor of the building and the ground surface. Indoor air samples were collected on November 22, 2016 at locations that corresponded to those of the air samples collected under the building, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.6-2. Summary statistics of the analytical results for the air samples collected under the building but above ground surface and the results for indoor and outdoor air are presented on Table 5.2.6-1. The complete analytical reports for the air samples are in Appendix D.

### RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. All 65 target analytes were ND in the two samples of air collected underneath the building but above ground surface at Building 3303. As an added level of conservatism, the results from the air samples collected under the building were compared to the VI indoor air screening levels. As a result, seven ND analytes had reporting limits that exceed the very conservative indoor air screening level.

Two indoor air samples were co-located and collected the next day and analyzed for the same 65 target analytes. Sixty of the 65 analytes were ND in each of the samples. The five analytes detected in indoor air were 2-propanol, acetone, CFC-12, ethanol, and toluene. None of the detected results exceed the indoor air screening levels (ethanol and 2-propanol do not have available screening levels). Seven ND analytes had reporting limits that exceed the indoor air screening levels. Most of the ND reporting limit exceedances only slightly exceed their respective screening levels. All but two analytes (EDB and HCB) have reporting limits in the same order of magnitude as the screening level. The results from the outdoor air sample collected immediately upwind of the building were ND for all 65 analytes.

### EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). While there are no sub-slab soil gas

samples from Building 3303, it is anticipated that if VI was occurring there would be detections in the air above the ground surface underneath the building. Sampling results indicated that there were no detects from under the building, only detects in indoor air that are below the indoor air screening levels. Table 3303-1 below shows detections in each of the three different types of air samples collected.

**Table 3303-1. Detections Matrix**

Analyte	Air Under the Building	Indoor Air	Outdoor Air
CFC 12		•	
Toluene		•	
Ethanol		•	
2-Propanol		•	
Acetone		•	

- = Detected
- = Non-detect

Table 3303-2 summarizes the detected indoor air results and also provides the outdoor air sample results to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 3303-2. Vapor Intrusion Evaluation for Building 3303**

Analyte	Air Under the Building Detection Frequency	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
CFC-12	0%	100%	7.3 - 7.8	220,000	<3.6
Ethanol	0%	100%	84 - 93	N/A	<5.5
Toluene	0%	100%	4.2 - 9.5	22,000	<2.8
2-Propanol	0%	50%	14	N/A	<7.2
Acetone	0%	50%	20	26,000	<17

N/A = No screening level available  
< = Non-detect at the reporting limit provided

As shown on Table 3303-2, the analytes detected in indoor air were not detected in outdoor air. All detects were below the available screening levels or are commonly found in household cleaning products such as those stored in Building 3303. Furthermore, since the analytes were ND in the air underneath the building but above ground surface, the detected indoor air analytes were eliminated from further VI evaluation.

## CONCLUSIONS AND RECOMMENDATIONS

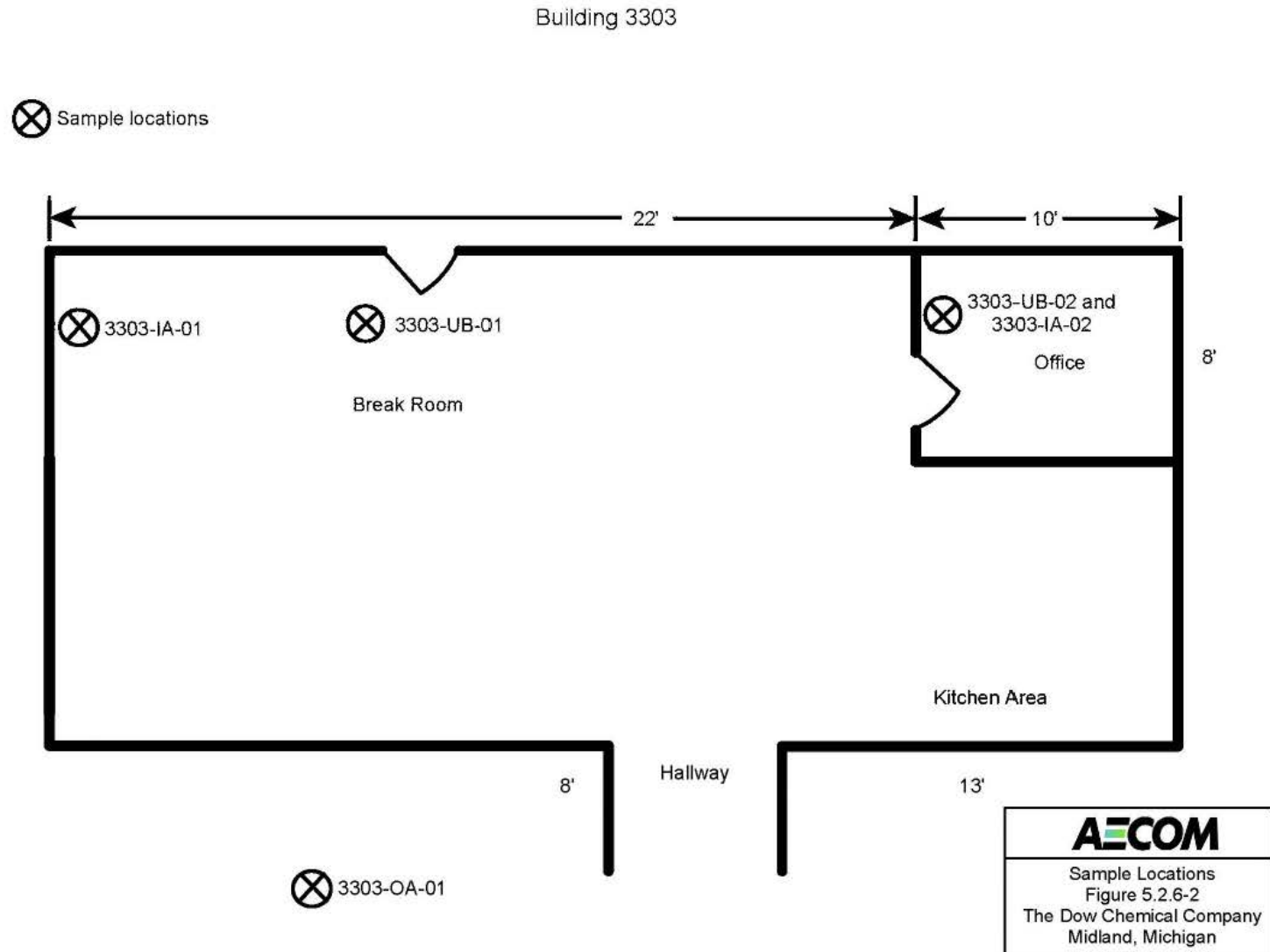
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sampling results, the VI pathway at Building 3303 is an insignificant exposure pathway based on current use. Building 3303 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.



**Figure 5.2.6-1. Building 3303 Location**



Figure 5.2.6-2. Building 3303 Sample Locations



**Table 5.2.6-1. Building 3303 Results Summary Statistics**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	3303	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	4.2	4.5	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	3303	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	5.4	5.6	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	3303	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	4.2	4.5	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	3303	IA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	3303	IA	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	3.1	3.2	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	3303	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	23	24	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	3303	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	3303	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	6	6.3	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	3303	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	4.7	4.9	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	3303	IA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	3303	IA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	3.6	3.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	3303	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	3303	IA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	1.7	1.8	No Screening Value Available	-	-	-
Category 1	3303	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	4.7	4.9	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	3303	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	4.7	4.9	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	3303	IA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	11	12	No Screening Value Available	-	-	-
Category 1	3303	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.6	3.8	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	3303	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	9.2	9.7	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	3303	IA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	13	13	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	3303	IA	2-Propanol	67-63-0	UG/M3	2	50%	9.03	7.04	14	14	8.1	8.1	No Screening Value Available	-	-	-
Category 1	3303	IA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	9.8	10	No Screening Value Available	-	-	-
Category 1	3303	IA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	3.8	4	No Screening Value Available	-	-	-
Category 1	3303	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	3303	IA	Acetone	67-64-1	UG/M3	2	50%	14.8	7.4	20	20	19	19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	3303	IA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	4	4.2	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	3303	IA	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	2.5	2.6	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	3303	IA	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	16	17	No Screening Value Available	-	-	-
Category 1	3303	IA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	5.2	5.5	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	3303	IA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	8.1	8.5	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	3303	IA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	30	32	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	3303	IA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	9.7	10	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	3303	IA	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	4.9	5.2	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	3303	IA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	3.6	3.8	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	3303	IA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	8.2	8.6	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	3303	IA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	3303	IA	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	16	17	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	3303	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	3.1	3.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	3303	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	3.5	3.7	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	3303	IA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	3303	IA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	2.7	2.8	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	3303	IA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	6.6	7	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	3303	IA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	22	23	No Screening Value Available	-	-	-
Category 1	3303	IA	Ethanol	64-17-5	UG/M3	2	100%	88.5	6.4	84	93	-	-	No Screening Value Available	-	-	-
Category 1	3303	IA	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	3.4	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	IA	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	4.4	4.6	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	3303	IA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	6	6.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	3303	IA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	5.4	5.7	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	3303	IA	CFC-12	75-71-8	UG/M3	2	100%	7.55	0.35	7.3	7.8	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	3303	IA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	3303	IA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	33	35	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	3303	IA	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	2.7	2.9	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	3303	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	3.4	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	11	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	3303	IA	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	27	28	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	3303	IA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	8.2	8.6	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	3303	IA	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	3.4	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	IA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.2.6-1. Building 3303 Results Summary Statistics (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	3303	IA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	3303	IA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	5.3	5.6	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	3303	IA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.3	2.4	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	3303	IA	Toluene	108-88-3	UG/M3	2	100%	6.85	3.75	4.2	9.5	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	3303	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	7	7.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	3303	IA	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	6.8	7.2	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	3.1	3.2	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	3303	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	3.5	3.7	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	3303	IA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	4.2	4.4	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	3303	IA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	2	2.1	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	3303	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	3303	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 1	3303	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	3303	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	3303	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 1	3303	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	22	22	-	-	-	-
Category 1	3303	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 1	3303	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 1	3303	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	3303	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	3303	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 1	3303	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 1	3303	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 1	3303	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 1	3303	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	3303	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	8.6	8.6	-	-	-	-
Category 1	3303	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 1	3303	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	7.2	7.2	-	-	-	-
Category 1	3303	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	9.1	9.1	-	-	-	-
Category 1	3303	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	3303	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 1	3303	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	3303	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 1	3303	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 1	3303	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	4.9	4.9	-	-	-	-
Category 1	3303	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	7.5	7.5	-	-	-	-
Category 1	3303	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	28	28	-	-	-	-
Category 1	3303	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	9.1	9.1	-	-	-	-
Category 1	3303	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 1	3303	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	3303	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	7.7	7.7	-	-	-	-
Category 1	3303	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 1	3303	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 1	3303	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	3303	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 1	3303	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 1	3303	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	21	21	-	-	-	-
Category 1	3303	OA	Ethanol	64-17-5	UG/M3	1	0%	-	-	-	-	5.5	5.5	-	-	-	-
Category 1	3303	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	3303	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 1	3303	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 1	3303	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.1	5.1	-	-	-	-

**Table 5.2.6-1. Building 3303 Results Summary Statistics (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	3303	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	3303	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	31	31	-	-	-	-
Category 1	3303	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	3303	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	3303	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 1	3303	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	25	25	-	-	-	-
Category 1	3303	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	7.6	7.6	-	-	-	-
Category 1	3303	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	3303	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	3303	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	3303	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 1	3303	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 1	3303	OA	Toluene	108-88-3	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	3303	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	6.6	6.6	-	-	-	-
Category 1	3303	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 1	3303	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 1	3303	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	3303	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	3303	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	1.9	1.9	-	-	-	-
Category 1	3303	UB	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	4.4	4.7	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	3303	UB	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	5.6	5.9	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	3303	UB	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	4.4	4.7	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	3303	UB	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	3303	UB	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	3303	UB	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	24	26	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	3303	UB	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	4	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	3303	UB	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	6.2	6.6	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	3303	UB	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	4.9	5.2	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	3303	UB	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	3303	UB	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	3.7	4	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	3303	UB	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	4	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	3303	UB	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	1.8	1.9	No Screening Value Available	-	-	-
Category 1	3303	UB	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	4.9	5.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	3303	UB	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	4.9	5.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	3303	UB	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	12	12	No Screening Value Available	-	-	-
Category 1	3303	UB	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	3303	UB	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	9.6	10	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	3303	UB	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	13	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	3303	UB	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	8	8.5	No Screening Value Available	-	-	-
Category 1	3303	UB	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	10	11	No Screening Value Available	-	-	-
Category 1	3303	UB	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	4	4.2	No Screening Value Available	-	-	-
Category 1	3303	UB	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	3303	UB	Acetone	67-64-1	UG/M3	2	0%	-	-	-	-	19	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	3303	UB	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	4.2	4.5	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	3303	UB	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	2.6	2.8	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	3303	UB	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	17	18	No Screening Value Available	-	-	-
Category 1	3303	UB	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	5.4	5.8	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	3303	UB	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	8.4	8.9	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	3303	UB	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	31	34	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	3303	UB	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	10	11	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	3303	UB	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	5.1	5.4	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	3303	UB	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	3.7	4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	3303	UB	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	8.5	9.1	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	3303	UB	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	4	4.2	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	3303	UB	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	17	18	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	3303	UB	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%

**Table 5.2.6-1. Building 3303 Results Summary Statistics (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	3303	UB	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	3.7	3.9	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	3303	UB	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	4	4.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	3303	UB	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	2.8	3	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	3303	UB	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	6.9	7.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	3303	UB	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	23	25	No Screening Value Available	-	-	-
Category 1	3303	UB	Ethanol	64-17-5	UG/M3	2	0%	-	-	-	-	6.1	6.5	No Screening Value Available	-	-	-
Category 1	3303	UB	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	3.5	3.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	UB	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	4.6	4.9	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	3303	UB	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	6.2	6.6	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	3303	UB	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	5.7	6	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	3303	UB	CFC-12	75-71-8	UG/M3	2	0%	-	-	-	-	4	4.3	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	3303	UB	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	3303	UB	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	34	37	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	3303	UB	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	2.8	3	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	3303	UB	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	3.5	3.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	UB	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	12	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	3303	UB	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	28	30	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	3303	UB	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	8.5	9.1	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	3303	UB	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	3.5	3.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	UB	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	4	4.2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	3303	UB	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	3.4	3.7	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	3303	UB	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	5.5	5.9	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	3303	UB	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.4	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	3303	UB	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	3	3.2	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	3303	UB	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	7.4	7.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	3303	UB	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	7	7.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	3303	UB	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	3303	UB	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	3.7	3.9	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	3303	UB	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	4.4	4.6	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	3303	UB	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	2.1	2.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%

## 5.2.7 Vapor Intrusion Evaluation for Building 462

### BACKGROUND

Building 462 is a Category 2 building in Zone 1. It is a large metal building that includes office space and a shop. It is known as the MRO/Investment Recovery Building (see Figure 5.2.7-1) and is located north of the WWTP within the southern portion of the facility designated as Zone 1. The building is single storied large warehouse with office space and is approximately 23,890 ft<sup>2</sup> (2,220 m<sup>2</sup>). Building 462 is connected to Building 1294, which is the Investment Recovery Warehouse with no occupancy. Building 1294 is a Category 3 building and is, therefore, currently deferred. The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 19, 2016 and the results can be found in Appendix C. The building has two HVAC units. One is dedicated to a larger office area and the shop. The other unit cools the smaller office area. One air intake is in the front of the building and the other is located in the back. There are two bay doors that are left open in good weather and closed when it is cold. The land surrounding the building is covered in asphalt and concrete.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified various cleaners. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On October 24, 2016, sub-slab soil gas samples were collected from ten locations from within the building. Indoor air samples were collected on October 26, 2016 at ten locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.2.7-2. Summary statistics of the analytical results for sub-slab soil gas for Building 462 are presented on Table 5.2.7-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.7-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 43 of the 65 target analytes were ND in the 10 samples collected at Building 462. All but one of these ND soil gas analytes (EDB) had reporting limits that met the respective screening level. Therefore, those 42 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation (EDB is discussed further below). A total of 22 analytes were detected in one or more of the 10 sub-slab soil gas samples. These analytes include but are not limited to five chlorinated VOCs, eight petroleum hydrocarbons, and several common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Fifteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Six analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above the non-residential screening level.

The sub-slab soil gas results are summarized in Table 462-1. Each of the six analytes detected above *de minimus* levels but below screening levels was detected at a frequency of less than 100%. Only analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for



VI. Therefore, PCE is the only soil gas AOI at Building 462. PCE had a 100% detection frequency; however, only a single sample exceeded the screening level (25,000  $\mu\text{g}/\text{m}^3$  and 23,000  $\mu\text{g}/\text{m}^3$ , respectively). The nine remaining PCE detections were well below the screening level.

**Table 462-1. Summary of Sub-Slab Soil Gas Detects for Building 462**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening level (analyte of interest)</b>				
Tetrachloroethene (PCE)	100%	87 - 25,000	10%	23,000
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	40%	12 - 150	0%	3,500,000
Acetone	80%	33 - 510	0%	3,400,000
CFC 11	50%	49 - 560	0%	33,000,000
CFC 114	20%	56 - 240	0%	11,000,000
Toluene	90%	9.4 - 120	0%	2,900,000
Trichloroethene (TCE)	70%	4.2 - 1,100	0%	1,200
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	70%	4.5 - 20	0%	130,000
1,2-Dichlorobenzene	10%	7.7	0%	180,000
1,3,5-Trimethylbenzene	40%	3.8 - 11	0%	130,000
2-Butanone (Methyl Ethyl Ketone)	60%	13 - 43	0%	2,900,000
2-Propanol	10%	7.9	N/A	N/A
4-Methyl-2-pentanone	10%	3.2	0%	1,800,000
Benzene	80%	6.4 - 34	0%	2,200
Chloroform	10%	10	0%	7,600
Cyclohexane	80%	8.8 - 27	0%	3,500,000
Ethanol	40%	8.1 - 16	N/A	N/A
Ethylbenzene	80%	5.2 - 40	0%	59,000
CFC 12	70%	5 - 17	0%	29,000,000
Heptane	80%	8.3 - 58	0%	2,000,000
Hexane	90%	9.1 - 82	0%	410,000
Total Xylenes	80%	17.7 - 80	0%	58,000

N/A - No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, 10 indoor air samples were collected two days after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and were analyzed for the same 65 analytes. Additionally one outdoor air sample was collected immediately upwind of the building. Table 462-2 below shows the analytes detected in each of the three media sampled.



**Table 462-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
Toluene	•	•	
<i>Hexane</i>	•	•	
<i>Ethanol</i>	•	•	
Acetone	•	•	
<i>CFC 12</i>	•	•	
PCE	X		
TCE	•		
1,1-Trichloroethane	•		
<i>1,2-Dichlorobenzene</i>	•		
<i>Benzene</i>	•		
<i>Ethylbenzene</i>	•		
<i>Total Xylenes</i>	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>Heptane</i>	•		
<i>Cyclohexane</i>	•		
<i>2-Propanol</i>	•		
<i>2-Butanone</i>	•		
CFC 11	•		
CFC 114	•		
<i>Chloroform</i>	•		
<i>4-Methyl-2-pentanone</i>	•		

• = Detect

= Non-detect

X = Detect exceeds screening level

*Italics* = *de minimus* detect(s) in sub-slab soil gas

Sixty of the 65 indoor air analytes were ND in each of the samples. Seven of these ND indoor air analytes had at least one ND reporting limit above the respective screening level and are discussed further below. Those 53 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. The five VOCs detected in indoor air were acetone, ethanol, CFC 12, hexane and toluene. None of the detected values in indoor air exceed applicable screening levels (ethanol does not have a screening level available). There were no analytes detected in the outdoor air sample.

Table 462-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 462-3. Vapor Intrusion Evaluation for Building 462**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels</b>				
Tetrachloroethene (PCE)	0%	<4.9 - <5.8	180	<5.7
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<4 - <4.6	26000	<4.6
Acetone	100%	74 - 380	26000	<20
CFC 11	0%	<4.1 - <4.8	250000	<4.7
CFC 114	0%	<5.1 - <5.9	85000	<5.8
Toluene	30%	3 - 4.4	22000	<3.1
Trichloroethene (TCE)	0%	<3.9 - <4.6	8.8	<4.5
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	0%	<22 - <25	18	<4.1
1,2-Dichlorobenzene	0%	<4.4 - <5.1	1300	<5
1,3,5-Trimethylbenzene	0%	<3.6 - <4.2	960	<4.1
2-Butanone (Methyl Ethyl Ketone)	0%	<8.6 - <10	22000	<9.8
2-Propanol	0%	<7.1 - <8.4	N/A	<8.2
4-Methyl-2-pentanone	0%	<3 - <3.5	13000	<3.4
Benzene	0%	<2.3 - <2.7	16	<2.7
Chloroform	0%	<3.5 - <4.2	57	<4.1
Cyclohexane	0%	<2.5 - <2.9	26000	<2.9
Ethanol	100%	7.4 - 330	N/A	<6.3
Ethylbenzene	0%	<3.1 - <3.7	440	<3.6
CFC 12	30%	4.2 - 7.4	220000	<4.1
Heptane	0%	<3 - <3.5	15000	<3.4
Hexane	100%	5.7 - 100	3100	<2.9
Total Xylenes	0%	<6.2 - <7.4	440	<7.2

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

The results of the outdoor air sample collected indicated that all analytes were ND in outdoor air. Therefore, the five analytes detected in indoor air (acetone, ethanol, CFC 12, hexane and toluene) do not appear to be present due to migration from outdoor air. All five detected indoor air analytes were also detected in sub-slab soil gas. While acetone and toluene were detected in soil gas above *de minimus* levels, the detected results in indoor air were well below screening levels. Ethanol, hexane and CFC 12 were detected in sub-slab soil gas below *de minimus* levels and the detected concentrations in indoor air were also well below screening levels.

While ethanol does not have a screening level for indoor air, it was detected in sub-slab soil gas below the *de minimus* level. Since the results of the outdoor air sample collected indicated that all analytes were ND, ethanol is likely not present due to migration from outdoor air. Ethanol was detected in 100% of the indoor air samples and the fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Scrubbing Bubbles, various bathroom and toilet bowl cleaners, disinfectants, etc.

Acetone, CFC 12, hexane, and toluene were all detected at concentrations several orders of magnitude below their respective indoor air screening levels and were eliminated from further evaluation. While

ethanol does not have an available screening level for indoor air, it was detected below *de minimus* levels in soil gas and its presence indoors is likely due to other sources. Therefore, ethanol was also eliminated from further evaluation.

There were seven ND analytes in indoor air that had reporting limits that exceeded screening levels. None of these analytes were detected in sub-slab soil gas; however, EDB had a single ND reporting limit exceedance in soil gas (one of 10 total ND reporting limits). Furthermore, throughout the evaluation, there have been laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB. Therefore, each of the seven ND analytes with reporting limit issues were eliminated from further evaluation since there was no evidence of VI.

## **CONCLUSIONS AND RECOMMENDATIONS**

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 462 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results for PCE and given the potential for future VI, Building 462 was placed in the VI Path Forward Group 2 (See Figure 5-3) and was resampled in August 2017. The second round of sampling is evaluated and discussed in Section 5.3.3. Additionally, PCE will be added to the Industrial Hygiene monitoring for this building.

**Figure 5.2.7-1. Building 462 Location**





**Table 5.2.7-1. Building 462 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	10	40%	23.0	45.8	12	150	4.1	8.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	462	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	10	0%	-	-	-	-	5.2	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	462	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	10	0%	-	-	-	-	4.1	84	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	462	SS	1,1-Dichloroethane	75-34-3	UG/M3	10	0%	-	-	-	-	3	62	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	462	SS	1,1-Dichloroethene	75-35-4	UG/M3	10	0%	-	-	-	-	3	61	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	462	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	10	0%	-	-	-	-	22	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	462	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	10	70%	10.6	10.7	4.5	20	7.7	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	462	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	10	0%	-	-	-	-	5.8	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	10%
Category 2	462	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	10	10%	8.12	13.44	7.7	7.7	4.5	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	462	SS	1,2-Dichloroethane	107-06-2	UG/M3	10	0%	-	-	-	-	3	62	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	462	SS	1,2-Dichloropropane	78-87-5	UG/M3	10	0%	-	-	-	-	3.5	71	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	462	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	10	40%	7.47	11.04	3.8	11	3.7	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	462	SS	1,3-Butadiene	106-99-0	UG/M3	10	0%	-	-	-	-	1.7	34	No Screening Value Available	-	-	-
Category 2	462	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	10	0%	-	-	-	-	4.5	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	462	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	10	0%	-	-	-	-	4.5	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	462	SS	1,4-Dioxane	123-91-1	UG/M3	10	0%	-	-	-	-	11	220	No Screening Value Available	-	-	-
Category 2	462	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	10	0%	-	-	-	-	3.5	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	462	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	10	60%	25.0	25.9	13	43	8.9	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	462	SS	2-Hexanone	591-78-6	UG/M3	10	0%	-	-	-	-	12	250	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	462	SS	2-Propanol	67-63-0	UG/M3	10	10%	12.7	22.0	7.9	7.9	7.4	150	No Screening Value Available	-	-	-
Category 2	462	SS	3-Chloropropene	107-05-1	UG/M3	10	0%	-	-	-	-	9.4	190	No Screening Value Available	-	-	-
Category 2	462	SS	4-Ethyltoluene	622-96-8	UG/M3	10	0%	-	-	-	-	3.7	76	No Screening Value Available	-	-	-
Category 2	462	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	10	10%	5.35	9.24	3.2	3.2	3.1	63	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	462	SS	Acetone	67-64-1	UG/M3	10	80%	123	144	33	510	37	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	462	SS	alpha-Chlorotoluene	100-44-7	UG/M3	10	0%	-	-	-	-	3.9	80	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	462	SS	Benzene	71-43-2	UG/M3	10	80%	14.3	9.2	6.4	34	5	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	462	SS	Bromochloromethane	74-97-5	UG/M3	10	0%	-	-	-	-	16	320	No Screening Value Available	-	-	-
Category 2	462	SS	Bromodichloromethane	75-27-4	UG/M3	10	0%	-	-	-	-	5	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	462	SS	Bromoform	75-25-2	UG/M3	10	0%	-	-	-	-	7.8	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	462	SS	Bromomethane	74-83-9	UG/M3	10	0%	-	-	-	-	29	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	462	SS	Carbon Disulfide	75-15-0	UG/M3	10	0%	-	-	-	-	9.4	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	462	SS	Carbon Tetrachloride	56-23-5	UG/M3	10	0%	-	-	-	-	4.8	97	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	462	SS	Chlorobenzene	108-90-7	UG/M3	10	0%	-	-	-	-	3.5	71	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	462	SS	Chloroethane	75-00-3	UG/M3	10	0%	-	-	-	-	8	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	580000	0%	0%
Category 2	462	SS	Chloroform	67-66-3	UG/M3	10	10%	6.99	11.01	10	10	3.7	75	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	462	SS	Chloromethane	74-87-3	UG/M3	10	0%	-	-	-	-	16	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	462	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	10	0%	-	-	-	-	3	61	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	462	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	10	0%	-	-	-	-	3.4	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	462	SS	Cumene	98-82-8	UG/M3	10	0%	-	-	-	-	3.7	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	462	SS	Cyclohexane	110-82-7	UG/M3	10	80%	17.7	8.3	8.8	27	5.4	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	462	SS	Dibromochloromethane	124-48-1	UG/M3	10	0%	-	-	-	-	6.4	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	462	SS	Dibromomethane	74-95-3	UG/M3	10	0%	-	-	-	-	21	440	No Screening Value Available	-	-	-
Category 2	462	SS	Ethanol	64-17-5	UG/M3	10	40%	13.0	17.0	8.1	16	5.7	120	No Screening Value Available	-	-	-
Category 2	462	SS	Ethylbenzene	100-41-4	UG/M3	10	80%	14.6	12.2	5.2	40	6.8	67	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	462	SS	CFC-11	75-69-4	UG/M3	10	50%	90.1	168.7	49	560	4.2	86	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 2	462	SS	CFC-113	76-13-1	UG/M3	10	0%	-	-	-	-	5.8	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	462	SS	CFC-114	76-14-2	UG/M3	10	20%	37.6	74.3	56	240	5.3	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	462	SS	CFC-12	75-71-8	UG/M3	10	70%	12.1	10.3	5	17	7.8	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	462	SS	Heptane	142-82-5	UG/M3	10	80%	32.2	18.6	8.3	58	6.4	63	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	462	SS	Hexachlorobutadiene	87-68-3	UG/M3	10	0%	-	-	-	-	32	660	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	462	SS	Hexane	110-54-3	UG/M3	10	90%	43.6	26.3	9.1	82	54	54	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	462	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	10	80%	23.0	15.2	13	59	6.8	67	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	462	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	10	0%	-	-	-	-	11	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	462	SS	Methylene Chloride	75-09-2	UG/M3	10	0%	-	-	-	-	26	540	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	462	SS	Naphthalene	91-20-3	UG/M3	10	0%	-	-	-	-	7.9	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	462	SS	o-Xylene	95-47-6	UG/M3	10	80%	10.4	9.5	4.7	21	6.8	67	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	462	SS	Propylbenzene	103-65-1	UG/M3	10	0%	-	-	-	-	3.7	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.2.7-1. Building 462 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	SS	Styrene	100-42-5	UG/M3	10	0%	-	-	-	-	3.2	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	462	SS	Tetrachloroethene	127-18-4	UG/M3	10	100%	3498	7641	87	25000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	10%	0%
Category 2	462	SS	Tetrahydrofuran	109-99-9	UG/M3	10	0%	-	-	-	-	2.2	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	462	SS	Toluene	108-88-3	UG/M3	10	90%	43.7	30.1	9.4	120	58	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	462	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	10	0%	-	-	-	-	6.8	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	462	SS	Total Xylenes	1330-20-7	UG/M3	10	80%	33.4	22.9	17.7	80	13.6	134	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	462	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	10	0%	-	-	-	-	3	61	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	462	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	10	0%	-	-	-	-	3.4	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	462	SS	Trichloroethene	79-01-6	UG/M3	10	70%	119	345	4.2	1100	4	8.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	462	SS	Vinyl Chloride	75-01-4	UG/M3	10	0%	-	-	-	-	1.9	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.2.7-2. Building 462 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	10	0%	-	-	-	-	4	4.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	462	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	10	0%	-	-	-	-	5	5.8	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 2	462	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	10	0%	-	-	-	-	4	4.6	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	462	IA	1,1-Dichloroethane	75-34-3	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	462	IA	1,1-Dichloroethene	75-35-4	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	462	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	10	0%	-	-	-	-	22	25	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 2	462	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	462	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	10	0%	-	-	-	-	5.6	6.5	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	462	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	10	0%	-	-	-	-	4.4	5.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	462	IA	1,2-Dichloroethane	107-06-2	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	462	IA	1,2-Dichloropropane	78-87-5	UG/M3	10	0%	-	-	-	-	3.4	3.9	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	462	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	462	IA	1,3-Butadiene	106-99-0	UG/M3	10	0%	-	-	-	-	1.6	1.9	No Screening Value Available	-	-	-
Category 2	462	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	10	0%	-	-	-	-	4.4	5.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	462	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	10	0%	-	-	-	-	4.4	5.1	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	462	IA	1,4-Dioxane	123-91-1	UG/M3	10	0%	-	-	-	-	10	12	No Screening Value Available	-	-	-
Category 2	462	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	10	0%	-	-	-	-	3.4	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	462	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	10	0%	-	-	-	-	8.6	10	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	462	IA	2-Hexanone	591-78-6	UG/M3	10	0%	-	-	-	-	12	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	462	IA	2-Propanol	67-63-0	UG/M3	10	0%	-	-	-	-	7.1	8.4	No Screening Value Available	-	-	-
Category 2	462	IA	3-Chloropropene	107-05-1	UG/M3	10	0%	-	-	-	-	9.1	11	No Screening Value Available	-	-	-
Category 2	462	IA	4-Ethyltoluene	622-96-8	UG/M3	10	0%	-	-	-	-	3.6	4.2	No Screening Value Available	-	-	-
Category 2	462	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	10	0%	-	-	-	-	3	3.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	462	IA	Acetone	67-64-1	UG/M3	10	100%	184	122	74	380	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	462	IA	alpha-Chlorotoluene	100-44-7	UG/M3	10	0%	-	-	-	-	3.8	4.4	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 2	462	IA	Benzene	71-43-2	UG/M3	10	0%	-	-	-	-	2.3	2.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	462	IA	Bromochloromethane	74-97-5	UG/M3	10	0%	-	-	-	-	15	18	No Screening Value Available	-	-	-
Category 2	462	IA	Bromodichloromethane	75-27-4	UG/M3	10	0%	-	-	-	-	4.8	5.7	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	462	IA	Bromoform	75-25-2	UG/M3	10	0%	-	-	-	-	7.5	8.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	462	IA	Bromomethane	74-83-9	UG/M3	10	0%	-	-	-	-	28	33	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 2	462	IA	Carbon Disulfide	75-15-0	UG/M3	10	0%	-	-	-	-	9	10	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	462	IA	Carbon Tetrachloride	56-23-5	UG/M3	10	0%	-	-	-	-	4.6	5.3	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	462	IA	Chlorobenzene	108-90-7	UG/M3	10	0%	-	-	-	-	3.3	3.9	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	462	IA	Chloroethane	75-00-3	UG/M3	10	0%	-	-	-	-	7.6	9	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	462	IA	Chloroform	67-66-3	UG/M3	10	0%	-	-	-	-	3.5	4.2	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	462	IA	Chloromethane	74-87-3	UG/M3	10	0%	-	-	-	-	15	18	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	462	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	462	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	10	0%	-	-	-	-	3.3	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	462	IA	Cumene	98-82-8	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	462	IA	Cyclohexane	110-82-7	UG/M3	10	0%	-	-	-	-	2.5	2.9	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	462	IA	Dibromochloromethane	124-48-1	UG/M3	10	0%	-	-	-	-	6.2	7.2	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 2	462	IA	Dibromomethane	74-95-3	UG/M3	10	0%	-	-	-	-	21	24	No Screening Value Available	-	-	-
Category 2	462	IA	Ethanol	64-17-5	UG/M3	10	100%	89.6	124.9	7.4	330	-	-	No Screening Value Available	-	-	-
Category 2	462	IA	Ethylbenzene	100-41-4	UG/M3	10	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	CFC-11	75-69-4	UG/M3	10	0%	-	-	-	-	4.1	4.8	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	462	IA	CFC-113	76-13-1	UG/M3	10	0%	-	-	-	-	5.6	6.5	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	462	IA	CFC-114	76-14-2	UG/M3	10	0%	-	-	-	-	5.1	5.9	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	462	IA	CFC-12	75-71-8	UG/M3	10	30%	3.17	2.01	4.2	7.4	3.7	4.2	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	462	IA	Heptane	142-82-5	UG/M3	10	0%	-	-	-	-	3	3.5	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	462	IA	Hexachlorobutadiene	87-68-3	UG/M3	10	0%	-	-	-	-	31	36	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	462	IA	Hexane	110-54-3	UG/M3	10	100%	22.4	29.4	5.7	100	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	462	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	10	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	10	0%	-	-	-	-	10	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	462	IA	Methylene Chloride	75-09-2	UG/M3	10	0%	-	-	-	-	25	30	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	462	IA	Naphthalene	91-20-3	UG/M3	10	0%	-	-	-	-	7.6	8.9	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	462	IA	o-Xylene	95-47-6	UG/M3	10	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	Propylbenzene	103-65-1	UG/M3	10	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%



Table 5.2.7-2. Building 462 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	IA	Styrene	100-42-5	UG/M3	10	0%	-	-	-	-	3.1	3.6	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	462	IA	Tetrachloroethene	127-18-4	UG/M3	10	0%	-	-	-	-	4.9	5.8	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	462	IA	Tetrahydrofuran	109-99-9	UG/M3	10	0%	-	-	-	-	2.1	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	462	IA	Toluene	108-88-3	UG/M3	10	30%	2.21	1.13	3	4.4	2.8	3.2	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	462	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	10	0%	-	-	-	-	6.6	7.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	462	IA	Total Xylenes	1330-20-7	UG/M3	10	0%	-	-	-	-	6.2	7.4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	10	0%	-	-	-	-	2.9	3.4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	462	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	10	0%	-	-	-	-	3.3	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	462	IA	Trichloroethene	79-01-6	UG/M3	10	0%	-	-	-	-	3.9	4.6	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	462	IA	Vinyl Chloride	75-01-4	UG/M3	10	0%	-	-	-	-	1.8	2.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	462	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 2	462	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5.7	5.7	-	-	-	-
Category 2	462	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4.6	4.6	-	-	-	-
Category 2	462	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	462	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	462	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	25	25	-	-	-	-
Category 2	462	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 2	462	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 2	462	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	462	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	462	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	462	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 2	462	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 2	462	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 2	462	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	462	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	9.8	9.8	-	-	-	-
Category 2	462	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	14	14	-	-	-	-
Category 2	462	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	8.2	8.2	-	-	-	-
Category 2	462	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	462	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	462	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	20	20	-	-	-	-
Category 2	462	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	462	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	462	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	18	18	-	-	-	-
Category 2	462	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 2	462	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	8.6	8.6	-	-	-	-
Category 2	462	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	32	32	-	-	-	-
Category 2	462	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	462	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	5.2	5.2	-	-	-	-
Category 2	462	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	462	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	8.8	8.8	-	-	-	-
Category 2	462	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 2	462	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	462	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	462	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 2	462	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	7.1	7.1	-	-	-	-
Category 2	462	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	24	24	-	-	-	-
Category 2	462	OA	Ethanol	64-17-5	UG/M3	1	0%	-	-	-	-	6.3	6.3	-	-	-	-
Category 2	462	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	462	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 2	462	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 2	462	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.8	5.8	-	-	-	-

**Table 5.2.7-2. Building 462 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	462	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	36	36	-	-	-	-
Category 2	462	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 2	462	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	462	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 2	462	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	29	29	-	-	-	-
Category 2	462	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	8.8	8.8	-	-	-	-
Category 2	462	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	462	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	462	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	462	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5.7	5.7	-	-	-	-
Category 2	462	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	462	OA	Toluene	108-88-3	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	462	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	7.6	7.6	-	-	-	-
Category 2	462	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	7.2	7.2	-	-	-	-
Category 2	462	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	462	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	462	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.5	4.5	-	-	-	-
Category 2	462	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2.1	2.1	-	-	-	-

## 5.2.8 Vapor Intrusion Evaluation for Building 680

### BACKGROUND

Building 680 is a Category 2 building in Zone 1. It is a large building that includes both process areas and office space. It is known as the Sulfonamides building (see Figure 5.2.8-1) and is located within the southwest portion of the facility designated as Zone 1. The building is four stories tall, but has only two internal floors. The building was constructed in 1960 and is slab-on-grade construction with a footprint of approximately 8,500 ft<sup>2</sup> (790 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 15, 2016 and the results can be found in Appendix C. Building 680 contains process areas, a control room, storage areas, a small laboratory, a locker room, a garage, and office space. The building has central air conditioning with the air intake at roof level and a steam radiation heating system. There is one large bay door that is open to the west during the work day in good weather. Building 680 has a service elevator located outside of the office areas. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified. A chemical inventory was completed during the building survey and a wide variety of chemicals was found to be stored within the building and each is listed in the survey (e.g., bleach, various cleaners, water-based bug killer containing pyrethrum, wasp spray containing 80-90% petroleum distillates). Also listed on the chemical inventory are the contents of the chemical storage cabinets which included a number of analytes on the TAL including acetone, dichloromethane, hexane, isopropyl alcohol, methanol, MEK, methylene chloride, and toluene.

### DATA SUMMARY

On October 13, 2016, sub-slab soil gas samples were collected from four locations from within the building. Indoor air samples were collected on October 14, 2016 at four locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.2.8-2. Summary statistics of the analytical results for sub-slab soil gas for Building 680 are presented on Table 5.2.8-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.8-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 34 of the 65 target analytes were ND in each of the four samples collected at Building 680. Thirty-two of the ND analytes had reporting limits that met screening levels and were eliminated from further VI evaluation (EDB and HCB had ND reporting limit exceedances that will be discussed further below). A total of 31 analytes were detected in one or more of the four sub-slab soil gas samples. These included 17 chlorinated VOCs, 1 brominated VOC, and 7 petroleum hydrocarbons, along with a few common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Ten analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Fifteen analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Six analytes that were detected above nonresidential screening levels.

The sub-slab soil gas results are summarized in Table 680-1. Of the 15 analytes detected above *de minimus* levels but below screening levels, only three had detection frequencies of 100% (trans-1,2-dichloroethene [DCE], 1,1,-DCE, and chloroform). Only the analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI. Therefore, AOIs in soil gas at Building 680 include PCE, TCE, cis-1,2-DCE, 1,2-dichloroethane, HCB, and EDB.

**Table 680-1. Summary of Sub-Slab Soil Gas Detects for Building 680**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Tetrachloroethene (PCE)	100%	1,800 - 460,000	25%	23,000
Trichloroethene (TCE)	100%	220 - 18,000	50%	1,200
cis-1,2-Dichloroethene	100%	30 - 17,000	50%	4,100
1,2-Dichloroethane	75%	7.9 - 850	25%	700
Hexachlorobutadiene (HCB)	75%	17 - 4,600	50%	830
1,2-Dibromoethane (EDB)	25%	240	25%	30
<b>Above <i>de minimus</i> levels but below screening levels</b>				
trans-1,2-Dichloroethene	100%	21 - 1,300	0%	41,000
1,1-Dichloroethene (1,1-DCE)	100%	26 - 5,100	0%	120,000
Chloroform	100%	170 - 2,000	0%	7,600
1,1-Dichloroethane	75%	28 - 570	0%	290,000
1,2-Dichloropropane	75%	34 - 100	0%	2,300
CFC-12	75%	47 - 5,600	0%	29,000,000
1,1,1-Trichloroethane	50%	540 - 2,700	0%	3,500,000
Carbon Tetrachloride	75%	30 - 1,100	0%	3,000
Cyclohexane	50%	22 - 170	0%	3,500,000
2-Butanone (MEK)	50%	18 - 240	0%	2,900,000
Chlorobenzene	25%	150	0%	41,000
Total Xylenes	25%	133	0%	58,000
Acetone	50%	55 -170	0%	3,400,000
1,1,2-Trichloroethane	25%	720	0%	1,100
Methylene Chloride	25%	1,000	0%	39,000
<b>Below <i>de minimus</i> levels</b>				
Ethanol	50%	13 - 72	N/A	N/A
1,2-Dichlorobenzene	25%	52	0%	180,000
1,4-Dichlorobenzene	25%	33	0%	2,600
Bromoform	25%	84	0%	17,000
Benzene	25%	67	0%	2,200
Toluene	25%	63	0%	2,900,000
Ethylbenzene	25%	36	0%	59,000
Hexane	25%	53	0%	410,000
Heptane	25%	28	0%	2,000,000
1,3-Butadiene <sup>a</sup>	25%	52	N/A	N/A

<sup>a</sup> - Compound is a combustion product with a short half-life and would not persist in soil gas.

N/A = No screening level available

Another line of evidence taken into consideration was data from Building 838, a smaller building immediately south of Building 680. Building 838 is known as the Sulfonamides Shop and is discussed in more detail in Section 5.2.9. Given its proximity to Building 680, the Building 838 data was compared with the Building 680 data. In general, the sub-slab soil gas at Building 838 had somewhat fewer

chlorinated VOCs (e.g., no cis- or trans-1,2-DCE) and much lower concentrations than the sub-slab soil gas results at Building 680. Both PCE and TCE were detected in sub-slab soil gas at Building 838, but the maximum concentrations of both were <15% of the maximum concentrations at Building 680.

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, four indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes.

Additionally, one outdoor air sample was collected immediately upwind of the building. Table 680-2 below shows the analytes detected in each of the three media sampled.

**Table 680-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
cis-1,2-Dichloroethene	X	•	
PCE	X	•	
TCE	X	•	
<i>Toluene</i>	•	•	
1,2-Dichloroethane	X		
EDB	X		
HCB	X		
1,1,1-Trichloroethane	•		
1,1,2-Trichloroethane	•		
1,1-Dichloroethane	•		
1,1-DCE	•		
1,2-Dichloropropane	•		
<i>1,2-Dichlorobenzene</i>	•		
<i>1,3-Butadiene</i>	•		
<i>1,4-Dichlorobenzene</i>	•		
2-Butanone (MEK)	•		
Acetone	•		
<i>Benzene</i>	•		
Carbon Tetrachloride	•		
CFC 12	•		
Chloroform	•		
Cyclohexane	•		
<i>Ethanol</i>	•		
<i>Ethylbenzene</i>	•		
<i>Heptane</i>	•		
<i>Hexane</i>	•		
Methylene Chloride	•		
trans-1,2-Dichloroethene	•		
Total Xylenes	•		

• = Detect

= Non-detect

X = Detect exceeds screening level

*Italics* = *de minimus* detect(s) in sub-slab soil gas

Sixty-one of the 65 indoor air analytes were ND in each of the samples. Fifty-four of the ND analytes had reporting limits that met the screening level and were eliminated from further evaluation. Seven ND

analytes had reporting limits that exceeded the screening level and will be discussed further below. The four analytes detected in indoor air were PCE, TCE, cis-1,2-DCE and toluene. None of the detected values in indoor air exceeded applicable screening levels and were eliminated from further evaluation. All results for the outdoor air sample collected were ND.

Table 680-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 680-3. Vapor Intrusion Evaluation for Building 680**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above soil gas screening levels</b>				
PCE	50%	<5.3 - 30	180	<5.4
TCE	50%	<4.2 - 5.7	8.8	<4.3
cis-1,2-Dichloroethene	50%	<3.1 - 14	31	<3.2
1,2-Dichloroethane	0%	<3.2 - <3.4	5.3	<3.2
HCB	0%	<33 - <36	6.2	<34
EDB	0%	<6.0 - <6.4	0.23	<6.1
<b>Detected in soil gas above <i>de minimus</i> levels but below soil gas screening levels</b>				
trans-1,2-Dichloroethene	0%	<3.1 - <3.3	310	<3.2
1,1-DCE	0%	<3.1 - <3.3	880	<3.2
Chloroform	0%	<3.8 - <4.1	57	<3.9
1,1-Dichloroethane	0%	<3.2 - <3.4	2,200	<3.2
1,2-Dichloropropane	0%	<3.6 - <3.8	18	<3.7
CFC-12	0%	<3.8 - <4.1	220,000	<3.9
1,1,1-Trichloroethane	0%	<4.2 - <4.6	26,000	<4.3
Carbon Tetrachloride	0%	<4.9 - <5.2	23	<5
Cyclohexane	0%	<2.7 - <2.9	26,000	<2.7
2-Butanone (MEK)	0%	<9.2 - <9.8	22,000	<9.4
Chlorobenzene	0%	<3.6 - <3.8	310	<3.6
Total Xylenes	0%	<6.8 - <7.2	440	<6.8
Acetone	0%	<18 - <20	26,000	<19
1,1,2-Trichloroethane	0%	<4.2 - <4.6	8.5	<4.3
Methylene Chloride	0%	<27 - <29	290	<28
<b>Detected in Soil Gas Below <i>de minimus</i> levels</b>				
Toluene	25%	<3 - 5.7	22,000	<3.0
Ethanol	0%	<5.9 - <6.3	N/A	<6
1,2-Dichlorobenzene	0%	<4.7 - <5	1300	<4.8
1,4-Dichlorobenzene	0%	<4.7 - <5	20	<4.8
Bromoform	0%	<8.1 - <8.6	120	<8.2
Benzene	0%	<2.5 - <2.7	16	<2.5
Ethylbenzene	0%	<3.4 - <3.6	440	<3.4
Hexane	0%	<2.7 - <2.9	3,100	<2.8
Heptane	0%	<3.2 - <3.4	15,000	<3.2
1,3-Butadiene	0%	<1.7 - <1.8	N/A	<1.8

N/A = No screening level available

< = Non-detect at the reporting limit provided

Of the four analytes detected indoors, toluene was the only analyte found to be stored or used indoors during the chemical inventory conducted as part of the building survey. For toluene, occupational exposure limits (OELs) may be a more relevant comparison than the screening level shown, given its storage and/or use within the building. The one detection for toluene was far below both the screening level and typical OELs for this compound.

As shown on Tables 680-2 and 630-3, of the six AOIs identified in sub-slab soil gas (PCE, TCE, cis-1,2-DCE, 1,2-dichloroethane, HCB, and EDB), three were detected in indoor air (PCE, TCE and cis-1,2-DCE); however, since the indoor air results do not exceed the screening levels, the VI pathway is considered insignificant at this time.

There were seven ND analytes in indoor air with reporting limits that exceeded the indoor air screening level. Of these, only EDB and HCB were detected in sub-slab soil gas and had ND reporting limits in sub-slab soil gas that exceeded the screening level. The other five ND analytes in indoor air (1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, alpha-chlorotoluene, bromomethane, and dibromochloromethane) were also ND in sub-slab soil gas with reporting limits that met the screening levels. Therefore, the five ND indoor air analytes with reporting limits that exceed the indoor air screening level were eliminated from further evaluation since there is no evidence of VI. EDB and HCB were already identified as AOIs due to detections in sub-slab soil gas that exceed the screening levels. Furthermore, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB and HCB, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated.

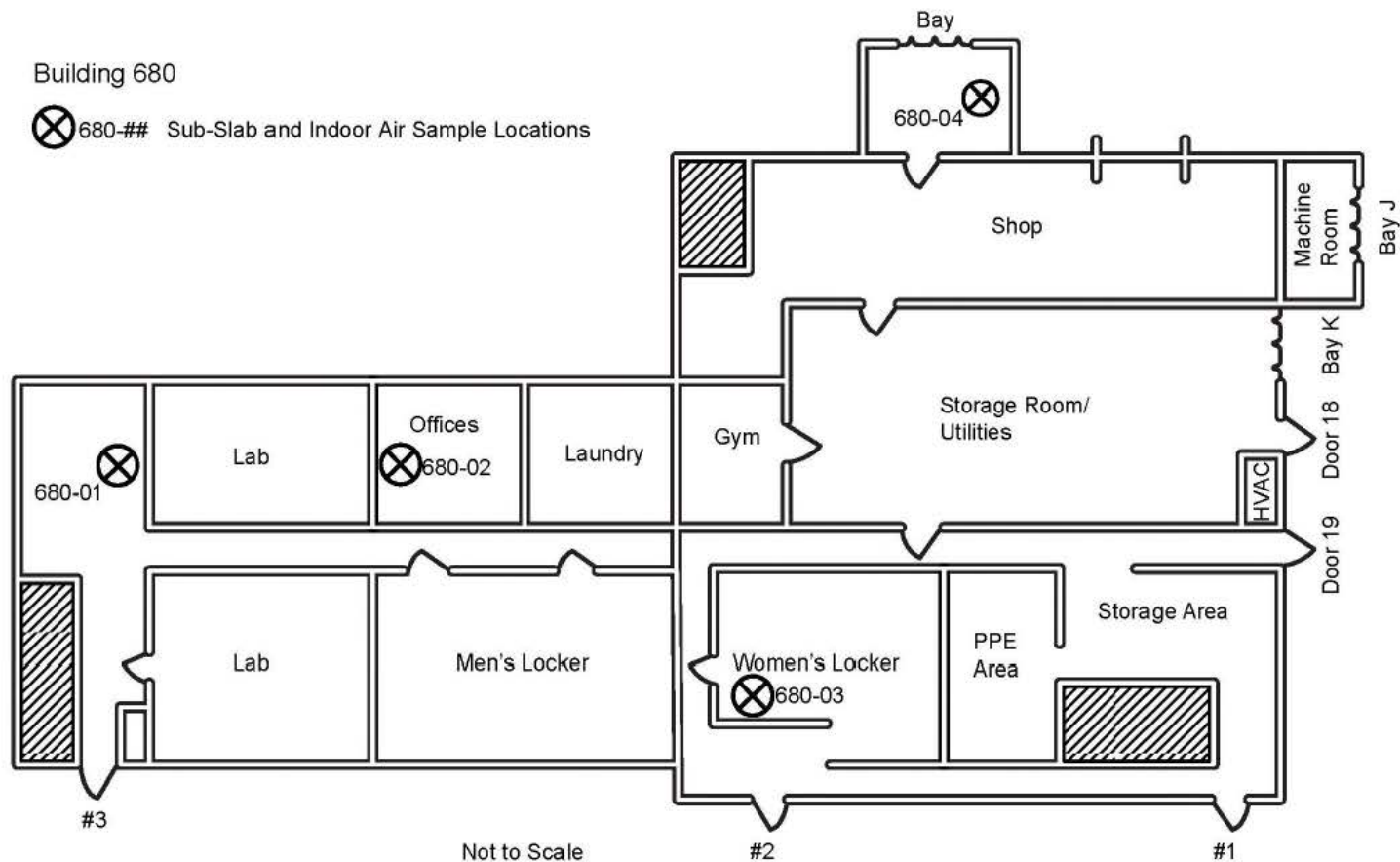
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 680 is an insignificant exposure pathway based on current use. However, based on sub-slab soil gas results and given the potential for future VI, Building 680 was placed into VI Path Forward Building Group 2 (see Figure 5-3) and was resampled in August 2017. The second round of sampling is evaluated and discussed in Section 5.3.4. Additionally, PCE, TCE, cis-1,2-DCE, 1,2-dichloroethane, HCB, and EDB will be added to the Industrial Hygiene monitoring for the building.





Figure 5.2.8-2. Building 680 Sample Locations



Note: Outdoor air sample was collected from rooftop immediately west of doorway used to access rooftop.

<b>AECOM</b>
Vapor Intrusion Sampling Figure 5.2.8-2 The Dow Chemical Company Midland, Michigan

**Table 5.2.8-1. Building 680 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	4	50%	825	1273	540	2700	30	89	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	680	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.9	310	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	680	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	4	25%	222	336	720	720	4.7	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	680	SS	1,1-Dichloroethane	75-34-3	UG/M3	4	75%	182	261	28	570	66	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	680	SS	1,1-Dichloroethene	75-35-4	UG/M3	4	100%	1392	2474	26	5100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	680	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	25	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	680	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	0%	-	-	-	-	4.2	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	680	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	25%	120	106	240	240	6.6	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	25%	50%
Category 2	680	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	4	25%	59.8	55.1	52	52	5.1	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	680	SS	1,2-Dichloroethane	107-06-2	UG/M3	4	75%	303	391	7.9	850	66	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	25%	0%
Category 2	680	SS	1,2-Dichloropropane	78-87-5	UG/M3	4	75%	76.5	33.0	34	100	210	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	680	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	4.2	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	680	SS	1,3-Butadiene	106-99-0	UG/M3	4	25%	30.1	24.8	52	52	1.9	99	No Screening Value Available	-	-	-
Category 2	680	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	5.1	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	680	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	4	25%	55.0	56.8	33	33	5.1	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	680	SS	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	12	640	No Screening Value Available	-	-	-
Category 2	680	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	4	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	200000	0%	0%
Category 2	680	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	50%	139	132	18	240	64	530	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	680	SS	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	14	730	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	680	SS	2-Propanol	67-63-0	UG/M3	4	0%	-	-	-	-	8.4	440	No Screening Value Available	-	-	-
Category 2	680	SS	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	11	560	No Screening Value Available	-	-	-
Category 2	680	SS	4-Ethyltoluene	622-96-8	UG/M3	4	0%	-	-	-	-	4.2	220	No Screening Value Available	-	-	-
Category 2	680	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.5	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	680	SS	Acetone	67-64-1	UG/M3	4	50%	158	70	55	170	390	420	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	680	SS	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	4.4	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	680	SS	Benzene	71-43-2	UG/M3	4	25%	41.1	33.2	67	67	2.7	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	680	SS	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	18	350	No Screening Value Available	-	-	-
Category 2	680	SS	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5.7	300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	680	SS	Bromofom	75-25-2	UG/M3	4	25%	101	94	84	84	8.8	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	680	SS	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	33	700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	680	SS	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	11	560	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	680	SS	Carbon Tetrachloride	56-23-5	UG/M3	4	75%	465	520	30	1100	100	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	680	SS	Chlorobenzene	108-90-7	UG/M3	4	25%	73.7	66.4	150	150	3.9	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	680	SS	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	9	470	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	680	SS	Chloroform	67-66-3	UG/M3	4	100%	1013	880	170	2000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	680	SS	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	18	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	680	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	100%	7660	8635	30	17000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	50%	0%
Category 2	680	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.9	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	680	SS	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	4.2	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	680	SS	Cyclohexane	110-82-7	UG/M3	4	50%	55.4	77.3	22	170	2.9	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	680	SS	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	7.3	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	680	SS	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	24	1300	No Screening Value Available	-	-	-
Category 2	680	SS	Ethanol	64-17-5	UG/M3	4	50%	78.8	65.9	13	72	120	340	No Screening Value Available	-	-	-
Category 2	680	SS	Ethylbenzene	100-41-4	UG/M3	4	25%	42.1	38.7	36	36	3.7	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	680	SS	CFC-11	75-69-4	UG/M3	4	0%	-	-	-	-	4.8	250	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 2	680	SS	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	6.6	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	680	SS	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	6	310	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	680	SS	CFC-12	75-71-8	UG/M3	4	75%	1479	2748	47	5600	81	81	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	680	SS	Heptane	142-82-5	UG/M3	4	25%	38.3	37.1	28	28	3.5	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	680	SS	Hexachlorobutadiene	87-68-3	UG/M3	4	75%	2280	2070	170	4600	1900	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	50%	25%
Category 2	680	SS	Hexane	110-54-3	UG/M3	4	25%	40.9	33.5	53	53	3	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	680	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	25%	56.8	46.2	95	95	3.7	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	680	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	12	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	680	SS	Methylene Chloride	75-09-2	UG/M3	4	25%	349	449	1000	1000	30	570	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	680	SS	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	9	940	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	680	SS	o-Xylene	95-47-6	UG/M3	4	25%	42.6	38.6	38	38	3.7	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.8-1. Building 680 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	SS	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	4.2	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	680	SS	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	3.6	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	680	SS	Tetrachloroethene	127-18-4	UG/M3	4	100%	118850	227471	1800	460000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	25%	0%
Category 2	680	SS	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.5	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	680	SS	Toluene	108-88-3	UG/M3	4	25%	45.2	36.5	63	63	3.2	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	680	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	7.8	400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	680	SS	Total Xylenes	1330-20-7	UG/M3	4	25%	99.4	80.2	133	133	7.4	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	680	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	100%	438	601	21	1300	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	680	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.9	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	680	SS	Trichloroethene	79-01-6	UG/M3	4	100%	5503	8471	220	18000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	50%	0%
Category 2	680	SS	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	2.2	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.2.8-2. Building 680 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	4	0%	-	-	-	-	4.2	4.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	680	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.4	5.7	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 2	680	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	4.2	4.6	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	680	IA	1,1-Dichloroethane	75-34-3	UG/M3	4	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	680	IA	1,1-Dichloroethene	75-35-4	UG/M3	4	0%	-	-	-	-	3.1	3.3	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	680	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	23	25	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 2	680	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	680	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	6	6.4	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	680	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	4.7	5	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	680	IA	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	680	IA	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	3.6	3.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	680	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	680	IA	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	1.7	1.8	No Screening Value Available	-	-	-
Category 2	680	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	4.7	5	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	680	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	4.7	5	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	680	IA	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	11	12	No Screening Value Available	-	-	-
Category 2	680	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.6	3.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	680	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	0%	-	-	-	-	9.2	9.8	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	680	IA	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	13	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	680	IA	2-Propanol	67-63-0	UG/M3	4	0%	-	-	-	-	7.7	8.2	No Screening Value Available	-	-	-
Category 2	680	IA	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	9.8	10	No Screening Value Available	-	-	-
Category 2	680	IA	4-Ethyltoluene	622-96-8	UG/M3	4	0%	-	-	-	-	3.8	4.1	No Screening Value Available	-	-	-
Category 2	680	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	680	IA	Acetone	67-64-1	UG/M3	4	0%	-	-	-	-	18	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	680	IA	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	4	4.3	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 2	680	IA	Benzene	71-43-2	UG/M3	4	0%	-	-	-	-	2.5	2.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	680	IA	Bromochloromethane	74-97-5	UG/M3	4	0%	-	-	-	-	16	18	No Screening Value Available	-	-	-
Category 2	680	IA	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5.2	5.6	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	680	IA	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	8.1	8.6	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	680	IA	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	30	32	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 2	680	IA	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	9.7	10	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	680	IA	Carbon Tetrachloride	56-23-5	UG/M3	4	0%	-	-	-	-	4.9	5.2	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	680	IA	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	3.6	3.8	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	680	IA	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	8.2	8.8	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	680	IA	Chloroform	67-66-3	UG/M3	4	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	680	IA	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	16	17	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	680	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	50%	7.05	6.41	11	14	3.1	3.3	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	680	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.5	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	680	IA	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	680	IA	Cyclohexane	110-82-7	UG/M3	4	0%	-	-	-	-	2.7	2.9	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	680	IA	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	6.6	7.1	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 2	680	IA	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	22	24	No Screening Value Available	-	-	-
Category 2	680	IA	Ethanol	64-17-5	UG/M3	4	0%	-	-	-	-	5.9	6.3	No Screening Value Available	-	-	-
Category 2	680	IA	Ethylbenzene	100-41-4	UG/M3	4	0%	-	-	-	-	3.4	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	CFC-11	75-69-4	UG/M3	4	0%	-	-	-	-	4.4	4.7	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	680	IA	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	6	6.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	680	IA	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	5.4	5.8	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	680	IA	CFC-12	75-71-8	UG/M3	4	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	680	IA	Heptane	142-82-5	UG/M3	4	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	680	IA	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	33	36	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	680	IA	Hexane	110-54-3	UG/M3	4	0%	-	-	-	-	2.7	2.9	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	680	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	0%	-	-	-	-	3.4	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	11	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	680	IA	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	27	29	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	680	IA	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	8.2	8.8	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	680	IA	o-Xylene	95-47-6	UG/M3	4	0%	-	-	-	-	3.4	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

Table 5.2.8-2. Building 680 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	IA	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	3.3	3.6	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	680	IA	Tetrachloroethene	127-18-4	UG/M3	4	50%	15.4	14.7	26	30	5.3	5.7	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	680	IA	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	680	IA	Toluene	108-88-3	UG/M3	4	25%	2.56	2.09	5.7	5.7	3	3.1	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	680	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	7	7.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	680	IA	Total Xylenes	1330-20-7	UG/M3	4	0%	-	-	-	-	6.8	7.2	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	3.1	3.3	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	680	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.5	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	680	IA	Trichloroethene	79-01-6	UG/M3	4	50%	3.76	1.86	5	5.7	4.2	4.5	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	680	IA	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	2	2.1	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	680	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	680	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	680	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	680	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	24	24	-	-	-	-
Category 2	680	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	680	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	680	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	680	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	680	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	680	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	680	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 2	680	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	680	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	9.4	9.4	-	-	-	-
Category 2	680	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	13	13	-	-	-	-
Category 2	680	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	7.8	7.8	-	-	-	-
Category 2	680	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	680	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	19	19	-	-	-	-
Category 2	680	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	680	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	680	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 2	680	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	5.3	5.3	-	-	-	-
Category 2	680	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	8.2	8.2	-	-	-	-
Category 2	680	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	31	31	-	-	-	-
Category 2	680	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	9.9	9.9	-	-	-	-
Category 2	680	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 2	680	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	680	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	8.4	8.4	-	-	-	-
Category 2	680	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 2	680	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	680	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	680	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.8	6.8	-	-	-	-
Category 2	680	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	23	23	-	-	-	-
Category 2	680	OA	Ethanol	64-17-5	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	680	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	680	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.5	4.5	-	-	-	-
Category 2	680	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	680	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-

**Table 5.2.8-2. Building 680 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	34	34	-	-	-	-
Category 2	680	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	680	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	680	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 2	680	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	28	28	-	-	-	-
Category 2	680	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	8.3	8.3	-	-	-	-
Category 2	680	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	680	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	680	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	680	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	680	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	680	OA	Toluene	108-88-3	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 2	680	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	7.2	7.2	-	-	-	-
Category 2	680	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	6.8	6.8	-	-	-	-
Category 2	680	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	680	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	680	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	680	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-

## 5.2.9 Vapor Intrusion Evaluation for Building 838

### BACKGROUND

Building 838 is a Category 2 building in Zone 1. It is a metal building that includes office space and a shop. It is known as the Sulfonamides Shop (see Figure 5.2.9-1) and is located within the southwest portion of the facility designated as Zone 1. The building is single story and is approximately 2,885 ft<sup>2</sup> (268 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 15, 2016 and the results can be found in Appendix C. The building has central air conditioning with an air intake located on the roof next to air conditioner unit. There is one bay door that is infrequently left open. The land surrounding the building is covered in asphalt. Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified degreasers, cleaners, motor oil, and insecticides.

### DATA SUMMARY

On October 13, 2016, sub-slab soil gas samples were collected from three locations within the building. Indoor air samples were collected on October 14, 2016 at three locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.2.9-2. Summary statistics of the analytical results for sub-slab soil gas for Building 838 are presented on Table 5.2.9-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.2.9-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 40 of the 65 target analytes were ND in each of the three samples collected at Building 838. All but one of the ND soil gas analytes had reporting limits that met the respective screening level (one of the three ND reporting limits for EDB exceeded the screening level). Therefore, the ND analytes were eliminated from further VI evaluation. A total of 25 analytes were detected in one or more of the three sub-slab soil gas samples. These analytes include, but are not limited to, 10 chlorinated VOCs, 6 petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Seventeen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Six analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Two analytes were detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 838-1. Of the six analytes detected above *de minimus* levels but below screening levels, only two (TCE and chloroform) were detected in all three samples (100% detection frequency). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI, which are HCB and PCE. HCB was detected in two of the three sub-slab soil gas samples and only one detect exceeded the screening level. PCE was detected in all three sub-slab soil gas samples and only one detect exceeded the screening level.

**Table 838-1. Summary of Sub-Slab Soil Gas Detects for Building 838**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Hexachlorobutadiene (HCB)	67%	38 - 3,000	33%	830
Tetrachloroethene (PCE)	100%	120 - 28,000	33%	23000
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	67%	14 - 180	0%	3500000
Acetone	67%	54 - 120	0%	3400000
Chloroform	100%	10 - 130	0%	7600
CFC 12	67%	100 - 180	0%	29000000
Toluene	67%	76 - 160	0%	2900000
Trichloroethene (TCE)	100%	7.2 - 700	0%	1200
<b>Below <i>de minimus</i> levels</b>				
1,1,2-Trichloroethane	33%	13	0%	1100
1,1-Dichloroethane	67%	4.6 - 72	0%	290000
1,1-Dichloroethene	33%	11	0%	120000
1,2,4-Trimethylbenzene	67%	13 - 14	0%	130000
1,2-Dichloroethane	33%	10	0%	700
1,2-Dichloropropane	33%	6.5	0%	2300
1,3,5-Trimethylbenzene	67%	6 - 6.1	0%	130000
2-Butanone (MEK)	33%	22	0%	2900000
Benzene	67%	9.3 - 18	0%	2200
Carbon Tetrachloride	33%	8.6	0%	3000
Chlorobenzene	33%	6.1	0%	41000
Cyclohexane	67%	12 - 25	0%	3500000
Ethanol	67%	32 - 96	N/A	N/A
Ethylbenzene	67%	18 - 27	0%	59000
Heptane	67%	25 - 52	0%	2000000
Hexane	67%	34 - 63	0%	410000
Total Xylenes	67%	59	0%	58000

N/A = No screening level available

Another line of evidence taken into consideration was data from Building 680, which is a larger building immediately north of Building 838. Building 680 is known as the Sulfonamides building and was discussed in Section 5.2.8. Given the building's proximities, the data was compared and in general, the sub-slab soil gas from Building 680 had more chlorinated VOCs detected (e.g., cis- or trans-1,2-DCE) and at higher concentrations than the sub-slab soil gas results from Building 838. Both PCE and TCE were detected in the soil gas at Building 838, but the maximum concentrations of both were <15% of the maximum concentrations at Building 680.

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, three indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 838-2 below shows the detections in each of the three media sampled.



**Table 838-2. Detections Matrix**

Compound	Sub-Slab	Indoor Air	Outdoor Air
<i>Ethanol</i>	•	•	
HCB	X		
PCE	X		
1,1,1-Trichloroethane	•		
Acetone	•		
Chloroform	•		
CFC 12	•		
Toluene	•		
TCE	•		
<i>1,2-Dichloroethane</i>	•		
<i>1,1-Dichloroethane</i>	•		
<i>1,1-Dichloroethene</i>	•		
<i>Carbon tetrachloride</i>	•		
<i>1,2-Dichloropropane</i>	•		
<i>Chlorobenzene</i>	•		
<i>Benzene</i>	•		
<i>Ethylbenzene</i>	•		
<i>Total Xylenes</i>	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>Hexane</i>	•		
<i>Heptane</i>	•		
<i>Cyclohexane</i>	•		
<i>2-Butanone</i>	•		
<i>1,1,2-Trichloroethane</i>	•		

• = Detected

= Non-detect

X = Detection exceeds screening level

*Italics = de minimus detections in sub-slab soil gas*

Sixty-four of the 65 indoor air analytes were ND in each of the samples. Fourteen of these ND analytes had reporting limits that exceeded the screening levels and are discussed further below. The 50 ND analytes with reporting limits that met the screening level were eliminated from further evaluation. The single detected analyte in indoor air was ethanol, which does not have an available screening level. All results for the outdoor air sample collected were ND.

Table 838-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 838-3. Vapor Intrusion Evaluation for Building 838**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above nonresidential screening levels</b>				
Hexachlorobutadiene (HCB)	0%	<35 - <130	6.2	<34
Tetrachloroethene (PCE)	0%	<5.6 - <21	180	<5.4
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<4.5 - <16	26000	<4.4
Acetone	0%	<19 - <72	26000	<19
Chloroform	0%	<4 - <15	57	<3.9
CFC 12	0%	<4 - <15	220000	<4
Toluene	0%	<3.1 - <11	22000	<3
Trichloroethene (TCE)	0%	<4.4 - <16	8.8	<4.3
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
Ethanol	100%	270 - 5700	N/A	<6
1,1,2-Trichloroethane	0%	<4.5 - 16	8.5	<4.4
1,1-Dichloroethane	0%	<3.3 - <12	2200	<3.2
1,1-Dichloroethene	0%	<3.2 - <12	880	<3.2
1,2,4-Trimethylbenzene	0%	<4 - <15	960	<3.9
1,2-Dichloroethane	0%	<3.3 - <12	5.3	<3.2
1,2-Dichloropropane	0%	<3.8 - <14	18	<3.7
1,3,5-Trimethylbenzene	0%	<4 - <15	960	<3.9
2-Butanone (Methyl Ethyl Ketone)	0%	<9.7 - <36	22000	<9.4
Benzene	0%	<2.6 - <9.7	16	<2.6
Carbon Tetrachloride	0%	<5.2 - <19	23	<5
Chlorobenzene	0%	<3.8 - <14	310	<3.7
Cyclohexane	0%	<2.8 - <10	26000	<2.8
Ethylbenzene	0%	<3.6 - <13	440	<3.5
Heptane	0%	<3.4 - <12	15000	<3.3
Hexane	0%	<2.9 - <11	3100	<2.8
Total Xylenes	0%	<7.2 - <26	440	<7

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

While ethanol does not have a screening level for indoor air, it was detected in sub-slab soil gas below the *de minimus* level, and is therefore eliminated from further VI evaluation. Since the results of the outdoor air sample collected indicated that all analytes were ND, ethanol is likely not present due to migration from outdoor air. Ethanol was detected in 100% of the indoor air samples. The fact that indoor air has far more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Purex, Scrubbing Bubbles, etc.

As shown in Tables 838-2 and 838-3, of the two AOIs identified in sub-slab soil gas (HCB and TCE), neither were detected in indoor air. Therefore, the VI pathway is considered insignificant at this time.

There were 14 ND analytes in indoor air with at least one reporting limit above the respective screening level. Of these 14 analytes, only four analytes were detected in sub-slab soil gas including 1,1,2-trichloroethane, 1,2-dichloroethane, HCB, and TCE. HCB and TCE were already identified as AOIs for

Building 838 due to detected results in soil gas greater than screening levels; however, since 1,1,2-trichloroethane and 1,2-dichloroethane were detected in soil gas (below the *de minimus* level), these two ND indoor air analytes are further discussed below. EDB was ND in all media sampled (one of the three ND reporting limits exceeded the sub-slab soil gas screening level) and all of the indoor air reporting limits exceeded the indoor air screening level. Due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB, further investigation for this analyte will be conducted once the facility-wide priority buildings have been sampled and evaluated.

## BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION

VI evaluations utilize attenuation factors, which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 838-1, 25 analytes were detected in sub-slab soil gas but only three were detected at a 100% detection frequency. The data for these three analytes is provided in Table 838-4. Attenuation factors based on both average and maximum concentrations are shown.

**Table 838-4. VI Attenuation Factors for Building 838**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )		
		PCE	Chloroform	TCE
Indoor Air	838-IA-01	<8.6	<6.2	<6.8
	838-IA-02	<5.6	<4	<4.4
	838-IA-03	<21	<15	<16
	Average	<11.7	<8.4	<9.1
Sub-Slab Soil Gas	838-SS-01	120	10	7.2
	838-SS-02	28000	130	700
	838-SS-03	1900	57	190
	Average	10,007	65.7	299
Attenuation Factors ( $\alpha$ )	Average	<1.2E-03	<1.3E-01	<3.0E-02
	Maximum	<7.5E-04	<1.2E-01	<2.3E-02

Notes:

1. Non-detect values were used to calculate the attenuation factor (the full RL value was used).
2. The indoor air values were not adjusted for the outdoor air results.
3. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

The most conservative attenuation factor calculated is for chloroform; however, this value is likely not representative of building conditions. Chloroform is a trihalomethane commonly found in indoor air due to its presence in chlorinated water supplies. Therefore, its presence in indoor air is not unexpected. It also was detected in sub-slab soil gas, but an attenuation factor of approximately 0.1 strongly suggests that the chloroform detected indoors is largely or entirely due to indoor sources. Therefore, any attenuation factor calculated for chloroform at this building is not meaningful for evaluating VI potential for other compounds.

Therefore, the attenuation factor calculated for TCE based on the average value was selected as the best estimate of a conservative, building attenuation factor. If the maximum value is used, the attenuation factor is slightly smaller and less conservative. Furthermore, since TCE was detected in sub-slab soil gas but was ND in indoor air, the estimated attenuation factor is even more conservative than an attenuation

factor calculated for an analyte with detected results in both media. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 838 is <math>3.0E-02</math>.

The building-specific attenuation factor was used to estimate the indoor air concentrations for 1,1,2-trichloroethane and 1,2-dichloroethane, as shown in Table 838-5, where:

$$\text{Estimated indoor air concentration} = (\text{Sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 838-5. Estimated Indoor Air Concentrations for Non-Detect Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub-Slab Soil Gas Concentration ( $\mu\text{g}/\text{m}^3$ )	Maximum Sub-Slab Soil Gas Detected Concentration ( $\mu\text{g}/\text{m}^3$ )	Building Specific Attenuation Factor $\alpha$	Estimated Indoor Air Concentration ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Exceeds Screening Level?
1,1,2-Trichloroethane	<100	13	<math>3.0E-02</math>	3.0	8.5	No
1,2-Dichloroethane	<74	72	<math>3.0E-02</math>	2.2	5.3	No

In order to be conservative, the estimated indoor air concentrations for both analytes were based on the maximum sub-slab soil gas concentrations (both of which were ND reporting limits since those results were higher than the detected results in soil gas). As shown above, the estimated indoor air concentrations for 1,1,2-trichloroethane and 1,2-dichloroethane do not exceed relevant indoor air screening levels.

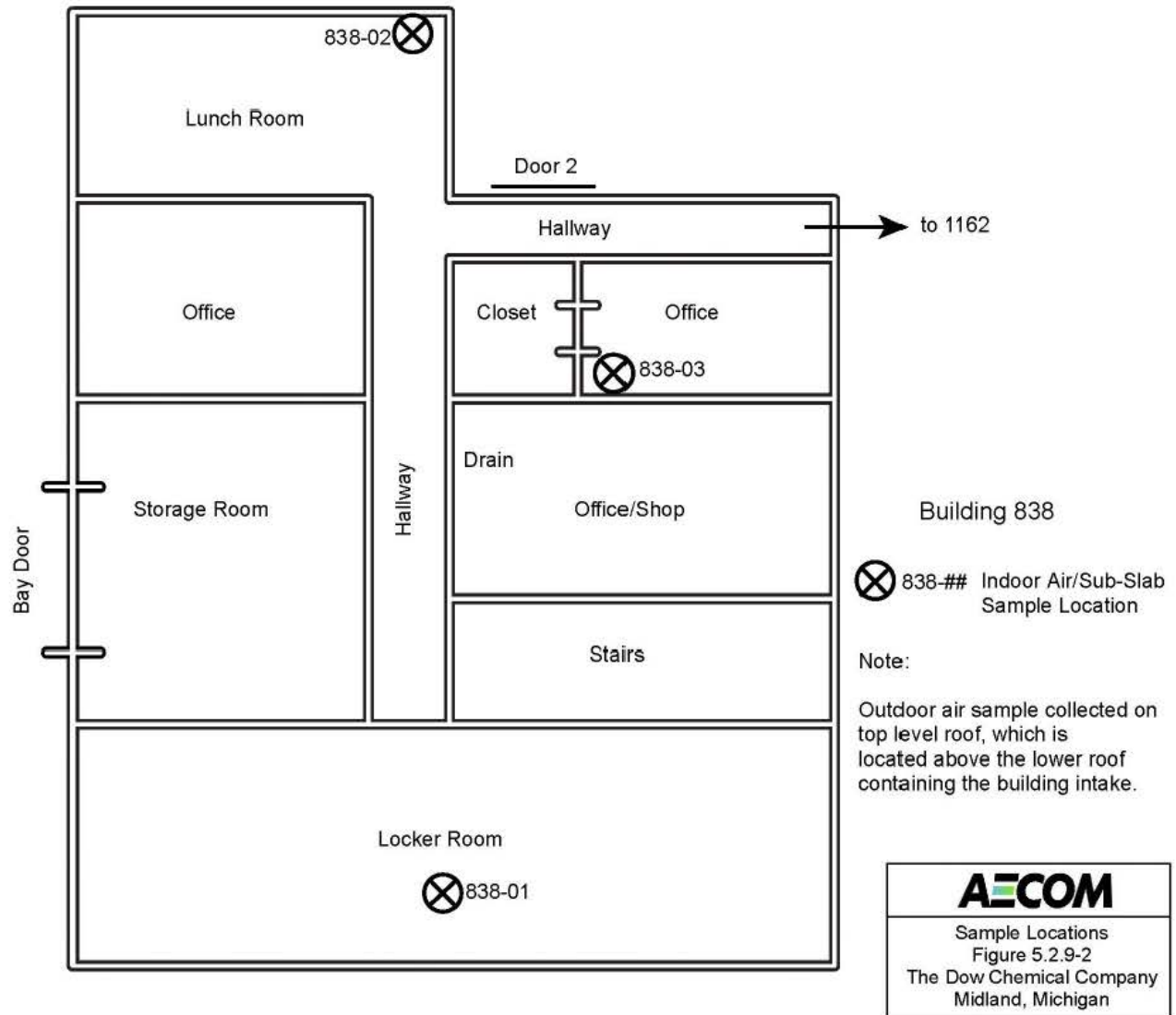
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 838 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results and given the potential for future VI, Building 838 was placed into VI Path Forward Building Group 2 (see Figure 5-3) and was resampled in August 2017. The second round of sampling is evaluated and discussed in Section 5.3.5. Additionally, HCB and PCE will be added to Industrial Hygiene monitoring for the building.

**Figure 5.2.9-1. Building 838 Location**



**Figure 5.2.9-2. Building 838 Sample Locations**



**Table 5.2.9-1. Building 838 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	3	67%	81.3	87.3	14	180	100	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	838	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	5.4	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	838	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	3	33%	21.7	25.1	13	13	4.3	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	838	SS	1,1-Dichloroethane	75-34-3	UG/M3	3	67%	37.9	33.7	4.6	72	74	74	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	838	SS	1,1-Dichloroethene	75-35-4	UG/M3	3	33%	16.2	17.8	11	11	3.1	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	838	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	23	540	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	838	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	67%	24.0	18.2	13	14	90	90	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	838	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	6.1	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	33%
Category 2	838	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	4.7	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	838	SS	1,2-Dichloroethane	107-06-2	UG/M3	3	33%	16.2	18.5	10	10	3.2	74	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	838	SS	1,2-Dichloropropane	78-87-5	UG/M3	3	33%	16.8	22.0	6.5	6.5	3.6	84	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	838	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	67%	19.0	22.5	6	6.1	90	90	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	838	SS	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	1.7	40	No Screening Value Available	-	-	-
Category 2	838	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	4.8	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	838	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	4.8	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	838	SS	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	11	260	No Screening Value Available	-	-	-
Category 2	838	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.7	85	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	838	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	33%	45.6	56.5	22	22	9.3	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	838	SS	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	13	300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	838	SS	2-Propanol	67-63-0	UG/M3	3	0%	-	-	-	-	7.8	180	No Screening Value Available	-	-	-
Category 2	838	SS	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	9.9	230	No Screening Value Available	-	-	-
Category 2	838	SS	4-Ethyltoluene	622-96-8	UG/M3	3	0%	-	-	-	-	3.9	90	No Screening Value Available	-	-	-
Category 2	838	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	3.2	75	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	838	SS	Acetone	67-64-1	UG/M3	3	67%	130	81	54	120	430	430	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	838	SS	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	4.1	94	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	838	SS	Benzene	71-43-2	UG/M3	3	67%	18.8	9.9	9.3	18	58	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	838	SS	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	17	390	No Screening Value Available	-	-	-
Category 2	838	SS	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	5.3	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	838	SS	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	8.2	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	838	SS	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	31	710	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	838	SS	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	9.8	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	838	SS	Carbon Tetrachloride	56-23-5	UG/M3	3	33%	22.0	28.7	8.6	8.6	5	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	838	SS	Chlorobenzene	108-90-7	UG/M3	3	33%	16.6	22.1	6.1	6.1	3.6	84	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	838	SS	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	8.3	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	838	SS	Chloroform	67-66-3	UG/M3	3	100%	65.7	60.5	10	130	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	838	SS	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	16	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	838	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	3.1	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	838	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	3.6	83	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	838	SS	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	3.9	90	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	838	SS	Cyclohexane	110-82-7	UG/M3	3	67%	22.8	9.9	12	25	63	63	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	838	SS	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	6.7	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	838	SS	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	22	520	No Screening Value Available	-	-	-
Category 2	838	SS	Ethanol	64-17-5	UG/M3	3	67%	66.0	32.2	32	96	140	140	No Screening Value Available	-	-	-
Category 2	838	SS	Ethylbenzene	100-41-4	UG/M3	3	67%	28.2	10.8	18	27	79	79	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	838	SS	CFC-11	75-69-4	UG/M3	3	0%	-	-	-	-	4.4	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 2	838	SS	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	6	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
Category 2	838	SS	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	5.5	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
Category 2	838	SS	CFC-12	75-71-8	UG/M3	3	67%	108	68	100	180	90	90	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	838	SS	Heptane	142-82-5	UG/M3	3	67%	38.2	13.5	25	52	75	75	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	838	SS	Hexachlorobutadiene	87-68-3	UG/M3	3	67%	1021	1714	38	3000	52	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	33%	0%
Category 2	838	SS	Hexane	110-54-3	UG/M3	3	67%	43.0	17.3	34	63	64	64	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	838	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	67%	41.5	2.3	41	44	79	79	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	838	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	11	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	838	SS	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	27	630	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	838	SS	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	8.3	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	838	SS	o-Xylene	95-47-6	UG/M3	3	67%	24.2	13.4	15	18	79	79	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.9-1. Building 838 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	SS	Propylbenzene	103-65-1	UG/M3	3	0%	-	-	-	-	3.9	90	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	838	SS	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	3.4	78	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	838	SS	Tetrachloroethene	127-18-4	UG/M3	3	100%	10007	15608	120	28000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	33%	0%
Category 2	838	SS	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.3	54	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	838	SS	Toluene	108-88-3	UG/M3	3	67%	90.2	63.9	76	160	69	69	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	838	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	7.2	166	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	838	SS	Total Xylenes	1330-20-7	UG/M3	3	67%	65.7	11.5	59	59	158	158	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	838	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	3.1	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	838	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	3.6	83	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	838	SS	Trichloroethene	79-01-6	UG/M3	3	100%	299	359	7.2	700	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	838	SS	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	2	47	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.2.9-2. Building 838 Indoor Air and Outdoor Air Summary Results Table**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	3	0%	-	-	-	-	4.5	16	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	838	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	5.6	21	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 2	838	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	4.5	16	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	33%
Category 2	838	IA	1,1-Dichloroethane	75-34-3	UG/M3	3	0%	-	-	-	-	3.3	12	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	838	IA	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	3.2	12	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	838	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	24	90	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 2	838	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	0%	-	-	-	-	4	15	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	838	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	6.3	23	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	838	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	4.9	18	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	838	IA	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	3.3	12	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	33%
Category 2	838	IA	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	3.8	14	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	838	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	0%	-	-	-	-	4	15	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	838	IA	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	1.8	6.7	No Screening Value Available	-	-	-
Category 2	838	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	4.9	18	Vapor Intrusion Indoor Air Screening Levels	13	0%	33%
Category 2	838	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	4.9	18	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	838	IA	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	12	44	No Screening Value Available	-	-	-
Category 2	838	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.8	14	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	838	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	0%	-	-	-	-	9.7	36	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	838	IA	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	13	50	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	838	IA	2-Propanol	67-63-0	UG/M3	3	0%	-	-	-	-	8.1	30	No Screening Value Available	-	-	-
Category 2	838	IA	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	10	38	No Screening Value Available	-	-	-
Category 2	838	IA	4-Ethyltoluene	622-96-8	UG/M3	3	0%	-	-	-	-	4	15	No Screening Value Available	-	-	-
Category 2	838	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	3.4	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	838	IA	Acetone	67-64-1	UG/M3	3	0%	-	-	-	-	19	72	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	838	IA	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	4.2	16	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 2	838	IA	Benzene	71-43-2	UG/M3	3	0%	-	-	-	-	2.6	9.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	838	IA	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	17	64	No Screening Value Available	-	-	-
Category 2	838	IA	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	5.5	20	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	67%
Category 2	838	IA	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	8.5	31	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	838	IA	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	32	120	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 2	838	IA	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	10	38	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	838	IA	Carbon Tetrachloride	56-23-5	UG/M3	3	0%	-	-	-	-	5.2	19	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	838	IA	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	3.8	14	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	838	IA	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	8.6	32	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	838	IA	Chloroform	67-66-3	UG/M3	3	0%	-	-	-	-	4	15	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	838	IA	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	17	63	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	838	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	3.2	12	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	838	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	3.7	14	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	838	IA	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	4	15	Vapor Intrusion Indoor Air Screening Levels	13	0%	33%
Category 2	838	IA	Cyclohexane	110-82-7	UG/M3	3	0%	-	-	-	-	2.8	10	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	838	IA	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	7	26	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 2	838	IA	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	23	86	No Screening Value Available	-	-	-
Category 2	838	IA	Ethanol	64-17-5	UG/M3	3	100%	2757	2744	270	5700	-	-	No Screening Value Available	-	-	-
Category 2	838	IA	Ethylbenzene	100-41-4	UG/M3	3	0%	-	-	-	-	3.6	13	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	CFC-11	75-69-4	UG/M3	3	0%	-	-	-	-	4.6	17	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	838	IA	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	6.3	23	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	838	IA	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	5.7	21	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	838	IA	CFC-12	75-71-8	UG/M3	3	0%	-	-	-	-	4	15	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	838	IA	Heptane	142-82-5	UG/M3	3	0%	-	-	-	-	3.4	12	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	838	IA	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	35	130	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	838	IA	Hexane	110-54-3	UG/M3	3	0%	-	-	-	-	2.9	11	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	838	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	0%	-	-	-	-	3.6	13	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	12	44	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	838	IA	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	28	100	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	838	IA	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	8.6	32	Vapor Intrusion Indoor Air Screening Levels	11	0%	67%
Category 2	838	IA	o-Xylene	95-47-6	UG/M3	3	0%	-	-	-	-	3.6	13	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	Propylbenzene	103-65-1	UG/M3	3	0%	-	-	-	-	4	15	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.2.9-2. Building 838 Indoor Air and Outdoor Air Summary Results Table (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	IA	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	3.5	13	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	838	IA	Tetrachloroethene	127-18-4	UG/M3	3	0%	-	-	-	-	5.6	21	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	838	IA	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.4	9	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	838	IA	Toluene	108-88-3	UG/M3	3	0%	-	-	-	-	3.1	11	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	838	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	7.4	28	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	838	IA	Total Xylenes	1330-20-7	UG/M3	3	0%	-	-	-	-	7.2	26	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	3.2	12	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	838	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	3.7	14	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	838	IA	Trichloroethene	79-01-6	UG/M3	3	0%	-	-	-	-	4.4	16	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	33%
Category 2	838	IA	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	2.1	7.8	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	838	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 2	838	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5.5	5.5	-	-	-	-
Category 2	838	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 2	838	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	838	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	838	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	24	24	-	-	-	-
Category 2	838	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	838	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	838	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	838	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	838	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	838	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	838	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	838	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 2	838	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	838	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	9.4	9.4	-	-	-	-
Category 2	838	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	13	13	-	-	-	-
Category 2	838	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	7.9	7.9	-	-	-	-
Category 2	838	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	838	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	838	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	19	19	-	-	-	-
Category 2	838	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 2	838	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	838	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 2	838	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	838	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	8.3	8.3	-	-	-	-
Category 2	838	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	31	31	-	-	-	-
Category 2	838	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	838	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 2	838	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	838	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	8.4	8.4	-	-	-	-
Category 2	838	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 2	838	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	838	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	838	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	838	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.8	6.8	-	-	-	-
Category 2	838	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	23	23	-	-	-	-
Category 2	838	OA	Ethanol	64-17-5	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	838	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	838	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.5	4.5	-	-	-	-
Category 2	838	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	838	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-

**Table 5.2.9-2. Building 838 Indoor Air and Outdoor Air Summary Results Table (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	838	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	838	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	34	34	-	-	-	-
Category 2	838	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	838	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	838	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 2	838	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	28	28	-	-	-	-
Category 2	838	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	8.4	8.4	-	-	-	-
Category 2	838	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	838	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	838	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	838	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	838	OA	Toluene	108-88-3	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 2	838	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	7.2	7.2	-	-	-	-
Category 2	838	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	7	7	-	-	-	-
Category 2	838	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	838	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	838	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	838	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-

## 5.2.10 Vapor Intrusion Evaluation for Building 1098

### BACKGROUND

Building 1098 is a Category 2 building in Zone 1. It is a small building that includes both a shop and office space. It is known as the EVO Maintenance Shop (see Figure 5.2.10-1) and is located within the southeast portion of the facility designated as Zone 1. The building is single story with an open-air storage loft. The building is slab-on-grade construction with a footprint of approximately 6,250 ft<sup>2</sup> (580 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 19, 2016 and the results can be found in Appendix C. Building 1098 contains a maintenance shop and two offices. The building has central air conditioning with two AC units. Both air intakes are at roof level. The building has a steam radiation heating system augmented with isolated propane heaters in the shop area. There are two large bay doors, one that opens to the west, and one that opens to the south. The bay doors are open during the work day in good weather. Maintenance activities may involve pulling gas-powered equipment and/or vehicles into the shop. The land surrounding the building is covered in concrete and asphalt. In addition, to the north and east, there are gravel lots near the building.

Drains and other openings were screened with a PID and no soil gas entry points were identified. A chemical inventory was completed during the building survey and a wide variety of chemicals was found to be stored within the building and each is listed in the survey (e.g., various cleaners, stains, degreasers, primers, galvanizers).

### DATA SUMMARY

On October 18, 2016, sub-slab soil gas samples were collected from four locations from within the building. Indoor air samples were collected on October 19, 2016 at four locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from one of the air intakes. The sampling locations are shown on Figure 5.2.10-2. The summary statistics of the analytical results for sub-slab soil gas for Building 1098 are presented on Table 5.2.10-1 and the summary statistics of results for indoor and outdoor air are presented on Table 5.2.10-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix D.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 52 of the 65 target analytes were ND in each of the four samples collected at Building 1098. Fourteen of these ND soil gas analytes had at least one ND reporting limit above the respective screening level. These reporting limit exceedances are discussed further in the VI evaluation below. Those 38 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 13 analytes were detected in one or more of the four sub-slab soil gas samples. These included four chlorinated VOCs, five petroleum hydrocarbons, along with acetone, 2,2,4-trimethylpentane, CFC-12 and CFC-114. All 13 analytes were detected above *de minimus* levels but below screening levels and only three had detection frequencies of 100% (CFC-12, CFC-114 and hexane).

The sub-slab soil gas results are summarized in Table 1098-1. Only the analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI. Therefore, since all detections were below the sub-slab soil gas screening levels there were no AOIs identified for Building 1098.

**Table 1098-1. Summary of Sub-Slab Soil Gas Detects for Building 1098**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
Hexane	100%	200 - 15000	0%	410000
CFC-12	100%	6600 - 320000	0%	29000000
CFC-114	100%	23000 - 150000	0%	11000000
1,1,1-Trichloroethane	25%	120	0%	3500000
1,1-Dichloroethane	50%	78 - 640	0%	290000
1,4-Dichlorobenzene	25%	1800	0%	2600
2,2,4-Trimethylpentane	25%	2100	0%	2000000
Acetone	25%	900	0%	3400000
Benzene	50%	45 - 410	0%	2200
Cyclohexane	75%	88 - 1800	0%	3500000
Heptane	50%	110 - 760	0%	2000000
Tetrachloroethene (PCE)	25%	410	0%	23000
Toluene	25%	110	0%	2900000

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, four indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1098-2 below shows detections in each of the three media sampled.

**Table 1098-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
Toluene	•	•	•
Hexane	•	•	•
2,2,4-Trimethylpentane	•	•	
CFC-12	•	•	
Benzene	•		•
Heptane	•		•
PCE	•		
1,1-Dichloroethane	•		
1,1,1-Trichloroethane	•		
1,4-Dichlorobenzene	•		
Cyclohexane	•		
Acetone	•		
CFC-114	•		
Ethanol		•	•
Xylenes		•	•
2-Propanol		•	

• = Detected  
 = Non-detect

Fifty-eight of the 65 indoor air analytes were ND in each of the samples. The fifty-one ND analytes with reporting limits that met the screening levels were eliminated from further evaluation. Seven ND analytes had reporting limits that exceeded screening levels and are discussed further below. The seven analytes detected in indoor air were ethanol, CFC-12, hexane, 2-propanol, toluene, 2,2,4-trimethylpentane, and total xylenes. None of the detected results in indoor air exceed applicable screening levels and were eliminated from further evaluation (2-propanol and ethanol do not have screening levels available). Six analytes were detected in the outdoor air sample.

Table 1098-2 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1098-3. Vapor Intrusion Evaluation for Building 1098**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<4.5 - <4.6	26000	<3.9
1,1-Dichloroethane	0%	<3.3 - <3.4	2200	<2.9
1,4-Dichlorobenzene	0%	<4.9 - <5	20	<4.3
2,2,4-Trimethylpentane	25%	4.3	15000	<3.3
Acetone	0%	<19 - <20	26000	<17
Benzene	0%	<2.6 - <2.7	16	3.5
Cyclohexane	0%	<2.8 - <2.9	26000	<2.5
CFC-114	0%	<5.7 - <5.8	85000	<5
CFC-12	100%	4.4 - 11	220000	<3.5
Heptane	0%	<3.4	15000	3.2
Hexane	75%	3.5 - 8	3100	9.9
Tetrachloroethene	0%	<5.6 - <5.7	180	<4.8
Toluene	100%	9.5 - 22	22000	47

< = Non-detect at the reporting limit provided

Building 1098 had an extensive chemical inventory. Of the seven VOCs detected indoors, most could be found to be stored or used indoors during the chemical inventory conducted as part of the building survey. Hexane and toluene were detected in the outdoor air sample at concentrations higher than those detected in the indoor air samples. For those two analytes, the outdoor air could be influencing indoor air concentrations. Outdoor air could also be influencing indoor air results for total xylenes and ethanol; however, these analytes were not detected in sub-slab soil gas so their respective results are not provided on Table 1098-3. Xylenes had similar detected results in the outdoor air sample ( $13.6 \mu\text{g}/\text{m}^3$ ) and in the indoor air samples collected (ranged from  $7.1 - 14 \mu\text{g}/\text{m}^3$ ). Ethanol was detected in the outdoor sample at  $28 \mu\text{g}/\text{m}^3$  and had detected results indoors from  $28-110 \mu\text{g}/\text{m}^3$ .

As shown in Tables 1098-2 and 1098-3, of the 13 analytes detected in sub-slab soil gas at concentrations greater than *de minimus* but less than screening levels, four were detected in indoor air (2,2,4-trimethylpentane, CFC-12, hexane, and toluene); however, since neither the sub-slab soil gas or indoor air results exceed the screening levels, the VI pathway is considered insignificant at this time.

There were seven indoor air ND analytes with reporting limits that exceeded the indoor air screening levels. While none of the seven ND analytes were detected in sub-slab soil gas, each of them had at least one ND reporting limit in sub-slab soil gas that exceeded applicable screening levels. Therefore,

these seven indoor air ND analytes and the additional seven sub-slab soil gas ND analytes that had at least one ND reporting limit above the respective screening level, are further discussed and evaluated in the section below.

## BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION

VI evaluations utilize attenuation factor, which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 1098-1, there were three analytes detected at a 100% frequency in the sub-slab soil gas (CFC-114, CFC-12, and hexane). The data for these analytes are provided in Table 1098-4. Attenuation factors based on both average and maximum concentrations are shown.

**Table 1098-4. VI Attenuation Factors for Building 1098**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )		
		CFC-114	CFC-12	Hexane
Indoor Air	1098-IA-01	<5.8	11	4.8
	1098-IA-02	<5.8	4.6	<2.9
	1098-IA-03	<5.7	9.4	8
	1098-IA-04	<5.8	4.4	3.5
	Average	<5.8	7.4	4.8
Sub-slab Soil Gas	1098-SS-01	62000	22000	7200
	1098-SS-02	150000	60000	15000
	1098-SS-03	81000	320000	11000
	1098-SS-04	23000	6600	200
	Average	79,000	102,150	8,350
Attenuation Factors	Average	<7.3E-05	7.20E-05	<5.75E-04
	Maximum	<3.9E-05	3.40E-05	5.33E-04

1. Non-detect values were used to calculate the attenuation factor (the full RL value was used).
2. The indoor air values were not adjusted for the outdoor air results.
3. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

Based on the attenuation factors calculated and shown on Table 1098-4, the best estimate for a conservative, building-specific attenuation factor is 5.75E-04. This attenuation factor is based on the average value. If the maximum value is used, the attenuation factor is slightly smaller and less conservative. This building-specific attenuation factor was used to estimate indoor air concentrations presented in Table 1098-5, where:

$$\text{Estimated indoor air concentration} = (\text{Sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 1098-5. Estimated Indoor Air Concentrations for Non-Detect Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub-Slab Soil Gas Concentration	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
1,1,2,2-Tetrachloroethane	<2,800	<5.75E-04	1.6	2.4	No
1,1,2-Trichloroethane	<2,200	<5.75E-04	1.3	8.5	No
1,2,4-Trichlorobenzene	<12,000	<5.75E-04	6.9	18	No
1,2-Dibromoethane (EDB)	<3,100	<5.75E-04	1.8	0.23	Yes
1,2-Dichloroethane	<1,600	<5.75E-04	0.9	5.3	No
1,3-Dichlorobenzene	<2,400	<5.75E-04	1.4	13	No
alpha-Chlorotoluene	<2,100	<5.75E-04	1.2	2.8	No
Bromodichloromethane	<2,700	<5.75E-04	1.6	7.6	No
Bromomethane	<6,200	<5.75E-04	3.6	22	No
Cumene	<2,000	<5.75E-04	1.2	13	No
Dibromochloromethane	<3,400	<5.75E-04	2.0	5.6	No
Hexachlorobutadiene (HCB)	<17,000	<5.75E-04	9.8	6.2	Yes
Naphthalene	<8,400	<5.75E-04	4.8	11	No
Trichloroethene	<2,200	<5.75E-04	1.3	8.8	No

With the exception of EDB and HCB, based on the maximum ND sub-slab soil gas reporting limit for each of the 14 ND sub-slab analytes (which includes the 7 ND indoor air analytes), all of the estimated indoor air concentrations are well below relevant indoor air screening levels. The 12 ND analytes with estimated indoor air concentrations below screening levels were eliminated from further evaluation. For EDB and HCB, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated.

## CONCLUSIONS AND RECOMMENDATIONS

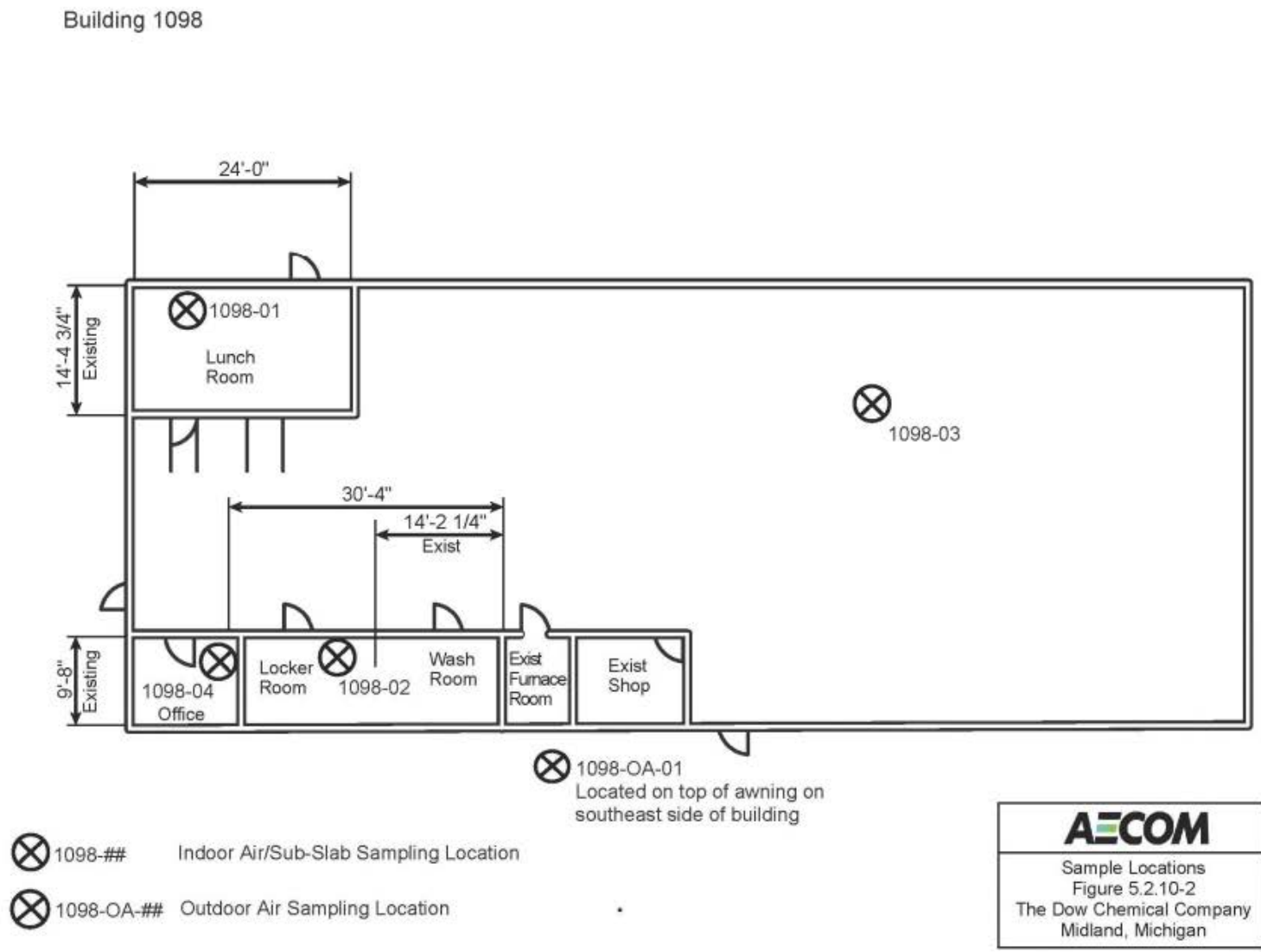
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1098 is an insignificant exposure pathway based on current use. Building 1098 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.



**Figure 5.2.10-1. Building 1098 Location**



**Figure 5.2.10-2. Building 1098 Sample Locations**



**Table 5.2.10-1. Building 1098 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1098	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	4	25%	421	461	120	120	300	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1098	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	84	2800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	75%
Category 2	1098	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	67	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	25%
Category 2	1098	SS	1,1-Dichloroethane	75-34-3	UG/M3	4	50%	408	366	78	640	230	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	1098	SS	1,1-Dichloroethene	75-35-4	UG/M3	4	0%	-	-	-	-	49	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	1098	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	360	12000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 2	1098	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	0%	-	-	-	-	60	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1098	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	94	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	100%
Category 2	1098	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	74	2400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	1098	SS	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	50	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	25%
Category 2	1098	SS	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	57	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	1098	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	60	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1098	SS	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	27	890	No Screening Value Available	-	-	-
Category 2	1098	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	74	2400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	25%
Category 2	1098	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	4	25%	802	844	1800	1800	74	2400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	1098	SS	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	180	5800	No Screening Value Available	-	-	-
Category 2	1098	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	25%	802	959	2100	2100	57	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	200000	0%	0%
Category 2	1098	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	0%	-	-	-	-	140	4700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1098	SS	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	200	6600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	1098	SS	2-Propanol	67-63-0	UG/M3	4	0%	-	-	-	-	120	4000	No Screening Value Available	-	-	-
Category 2	1098	SS	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	150	5000	No Screening Value Available	-	-	-
Category 2	1098	SS	4-Ethyltoluene	622-96-8	UG/M3	4	0%	-	-	-	-	60	2000	No Screening Value Available	-	-	-
Category 2	1098	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	50	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	1098	SS	Acetone	67-64-1	UG/M3	4	25%	874	751	900	900	290	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	1098	SS	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	64	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	50%
Category 2	1098	SS	Benzene	71-43-2	UG/M3	4	50%	299	285	45	410	180	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	1098	SS	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	260	260	No Screening Value Available	-	-	-
Category 2	1098	SS	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	82	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	25%
Category 2	1098	SS	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	130	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	1098	SS	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	480	6200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	25%
Category 2	1098	SS	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	150	5000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1098	SS	Carbon Tetrachloride	56-23-5	UG/M3	4	0%	-	-	-	-	77	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	1098	SS	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	57	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1098	SS	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	130	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	1098	SS	Chloroform	67-66-3	UG/M3	4	0%	-	-	-	-	60	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	1098	SS	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	250	3300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	1098	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	0%	-	-	-	-	49	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	1098	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	56	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1098	SS	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	60	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	25%
Category 2	1098	SS	Cyclohexane	110-82-7	UG/M3	4	75%	780	728	88	1800	1400	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1098	SS	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	100	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	50%
Category 2	1098	SS	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	350	11000	No Screening Value Available	-	-	-
Category 2	1098	SS	Ethanol	64-17-5	UG/M3	4	0%	-	-	-	-	93	3000	No Screening Value Available	-	-	-
Category 2	1098	SS	Ethylbenzene	100-41-4	UG/M3	4	0%	-	-	-	-	53	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	1098	SS	CFC-11	75-69-4	UG/M3	4	0%	-	-	-	-	69	2300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	1098	SS	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	94	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1098	SS	CFC-114	76-14-2	UG/M3	4	100%	79000	53135	23000	150000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1098	SS	CFC-12	75-71-8	UG/M3	4	100%	102150	146957	6600	320000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	1098	SS	Heptane	142-82-5	UG/M3	4	50%	476	355	110	760	470	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1098	SS	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	520	17000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	75%
Category 2	1098	SS	Hexane	110-54-3	UG/M3	4	100%	8350	6298	200	15000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1098	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	0%	-	-	-	-	53	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1098	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	180	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	1098	SS	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	430	5600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	1098	SS	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	130	8400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	50%
Category 2	1098	SS	o-Xylene	95-47-6	UG/M3	4	0%	-	-	-	-	53	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.2.10-1. Building 1098 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1098	SS	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	60	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	1098	SS	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	52	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	1098	SS	Tetrachloroethene	127-18-4	UG/M3	4	25%	585	520	410	410	380	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	1098	SS	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	36	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	1098	SS	Toluene	108-88-3	UG/M3	4	25%	295	308	110	110	210	1500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1098	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	112	3600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1098	SS	Total Xylenes	1330-20-7	UG/M3	4	0%	-	-	-	-	106	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1098	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	49	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1098	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	56	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1098	SS	Trichloroethene	79-01-6	UG/M3	4	0%	-	-	-	-	66	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	25%
Category 2	1098	SS	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	31	1000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.2.10-2. Building 1098 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1098	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	4	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1098	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.6	5.7	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 2	1098	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	1098	IA	1,1-Dichloroethane	75-34-3	UG/M3	4	0%	-	-	-	-	3.3	3.4	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	1098	IA	1,1-Dichloroethene	75-35-4	UG/M3	4	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	1098	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	24	25	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 2	1098	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1098	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	6.3	6.4	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	1098	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	4.9	5	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	1098	IA	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	3.3	3.4	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	1098	IA	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	3.8	3.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1098	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1098	IA	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	1.8	1.8	No Screening Value Available	-	-	-
Category 2	1098	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	4.9	5	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1098	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	4.9	5	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	1098	IA	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	12	12	No Screening Value Available	-	-	-
Category 2	1098	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	25%	2.53	1.18	4.3	4.3	3.8	3.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1098	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	0%	-	-	-	-	9.7	9.8	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1098	IA	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	13	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	1098	IA	2-Propanol	67-63-0	UG/M3	4	100%	22.1	12.9	8.2	34	-	-	No Screening Value Available	-	-	-
Category 2	1098	IA	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	10	10	No Screening Value Available	-	-	-
Category 2	1098	IA	4-Ethyltoluene	622-96-8	UG/M3	4	0%	-	-	-	-	4	4.1	No Screening Value Available	-	-	-
Category 2	1098	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.4	3.4	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1098	IA	Acetone	67-64-1	UG/M3	4	0%	-	-	-	-	19	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1098	IA	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	4.2	4.3	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 2	1098	IA	Benzene	71-43-2	UG/M3	4	0%	-	-	-	-	2.6	2.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	1098	IA	Bromochloromethane	74-97-5	UG/M3	4	0%	-	-	-	-	17	18	No Screening Value Available	-	-	-
Category 2	1098	IA	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5.5	5.6	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	1098	IA	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	8.5	8.6	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	1098	IA	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	32	32	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 2	1098	IA	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	10	10	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1098	IA	Carbon Tetrachloride	56-23-5	UG/M3	4	0%	-	-	-	-	5.2	5.2	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	1098	IA	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	3.8	3.8	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1098	IA	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	8.6	8.8	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	1098	IA	Chloroform	67-66-3	UG/M3	4	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	1098	IA	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	17	17	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	1098	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1098	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1098	IA	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1098	IA	Cyclohexane	110-82-7	UG/M3	4	0%	-	-	-	-	2.8	2.9	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1098	IA	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	7	7.1	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 2	1098	IA	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	23	24	No Screening Value Available	-	-	-
Category 2	1098	IA	Ethanol	64-17-5	UG/M3	4	100%	52.8	38.7	28	110	-	-	No Screening Value Available	-	-	-
Category 2	1098	IA	Ethylbenzene	100-41-4	UG/M3	4	0%	-	-	-	-	3.6	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1098	IA	CFC-11	75-69-4	UG/M3	4	0%	-	-	-	-	4.6	4.7	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	1098	IA	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	6.3	6.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1098	IA	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	5.7	5.8	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1098	IA	CFC-12	75-71-8	UG/M3	4	100%	7.35	3.36	4.4	11	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	1098	IA	Heptane	142-82-5	UG/M3	4	0%	-	-	-	-	3.4	3.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1098	IA	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	35	36	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	1098	IA	Hexane	110-54-3	UG/M3	4	75%	4.44	2.75	3.5	8	2.9	2.9	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1098	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	6.90	2.22	5.3	10	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1098	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	12	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1098	IA	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	28	29	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	1098	IA	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	8.6	8.8	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	1098	IA	o-Xylene	95-47-6	UG/M3	4	25%	2.35	1.10	4	4	3.6	3.6	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1098	IA	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.2.10-2. Building 1098 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1098	IA	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	3.5	3.6	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	1098	IA	Tetrachloroethene	127-18-4	UG/M3	4	0%	-	-	-	-	5.6	5.7	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	1098	IA	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.4	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	1098	IA	Toluene	108-88-3	UG/M3	4	100%	16.9	6.2	9.5	22	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1098	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	7.4	7.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1098	IA	Total Xylenes	1330-20-7	UG/M3	4	100%	9.25	3.27	7.1	14	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1098	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1098	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1098	IA	Trichloroethene	79-01-6	UG/M3	4	0%	-	-	-	-	4.4	4.5	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	1098	IA	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	2.1	2.1	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1098	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	1098	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	4.9	4.9	-	-	-	-
Category 2	1098	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	1098	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 2	1098	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	1098	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	21	21	-	-	-	-
Category 2	1098	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	5.5	5.5	-	-	-	-
Category 2	1098	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	1098	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 2	1098	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	1098	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	1098	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	1098	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.3	4.3	-	-	-	-
Category 2	1098	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	1098	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	1098	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	8.4	8.4	-	-	-	-
Category 2	1098	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	12	12	-	-	-	-
Category 2	1098	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	7	7	-	-	-	-
Category 2	1098	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	9	9	-	-	-	-
Category 2	1098	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 2	1098	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 2	1098	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	1098	OA	Benzene	71-43-2	UG/M3	1	100%	3.50	-	3.5	3.5	-	-	-	-	-	-
Category 2	1098	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 2	1098	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	1098	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	7.4	7.4	-	-	-	-
Category 2	1098	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	28	28	-	-	-	-
Category 2	1098	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	8.9	8.9	-	-	-	-
Category 2	1098	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	4.5	4.5	-	-	-	-
Category 2	1098	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	1098	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	7.5	7.5	-	-	-	-
Category 2	1098	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 2	1098	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	1098	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	1098	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	1098	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	1098	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	20	20	-	-	-	-
Category 2	1098	OA	Ethanol	64-17-5	UG/M3	1	100%	28.0	-	28	28	-	-	-	-	-	-
Category 2	1098	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	1098	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	1098	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	5.5	5.5	-	-	-	-
Category 2	1098	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-

**Table 5.2.10-2. Building 1098 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1098	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	Heptane	142-82-5	UG/M3	1	100%	3.20	-	3.2	3.2	-	-	-	-	-	-
Category 2	1098	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	30	30	-	-	-	-
Category 2	1098	OA	Hexane	110-54-3	UG/M3	1	100%	9.90	-	9.9	9.9	-	-	-	-	-	-
Category 2	1098	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	10.0	-	10	10	-	-	-	-	-	-
Category 2	1098	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 2	1098	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	25	25	-	-	-	-
Category 2	1098	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	7.5	7.5	-	-	-	-
Category 2	1098	OA	o-Xylene	95-47-6	UG/M3	1	100%	3.60	-	3.6	3.6	-	-	-	-	-	-
Category 2	1098	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1098	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 2	1098	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 2	1098	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.1	2.1	-	-	-	-
Category 2	1098	OA	Toluene	108-88-3	UG/M3	1	100%	47.0	-	47	47	-	-	-	-	-	-
Category 2	1098	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 2	1098	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	13.6	-	13.6	13.6	-	-	-	-	-	-
Category 2	1098	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	1098	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	1098	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	1098	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-



## 5.2.11 Vapor Intrusion Evaluation for Building T-1561

### BACKGROUND

Building T-1561, which is primarily used for office space, is a Category 2 office trailer in Zone 1. It is a temporary building with extensive crawl space between the ground surface and the floor of the building (see Figure 5.2.11-1) and is located within the southeast portion of the facility designated as Zone 1. The temporary building is single story and is approximately 13,810 ft<sup>2</sup> (1,283 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on September 21, 2016 and the results can be found in Appendix C. The trailer is a raised structure with extensive crawl space covered with skirting. The building has multiple air conditioning units so there is more than one air intake for the structure. It does not have a garage or any bay doors present. The land surrounding the building is covered in asphalt, concrete and nearby grass.

All of the rooms within the trailer were screened with a PID during the building survey and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey and a can of spray paint, an air freshener and common household cleaning products were found in the building.

### DATA SUMMARY

Due to the unique characteristic of this building, three samples were collected in the crawl space underneath the building and above ground surface on October 18, 2016. One outdoor air sample was collected on October 19, 2016. The sampling locations are shown on Figure 5.2.11-2. Summary statistics of the analytical results for the air samples collected in the crawl space of the building and the outdoor air sample are presented on Table 5.2.11-1. The complete analytical reports for the air samples are in Appendix D.

### RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented in Section 5.1. As an added level of conservatism, the crawl space air results were compared to the VI indoor air screening levels. A total of 63 of the 65 target analytes were ND in the three samples collected from the crawl space underneath the building but above ground surface of Building T-1561. The two analytes detected in the crawl space samples were ethanol and toluene and each of the analytes was only detected in a single sample (33% detection frequency). While ethanol does not have a screening level available for indoor air, it was detected at a very low concentration, and the detected concentration of toluene was orders of magnitude below the indoor air screening level. There were seven ND analytes from the crawl space with reporting limits that exceed the indoor air screening level; however, as stated above, the indoor air screening level was used for a conservative evaluation. Additionally, most of the reporting limit exceedances only slightly exceed the screening level. All but two analytes (EDB and HCB) have reporting limits in the same order of magnitude as the screening level.

As shown in Table T-1561-1, ethanol and toluene were not detected in the outdoor air sample. The only analyte detected in outdoor air was 2-propanol, which was not detected in the crawl space.



**Table T-1561-1. Summary of Under Trailer Crawl Space Air Detects for Building T-1561**

Analyte	Under Trailer Crawl Space Air Detection Frequency	Under Trailer Crawl Space Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in Air Under Trailer Crawl Space</b>				
Ethanol	33%	8.7	N/A	<5.9
Toluene	33%	4.2	22000	<2.9

N/A = No screening level available

Based on the results of the UT crawl space, the collection of indoor air is not warranted. By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Due to the unique characteristics of Building T-1561, sub-slab soil gas samples were not collected and in their place, the air in the UT crawl space was sampled and evaluated. Only two analytes were detected at concentrations slightly higher than their respective reporting limit and toluene was detected orders of magnitude below the conservative VI indoor screening level.

## CONCLUSIONS AND RECOMMENDATIONS

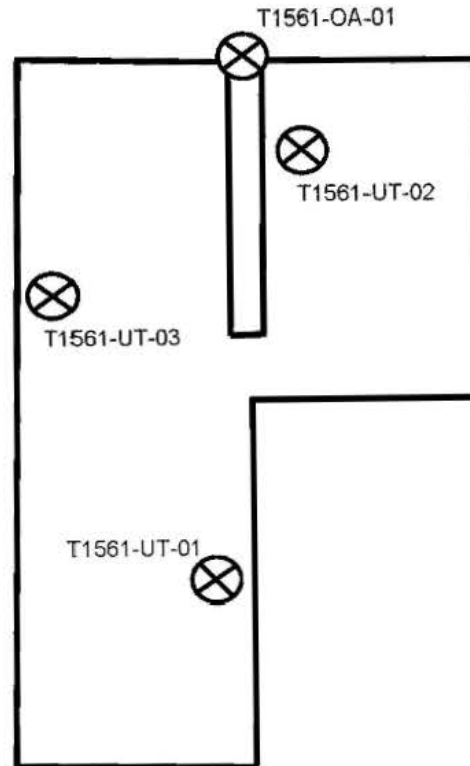
The analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the results from the UT crawl space air samples collected above ground surface and the one outdoor air sample, the VI pathway at Building T-1561 is an insignificant exposure pathway based on current use. Building T-1561 was placed in VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.2.11-1. Building T1561 Location**



**Figure 5.2.11-2. Building T1561 Sample Locations**

Building T-1561



⊗ T1561-UT/OA-## Under Trailer/Outdoor Air Sample Location

Note: Under trailer locations accessed via entry points in lower paneling from the outside. Canisters placed 5 feet within crawl space/away from entry point.

<b>AECOM</b>
Sample Locations Figure 5.2.11-2 The Dow Chemical Company Midland, Michigan

**Table 5.2.11-1. Building T-1561 Results Summary Statistics**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	T1561	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 2	T1561	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	T1561	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 2	T1561	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	T1561	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	T1561	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	23	23	-	-	-	-
Category 2	T1561	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	T1561	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	T1561	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 2	T1561	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	T1561	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	T1561	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	T1561	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	T1561	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 2	T1561	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 2	T1561	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 2	T1561	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	T1561	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	9.2	9.2	-	-	-	-
Category 2	T1561	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	13	13	-	-	-	-
Category 2	T1561	OA	2-Propanol	67-63-0	UG/M3	1	100%	8.80	-	8.8	8.8	-	-	-	-	-	-
Category 2	T1561	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	9.8	9.8	-	-	-	-
Category 2	T1561	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	T1561	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	T1561	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	18	18	-	-	-	-
Category 2	T1561	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	T1561	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	T1561	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 2	T1561	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	5.2	5.2	-	-	-	-
Category 2	T1561	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	8.1	8.1	-	-	-	-
Category 2	T1561	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	30	30	-	-	-	-
Category 2	T1561	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	9.7	9.7	-	-	-	-
Category 2	T1561	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	4.9	4.9	-	-	-	-
Category 2	T1561	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	T1561	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	8.2	8.2	-	-	-	-
Category 2	T1561	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	T1561	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	16	16	-	-	-	-
Category 2	T1561	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	T1561	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	T1561	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	T1561	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	T1561	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6.6	6.6	-	-	-	-
Category 2	T1561	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	22	22	-	-	-	-
Category 2	T1561	OA	Ethanol	64-17-5	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 2	T1561	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	T1561	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 2	T1561	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	T1561	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	T1561	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	T1561	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	T1561	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	33	33	-	-	-	-
Category 2	T1561	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	T1561	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	T1561	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 2	T1561	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	27	27	-	-	-	-
Category 2	T1561	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	8.2	8.2	-	-	-	-
Category 2	T1561	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	T1561	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-

**Table 5.2.11-1. Building T-1561 Results Summary Statistics (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	T1561	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	T1561	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	5.3	5.3	-	-	-	-
Category 2	T1561	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	T1561	OA	Toluene	108-88-3	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 2	T1561	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	7	7	-	-	-	-
Category 2	T1561	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	6.8	6.8	-	-	-	-
Category 2	T1561	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	T1561	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	T1561	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 2	T1561	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 2	T1561	UT	1,1,1-Trichloroethane	71-55-6	UG/M3	3	0%	-	-	-	-	4.1	4.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	T1561	UT	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	5.2	5.8	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 2	T1561	UT	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	4.1	4.6	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	T1561	UT	1,1-Dichloroethane	75-34-3	UG/M3	3	0%	-	-	-	-	3.1	3.4	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	T1561	UT	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	3	3.4	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	T1561	UT	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	22	25	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 2	T1561	UT	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	0%	-	-	-	-	3.7	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	T1561	UT	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	5.8	6.5	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	T1561	UT	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	4.6	5.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	T1561	UT	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	3.1	3.4	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	T1561	UT	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	3.5	3.9	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	T1561	UT	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	0%	-	-	-	-	3.7	4.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	T1561	UT	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	1.7	1.9	No Screening Value Available	-	-	-
Category 2	T1561	UT	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	4.6	5.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	T1561	UT	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	4.6	5.1	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	T1561	UT	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	11	12	No Screening Value Available	-	-	-
Category 2	T1561	UT	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.6	3.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	T1561	UT	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	0%	-	-	-	-	9	10	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	T1561	UT	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	12	14	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	T1561	UT	2-Propanol	67-63-0	UG/M3	3	0%	-	-	-	-	7.5	8.3	No Screening Value Available	-	-	-
Category 2	T1561	UT	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	9.5	10	No Screening Value Available	-	-	-
Category 2	T1561	UT	4-Ethyltoluene	622-96-8	UG/M3	3	0%	-	-	-	-	3.7	4.2	No Screening Value Available	-	-	-
Category 2	T1561	UT	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	3.1	3.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	T1561	UT	Acetone	67-64-1	UG/M3	3	0%	-	-	-	-	18	20	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	T1561	UT	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	3.9	4.4	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 2	T1561	UT	Benzene	71-43-2	UG/M3	3	0%	-	-	-	-	2.4	2.7	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	T1561	UT	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	16	18	No Screening Value Available	-	-	-
Category 2	T1561	UT	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	5.1	5.7	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	T1561	UT	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	7.8	8.7	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	T1561	UT	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	30	33	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 2	T1561	UT	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	9.5	10	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	T1561	UT	Carbon Tetrachloride	56-23-5	UG/M3	3	0%	-	-	-	-	4.8	5.3	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	T1561	UT	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	3.5	3.9	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	T1561	UT	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	8	8.9	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	T1561	UT	Chloroform	67-66-3	UG/M3	3	0%	-	-	-	-	3.7	4.1	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	T1561	UT	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	16	17	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	T1561	UT	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	3	3.4	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	T1561	UT	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	3.4	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	T1561	UT	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	3.7	4.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	T1561	UT	Cyclohexane	110-82-7	UG/M3	3	0%	-	-	-	-	2.6	2.9	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	T1561	UT	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	6.5	7.2	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 2	T1561	UT	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	22	24	No Screening Value Available	-	-	-
Category 2	T1561	UT	Ethanol	64-17-5	UG/M3	3	33%	4.92	3.28	8.7	8.7	5.7	6.4	No Screening Value Available	-	-	-
Category 2	T1561	UT	Ethylbenzene	100-41-4	UG/M3	3	0%	-	-	-	-	3.3	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	T1561	UT	CFC-11	75-69-4	UG/M3	3	0%	-	-	-	-	4.3	4.7	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	T1561	UT	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	5.8	6.5	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	T1561	UT	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	5.3	5.9	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%

**Table 5.2.11-1. Building T-1561 Results Summary Statistics (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	T1561	UT	CFC-12	75-71-8	UG/M3	3	0%	-	-	-	-	3.8	4.2	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	T1561	UT	Heptane	142-82-5	UG/M3	3	0%	-	-	-	-	3.1	3.5	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	T1561	UT	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	32	36	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	T1561	UT	Hexane	110-54-3	UG/M3	3	0%	-	-	-	-	2.7	3	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	T1561	UT	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	0%	-	-	-	-	3.3	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	T1561	UT	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	11	12	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	T1561	UT	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	26	29	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	T1561	UT	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	8	8.8	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	T1561	UT	o-Xylene	95-47-6	UG/M3	3	0%	-	-	-	-	3.3	3.7	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	T1561	UT	Propylbenzene	103-65-1	UG/M3	3	0%	-	-	-	-	3.7	4.2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	T1561	UT	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	3.2	3.6	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	T1561	UT	Tetrachloroethene	127-18-4	UG/M3	3	0%	-	-	-	-	5.2	5.7	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	T1561	UT	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.2	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	T1561	UT	Toluene	108-88-3	UG/M3	3	33%	2.42	1.55	4.2	4.2	2.9	3.2	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	T1561	UT	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	6.8	7.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	T1561	UT	Total Xylenes	1330-20-7	UG/M3	3	0%	-	-	-	-	6.6	7.4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	T1561	UT	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	3	3.4	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	T1561	UT	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	3.4	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	T1561	UT	Trichloroethene	79-01-6	UG/M3	3	0%	-	-	-	-	4.1	4.5	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	T1561	UT	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	1.9	2.2	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%

## **5.2.12 Zone 1 Sampling Results and Evaluation Summary**

The results of the 11 buildings sampled in Zone 1 are summarized in Table 5.2.12-1.

**Table 5.2.12-1. Zone 1 Sampling Results and Evaluation Summary**

Zone 1 Bldg	Category	Section No.	Sub-Slab Soil Gas AOI(s)	Indoor Air AOI(s)	Path Forward Bldg Group	
					Bldg Grouping	Conclusions
34	1	5.2.1	1,2,4-Trichlorobenzene	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
1078	1	5.2.2	--	--	1	No AOI identified. No further VI work at this time.
1100	1	5.2.3	--	--	1	No AOI identified. No further VI work at this time.
1335	1	5.2.4	Hexachlorobutadiene (HCB)	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
1358	1	5.2.5	--	--	1	No AOI identified. No further VI work at this time.
3303	1	5.2.6	N/A	--	1	No AOI identified. No further VI work at this time.
462	2	5.2.7	Tetrachloroethene (PCE)	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
680	2	5.2.8	1,2-Dibromoethane (EDB), 1,2-Dichloroethane, cis-1,2-Dichloroethene, Hexachlorobutadiene (HCB), Tetrachloroethene (PCE), and Trichloroethene (TCE)	--	2	Sub-slab soil gas AOIs identified; however, indoor air results were below screening levels. Additional sampling recommended. AOIs will be added to Industrial Hygiene monitoring.
838	2	5.2.9	Hexachlorobutadiene (HCB) and Tetrachloroethene (PCE)	--	2	Sub-slab soil gas AOIs identified; however, indoor air results were below screening levels. Additional sampling recommended. AOIs will be added to Industrial Hygiene monitoring.
1098	2	5.2.10	--	--	1	No AOI identified. No further VI work at this time.
T-1561	2	5.2.11	N/A	--	1	No AOI identified. No further VI work at this time.



### 5.3 Zone 1 VI Pathway Additional Sampling

The first round of VI sampling for Zone 1 was performed in October and November of 2016. At buildings where there was an exceedance of screening levels for sub-slab soil gas during the initial sampling event, a second round of sampling was performed during the last week of August 2017. The sampling methodology was consistent with the first round of sampling. The samples were collected within 6 to 12 inches of the sample locations from the first round of sampling presented in Section 5.2. In general, the sampling data sets showed good agreement with the repeat measurements.

The Zone 1 VI second round of sampling results are presented in the following subsections:

Category 1:

- Section 5.3.1 Building 34
- Section 5.3.2 Building 1335

Category 2:

- Section 5.3.3 Building 462
- Section 5.3.4 Building 680
- Section 5.3.5 Building 838

### 5.3.1 Vapor Intrusion Additional Sampling Evaluation for Building 34

Building 34 is a Category 1 building in Zone 1 and was first sampled in November 2016. The results of the initial evaluation were presented in Section 5.2.1 and based on the sub-slab soil gas results for 1,2,4-trichlorobenzene, Building 34 was placed in VI Path Forward Group 2 and resampled. The results and evaluation of the second round of VI sampling are discussed below.

#### DATA SUMMARY

On August 29, 2017, sub-slab soil gas samples were collected from the building at the same nine locations as the initial sampling event (see Figure 5.2.1-2). Indoor air samples were collected on August 30, 2017 at locations that corresponded with the soil gas sample locations, along with one outdoor air sample from the main air intake. Summary statistics of the analytical results for sub-slab soil gas are presented on Table 5.3.1-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.3.1-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix E.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 35 of the 65 target analytes were ND in each of the 9 samples collected at Building 34 and eliminated from further VI evaluation (EDB had one ND reporting limit exceedance that will be discussed further below). A total of 30 analytes were detected in one or more of the 9 sub-slab soil gas samples. In terms of measured concentrations, the detected compounds were divided into three categories:

- Twenty analytes were detected below *de minimus* levels ( $<100 \mu\text{g}/\text{m}^3$ ) and were eliminated from further evaluation;
- Nine analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above the nonresidential screening level.

The sub-slab soil gas results are summarized in Table 34-1. There were two analytes in sub-slab soil gas at Building 34 that were detected at 100% detection frequency (PCE and toluene) and both analytes were detected above *de minimus* but below the screening level. Similarly to the initial sampling event, the only analyte present in the sub-slab soil gas at concentrations above the nonresidential screening level at Building 34 is 1,2,4-trichlorobenzene. Therefore, the only AOI in soil gas at Building 34 is 1,2,4-trichlorobenzene. This analyte was only detected in two of nine samples and both results exceed the sub-slab soil gas screening level.

**Table 34-1. Summary of Sub-Slab Soil gas Detects for Building 34**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analyte of interest)</b>				
1,2,4-Trichlorobenzene	22%	4800 - 19000	22%	2300
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,2-Dichlorobenzene	22%	34 - 320	0%	180000
1,3-Dichlorobenzene	33%	6.7 - 250	0%	1800
1,4-Dichlorobenzene	33%	11 - 1400	0%	2600
Acetone	89%	27 - 300	0%	3400000
Heptane	78%	6.9 - 160	0%	2000000
Hexane	89%	5.2 - 240	0%	410000
Tetrachloroethene (PCE)	100%	16 - 670	0%	23000
Toluene	100%	7.2 - 170	0%	2900000
Trichloroethene (TCE)	78%	5.1 - 150	0%	1200
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	11%	52	0%	3500000
1,1-Dichloroethene	11%	3.2	0%	120000
1,2,4-Trimethylbenzene	44%	5.4-10	0%	130000
1,3,5-Trimethylbenzene	33%	5 - 6	0%	130000
1,3-Butadiene	22%	2.2 - 4.8	N/A	N/A
2-Butanone (Methyl Ethyl Ketone)	56%	12 - 46	0%	2900000
2-Propanol	22%	9.1 - 15	N/A	N/A
4-Ethyltoluene	11%	4	N/A	N/A
4-Methyl-2-pentanone	11%	3.1	0%	1800000
Benzene	89%	4.6 - 59	0%	2200
CFC-11	11%	11	0%	33000000
CFC-12	44%	4.1 - 4.7	0%	29000000
Chlorobenzene	11%	13	0%	41000
Chloroform	11%	5.2	0%	7600
cis-1,2-Dichloroethene	22%	6.9 - 12	0%	4100
Cyclohexane	89%	4.4 - 82	0%	3500000
Ethanol	89%	17 - 93	N/A	N/A
Ethylbenzene	56%	5.9 - 31	0%	59000
Tetrahydrofuran	11%	2.5	0%	11000
Total Xylenes	89%	6 - 73	0%	58000

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were co-located and collected one day after the sub-slab soil gas samples were collected and analyzed for the same 65 analytes. Additionally, an outdoor air sample was collected immediately upwind of the building. Table 34-2 below shows the analytes detected in each of the three media sampled.

**Table 34-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
Hexane	•	•	•
Tetrachloroethene (PCE)	•	•	•
Toluene	•	•	•
<i>Benzene</i>	•	•	•
<i>CFC-11</i>	•	•	•
<i>CFC-12</i>	•	•	•
<i>Ethanol</i>	•	•	•
<i>Ethylbenzene</i>	•	•	•
<i>Total Xylenes</i>	•	•	•
1,4-Dichlorobenzene	•	•	
Heptane	•	•	
Trichloroethene (TCE)	•	•	
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
<i>2-Propanol</i>	•	•	
<i>4-Methyl-2-pentanone</i>	•	•	
<i>Chloroform</i>	•	•	
<i>cis-1,2-Dichloroethene</i>	•	•	
1,2,4-Trichlorobenzene	X		
1,2-Dichlorobenzene	•		
1,3-Dichlorobenzene	•		
<i>1,1,1-Trichloroethane</i>	•		
<i>1,1-Dichloroethene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>1,3-Butadiene</i>	•		
<i>4-Ethyltoluene</i>	•		
<i>Chlorobenzene</i>	•		
<i>Cyclohexane</i>	•		
<i>Tetrahydrofuran</i>	•		
Carbon Tetrachloride		•	•
CFC-113		•	
Methylene Chloride		•	
Naphthalene		•	
Vinyl chloride		•	

• = Detect

= Non-detect

X = Detect exceeds screening level

*Italics* = *de minimus* detect in sub-slab soil gas

Forty-one of the 65 indoor air analytes were ND in each of the samples. Two of these 41 ND analytes had reporting limits that exceeded screening levels and are discussed further below (HCB and EDB). The 39 ND analytes with adequate reporting limits were eliminated from further evaluation. Twenty-four analytes were detected in indoor air and none of the detected values exceed applicable screening levels (ethanol and 2-propanol do not have screening levels available). One outdoor air sample was collected immediately upwind of the building and eleven analytes were detected.

Table 34-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample

results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 34-3. Vapor Intrusion Evaluation for Building 34**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analyte of interest)</b>				
1,2,4-Trichlorobenzene	0%	<5.9 - <6.9	18	<6.6
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,2-Dichlorobenzene	0%	<0.95 - <1.1	1300	<1.1
1,3-Dichlorobenzene	0%	<0.95 - <1.1	13	<1.1
1,4-Dichlorobenzene	11%	<0.19 - 0.21	20	<0.21
Acetone	100%	31 - 110	26000	11
Heptane	22%	0.9 - 0.96	15000	<0.72
Hexane	67%	0.55 - 1.8	3100	0.64
Tetrachloroethene (PCE)	33%	0.24 - 9.8	180	0.82
Toluene	100%	0.89 - 1.8	22000	0.88
Trichloroethene (TCE)	22%	0.18 - 0.53	8.8	<0.19
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	0%	<0.17 - <0.2	26000	<0.19
1,1-Dichloroethene	0%	<0.06 - <0.07	880	<0.07
1,2,4-Trimethylbenzene	11%	<0.78 - 0.91	960	<0.87
1,3,5-Trimethylbenzene	0%	<0.78 - <0.92	960	<0.87
1,3-Butadiene	0%	<0.35 - <0.41	N/A	<0.39
2-Butanone (MEK)	78%	3.6 - 12	22000	<2.6
2-Propanol	100%	15 - 110	N/A	<2.2
4-Ethyltoluene	0%	<0.78 - <0.92	N/A	<0.87
4-Methyl-2-pentanone	33%	0.65 - 0.81	13000	<0.72
Benzene	100%	0.49 - 0.64	16	0.58
CFC-11	100%	1 - 1.7	250000	1.1
CFC-12	100%	2.6 - 2.8	220000	2.8
Chlorobenzene	0%	<0.73 - <0.86	310	<0.81
Chloroform	100%	0.24 - 0.79	57	<0.17
cis-1,2-Dichloroethene	11%	<0.12 - 1.2	31	<0.14
Cyclohexane	0%	<0.54 - <0.64	26000	<0.61
Ethanol	100%	38 - 280	N/A	3.1
Ethylbenzene	100%	0.2 - 0.48	440	0.22
Tetrahydrofuran	0%	<2.3 - <2.8	79	<2.6
Total Xylenes	100%	0.8 - 1.78	440	0.91

N/A = No screening level available

< = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

Of the 24 analytes detected in indoor air, 11 were detected in outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Each of the outdoor air analyte detections were detected within the range of detects in indoor air, with the exception of acetone and ethanol, which had higher detected results indoors. Acetone was detected outdoors at 11  $\mu\text{g}/\text{m}^3$  and

detected indoors in all the samples ranging from  $31 \mu\text{g}/\text{m}^3$  -  $110 \mu\text{g}/\text{m}^3$ ; however, it is important to point out that all of the indoor air results for acetone were well below screening levels.

While ethanol does not have a screening level, it was detected outdoors at  $3.1 \mu\text{g}/\text{m}^3$  and indoors in all of the samples ranging from  $38 \mu\text{g}/\text{m}^3$  -  $280 \mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: disinfectants, toilet bowl cleaner, Purex, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceed the indoor air screening levels and for EDB, one of the nine ND sub-slab soil gas reporting limits exceed the soil gas screening level. HCB was eliminated from further VI evaluation since all of the ND reporting limits in sub-slab soil gas met the soil gas screening level. Also, the ND indoor air reporting limits for HCB ( $<8.4 - 10 \mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ). Similarly, the ND indoor air reporting limits for EDB ( $0.24 - 0.29 \mu\text{g}/\text{m}^3$ ) only very slightly exceed the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ) and eight of the nine ND sub-slab soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for these two analytes. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation for Building 34.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results of the additional sampling will be provided to the site industrial hygiene staff and the occupants of the building. The results of the VI evaluation were consistent with the initial sampling event. The VI pathway at Building 34 is an insignificant exposure pathway based on current use; however, based on the sub-slab soil gas results for 1,2,4-trichlorobenzene and given the potential for future VI, Building 34 will remain in VI Path Forward Building Group 2 (see Figure 5-3). Additional seasonal sampling will occur in 2018 and 1,2,4-trichlorobenzene will be added to Industrial Hygiene monitoring for the building.

**Table 5.3.1-1. Building 34 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	11%	9.85	17.05	52	52	3.9	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	34	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	4.9	54	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	34	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	3.9	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	34	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	2.9	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	34	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	11%	3.73	4.75	3.2	3.2	2.8	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	34	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	22%	2654	6331	4800	19000	21	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	22%	0%
Category 1	34	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	44%	7.08	5.57	5.4	10	3.8	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	34	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	5.5	61	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	11%
Category 1	34	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	22%	41.2	105.1	34	320	4.3	5.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	34	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	2.9	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	34	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.3	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	34	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	33%	5.57	5.54	5	6	3.8	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	34	SS	1,3-Butadiene	106-99-0	UG/M3	9	22%	2.57	2.76	2.2	4.8	1.6	18	No Screening Value Available	-	-	-
Category 1	34	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	33%	33.0	81.7	6.7	250	4.3	5.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	34	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	33%	188	463	11	1400	4.3	5.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	34	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	10	110	No Screening Value Available	-	-	-
Category 1	34	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.4	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	34	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	56%	19.2	16.0	12	46	9.7	94	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	34	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	12	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	34	SS	2-Propanol	67-63-0	UG/M3	9	22%	10.5	11.5	9.1	15	7.1	78	No Screening Value Available	-	-	-
Category 1	34	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9	100	No Screening Value Available	-	-	-
Category 1	34	SS	4-Ethyltoluene	622-96-8	UG/M3	9	11%	4.58	5.77	4	4	3.5	39	No Screening Value Available	-	-	-
Category 1	34	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	11%	3.78	4.72	3.1	3.1	3.2	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	34	SS	Acetone	67-64-1	UG/M3	9	89%	110	81	27	300	190	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	34	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	3.7	41	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	34	SS	Benzene	71-43-2	UG/M3	9	89%	19.2	20.7	4.6	59	25	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	34	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	15	170	No Screening Value Available	-	-	-
Category 1	34	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	4.8	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	34	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	7.4	82	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	34	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	28	310	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	34	SS	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	9	99	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	34	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	4.5	50	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	34	SS	CFC-11	75-69-4	UG/M3	9	11%	5.98	6.93	11	11	4	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 1	34	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	5.5	61	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	34	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	34	SS	CFC-12	75-71-8	UG/M3	9	44%	5.43	5.46	4.1	4.7	3.9	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	34	SS	Chlorobenzene	108-90-7	UG/M3	9	11%	5.27	6.06	13	13	3.3	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	34	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	7.6	84	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	34	SS	Chloroform	67-66-3	UG/M3	9	11%	4.71	5.77	5.2	5.2	3.5	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	34	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	15	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	34	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	22%	4.93	5.52	6.9	12	2.8	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	34	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.3	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	34	SS	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	3.5	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	34	SS	Cyclohexane	110-82-7	UG/M3	9	89%	20.4	24.6	4.4	82	27	27	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	34	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.1	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	34	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	20	230	No Screening Value Available	-	-	-
Category 1	34	SS	Ethanol	64-17-5	UG/M3	9	89%	41.0	25.2	17	93	60	60	No Screening Value Available	-	-	-
Category 1	34	SS	Ethylbenzene	100-41-4	UG/M3	9	56%	11.9	10.3	5.9	31	3.3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	34	SS	Heptane	142-82-5	UG/M3	9	78%	35.6	49.0	6.9	160	3.5	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	34	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	31	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	34	SS	Hexane	110-54-3	UG/M3	9	89%	55.0	74.3	5.2	240	28	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	34	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	89%	21.3	18.0	4.2	57	34	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	34	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	10	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	34	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	25	280	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	34	SS	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	7.5	83	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	34	SS	o-Xylene	95-47-6	UG/M3	9	44%	7.70	6.17	4.4	16	3.3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.3.1-1. Building 34 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	SS	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	3.5	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	34	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3.1	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	34	SS	Tetrachloroethene	127-18-4	UG/M3	9	100%	139	222	16	670	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	34	SS	Tetrahydrofuran	109-99-9	UG/M3	9	11%	2.76	3.39	2.5	2.5	2.3	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	34	SS	Toluene	108-88-3	UG/M3	9	100%	48.1	52.3	7.2	170	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	34	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	6.6	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	34	SS	Total Xylenes	1330-20-7	UG/M3	9	89%	29.0	23.0	6.05	73	68	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	34	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	2.8	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	34	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.3	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	34	SS	Trichloroethene	79-01-6	UG/M3	9	78%	39.0	55.7	5.1	150	4.1	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	34	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	1.8	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.3.1-2. Building 34 Indoor and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	0.17	0.2	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	34	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.22	0.26	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	34	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.17	0.2	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	34	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.13	0.15	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	34	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	0.063	0.074	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	34	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.9	6.9	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	34	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	11%	0.472	0.166	0.91	0.91	0.78	0.92	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	34	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.24	0.29	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	34	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.95	1.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	34	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	0.13	0.15	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	34	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.73	0.86	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	34	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	0.78	0.92	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	34	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.35	0.41	No Screening Value Available	-	-	-
Category 1	34	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.95	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	34	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	11%	0.113	0.037	0.21	0.21	0.19	0.22	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	34	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.57	0.67	No Screening Value Available	-	-	-
Category 1	34	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.7	4.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	34	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	78%	5.76	3.71	3.6	12	2.7	2.8	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	34	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.2	3.8	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	34	IA	2-Propanol	67-63-0	UG/M3	9	100%	38.2	28.7	15	110	-	-	No Screening Value Available	-	-	-
Category 1	34	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.5	2.9	No Screening Value Available	-	-	-
Category 1	34	IA	4-Ethyltoluene	622-96-8	UG/M3	9	0%	-	-	-	-	0.78	0.92	No Screening Value Available	-	-	-
Category 1	34	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	33%	0.476	0.191	0.65	0.81	0.65	0.77	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	34	IA	Acetone	67-64-1	UG/M3	9	100%	48.3	24.9	31	110	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	34	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.82	0.97	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	34	IA	Benzene	71-43-2	UG/M3	9	100%	0.559	0.053	0.49	0.64	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	34	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	34	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	1.9	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	34	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3.1	3.6	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	34	IA	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	2.5	2.9	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	34	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	78%	0.267	0.089	0.26	0.35	0.23	0.24	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	34	IA	CFC-11	75-69-4	UG/M3	9	100%	1.19	0.24	1	1.7	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	34	IA	CFC-113	76-13-1	UG/M3	9	11%	0.750	0.321	1.6	1.6	1.2	1.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	34	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.22	0.26	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	34	IA	CFC-12	75-71-8	UG/M3	9	100%	2.71	0.06	2.6	2.8	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	34	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.73	0.86	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	34	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	0.21	0.25	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	34	IA	Chloroform	67-66-3	UG/M3	9	100%	0.351	0.175	0.24	0.79	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	34	IA	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	1.6	1.9	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	34	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	11%	0.191	0.378	1.2	1.2	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	34	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.72	0.85	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	34	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.78	0.92	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	34	IA	Cyclohexane	110-82-7	UG/M3	9	0%	-	-	-	-	0.54	0.64	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	34	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.3	1.6	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	34	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.6	6.6	No Screening Value Available	-	-	-
Category 1	34	IA	Ethanol	64-17-5	UG/M3	9	100%	99.0	81.0	38	280	-	-	No Screening Value Available	-	-	-
Category 1	34	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	0.284	0.099	0.2	0.48	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	34	IA	Heptane	142-82-5	UG/M3	9	22%	0.469	0.262	0.9	0.96	0.65	0.71	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	34	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.4	10	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	34	IA	Hexane	110-54-3	UG/M3	9	67%	0.728	0.502	0.55	1.8	0.56	0.59	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	34	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	0.863	0.312	0.59	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	34	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.57	0.67	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	34	IA	Methylene Chloride	75-09-2	UG/M3	9	100%	1.42	0.28	1.2	2.1	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	34	IA	Naphthalene	91-20-3	UG/M3	9	11%	0.250	0.091	0.49	0.49	0.41	0.49	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	34	IA	o-Xylene	95-47-6	UG/M3	9	100%	0.292	0.089	0.21	0.47	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	34	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.78	0.92	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	34	IA	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	0.67	0.8	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.3.1-2. Building 34 Indoor and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	IA	Tetrachloroethene	127-18-4	UG/M3	9	33%	1.28	3.20	0.24	9.8	0.21	0.25	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	34	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	2.8	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	34	IA	Toluene	108-88-3	UG/M3	9	100%	1.14	0.34	0.89	1.8	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	34	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.44	1.7	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	34	IA	Total Xylenes	1330-20-7	UG/M3	9	100%	1.16	0.39	0.8	1.78	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	34	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.63	0.74	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	34	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.72	0.85	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	34	IA	Trichloroethene	79-01-6	UG/M3	9	22%	0.149	0.146	0.18	0.53	0.17	0.2	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	34	IA	Vinyl Chloride	75-01-4	UG/M3	9	11%	0.0254	0.0126	0.059	0.059	0.04	0.046	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	34	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 1	34	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 1	34	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 1	34	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	34	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.07	0.07	-	-	-	-
Category 1	34	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.6	6.6	-	-	-	-
Category 1	34	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
Category 1	34	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.27	0.27	-	-	-	-
Category 1	34	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	34	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	34	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 1	34	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
Category 1	34	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.39	0.39	-	-	-	-
Category 1	34	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	34	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 1	34	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.64	0.64	-	-	-	-
Category 1	34	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 1	34	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	34	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	34	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 1	34	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	34	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
Category 1	34	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 1	34	OA	Acetone	67-64-1	UG/M3	1	100%	11.0	-	11	11	-	-	-	-	-	-
Category 1	34	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.92	0.92	-	-	-	-
Category 1	34	OA	Benzene	71-43-2	UG/M3	1	100%	0.580	-	0.58	0.58	-	-	-	-	-	-
Category 1	34	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	34	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 1	34	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	34	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	34	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	0.260	-	0.26	0.26	-	-	-	-	-	-
Category 1	34	OA	CFC-11	75-69-4	UG/M3	1	100%	1.10	-	1.1	1.1	-	-	-	-	-	-
Category 1	34	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 1	34	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 1	34	OA	CFC-12	75-71-8	UG/M3	1	100%	2.80	-	2.8	2.8	-	-	-	-	-	-
Category 1	34	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	34	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	34	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 1	34	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 1	34	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	34	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.8	0.8	-	-	-	-
Category 1	34	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
Category 1	34	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.61	0.61	-	-	-	-
Category 1	34	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 1	34	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	6.3	6.3	-	-	-	-
Category 1	34	OA	Ethanol	64-17-5	UG/M3	1	100%	3.10	-	3.1	3.1	-	-	-	-	-	-
Category 1	34	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	0.220	-	0.22	0.22	-	-	-	-	-	-

Table 5.3.1-2. Building 34 Indoor and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	34	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 1	34	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	9.4	9.4	-	-	-	-
Category 1	34	OA	Hexane	110-54-3	UG/M3	1	100%	0.640	-	0.64	0.64	-	-	-	-	-	-
Category 1	34	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	0.670	-	0.67	0.67	-	-	-	-	-	-
Category 1	34	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.64	0.64	-	-	-	-
Category 1	34	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	34	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.46	0.46	-	-	-	-
Category 1	34	OA	o-Xylene	95-47-6	UG/M3	1	100%	0.240	-	0.24	0.24	-	-	-	-	-	-
Category 1	34	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
Category 1	34	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 1	34	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	0.820	-	0.82	0.82	-	-	-	-	-	-
Category 1	34	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	34	OA	Toluene	108-88-3	UG/M3	1	100%	0.880	-	0.88	0.88	-	-	-	-	-	-
Category 1	34	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 1	34	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	0.910	-	0.91	0.91	-	-	-	-	-	-
Category 1	34	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 1	34	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.8	0.8	-	-	-	-
Category 1	34	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 1	34	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.045	0.045	-	-	-	-

### 5.3.2 Vapor Intrusion Additional Sampling Evaluation for Building 1335

Building 1335 is a Category 1 building in Zone 1 and was first sampled in November 2016. The results of the initial evaluation were presented in Section 5.2.4 and based on the sub-slab soil gas results for HCB; Building 1335 was placed in VI Path Forward Group 2 and resampled. The results and evaluation of the second round of VI sampling are discussed below.

#### DATA SUMMARY

On August 25, 2017, sub-slab soil gas samples were collected from the building at the same two locations as the initial sampling event (see Figure 5.2.4-2). Indoor air samples were collected on August 24, 2017 at locations that corresponded with the soil gas sample locations, along with one outdoor air sample from the main air intake. Summary statistics of the analytical results for sub-slab soil gas are presented on Table 5.3.2-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.3.2-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix E.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 62 of the 65 target analytes were ND in each of the two sub-slab soil gas samples collected at Building 1335. Nineteen of the ND soil gas analytes had at least one ND reporting limit above the respective screening level and these ND reporting limit exceedances are discussed further in the VI evaluation below. The remaining 43 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation.

A total of three analytes were detected in one or both of the two sub-slab soil gas samples (CFC-12, PCE, and HCB). In terms of measured concentrations, the detected compounds were divided into two categories:

- Two analytes were detected above *de minimus* levels ( $<100 \mu\text{g}/\text{m}^3$ ) but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above nonresidential screening levels.

The sub-slab soil gas results are summarized in Table 1335-1. Of the three analytes detected, only CFC-12 had a detection frequency of 100%. Similarly, to the initial sampling event, the only analyte present in the sub-slab soil gas at concentrations above the nonresidential screening level at Building 1335 is HCB. Therefore, the AOI in soil gas at Building 1335 is HCB.

**Table 1335-1. Summary of Sub-Slab Soil Gas Detects for Building 1335**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Hexachlorobutadiene (HCB)	50%	3800	50%	830
<b>Above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	100%	22000 - 680000	0%	29000000
Tetrachloroethene (PCE)	50%	890	0%	23000

#### EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage

and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, two indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1335-2 below shows the detections in each of the three media sampled.

**Table 1335-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
CFC-12	•	•	•
PCE	•	•	•
1,1-Dichloroethene		•	•
1,4-Dichlorobenzene		•	•
Acetone		•	•
Benzene		•	•
CFC-11		•	•
Chloroethane		•	•
Chloroform		•	•
Chloromethane		•	•
Ethanol		•	•
Ethylbenzene		•	•
Toluene		•	•
Total Xylenes		•	•
HCB	X		
2-Butanone (Methyl Ethyl Ketone)		•	
2-Propanol		•	
Carbon Tetrachloride		•	
Hexane		•	
Methylene Chloride		•	

• = Detect

= Non-detect

X = Detect exceeds screening level

Forty-six of the 65 indoor air analytes were ND in each of the samples. Two ND analytes had at least one reporting limit that exceeded the indoor air screening level and are discussed further below (EDB and HCB). The remaining 44 ND analytes with reporting limits that met the screening level were eliminated from further evaluation. Nineteen analytes were detected in indoor air and none of the detected concentrations in indoor air exceed screening levels (screening levels are not available for 2-propanol and ethanol). Fourteen analytes were detected in the outdoor air sample.

Table 1335-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1335-3. Vapor Intrusion Evaluation for Building 1335**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Measured Range or Maximum ND Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
HCB	0%	<8.4 - <8.6	6.2	<8.7
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
CFC-12	100%	22 - 27	220000	2.8
PCE	100%	0.68 - 0.72	180	0.54

< = Non-detect at the reporting limit provided

As shown in Tables 1335-2 and 1335-3, CFC-12 and PCE were detected in both sub-slab soil gas and indoor air. Both analytes were detected in indoor air at concentrations at least three orders of magnitude less than the screening level and were eliminated from further evaluation.

The 14 analytes detected in outdoor air were also detected indoors, which indicates that it is possible that outdoor air could have contributed to the presence of analytes detected indoors. Additionally, 11 of the 14 analytes detected outdoors had very similar results in both media. The three exceptions are acetone, CFC-12, and ethanol, which each had higher concentrations indoors. Acetone had indoor air results that ranged from  $18 \mu\text{g}/\text{m}^3$  -  $21 \mu\text{g}/\text{m}^3$  and an outdoor result of  $9.6 \mu\text{g}/\text{m}^3$ . CFC-12 had indoor air results that ranged from  $22 \mu\text{g}/\text{m}^3$  -  $27 \mu\text{g}/\text{m}^3$  and an outdoor result of  $2.8 \mu\text{g}/\text{m}^3$ . It is important to note that the indoor air results for both of these analytes are well below screening levels.

While ethanol does not have a screening level for indoor air, it was ND in both sub-slab soil gas samples and was eliminated from further VI evaluation. In indoor air, ethanol had indoor air results that ranged from  $420 \mu\text{g}/\text{m}^3$  -  $540 \mu\text{g}/\text{m}^3$  and was detected at  $4.1 \mu\text{g}/\text{m}^3$  in outdoor air. The fact that indoor air has far more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Scrubbing Bubbles, toilet-bowl cleaner, disinfectants, etc.

EDB and HCB were ND in indoor air with reporting limits that exceeded the indoor air screening levels. HCB also had one soil gas ND reporting limit above the screening level; however, HCB was detected in sub-slab soil gas above the screening level and was already identified as an AOI. EDB was also ND in sub-slab soil gas with reporting limits that exceeded screening levels. Therefore, EDB and the additional 17 ND analytes in sub-slab soil gas with reporting limits that exceeded the sub-slab soil gas screening levels are discussed and evaluated in the section below.

## **BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION**

VI evaluations utilize attenuation factor, which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 1335-1, CFC-12 was the only analyte detected at a 100% detection frequency. The data for CFC-12 is provided in Table 1335-4. Attenuation factors based on both average and maximum concentrations are shown.

**Table 1335-4. VI Attenuation Factors for Building 1335**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )
		CFC-12
Indoor Air	1335-IA-01	27
	1335-IA-02	22
	Average	24.5
Sub-slab Soil Gas	1335-SS-01	680,000
	1335-SS-02	22,000
	Average	351,000
Attenuation Factors	Average	7.0E-05
	Maximum	4.0E-05

1. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

As expected and shown in Table 1335-4, the sub-slab soil gas data exhibited more spatial variability than the indoor air data. The sub-slab soil gas concentrations exhibit approximately one order of magnitude of spatial variability, whereas the indoor air data is very similar. The most conservative attenuation factor calculated for CFC-12 is based on the average value. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 1335 is 7.0E-05.

This building-specific attenuation factor is used to estimate indoor air concentrations where:

$$\text{Estimated Indoor air concentration} = (\text{sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 1335-5. Estimated Indoor Air Concentrations for Non-Detect Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas but RLs Exceed Screening Levels</b>					
1,1,2,2-Tetrachloroethane	<5800	7.0E-05	4.1E-01	2.4	No
1,1,2-Trichloroethane	<4600	7.0E-05	3.2E-01	8.5	No
1,2,4-Trichlorobenzene	<25000	7.0E-05	1.8E+00	18	No
1,2-Dibromoethane (EDB)	<6500	7.0E-05	4.6E-01	0.23	Yes
1,2-Dichloroethane	<3400	7.0E-05	2.4E-01	5.3	No
1,2-Dichloropropane	<3900	7.0E-05	2.7E-01	18	No
1,3-Dichlorobenzene	<5100	7.0E-05	3.6E-01	13	No
1,4-Dichlorobenzene	<5100	7.0E-05	3.6E-01	20	No
alpha-Chlorotoluene	<4400	7.0E-05	3.1E-01	2.8	No
Benzene	<2700	7.0E-05	1.9E-01	16	No
Bromodichloromethane	<5700	7.0E-05	4.0E-01	7.6	No
Bromomethane	<13000	7.0E-05	9.1E-01	22	No

**Table 1335-5. Estimated Indoor Air Concentrations for Non-Detect Analytes with Reporting Limits that Exceed Screening Levels (Continued)**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas but RLs Exceed Screening Levels</b>					
Carbon Tetrachloride	<5300	7.0E-05	3.7E-01	23	No
Cumene	<4200	7.0E-05	2.9E-01	13	No
Dibromochloromethane	<7200	7.0E-05	5.0E-01	5.6	No
Naphthalene	<18000	7.0E-05	1.3E+00	11	No
Total 1,3-Dichloropropene	<7600	7.0E-05	5.3E-01	34	No
Trichloroethene	<4600	7.0E-05	3.2E-01	8.8	No

Table 1335-5 shows the estimated indoor air concentrations compared to the applicable indoor air screening levels. Based on the maximum ND sub-slab soil gas reporting limits for the 18 ND analytes, all but one had an estimated indoor air concentration well below relevant indoor air screening levels. Therefore, these 17 ND analytes with estimated indoor air concentrations below the screening level were eliminated from further evaluation.

EDB had an estimated indoor air concentration ( $0.46 \mu\text{g}/\text{m}^3$ ) that exceeds the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). The actual measured ND reporting limits for the EDB indoor air samples ranged from  $0.24 \mu\text{g}/\text{m}^3$  -  $0.25 \mu\text{g}/\text{m}^3$ , which are lower than the estimated indoor air concentration presented above and only very slightly exceed the indoor air screening level. Furthermore, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB, further investigation will be conducted once the facility-wide priority buildings have been sampled and evaluated.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results of the additional sampling will be provided to the site industrial hygiene staff and the occupants of the building. The results of the VI evaluation were consistent with the initial sampling event. The VI pathway at Building 1335 is an insignificant exposure pathway based on current use; however, based on the sub-slab soil gas results for HCB and given the potential for future VI, Building 1335 will remain in VI Path Forward Building Group 2 (see Figure 5-3). Additional seasonal sampling will occur in 2018 and HCB will be added to Industrial Hygiene monitoring for the building.



**Table 5.3.2-1. Building 1335 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	210	4600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1335	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	260	5800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	50%
Category 1	1335	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	210	4600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	50%
Category 1	1335	SS	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	150	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1335	SS	1,1-Dichloroethene	75-35-4	UG/M3	2	0%	-	-	-	-	150	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1335	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	1100	25000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 1	1335	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	190	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1335	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	290	6500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	100%
Category 1	1335	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	230	5100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1335	SS	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	150	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	50%
Category 1	1335	SS	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	180	3900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 1	1335	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	190	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1335	SS	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	84	1900	No Screening Value Available	-	-	-
Category 1	1335	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	230	5100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	50%
Category 1	1335	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	230	5100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	50%
Category 1	1335	SS	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	550	12000	No Screening Value Available	-	-	-
Category 1	1335	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	180	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1335	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	0%	-	-	-	-	450	10000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1335	SS	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	620	14000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1335	SS	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	370	8400	No Screening Value Available	-	-	-
Category 1	1335	SS	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	470	11000	No Screening Value Available	-	-	-
Category 1	1335	SS	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	190	4200	No Screening Value Available	-	-	-
Category 1	1335	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	160	3500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1335	SS	Acetone	67-64-1	UG/M3	2	0%	-	-	-	-	360	8100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1335	SS	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	200	4400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	50%
Category 1	1335	SS	Benzene	71-43-2	UG/M3	2	0%	-	-	-	-	120	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	50%
Category 1	1335	SS	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	250	5700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	50%
Category 1	1335	SS	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	390	8800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1335	SS	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	590	13000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	50%
Category 1	1335	SS	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	470	10000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1335	SS	Carbon Tetrachloride	56-23-5	UG/M3	2	0%	-	-	-	-	240	5300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	50%
Category 1	1335	SS	CFC-11	75-69-4	UG/M3	2	0%	-	-	-	-	210	4800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	1335	SS	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	290	6500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1335	SS	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	260	5900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1335	SS	CFC-12	75-71-8	UG/M3	2	100%	351000	465276	22000	680000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	1335	SS	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	170	3900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1335	SS	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	400	9000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	1335	SS	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	180	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1335	SS	Chloromethane	74-87-3	UG/M3	2	0%	-	-	-	-	310	7000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1335	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	150	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1335	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	170	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1335	SS	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	190	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	50%
Category 1	1335	SS	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	130	2900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1335	SS	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	320	7200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	50%
Category 1	1335	SS	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	1100	24000	No Screening Value Available	-	-	-
Category 1	1335	SS	Ethanol	64-17-5	UG/M3	2	0%	-	-	-	-	280	6400	No Screening Value Available	-	-	-
Category 1	1335	SS	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	160	3700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1335	SS	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	160	3500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1335	SS	Hexachlorobutadiene	87-68-3	UG/M3	2	50%	10900	10041	3800	3800	36000	36000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	50%	50%
Category 1	1335	SS	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	130	3000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1335	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	160	3700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1335	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	140	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1335	SS	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	530	12000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1335	SS	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	790	18000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	50%
Category 1	1335	SS	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	160	3700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1335	SS	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	190	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.3.2-1. Building 1335 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	SS	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	160	3600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1335	SS	Tetrachloroethene	127-18-4	UG/M3	2	50%	1895	1421	890	890	5800	5800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1335	SS	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	110	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1335	SS	Toluene	108-88-3	UG/M3	2	0%	-	-	-	-	140	3200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1335	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	340	7600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	50%
Category 1	1335	SS	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	320	7400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1335	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	150	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1335	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	170	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1335	SS	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	200	4600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	50%
Category 1	1335	SS	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	97	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1335	SS	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	40	510	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.3.2-2. Building 1335 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1335	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	0.22	0.22	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	1335	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	1335	IA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	0.13	0.13	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1335	IA	1,1-Dichloroethene	75-35-4	UG/M3	2	100%	0.0930	0.0057	0.089	0.097	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1335	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	5.8	6	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1335	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	0.77	0.8	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1335	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	0.24	0.25	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1335	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	0.94	0.97	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1335	IA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	0.13	0.13	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	1335	IA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	0.72	0.75	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1335	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	0.77	0.8	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1335	IA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	0.35	0.36	No Screening Value Available	-	-	-
Category 1	1335	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	0.94	0.97	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1335	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	50%	0.153	0.081	0.21	0.21	0.19	0.19	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1335	IA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	0.56	0.58	No Screening Value Available	-	-	-
Category 1	1335	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1335	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	50%	1.85	0.92	2.5	2.5	2.4	2.4	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1335	IA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1335	IA	2-Propanol	67-63-0	UG/M3	2	100%	4.00	0.14	3.9	4.1	-	-	No Screening Value Available	-	-	-
Category 1	1335	IA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	2.4	2.5	No Screening Value Available	-	-	-
Category 1	1335	IA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	0.77	0.8	No Screening Value Available	-	-	-
Category 1	1335	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	0.64	0.66	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1335	IA	Acetone	67-64-1	UG/M3	2	100%	19.5	2.1	18	21	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1335	IA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	0.81	0.84	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	1335	IA	Benzene	71-43-2	UG/M3	2	100%	0.390	0.014	0.38	0.4	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1335	IA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	1	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	1335	IA	Bromofom	75-25-2	UG/M3	2	0%	-	-	-	-	1.6	1.7	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1335	IA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	3	3.1	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	1335	IA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	2.4	2.5	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1335	IA	Carbon Tetrachloride	56-23-5	UG/M3	2	50%	0.175	0.106	0.25	0.25	0.2	0.2	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1335	IA	CFC-11	75-69-4	UG/M3	2	100%	1.10	0.00	1.1	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1335	IA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	1.2	1.2	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1335	IA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1335	IA	CFC-12	75-71-8	UG/M3	2	100%	24.5	3.5	22	27	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1335	IA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	0.72	0.74	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1335	IA	Chloroethane	75-00-3	UG/M3	2	100%	0.695	0.021	0.68	0.71	-	-	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1335	IA	Chloroform	67-66-3	UG/M3	2	100%	0.810	0.127	0.72	0.9	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1335	IA	Chloromethane	74-87-3	UG/M3	2	100%	3.40	0.28	3.2	3.6	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1335	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	0.12	0.13	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1335	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	0.71	0.74	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1335	IA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	0.77	0.8	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1335	IA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	0.54	0.56	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1335	IA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	1.3	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	1335	IA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	5.6	5.8	No Screening Value Available	-	-	-
Category 1	1335	IA	Ethanol	64-17-5	UG/M3	2	100%	480	85	420	540	-	-	No Screening Value Available	-	-	-
Category 1	1335	IA	Ethylbenzene	100-41-4	UG/M3	2	100%	0.255	0.049	0.22	0.29	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	0.64	0.66	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1335	IA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	8.4	8.6	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1335	IA	Hexane	110-54-3	UG/M3	2	100%	0.755	0.106	0.68	0.83	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1335	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	100%	0.435	0.049	0.4	0.47	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	0.57	0.58	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1335	IA	Methylene Chloride	75-09-2	UG/M3	2	100%	1.25	0.21	1.1	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1335	IA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	0.41	0.42	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	1335	IA	o-Xylene	95-47-6	UG/M3	2	100%	0.200	0.042	0.17	0.23	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	0.77	0.8	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	1335	IA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	0.67	0.69	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.3.2-2. Building 1335 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	IA	Tetrachloroethene	127-18-4	UG/M3	2	100%	0.700	0.028	0.68	0.72	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1335	IA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.3	2.4	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1335	IA	Toluene	108-88-3	UG/M3	2	100%	1.10	0.14	1	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1335	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	1.42	1.48	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1335	IA	Total Xylenes	1330-20-7	UG/M3	2	100%	0.635	0.092	0.57	0.7	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1335	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	0.62	0.64	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1335	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	0.71	0.74	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1335	IA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	0.17	0.17	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1335	IA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	0.04	0.041	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1335	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1335	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	1335	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1335	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1335	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	100%	0.0740	-	0.074	0.074	-	-	-	-	-	-
Category 1	1335	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 1	1335	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	1335	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 1	1335	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 1	1335	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1335	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 1	1335	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	1335	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 1	1335	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 1	1335	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	100%	0.240	-	0.24	0.24	-	-	-	-	-	-
Category 1	1335	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 1	1335	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1335	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1335	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	1335	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 1	1335	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	1335	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	1335	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 1	1335	OA	Acetone	67-64-1	UG/M3	1	100%	9.60	-	9.6	9.6	-	-	-	-	-	-
Category 1	1335	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	1335	OA	Benzene	71-43-2	UG/M3	1	100%	0.300	-	0.3	0.3	-	-	-	-	-	-
Category 1	1335	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	1335	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 1	1335	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1335	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	1335	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 1	1335	OA	CFC-11	75-69-4	UG/M3	1	100%	1.10	-	1.1	1.1	-	-	-	-	-	-
Category 1	1335	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	1335	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	1335	OA	CFC-12	75-71-8	UG/M3	1	100%	2.80	-	2.8	2.8	-	-	-	-	-	-
Category 1	1335	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 1	1335	OA	Chloroethane	75-00-3	UG/M3	1	100%	0.660	-	0.66	0.66	-	-	-	-	-	-
Category 1	1335	OA	Chloroform	67-66-3	UG/M3	1	100%	0.430	-	0.43	0.43	-	-	-	-	-	-
Category 1	1335	OA	Chloromethane	74-87-3	UG/M3	1	100%	2.50	-	2.5	2.5	-	-	-	-	-	-
Category 1	1335	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1335	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1335	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	1335	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.56	0.56	-	-	-	-
Category 1	1335	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 1	1335	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.8	5.8	-	-	-	-
Category 1	1335	OA	Ethanol	64-17-5	UG/M3	1	100%	4.10	-	4.1	4.1	-	-	-	-	-	-
Category 1	1335	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	0.160	-	0.16	0.16	-	-	-	-	-	-
Category 1	1335	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-

Table 5.3.2-2. Building 1335 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1335	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.7	8.7	-	-	-	-
Category 1	1335	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 1	1335	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	0.280	-	0.28	0.28	-	-	-	-	-	-
Category 1	1335	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 1	1335	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	1335	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 1	1335	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	1335	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	1335	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 1	1335	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	0.540	-	0.54	0.54	-	-	-	-	-	-
Category 1	1335	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1335	OA	Toluene	108-88-3	UG/M3	1	100%	0.850	-	0.85	0.85	-	-	-	-	-	-
Category 1	1335	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.48	1.48	-	-	-	-
Category 1	1335	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	0.350	-	0.35	0.35	-	-	-	-	-	-
Category 1	1335	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.65	0.65	-	-	-	-
Category 1	1335	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1335	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1335	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.042	0.042	-	-	-	-
Category 1	1335	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	4.1	4.1	-	-	-	-
Category 1	1335	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-

### 5.3.3 Vapor Intrusion Additional Sampling Evaluation for Building 462

Building 462 is a Category 2 building in Zone 1 and was first sampled in October 2016. The results of the initial evaluation were presented in Section 5.2.7 and based on the sub-slab soil gas results for PCE; Building 462 was placed in VI Path Forward Group 2 and resampled. The results and evaluation of the second round of VI sampling are discussed below.

#### DATA SUMMARY

On August 30, 2017, sub-slab soil gas samples were collected from the building at the same ten locations as the initial sampling event (see Figure 5.2.7-2). Indoor air samples were collected on August 29, 2017 at locations that corresponded with the soil gas sample locations, along with one outdoor air sample from the main air intake. Summary statistics of the analytical results for sub-slab soil gas are presented on Table 5.3.3-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.3.3-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix E.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 34 of the 65 target analytes were ND in the 10 samples collected at Building 462. All but one of these ND soil gas analytes (EDB) had reporting limits that met the respective screening level. Therefore, those 33 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 31 analytes were detected in one or more of the 10 sub-slab soil gas samples. These analytes include but are not limited to 10 chlorinated VOCs, eight petroleum hydrocarbons, and several common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Eighteen analytes were detected below *de minimus* levels ( $<100 \mu\text{g}/\text{m}^3$ ) and were eliminated from further evaluation;
- Eleven analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Two analytes were detected above the non-residential screening level.

The sub-slab soil gas results are summarized in Table 462-1. Four of the 11 analytes detected above *de minimus* levels but below screening levels were detected at a frequency of 100% (acetone, hexane, PCE, and toluene). Similarly to the initial sampling event, PCE was present in the sub-slab soil gas at concentrations above the nonresidential screening level at Building 462; however, TCE was also present above the soil gas screening level during the second sampling event. Therefore, PCE and TCE are the soil gas AOIs at Building 462. PCE had a 100% detection frequency; however, only one sample exceeded the screening level ( $43,000 \mu\text{g}/\text{m}^3$  and  $23,000 \mu\text{g}/\text{m}^3$ , respectively). TCE had a 70% detection frequency; however, only one sample exceeded the screening level ( $2,500 \mu\text{g}/\text{m}^3$  and  $1,200 \mu\text{g}/\text{m}^3$ , respectively). Both exceedances occurred in the same sample (462-SS-05). The nine remaining PCE and TCE detections were well below the screening level.

**Table 462-1. Summary of Sub-Slab Soil Gas Detects for Building 462**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Tetrachloroethene (PCE)	100%	93 - 43000	10%	23,000
Trichloroethene (TCE)	70%	4.3 - 2500	10%	1200
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	30%	12 - 280	0%	3500000
1,2,4-Trimethylbenzene	80%	5.3 - 100	0%	130000
Acetone	100%	41 - 1200	0%	3400000
Benzene	90%	4.8 - 110	0%	2200
CFC-11	50%	49 - 620	0%	33000000
CFC-114	20%	27 - 160	0%	11000000
Ethylbenzene	80%	8.4 - 130	0%	59000
Heptane	80%	11 - 110	0%	2000000
Hexane	100%	3.1 - 180	0%	410000
Toluene	100%	30 - 340	0%	2900000
Total Xylenes	90%	7.1 - 269	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,2-Dichlorobenzene	30%	6.1 - 24	0%	180000
1,3,5-Trimethylbenzene	50%	4.3 - 39	0%	130000
1,3-Butadiene	10%	42	N/A	N/A
1,4-Dichlorobenzene	10%	9.3	0%	2600
2-Butanone (Methyl Ethyl Ketone)	90%	9 - 68	0%	2900000
2-Propanol	10%	12	N/A	N/A
4-Ethyltoluene	70%	4.6 - 66	N/A	N/A
4-Methyl-2-pentanone	20%	5.2 - 5.6	0%	1800000
Carbon Disulfide	10%	20	0%	410000
CFC-12	90%	4 - 37	0%	29000000
Chlorobenzene	10%	14	0%	41000
Chloroform	20%	7.1 - 14	0%	7600
Cumene	20%	7.9 - 13	0%	1700
Cyclohexane	90%	4.8 - 57	0%	3500000
Ethanol	80%	6 - 16	N/A	N/A
Naphthalene	20%	8.2 - 17	0%	1500
Propylbenzene	30%	3.8 - 33	0%	12000
Styrene	10%	12	0%	32000

N/A - No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, 10 indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and were analyzed for the same 65 analytes. Additionally one outdoor air sample was collected immediately upwind of the building. Table 462-2 below shows the analytes detected in each of the three media sampled.

**Table 462-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
PCE	X	•	•
1,4-Dichlorobenzene	•	•	•
2-Butanone (Methyl Ethyl Ketone)	•	•	•
2-Propanol	•	•	•
Acetone	•	•	•
Benzene	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
Chloroform	•	•	•
Ethanol	•	•	•
Ethylbenzene	•	•	•
Heptane	•	•	•
Hexane	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
1,1,1-Trichloroethane	•	•	
Chlorobenzene	•	•	
TCE	X		
1,2,4-Trimethylbenzene	•		
1,2-Dichlorobenzene	•		
1,3,5-Trimethylbenzene	•		
1,3-Butadiene	•		
4-Ethyltoluene	•		
4-Methyl-2-pentanone	•		
Carbon Disulfide	•		
CFC-114	•		
Cumene	•		
Cyclohexane	•		
Naphthalene	•		
Propylbenzene	•		
Styrene	•		
1,1-Dichloroethene		•	•
Carbon Tetrachloride		•	•
Chloroethane		•	•
Methylene chloride		•	•
1,2-Dichloropropane			•
Chloromethane			•

• = Detect

= Non-detect

X = Detect exceeds screening level

*Italics* = *de minimus* detect(s) in sub-slab soil gas

Forty-four of the 65 indoor air analytes were ND in each of the samples. Two of these ND indoor air analytes had at least one ND reporting limit above the respective screening level and are discussed further below. The 42 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. Twenty-one analytes were detected in indoor air and none of the detected values in indoor air exceed applicable screening levels (ethanol and 2-propanol do not have a screening level available). Twenty-one analytes were also detected in the outdoor air sample.



Table 462-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 462-3. Vapor Intrusion Evaluation for Building 462**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Measured Range or Maximum ND Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Tetrachloroethene	100%	0.34 - 0.49	180	0.34
Trichloroethene	0%	<0.16 - <0.19	8.8	<0.18
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	20%	0.2	26000	<0.18
1,2,4-Trimethylbenzene	0%	<0.75 - <0.87	960	<0.81
Acetone	100%	14 - 64	26000	42
Benzene	100%	0.68 - 1.1	16	0.73
CFC-11	100%	1.1 - 2.7	250000	1.1
CFC-114	0%	<0.21 - <0.25	85000	<0.23
Ethylbenzene	100%	0.36 - 0.68	4440	0.38
Heptane	90%	0.74 - 1.3	15000	1
Hexane	100%	1.1 - 4.6	3100	1.2
Toluene	100%	2 - 3.9	22000	2.2
Total Xylenes	100%	0.93 - 2.45	440	0.98
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,2-Dichlorobenzene	0%	<0.92 - <1.1	1300	<0.99
1,3,5-Trimethylbenzene	0%	<0.75 - <0.87	960	<0.81
1,3-Butadiene	0%	<0.34 - <0.39	N/A	<0.36
1,4-Dichlorobenzene	100%	0.25 - 0.4	20	0.39
2-Butanone (Methyl Ethyl Ketone)	70%	3.3 - 7.8	22000	6.3
2-Propanol	60%	2.1 - 3.1	N/A	2.6
4-Ethyltoluene	0%	<0.75 - <0.87	N/A	<0.81
4-Methyl-2-pentanone	0%	<0.63 - <0.72	13000	<0.68
Carbon Disulfide	0%	<2.4 - <2.8	3100	<2.6
CFC-12	100%	2.9 - 4.2	220000	2.7
Chlorobenzene	10%	0.93	310	<0.76
Chloroform	100%	0.4 - 1	57	0.49
Cumene	0%	<0.75 - <0.87	13	<0.81
Cyclohexane	0%	<0.53 - <0.61	26000	<0.57
Ethanol	100%	3 - 120	N/A	9.8
Naphthalene	0%	<0.4 - <0.46	11	<0.43
Propylbenzene	0%	<0.75 - <0.87	88	<0.81
Styrene	0%	<0.65 - <0.75	240	<0.7

N/A = No screening level available  
< = Non-detect at the reporting limit provided

As shown in Tables 462-2 and 462-3, 17 analytes were detected in sub-slab soil gas and indoor air and only PCE exceeded the screening level in sub-slab soil gas. All of the detected indoor air analytes had

results below the applicable screening levels and were eliminated from further evaluation. Where a screening level was available, the indoor air detects were at least two orders of magnitude lower than the indoor air screening levels.

The results of the outdoor air sample collected indicated that 21 analytes were detected. Of those 21, 19 were detected in both indoor air and outdoor air, and 13 were detected at similar concentrations in both media. Therefore, it is possible that those 13 analytes may be present in indoor air due to migration from outdoor air. Acetone, CFC-11, CFC-12, ethanol, hexane, and total xylenes were detected at lower concentrations outdoors; however, all indoor air results were well below the screening levels.

Ethanol was detected outdoors and in 100% of the indoor air samples. While ethanol does not have a screening level for indoor air, it was detected in sub-slab soil gas below the *de minimus* level. The fact that indoor air has more ethanol than outdoor air and the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Scrubbing Bubbles, various bathroom and toilet bowl cleaners, disinfectants, etc. Therefore, ethanol was eliminated from further evaluation.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceed the indoor air screening levels and for EDB, one of 10 ND sub-slab soil gas reporting limits exceed the soil gas screening level. HCB was eliminated from further VI evaluation since all sub-slab soil gas ND reporting limits met the screening level. Also, the ND indoor air reporting limits (8.2 - 9.4  $\mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, the ND indoor air reporting limits for EDB (0.24 - 0.27  $\mu\text{g}/\text{m}^3$ ) only very slightly exceed the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ) and 9 of the 10 ND sub-slab soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently met screening levels for these two analytes. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation for Building 462.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results of the additional sampling will be provided to the site industrial hygiene staff and the occupants of the building. The results of the VI evaluation were consistent with the initial sampling event; with the exception of the addition of an AOI for sub-slab soil gas (TCE exceeded the sub-slab soil gas screening level in one of 10 samples). The VI pathway at Building 462 is an insignificant exposure pathway based on current use; however, based on the sub-slab soil gas results for PCE and TCE, and given the potential for future VI, Building 462 will remain in VI Path Forward Building Group 2 (see Figure 5-3). Additional seasonal sampling will occur in 2018 and PCE and TCE will be added to Industrial Hygiene monitoring for the building.

**Table 5.3.3-1. Building 462 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	10	30%	33.9	86.8	12	280	4	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	462	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	10	0%	-	-	-	-	5	51	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	462	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	10	0%	-	-	-	-	4	41	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	462	SS	1,1-Dichloroethane	75-34-3	UG/M3	10	0%	-	-	-	-	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	462	SS	1,1-Dichloroethene	75-35-4	UG/M3	10	0%	-	-	-	-	2.9	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	462	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	10	0%	-	-	-	-	22	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	462	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	10	80%	23.0	31.5	5.3	100	3.6	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	462	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	10	0%	-	-	-	-	5.6	57	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	10%
Category 2	462	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	10	30%	7.93	8.39	6.1	24	4.4	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	462	SS	1,2-Dichloroethane	107-06-2	UG/M3	10	0%	-	-	-	-	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	462	SS	1,2-Dichloropropane	78-87-5	UG/M3	10	0%	-	-	-	-	3.4	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	462	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	10	50%	11.2	13.1	4.3	39	3.6	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	462	SS	1,3-Butadiene	106-99-0	UG/M3	10	10%	5.90	12.88	42	42	1.6	16	No Screening Value Available	-	-	-
Category 2	462	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	10	0%	-	-	-	-	4.4	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	462	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	10	10%	5.61	6.50	9.3	9.3	4.4	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	462	SS	1,4-Dioxane	123-91-1	UG/M3	10	0%	-	-	-	-	10	110	No Screening Value Available	-	-	-
Category 2	462	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	10	0%	-	-	-	-	3.4	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	462	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	10	90%	25.6	21.2	9	68	88	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	462	SS	2-Hexanone	591-78-6	UG/M3	10	0%	-	-	-	-	12	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	462	SS	2-Propanol	67-63-0	UG/M3	10	10%	8.81	10.38	12	12	7.2	73	No Screening Value Available	-	-	-
Category 2	462	SS	3-Chloropropene	107-05-1	UG/M3	10	0%	-	-	-	-	9.2	93	No Screening Value Available	-	-	-
Category 2	462	SS	4-Ethyltoluene	622-96-8	UG/M3	10	70%	14.1	19.1	4.6	66	3.6	37	No Screening Value Available	-	-	-
Category 2	462	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	10	20%	4.08	4.25	5.2	5.6	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	462	SS	Acetone	67-64-1	UG/M3	10	100%	213	353	41	1200	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	462	SS	alpha-Chlorotoluene	100-44-7	UG/M3	10	0%	-	-	-	-	3.8	38	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	462	SS	Benzene	71-43-2	UG/M3	10	90%	31.7	35.0	4.8	110	24	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	462	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	16	57	No Screening Value Available	-	-	-
Category 2	462	SS	Bromodichloromethane	75-27-4	UG/M3	10	0%	-	-	-	-	4.9	50	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	462	SS	Bromoform	75-25-2	UG/M3	10	0%	-	-	-	-	7.6	77	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	462	SS	Bromomethane	74-83-9	UG/M3	10	0%	-	-	-	-	28	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	462	SS	Carbon Disulfide	75-15-0	UG/M3	10	10%	11.8	13.5	20	20	9.2	93	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	462	SS	Carbon Tetrachloride	56-23-5	UG/M3	10	0%	-	-	-	-	4.6	47	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	462	SS	CFC-11	75-69-4	UG/M3	10	50%	94.6	188.4	49	620	4.1	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	462	SS	CFC-113	76-13-1	UG/M3	10	0%	-	-	-	-	5.6	57	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	462	SS	CFC-114	76-14-2	UG/M3	10	20%	23.2	49.1	27	160	5.1	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	462	SS	CFC-12	75-71-8	UG/M3	10	90%	11.8	10.4	4	37	3.8	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	462	SS	Chlorobenzene	108-90-7	UG/M3	10	10%	4.96	5.75	14	14	3.4	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	462	SS	Chloroethane	75-00-3	UG/M3	10	0%	-	-	-	-	7.8	79	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	462	SS	Chloroform	67-66-3	UG/M3	10	20%	5.25	5.97	7.1	14	3.6	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	462	SS	Chloromethane	74-87-3	UG/M3	10	0%	-	-	-	-	15	62	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	462	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	10	0%	-	-	-	-	2.9	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	462	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	10	0%	-	-	-	-	3.3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	462	SS	Cumene	98-82-8	UG/M3	10	20%	5.28	5.97	7.9	13	3.6	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	462	SS	Cyclohexane	110-82-7	UG/M3	10	90%	26.1	17.5	4.8	57	26	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	462	SS	Dibromochloromethane	124-48-1	UG/M3	10	0%	-	-	-	-	6.3	63	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	462	SS	Dibromomethane	74-95-3	UG/M3	10	0%	-	-	-	-	21	210	No Screening Value Available	-	-	-
Category 2	462	SS	Ethanol	64-17-5	UG/M3	10	80%	11.3	6.6	6	16	20	56	No Screening Value Available	-	-	-
Category 2	462	SS	Ethylbenzene	100-41-4	UG/M3	10	80%	30.6	39.9	8.4	130	3.2	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	462	SS	Heptane	142-82-5	UG/M3	10	80%	43.8	35.1	11	110	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	462	SS	Hexachlorobutadiene	87-68-3	UG/M3	10	0%	-	-	-	-	31	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	462	SS	Hexane	110-54-3	UG/M3	10	100%	82.4	55.3	3.1	180	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	462	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	10	90%	55.8	72.5	5.5	200	32	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	462	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	10	0%	-	-	-	-	10	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	462	SS	Methylene Chloride	75-09-2	UG/M3	10	0%	-	-	-	-	26	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	462	SS	Naphthalene	91-20-3	UG/M3	10	20%	14.4	23.5	8.2	17	7.7	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	462	SS	o-Xylene	95-47-6	UG/M3	10	80%	19.5	24.0	4.4	69	3.2	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	462	SS	Propylbenzene	103-65-1	UG/M3	10	30%	8.09	10.59	3.8	33	3.6	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.3.3-1. Building 462 Sub-Slab Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	SS	Styrene	100-42-5	UG/M3	10	10%	4.51	5.23	12	12	3.1	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	462	SS	Tetrachloroethene	127-18-4	UG/M3	10	100%	5322	13290	93	43000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	10%	0%
Category 2	462	SS	Tetrahydrofuran	109-99-9	UG/M3	10	0%	-	-	-	-	2.2	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	462	SS	Toluene	108-88-3	UG/M3	10	100%	110	112	30	340	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	462	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	10	0%	-	-	-	-	6.6	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	462	SS	Total Xylenes	1330-20-7	UG/M3	10	90%	75.2	96.3	7.1	269	64	64	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	462	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	10	0%	-	-	-	-	2.9	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	462	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	10	0%	-	-	-	-	3.3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	462	SS	Trichloroethene	79-01-6	UG/M3	10	70%	257	788	4.3	2500	4	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	10%	0%
Category 2	462	SS	Vinyl Chloride	75-01-4	UG/M3	10	0%	-	-	-	-	1.9	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.3.3-2. Building 462 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	10	20%	0.111	0.047	0.2	0.2	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	462	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	10	0%	-	-	-	-	0.21	0.24	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	462	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	10	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	462	IA	1,1-Dichloroethane	75-34-3	UG/M3	10	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	462	IA	1,1-Dichloroethene	75-35-4	UG/M3	10	100%	0.0856	0.0054	0.079	0.096	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	462	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	10	0%	-	-	-	-	5.7	6.6	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	462	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	10	0%	-	-	-	-	0.75	0.87	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	462	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	10	0%	-	-	-	-	0.24	0.27	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	462	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	10	0%	-	-	-	-	0.92	1.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	462	IA	1,2-Dichloroethane	107-06-2	UG/M3	10	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	462	IA	1,2-Dichloropropane	78-87-5	UG/M3	10	0%	-	-	-	-	0.71	0.82	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	462	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	10	0%	-	-	-	-	0.75	0.87	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	462	IA	1,3-Butadiene	106-99-0	UG/M3	10	0%	-	-	-	-	0.34	0.39	No Screening Value Available	-	-	-
Category 2	462	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	10	0%	-	-	-	-	0.92	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	462	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	10	100%	0.365	0.046	0.25	0.4	-	-	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	462	IA	1,4-Dioxane	123-91-1	UG/M3	10	0%	-	-	-	-	0.55	0.64	No Screening Value Available	-	-	-
Category 2	462	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	10	0%	-	-	-	-	3.6	4.1	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	462	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	10	70%	3.80	2.35	3.3	7.8	2.2	2.6	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	462	IA	2-Hexanone	591-78-6	UG/M3	10	0%	-	-	-	-	3.1	3.6	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	462	IA	2-Propanol	67-63-0	UG/M3	10	60%	1.85	0.81	2.1	3.1	1.9	2.1	No Screening Value Available	-	-	-
Category 2	462	IA	3-Chloropropene	107-05-1	UG/M3	10	0%	-	-	-	-	2.4	2.8	No Screening Value Available	-	-	-
Category 2	462	IA	4-Ethyltoluene	622-96-8	UG/M3	10	0%	-	-	-	-	0.75	0.87	No Screening Value Available	-	-	-
Category 2	462	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	10	0%	-	-	-	-	0.63	0.72	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	462	IA	Acetone	67-64-1	UG/M3	10	100%	30.8	15.7	14	64	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	462	IA	alpha-Chlorotoluene	100-44-7	UG/M3	10	0%	-	-	-	-	0.79	0.92	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	462	IA	Benzene	71-43-2	UG/M3	10	100%	0.832	0.162	0.68	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	462	IA	Bromodichloromethane	75-27-4	UG/M3	10	0%	-	-	-	-	1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	462	IA	Bromoform	75-25-2	UG/M3	10	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	462	IA	Bromomethane	74-83-9	UG/M3	10	0%	-	-	-	-	3	3.4	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	462	IA	Carbon Disulfide	75-15-0	UG/M3	10	0%	-	-	-	-	2.4	2.8	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	462	IA	Carbon Tetrachloride	56-23-5	UG/M3	10	80%	0.410	0.311	0.19	1.1	0.2	0.22	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	462	IA	CFC-11	75-69-4	UG/M3	10	100%	1.32	0.49	1.1	2.7	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	462	IA	CFC-113	76-13-1	UG/M3	10	0%	-	-	-	-	1.2	1.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	462	IA	CFC-114	76-14-2	UG/M3	10	0%	-	-	-	-	0.21	0.25	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	462	IA	CFC-12	75-71-8	UG/M3	10	100%	3.23	0.48	2.9	4.2	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	462	IA	Chlorobenzene	108-90-7	UG/M3	10	10%	0.433	0.176	0.93	0.93	0.7	0.81	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	462	IA	Chloroethane	75-00-3	UG/M3	10	90%	0.241	0.046	0.24	0.28	0.23	0.23	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	462	IA	Chloroform	67-66-3	UG/M3	10	100%	0.604	0.210	0.4	1	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	462	IA	Chloromethane	74-87-3	UG/M3	10	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	462	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	10	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	462	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	10	0%	-	-	-	-	0.69	0.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	462	IA	Cumene	98-82-8	UG/M3	10	0%	-	-	-	-	0.75	0.87	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	462	IA	Cyclohexane	110-82-7	UG/M3	10	0%	-	-	-	-	0.53	0.61	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	462	IA	Dibromochloromethane	124-48-1	UG/M3	10	0%	-	-	-	-	1.3	1.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	462	IA	Dibromomethane	74-95-3	UG/M3	10	0%	-	-	-	-	5.4	6.3	No Screening Value Available	-	-	-
Category 2	462	IA	Ethanol	64-17-5	UG/M3	10	100%	29.9	39.6	3	120	-	-	No Screening Value Available	-	-	-
Category 2	462	IA	Ethylbenzene	100-41-4	UG/M3	10	100%	0.474	0.139	0.36	0.68	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	Heptane	142-82-5	UG/M3	10	90%	0.880	0.239	0.74	1.3	0.72	0.72	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	462	IA	Hexachlorobutadiene	87-68-3	UG/M3	10	0%	-	-	-	-	8.2	9.4	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	462	IA	Hexane	110-54-3	UG/M3	10	100%	1.73	1.03	1.1	4.6	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	462	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	10	100%	1.09	0.45	0.7	1.8	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	10	0%	-	-	-	-	0.55	0.64	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	462	IA	Methylene Chloride	75-09-2	UG/M3	10	100%	1.58	0.06	1.5	1.7	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	462	IA	Naphthalene	91-20-3	UG/M3	10	0%	-	-	-	-	0.4	0.46	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	462	IA	o-Xylene	95-47-6	UG/M3	10	100%	0.384	0.166	0.23	0.65	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	Propylbenzene	103-65-1	UG/M3	10	0%	-	-	-	-	0.75	0.87	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	462	IA	Styrene	100-42-5	UG/M3	10	0%	-	-	-	-	0.65	0.75	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.3.3-2. Building 462 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	IA	Tetrachloroethene	127-18-4	UG/M3	10	100%	0.386	0.062	0.34	0.49	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	462	IA	Tetrahydrofuran	109-99-9	UG/M3	10	0%	-	-	-	-	2.2	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	462	IA	Toluene	108-88-3	UG/M3	10	100%	2.70	0.83	2	3.9	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	462	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	10	0%	-	-	-	-	1.38	1.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	462	IA	Total Xylenes	1330-20-7	UG/M3	10	100%	1.47	0.62	0.93	2.45	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	462	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	10	0%	-	-	-	-	0.61	0.7	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	462	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	10	0%	-	-	-	-	0.69	0.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	462	IA	Trichloroethene	79-01-6	UG/M3	10	0%	-	-	-	-	0.16	0.19	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	462	IA	Vinyl Chloride	75-01-4	UG/M3	10	0%	-	-	-	-	0.039	0.045	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	462	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	462	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	462	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	462	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	462	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	100%	0.100	-	0.1	0.1	-	-	-	-	-	-
Category 2	462	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	462	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	462	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 2	462	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 2	462	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	462	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	100%	0.870	-	0.87	0.87	-	-	-	-	-	-
Category 2	462	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	462	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 2	462	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 2	462	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	100%	0.390	-	0.39	0.39	-	-	-	-	-	-
Category 2	462	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 2	462	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	462	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	6.30	-	6.3	6.3	-	-	-	-	-	-
Category 2	462	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	462	OA	2-Propanol	67-63-0	UG/M3	1	100%	2.60	-	2.6	2.6	-	-	-	-	-	-
Category 2	462	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	462	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	462	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	462	OA	Acetone	67-64-1	UG/M3	1	100%	42.0	-	42	42	-	-	-	-	-	-
Category 2	462	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 2	462	OA	Benzene	71-43-2	UG/M3	1	100%	0.730	-	0.73	0.73	-	-	-	-	-	-
Category 2	462	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	462	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	462	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	462	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	462	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	0.340	-	0.34	0.34	-	-	-	-	-	-
Category 2	462	OA	CFC-11	75-69-4	UG/M3	1	100%	1.10	-	1.1	1.1	-	-	-	-	-	-
Category 2	462	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	462	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	462	OA	CFC-12	75-71-8	UG/M3	1	100%	2.70	-	2.7	2.7	-	-	-	-	-	-
Category 2	462	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	462	OA	Chloroethane	75-00-3	UG/M3	1	100%	0.340	-	0.34	0.34	-	-	-	-	-	-
Category 2	462	OA	Chloroform	67-66-3	UG/M3	1	100%	0.490	-	0.49	0.49	-	-	-	-	-	-
Category 2	462	OA	Chloromethane	74-87-3	UG/M3	1	100%	4.00	-	4	4	-	-	-	-	-	-
Category 2	462	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	462	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 2	462	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	462	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 2	462	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	462	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 2	462	OA	Ethanol	64-17-5	UG/M3	1	100%	9.80	-	9.8	9.8	-	-	-	-	-	-
Category 2	462	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	0.380	-	0.38	0.38	-	-	-	-	-	-
Category 2	462	OA	Heptane	142-82-5	UG/M3	1	100%	1.00	-	1	1	-	-	-	-	-	-

Table 5.3.3-2. Building 462 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	462	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.8	8.8	-	-	-	-
Category 2	462	OA	Hexane	110-54-3	UG/M3	1	100%	1.20	-	1.2	1.2	-	-	-	-	-	-
Category 2	462	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	0.740	-	0.74	0.74	-	-	-	-	-	-
Category 2	462	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 2	462	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	1.60	-	1.6	1.6	-	-	-	-	-	-
Category 2	462	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 2	462	OA	o-Xylene	95-47-6	UG/M3	1	100%	0.240	-	0.24	0.24	-	-	-	-	-	-
Category 2	462	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	462	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 2	462	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	0.340	-	0.34	0.34	-	-	-	-	-	-
Category 2	462	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	462	OA	Toluene	108-88-3	UG/M3	1	100%	2.20	-	2.2	2.2	-	-	-	-	-	-
Category 2	462	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 2	462	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	0.980	-	0.98	0.98	-	-	-	-	-	-
Category 2	462	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.65	0.65	-	-	-	-
Category 2	462	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 2	462	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	462	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.042	0.042	-	-	-	-

### 5.3.4 Vapor Intrusion Additional Sampling Evaluation for Building 680

Building 680 is a Category 2 building in Zone 1 and was first sampled in October 2016. The results of the initial evaluation were presented in Section 5.2.9 and based on the sub-slab soil gas results for PCE, TCE, cis-1,2-DCE, 1,2-dichloroethane, HCB, and EDB Building 680 was placed in VI Path Forward Group 2 and resampled. The results and evaluation of the second round of VI sampling are discussed below.

#### DATA SUMMARY

On August 23 and 24, 2017, sub-slab soil gas samples were collected from the building at the same four locations as the initial sampling event (see Figure 5.2.1-2). Indoor air samples were collected on September 1, 2017 at locations that corresponded with the sub-slab soil gas sample locations, along with one outdoor air sample on August 23, 2017 from the main air intake. Summary statistics of the analytical results for sub-slab soil gas are presented on Table 5.3.4-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.3.4-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix E.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 32 of the 65 target analytes were ND in each of the four samples collected at Building 680. Seven of these 32 ND analytes had reporting limits that exceeded screening levels and are discussed further below. The 25 ND analytes with adequate reporting limits were eliminated from further evaluation. A total of 33 analytes were detected in one or more of the four sub-slab soil gas samples. These included 16 chlorinated VOCs, one brominated VOC, and seven petroleum hydrocarbons, along with a few common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Thirteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Fifteen analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Five analytes that were detected above nonresidential screening levels.

The sub-slab soil gas results are summarized in Table 680-1. Of the 15 analytes detected above *de minimus* levels but below screening levels, only three had detection frequencies of 100% (trans-1,2-DCE, 1,1-dichloroethane, and chloroform). Five of the six analytes identified as AOIs in the first round of sampling were present in the sub-slab soil gas at concentrations above the nonresidential screening level in the second sampling event. 1,2-Dichloroethane was identified as an AOI initially; however, in the second round of sampling, 1,2-dichloroethane was only detected in one of four samples and the result was below the screening level. The AOIs in soil gas for the second sampling event at Building 680 are PCE, TCE, cis-1,2-DCE, HCB, and EDB.



**Table 680-1. Summary of Sub-Slab Soil Gas Detects for Building 680**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Tetrachloroethene (PCE)	100%	550 - 760,000	25%	23,000
Trichloroethene (TCE)	100%	120 - 32,000	50%	1,200
cis-1,2-Dichloroethene	100%	18 - 20,000	50%	4,100
Hexachlorobutadiene (HCB)	75%	84 - 9,600	50%	830
1,2-Dibromoethane (EDB)	25%	68	25%	30
<b>Above de minimus levels but below screening levels</b>				
1,1,1-Trichloroethane	50%	27 - 2,500	0%	3,500,000
1,1,2-Trichloroethane	25%	1,000	0%	1,100
1,1-Dichloroethane (1,1-DCA)	100%	22 - 500	0%	290,000
1,1-Dichloroethene	75%	9.9 - 3300	0%	120,000
1,2-Dichlorobenzene	25%	380	0%	180,000
1,2-Dichloroethane	25%	210	0%	700
1,2-Dichloropropane	75%	12 - 110	0%	2,300
1,4-Dichlorobenzene	25%	130	0%	2,600
2-Butanone (Methyl Ethyl Ketone)	75%	15 - 260	0%	2,900,000
Acetone	75%	44 - 240	0%	3,400,000
Carbon Disulfide	25%	440	0%	410,000
Carbon Tetrachloride	75%	8.3 - 1,000	0%	3,000
CFC-12	25%	310	0%	29,000,000
Chloroform	100%	53 - 2,000	0%	7,600
trans-1,2-Dichloroethene	100%	14 - 1,800	0%	41,000
<b>Below de minimus levels</b>				
1,2,4-Trimethylbenzene	25%	8	0%	130,000
1,3-Butadiene <sup>a</sup>	25%	25	N/A	N/A
4-Ethyltoluene	25%	4.9	N/A	N/A
Benzene	75%	3.2 - 70	0%	2,200
Bromoform	25%	35	0%	17,000
Chlorobenzene	25%	54	0%	41,000
Cyclohexane	50%	4.3 - 22	0%	3,500,000
Ethanol	25%	23	N/A	N/A
Ethylbenzene	75%	8.2 - 36	0%	59,000
Heptane	75%	11 - 36	0%	2,000,000
Hexane	75%	17 - 62	0%	410,000
Toluene	75%	10 - 56	0%	2,900,000
Total Xylenes	75%	28 - 64	0%	58,000

<sup>a</sup> - Compound is a combustion product with a short half-life and would not persist in soil gas.

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, four indoor air samples were collected eight days after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 680-2 below shows the analytes detected in each of the three media sampled.

**Table 680-2. Detections Matrix**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
Tetrachloroethene (PCE)	X	•	•
Trichloroethene (TCE)	X	•	
cis-1,2-Dichloroethene	X	•	
Hexachlorobutadiene (HCB)	X		
1,2-Dibromoethane (EDB)	X		
2-Butanone (Methyl Ethyl Ketone)	•	•	•
Acetone	•	•	•
CFC-12	•	•	•
<i>Benzene</i>	•	•	•
<i>Ethanol</i>	•	•	•
<i>Toluene</i>	•	•	•
1,1,1-Trichloroethane	•	•	
1,1-Dichloroethane	•	•	
1,1-Dichloroethene	•	•	
1,2-Dichloroethane	•	•	
Carbon Tetrachloride	•	•	
Chloroform	•	•	
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>4-Ethyltoluene</i>	•	•	
<i>Cyclohexane</i>	•	•	
<i>Ethylbenzene</i>	•	•	
<i>Heptane</i>	•	•	
<i>Hexane</i>	•	•	
<i>Total Xylenes</i>	•	•	
1,1,2-Trichloroethane	•		
1,2-Dichlorobenzene	•		
1,2-Dichloropropane	•		
1,4-Dichlorobenzene	•		
Carbon Disulfide	•		
trans-1,2-Dichloroethene	•		
<i>1,3-Butadiene</i>	•		
<i>Bromoform</i>	•		
<i>Chlorobenzene</i>	•		
Tetrahydrofuran		X	
CFC-11		•	•
Methylene chloride		•	•
1,3,5-Trimethylbenzene		•	
2-Propanol		•	

**Table 680-2. Detections Matrix (Continued)**

Analyte	Sub-Slab	Indoor Air	Outdoor Air
4-Methyl-2-pentanone		•	
Chloroethane		•	
Chloromethane		•	
Propylbenzene		•	
Vinyl chloride		•	

• = Detect

= Non-detect

X = Detect exceeds screening level

*Italics* = *de minimus* detect(s) in sub-slab soil gas

Thirty-three of the 65 indoor air analytes were ND in each of the samples and were eliminated from further evaluation. Two of the 33 ND analytes had reporting limits that exceeded the screening level and will be discussed further below (HCB and EDB). Thirty-two analytes were detected in indoor air and only one analyte (tetrahydrofuran) exceeded the applicable screening level. The 31 analytes that were detected below the indoor air screening level were eliminated from further evaluation. Nine analytes were detected in the outdoor air sample collected.

Table 680-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 680-3. Vapor Intrusion Evaluation for Building 680**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Results ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above soil gas screening levels</b>				
PCE	100%	3.4 - 54	180	0.39
TCE	100%	0.57 - 5.3	8.8	<0.17
cis-1,2-Dichloroethene	100%	0.65 - 6.9	31	<0.13
HCB	0%	<8.3 - <9.1	6.2	<8.5
EDB	0%	<0.24 - <0.26	0.23	<0.24
<b>Detected in soil gas above de minimus levels but below soil gas screening levels</b>				
1,1,1-Trichloroethane	25%	<0.17 - 1.1	26,000	<0.17
1,1,2-Trichloroethane	0%	<0.17 - <0.18	85	<0.17
1,1-Dichloroethane (1,1-DCA)	25%	<0.13 - 0.2	2,200	<0.13
1,1-Dichloroethene	75%	<0.06 - 0.16	880	<0.063
1,2-Dichlorobenzene	0%	<0.94 - <1	1,300	<0.96
1,2-Dichloroethane	50%	<0.13 - <0.2	5.3	<0.13
1,2-Dichloropropane	0%	<0.72 - <0.78	18	<0.74
1,4-Dichlorobenzene	0%	<0.19 - <0.2	20	<0.19
2-Butanone (Methyl Ethyl Ketone)	100%	5.3 - 12	22,000	2.6
Acetone	100%	8 - 28	26,000	15
Carbon Disulfide	0%	<2.4 - <2.6	3,100	<2.5
Carbon Tetrachloride	25%	<0.2 - 0.68	23	<0.2
CFC-12	100%	2.7 - 31	220,000	2.8
Chloroform	100%	0.17 - 0.64	57	<0.16
trans-1,2-Dichloroethene	0%	<0.62 - <0.67	310	<0.63

**Table 680-3. Vapor Intrusion Evaluation for Building 680 (Continued)**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Results ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in Soil Gas Below de minimus levels</b>				
1,2,4-Trimethylbenzene	100%	1.2 - 5.7	960	<0.79
1,3-Butadiene	0%	<0.34 - <0.38	N/A	<0.35
4-Ethyltoluene	100%	1.2 - 7.3	N/A	<0.79
Benzene	100%	0.38 - 0.6	16	0.28
Bromoform	0%	<1.6 - <1.8	120	<1.6
Chlorobenzene	0%	<0.72 - <0.78	310	<0.74
Cyclohexane	50%	<0.54 - <1.4	26,000	<0.55
Ethanol	100%	9.1 - 14	N/A	1.9
Ethylbenzene	100%	1 - 2.2	440	<0.14
Heptane	50%	<0.64 - 1.3	15,000	<0.66
Hexane	75%	<0.56 - <1.3	3,100	<0.56
Toluene	100%	0.76 - 13	22,000	0.16
Total Xylenes	100%	5.4 - 12.3	440	<0.42

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

As shown on Tables 680-2 and 630-3, of the five AOIs identified in sub-slab soil gas (PCE, TCE, cis-1,2-DCE, HCB, and EDB), three were detected in indoor air (PCE, TCE, and cis-1,2-DCE); however, since the indoor air results do not exceed the screening levels, the VI pathway is considered insignificant at this time. There were 19 other analytes (22 total) detected in both sub-slab soil gas and indoor air and all of the indoor air results were below the screening level. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 10 additional analytes detected in indoor air that were ND in sub-slab soil gas. Only one detected result for tetrahydrofuran exceeded the indoor air screening level. This was the only detection of tetrahydrofuran in indoor air at a concentration of  $530 \mu\text{g}/\text{m}^3$  compared to a screening level of  $79 \mu\text{g}/\text{m}^3$ . Tetrahydrofuran was ND in the remaining three samples in indoor air with reporting limits that met the screening level. Tetrahydrofuran was ND in sub-slab soil gas with reporting limits that met the screening level and was therefore eliminated from further VI evaluation. Since the outdoor air sample collected indicated that tetrahydrofuran was also ND, it is not likely present due to migration from outdoor air. The fact that a single indoor air sample has more tetrahydrofuran than the sub-slab soil gas samples is indicative of an indoor source for this chemical (i.e., its presence in the indoor air is not due to VI). Tetrahydrofuran is found in numerous consumer products, including waterproofing compounds, lubricating oils, paint and varnish removers, adhesives, cleaners, etc. The chemical inventory from the building identified a number of materials likely to contain tetrahydrofuran (adhesive spray, various lubricants, and cleaners, etc.). Furthermore, due to the relatively high single concentration (E-flagged result) of tetrahydrofuran being detected near the shop of the building (sample 4), it is more likely that a product containing tetrahydrofuran was being used at or near the time of sampling. Therefore, tetrahydrofuran was eliminated from further evaluation since there was no evidence of VI.

Nine analytes were detected in both indoor and outdoor air, which indicates that it is possible that outdoor air could have contributed to the presence of analytes detected indoors. Of those nine, three indoor air analytes (acetone, CFC-11, and methylene chloride) were detected within the same range or at concentrations lower than the outdoor air detects. Six analytes (PCE, MEK, CFC-12, benzene, ethanol, and toluene) were detected at higher concentrations indoors; however, the analytes were detected at concentrations at least one order of magnitude below the indoor air screening levels where a screening level was available. While ethanol does not have a screening level for indoor air, it was detected in sub-slab soil gas below the *de minimus* level, and was therefore eliminated from further VI evaluation.

Ethanol was detected in 100% of the indoor air samples ranging from 9.1  $\mu\text{g}/\text{m}^3$  - 14  $\mu\text{g}/\text{m}^3$  and in the outdoor air sample at 1.9  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples, as well as outdoor air, is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Purex, Scrubbing Bubbles, etc.

There were seven ND analytes in sub-slab soil gas with at least one reporting limit that exceeds the soil gas screening level. Each these seven analytes were also ND in indoor air and five of those analytes had ND reporting limits that met the indoor air screening levels. Therefore, these five ND soil gas analytes (1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, alpha-chlorotoluene, dibromochloromethane, and naphthalene) were eliminated from further evaluation. HCB and EDB each had at least one soil gas ND reporting limit, as well as all indoor air ND reporting limits, exceed the applicable screening levels; however, HCB and EDB were already identified as AOIs for building 680 since at least one detected result exceeded the soil gas screening level. The ND reporting limits for HCB in indoor air (8.3 - 9.1  $\mu\text{g}/\text{m}^3$ ) only slightly exceeded the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). The ND reporting limits for EDB in indoor air (0.24 - 0.26  $\mu\text{g}/\text{m}^3$ ) only very slightly exceeded the screening level (0.23  $\mu\text{g}/\text{m}^3$ ). Furthermore, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for HCB and EDB, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results of the additional sampling will be provided to the site industrial hygiene staff and the occupants of the building. Overall, the results of the VI evaluation were consistent with the initial sampling event (1,2-dichloroethane was not identified as an AOI in soil gas in the this sampling event but will remain on the AOI list for the building). Tetrahydrofuran was identified as an AOI in indoor air in the second sampling event; however, there was no evidence of VI based on the single tetrahydrofuran exceedance. The VI pathway at Building 680 is an insignificant exposure pathway based on current use; however, based on the sub-slab soil gas results and given the potential for future VI, Building 680 will remain in VI Path Forward Building Group 2 (see Figure 5-3). Additional seasonal sampling will occur in 2018 and PCE, TCE, cis-1,2-DCE, 1,2-dichloroethane, HCB, and EDB will be added to Industrial Hygiene monitoring for the building.

**Table 5.3.4-1. Sub-Slab Soil Gas Summary Results for Building 680**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	4	50%	639	1241	27	2500	18	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	680	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.5	690	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	25%
Category 2	680	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	4	25%	325	467	1000	1000	4.4	550	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	680	SS	1,1-Dichloroethane	75-34-3	UG/M3	4	100%	162	229	22	500	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	680	SS	1,1-Dichloroethene	75-35-4	UG/M3	4	75%	950	1571	9.9	3300	400	400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	680	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	24	3000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	25%
Category 2	680	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	25%	70.0	116.8	8	8	16	490	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	680	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	25%	122	178	68	68	6.2	770	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	25%	50%
Category 2	680	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	4	25%	173	196	380	380	4.8	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	680	SS	1,2-Dichloroethane	107-06-2	UG/M3	4	25%	108	115	210	210	3.2	410	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	680	SS	1,2-Dichloropropane	78-87-5	UG/M3	4	75%	108	91	12	110	460	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	680	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	4	490	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	680	SS	1,3-Butadiene	106-99-0	UG/M3	4	25%	36.1	50.3	25	25	1.8	220	No Screening Value Available	-	-	-
Category 2	680	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	4.8	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	680	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	4	25%	110	139	130	130	4.8	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	680	SS	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	12	1400	No Screening Value Available	-	-	-
Category 2	680	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.8	470	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	680	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	75%	229	271	15	260	1200	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	680	SS	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	13	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	680	SS	2-Propanol	67-63-0	UG/M3	4	0%	-	-	-	-	7.9	990	No Screening Value Available	-	-	-
Category 2	680	SS	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	10	1200	No Screening Value Available	-	-	-
Category 2	680	SS	4-Ethyltoluene	622-96-8	UG/M3	4	25%	69.2	117.3	4.9	4.9	16	490	No Screening Value Available	-	-	-
Category 2	680	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.3	410	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	680	SS	Acetone	67-64-1	UG/M3	4	75%	237	179	44	240	950	950	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	680	SS	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	4.2	520	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	25%
Category 2	680	SS	Benzene	71-43-2	UG/M3	4	75%	65.3	68.9	3.2	70	320	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	680	SS	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	17	68	No Screening Value Available	-	-	-
Category 2	680	SS	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5.4	670	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	680	SS	Bromoform	75-25-2	UG/M3	4	25%	145	237	35	35	8.3	1000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	680	SS	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	31	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	680	SS	Carbon Disulfide	75-15-0	UG/M3	4	25%	273	293	440	440	10	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	680	SS	Carbon Tetrachloride	56-23-5	UG/M3	4	75%	426	491	8.3	1000	49	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	680	SS	CFC-11	75-69-4	UG/M3	4	0%	-	-	-	-	4.5	560	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 2	680	SS	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	6.2	770	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	680	SS	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	5.6	700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	680	SS	CFC-12	75-71-8	UG/M3	4	25%	145	158	310	310	4	500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	680	SS	Chlorobenzene	108-90-7	UG/M3	4	25%	76.0	105.0	54	54	3.7	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	680	SS	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	8.5	1100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	680	SS	Chloroform	67-66-3	UG/M3	4	100%	948	951	53	2000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	680	SS	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	17	830	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	680	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	100%	9850	11152	18	20000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	50%	0%
Category 2	680	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.6	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	680	SS	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	4	490	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	680	SS	Cyclohexane	110-82-7	UG/M3	4	50%	52.5	78.7	4.3	22	27	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	680	SS	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	6.8	860	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	25%
Category 2	680	SS	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	23	2800	No Screening Value Available	-	-	-
Category 2	680	SS	Ethanol	64-17-5	UG/M3	4	25%	111	179	23	23	24	760	No Screening Value Available	-	-	-
Category 2	680	SS	Ethylbenzene	100-41-4	UG/M3	4	75%	70.6	100.3	8.2	36	440	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	680	SS	Heptane	142-82-5	UG/M3	4	75%	72.0	89.4	11	36	410	410	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	680	SS	Hexachlorobutadiene	87-68-3	UG/M3	4	75%	3459	4201	84	9600	4300	4300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	50%	25%
Category 2	680	SS	Hexane	110-54-3	UG/M3	4	75%	75.0	69.2	17	62	350	350	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	680	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	75%	80.5	93.8	18	47	440	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	680	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	12	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	680	SS	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	28	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	680	SS	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	8.4	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	25%
Category 2	680	SS	o-Xylene	95-47-6	UG/M3	4	25%	63.5	104.4	10	10	14	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

Table 5.3.4-1. Sub-Slab Soil Gas Summary Results for Building 680 (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	SS	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	4	490	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	680	SS	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	3.4	430	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	680	SS	Tetrachloroethene	127-18-4	UG/M3	4	100%	194838	376849	550	760000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	25%	0%
Category 2	680	SS	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.4	300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	680	SS	Toluene	108-88-3	UG/M3	4	75%	75.8	78.7	10	56	380	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	680	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	7.2	920	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	680	SS	Total Xylenes	1330-20-7	UG/M3	4	75%	144	198	28	64	880	880	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	680	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	100%	647	840	14	1800	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	680	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.6	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	680	SS	Trichloroethene	79-01-6	UG/M3	4	100%	9723	15146	120	32000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	50%	0%
Category 2	680	SS	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	2	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.3.4-2. Indoor Air and Outdoor Air Summary Results for Building 680**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	4	25%	0.340	0.507	1.1	1.1	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	680	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	680	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	680	IA	1,1-Dichloroethane	75-34-3	UG/M3	4	25%	0.0988	0.0675	0.2	0.2	0.13	0.13	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	680	IA	1,1-Dichloroethene	75-35-4	UG/M3	4	75%	0.107	0.060	0.087	0.16	0.063	0.063	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	680	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	5.8	6.3	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	680	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	100%	2.75	2.03	1.2	5.7	-	-	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	680	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	0.24	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	680	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	0.94	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	680	IA	1,2-Dichloroethane	107-06-2	UG/M3	4	50%	0.123	0.068	0.16	0.2	0.13	0.13	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	680	IA	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	0.72	0.78	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	680	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	50%	1.07	0.99	0.98	2.5	0.79	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	680	IA	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	0.34	0.38	No Screening Value Available	-	-	-
Category 2	680	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	0.94	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	680	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	0.19	0.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	680	IA	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	0.56	0.61	No Screening Value Available	-	-	-
Category 2	680	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.6	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	680	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	100%	8.23	2.78	5.3	12	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	680	IA	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	3.2	3.5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	680	IA	2-Propanol	67-63-0	UG/M3	4	50%	2.20	1.57	2.7	4.2	1.9	1.9	No Screening Value Available	-	-	-
Category 2	680	IA	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	2.4	2.7	No Screening Value Available	-	-	-
Category 2	680	IA	4-Ethyltoluene	622-96-8	UG/M3	4	100%	3.40	2.70	1.2	7.3	-	-	No Screening Value Available	-	-	-
Category 2	680	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	4	50%	0.629	0.378	0.77	1.1	0.64	0.65	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	680	IA	Acetone	67-64-1	UG/M3	4	100%	17.3	9.4	8	28	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	680	IA	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	0.81	0.88	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	680	IA	Benzene	71-43-2	UG/M3	4	100%	0.470	0.096	0.38	0.6	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	680	IA	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	1	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	680	IA	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	680	IA	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	3	3.3	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	680	IA	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	2.4	2.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	680	IA	Carbon Tetrachloride	56-23-5	UG/M3	4	25%	0.245	0.290	0.68	0.68	0.2	0.2	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	680	IA	CFC-11	75-69-4	UG/M3	4	100%	1.15	0.19	1	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	25000	0%	0%
Category 2	680	IA	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	680	IA	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	680	IA	CFC-12	75-71-8	UG/M3	4	100%	2.85	0.17	2.7	3.1	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	680	IA	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	0.72	0.78	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	680	IA	Chloroethane	75-00-3	UG/M3	4	100%	2.10	2.78	0.39	6.2	-	-	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	680	IA	Chloroform	67-66-3	UG/M3	4	100%	0.365	0.202	0.17	0.64	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	680	IA	Chloromethane	74-87-3	UG/M3	4	100%	2.80	0.08	2.7	2.9	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	680	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	100%	4.94	2.88	0.65	6.9	-	-	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	680	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	0.71	0.77	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	680	IA	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	0.77	0.84	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	680	IA	Cyclohexane	110-82-7	UG/M3	4	50%	0.735	0.561	1	1.4	0.54	0.54	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	680	IA	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	1.3	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	680	IA	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	5.5	6	No Screening Value Available	-	-	-
Category 2	680	IA	Ethanol	64-17-5	UG/M3	4	100%	11.0	2.2	9.1	14	-	-	No Screening Value Available	-	-	-
Category 2	680	IA	Ethylbenzene	100-41-4	UG/M3	4	100%	1.38	0.56	1	2.2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	Heptane	142-82-5	UG/M3	4	50%	0.676	0.464	0.76	1.3	0.64	0.65	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	680	IA	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	8.3	9.1	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	680	IA	Hexane	110-54-3	UG/M3	4	75%	0.895	0.498	0.7	1.3	0.56	0.56	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	680	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	5.38	2.62	4	9.3	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	0.56	0.61	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	680	IA	Methylene Chloride	75-09-2	UG/M3	4	100%	3.53	1.17	2.5	5.2	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	680	IA	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	0.41	0.44	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	680	IA	o-Xylene	95-47-6	UG/M3	4	100%	1.78	0.82	1.3	3	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	Propylbenzene	103-65-1	UG/M3	4	25%	0.675	0.550	1.5	1.5	0.77	0.84	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	680	IA	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	0.66	0.72	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	680	IA	Tetrachloroethene	127-18-4	UG/M3	4	100%	29.9	20.8	3.4	54	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	680	IA	Tetrahydrofuran	109-99-9	UG/M3	4	100%	151	254	4.1	530	-	-	Vapor Intrusion Indoor Air Screening Levels	79	25%	0%
Category 2	680	IA	Toluene	108-88-3	UG/M3	4	100%	6.22	6.23	0.76	13	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%



**Table 5.3.4-2. Indoor Air and Outdoor Air Summary Results for Building 680 (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	1.42	1.54	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	680	IA	Total Xylenes	1330-20-7	UG/M3	4	100%	7.15	3.43	5.4	12.3	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	680	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	0.62	0.67	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	680	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	0.71	0.77	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	680	IA	Trichloroethene	79-01-6	UG/M3	4	100%	3.62	2.13	0.57	5.3	-	-	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	680	IA	Vinyl Chloride	75-01-4	UG/M3	4	50%	0.0320	0.0142	0.04	0.048	0.04	0.04	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	680	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	680	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	680	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	680	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	680	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	0.063	0.063	-	-	-	-
Category 2	680	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 2	680	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	680	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 2	680	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.96	0.96	-	-	-	-
Category 2	680	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	680	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 2	680	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	680	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.35	0.35	-	-	-	-
Category 2	680	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.96	0.96	-	-	-	-
Category 2	680	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 2	680	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 2	680	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	680	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	2.60	-	2.6	2.6	-	-	-	-	-	-
Category 2	680	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	680	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 2	680	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	680	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	680	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	680	OA	Acetone	67-64-1	UG/M3	1	100%	15.0	-	15	15	-	-	-	-	-	-
Category 2	680	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.83	0.83	-	-	-	-
Category 2	680	OA	Benzene	71-43-2	UG/M3	1	100%	0.280	-	0.28	0.28	-	-	-	-	-	-
Category 2	680	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	680	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	680	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	680	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	680	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	680	OA	CFC-11	75-69-4	UG/M3	1	100%	1.00	-	1	1	-	-	-	-	-	-
Category 2	680	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	680	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	680	OA	CFC-12	75-71-8	UG/M3	1	100%	2.80	-	2.8	2.8	-	-	-	-	-	-
Category 2	680	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 2	680	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 2	680	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 2	680	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	680	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	680	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 2	680	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	680	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.55	0.55	-	-	-	-
Category 2	680	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	680	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.7	5.7	-	-	-	-
Category 2	680	OA	Ethanol	64-17-5	UG/M3	1	100%	1.90	-	1.9	1.9	-	-	-	-	-	-
Category 2	680	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	680	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	680	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.5	8.5	-	-	-	-
Category 2	680	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.56	0.56	-	-	-	-
Category 2	680	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.28	0.28	-	-	-	-
Category 2	680	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 2	680	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	12.0	-	12	12	-	-	-	-	-	-
Category 2	680	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.42	0.42	-	-	-	-

**Table 5.3.4-2. Indoor Air and Outdoor Air Summary Results for Building 680 (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	680	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	680	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	680	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	680	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	0.390	-	0.39	0.39	-	-	-	-	-	-
Category 2	680	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	680	OA	Toluene	108-88-3	UG/M3	1	100%	0.160	-	0.16	0.16	-	-	-	-	-	-
Category 2	680	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.46	1.46	-	-	-	-
Category 2	680	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.42	0.42	-	-	-	-
Category 2	680	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.63	0.63	-	-	-	-
Category 2	680	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 2	680	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	680	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.041	0.041	-	-	-	-

### 5.3.5 Vapor Intrusion Additional Sampling Evaluation for Building 838

Building 838 is a Category 2 building in Zone 1 and was first sampled in October 2016. The results of the initial evaluation were presented in Section 5.2.9 and based on the sub-slab soil gas results for HCB and PCE, Building 34 was placed in VI Path Forward Group 2 and resampled. The results and evaluation of the second round of VI sampling are discussed below.

#### DATA SUMMARY

On August 24, 2017, sub-slab soil gas samples were collected from the building at the same three locations as the initial sampling event (see Figure 5.2.9-2). Indoor air samples were collected on August 23, 2017 at locations that corresponded with the soil gas sample locations, along with one outdoor air sample from the main air intake. Summary statistics of the analytical results for sub-slab soil gas for Building 838 are presented on Table 5.3.5-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.3.5-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix E.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 41 of the 65 target analytes were ND in each of the three samples collected at Building 838. All but one of the ND soil gas analytes had reporting limits that met the respective screening level (one of the three ND reporting limits for EDB exceeded the screening level). Therefore, the ND analytes were eliminated from further VI evaluation. A total of 24 analytes were detected in one or more of the three sub-slab soil gas samples. These analytes include, but are not limited to, 10 chlorinated VOCs, six petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Sixteen analytes were detected below *de minimus* levels ( $<100 \mu\text{g}/\text{m}^3$ ) and were eliminated from further evaluation;
- Six analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Two analytes were detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 838-1. Each of the six analytes detected above *de minimus* levels but below screening levels were detected in all three samples (100% detection frequency). Similarly, to the initial sampling event, two analytes were present in the sub-slab soil gas at concentrations above the nonresidential screening level at Building 838 (HCB and PCE). Therefore, the AOIs in soil gas at Building 34 are HCB and PCE. These analytes each had a detected result exceed the screening level in one of the three sub-slab soil gas samples.

**Table 838-1. Summary of Sub-Slab Soil Gas Detects for Building 838**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Hexachlorobutadiene (HCB)	100%	35 - 3200	33%	830
Tetrachloroethene (PCE)	100%	82 - 31000	33%	23000
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	8.2 - 120	0%	3500000
Acetone	100%	66 - 200	0%	3400000
Chloroform	100%	6.8 - 140	0%	7600
CFC 12	100%	18 - 140	0%	29000000
Toluene	100%	44 - 130	0%	2900000
Trichloroethene (TCE)	100%	5.8 - 1000	0%	1200
<b>Below <i>de minimus</i> levels</b>				
1,1,2-Trichloroethane	33%	14	0%	1100
1,1-Dichloroethane	67%	3.2 - 66	0%	290000
1,2,4-Trimethylbenzene	67%	14 - 17	0%	130000
1,2-Dichloropropane	33%	6.5	0%	2300
1,3,5-Trimethylbenzene	67%	6.9 - 7.2	0%	130000
2-Butanone (MEK)	33%	20	0%	2900000
2-Propanol	33%	42	N/A	N/A
4-Ethyltoluene	67%	11 - 12	N/A	N/A
Benzene	67%	8.5 - 18	0%	2200
Carbon Tetrachloride	33%	7.4	0%	3000
Cyclohexane	67%	10 - 29	0%	3500000
Ethanol	67%	14 - 22	N/A	N/A
Ethylbenzene	67%	14 - 29	0%	59000
Heptane	67%	14 - 57	0%	2000000
Hexane	100%	18 - 86	0%	410000
Total Xylenes	67%	58 - 98	0%	58000

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, three indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 838-2 below shows the detections in each of the three media sampled.

**Table 838-2. Detections Matrix**

Compound	Sub-Slab	Indoor Air	Outdoor Air
<i>Ethanol</i>	•	•	•
PCE	X	•	•
Acetone	•	•	•
Chloroform	•	•	•
CFC 12	•	•	•
Toluene	•	•	•
Trichloroethene (TCE)	•	•	•
<i>2-Butanone (MEK)</i>	•	•	•
<i>2-Propanol</i>	•	•	•
<i>Benzene</i>	•	•	•
<i>Carbon Tetrachloride</i>	•	•	•
<i>Ethylbenzene</i>	•	•	•
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>Total Xylenes</i>	•	•	
<i>1,1-Dichloroethane</i>	•		•
<i>Hexane</i>	•		•
HCB	X		
<i>1,2-Dichloropropane</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>1,1,1-Trichloroethane</i>	•		
<i>1,1,2-Trichloroethane</i>	•		
<i>4-Ethyltoluene</i>	•		
<i>Cyclohexane</i>	•		
<i>Heptane</i>	•		
CFC-11		•	•
Methylene Chloride		•	•
Vinyl Chloride		•	•
1,1,2,2-Tetrachloroethane		•	
4-Methyl-2-pentanone		•	
1,1-Dichloroethene			•
1,2-Dichloroethane			•
1,4-Dichlorobenzene			•
Chlorobenzene			•
Cis-1,2-Dichloroethene			•

• = Detected

= Non-detect

X = Detection exceeds screening level

*Italics = de minimus detections in sub-slab soil gas*

Forty-six of the 65 indoor air analytes were ND in each of the samples collected. Two of the 46 ND analytes had reporting limits that exceeded screening levels and are discussed further below (HCB and EDB). The 44 ND analytes with adequate reporting limits were eliminated from further evaluation. The 19 analytes detected in indoor air were eliminated from further evaluation since none of the detected values exceed applicable screening levels (ethanol and 2-propanol do not have screening levels available). Twenty-two analytes were detected in the outdoor air sample collected immediately upwind of the building.

Table 838-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample

results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 838-3. Vapor Intrusion Evaluation for Building 838**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above nonresidential screening levels</b>				
Hexachlorobutadiene (HCB)	0%	<7.9 - <8.9	6.2	<9
Tetrachloroethene (PCE)	100%	3.5 - 6.2	180	2.1
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<0.16 - <0.18	26000	<0.18
Acetone	100%	30 - 33	26000	56
Chloroform	100%	0.7 - 1.4	57	0.6
CFC 12	100%	5.5 - 5.6	220000	2.7
Toluene	100%	0.76 - 0.9	22000	0.27
Trichloroethene (TCE)	100%	0.24 - 0.35	8.8	1.3
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1,2-Trichloroethane	0%	<0.16 - <0.18	8.5	<0.18
1,1-Dichloroethane	0%	<0.12 - <0.14	2200	0.17
1,2,4-Trimethylbenzene	33%	<0.73 - 0.73	960	<0.82
1,2-Dichloropropane	0%	<0.68 - <0.77	18	<0.78
1,3,5-Trimethylbenzene	0%	<0.73 - <0.82	960	<0.82
2-Butanone (Methyl Ethyl Ketone)	100%	2.7 - 5.6	22000	4.2
2-Propanol	100%	10 - 10	N/A	7.2
4-Ethyltoluene	0%	<0.73 - <0.82	N/A	<0.82
Benzene	100%	0.42 - 0.44	16	1.5
Carbon Tetrachloride	100%	0.22 - 0.27	23	0.29
Cyclohexane	0%	<0.51 - <0.57	26000	<0.58
Ethanol	100%	32 - 96	N/A	5.9
Ethylbenzene	100%	0.27 - 0.28	440	0.19
Heptane	0%	<0.61 - <0.68	15000	<0.69
Hexane	0%	<0.52 - <0.59	3100	0.62
Total Xylenes	100%	1.53 - 1.69	440	<0.43

N/A = No screening level available

< = Non-detect at the reporting limit provided

There were no exceedances of indoor air screening levels. As shown in Tables 838-2 and 838-3, 13 analytes were detected in both sub-slab soil gas and indoor air and only one of those analytes exceeded an applicable screening level (PCE exceeded the soil gas screening level). Fifteen analytes were detected in both indoor and outdoor air. Of those 15, 12 indoor air analytes were detected within the same range or at concentrations lower than the outdoor air detects. Acetone, ethanol and PCE were detected at higher concentrations indoors; however, acetone and PCE were detected at concentrations at least 2 orders of magnitude below the indoor air screening levels. While ethanol does not have a screening level for indoor air, it was detected in sub-slab soil gas below the *de minimus* level, and was therefore eliminated from further VI evaluation. Ethanol was detected in 100% of the indoor air samples ranging from 32  $\mu\text{g}/\text{m}^3$  - 96  $\mu\text{g}/\text{m}^3$  and in the outdoor air sample at 5.9  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples, as well as outdoor air, is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants,

air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Purex, Scrubbing Bubbles, etc.

The ND indoor air results for EDB and HCB had at least two reporting limits above the respective screening level. HCB was already identified as an AOI for Building 838 due to a detected exceedance of the sub-slab soil gas screening level; however, HCB was ND in indoor air and the ND indoor air reporting limits (7.9 - 8.9  $\mu\text{g}/\text{m}^3$ ) only slightly exceeded the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, EDB was ND in all media sampled (one of the three ND reporting limits exceeded the sub-slab soil gas screening level) and the indoor air reporting limits (0.23 - 0.26  $\mu\text{g}/\text{m}^3$ ) met or only slightly exceeded the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ). Due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB and HCB, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results of the additional sampling will be provided to the site industrial hygiene staff and the occupants of the building. The results of the VI evaluation were consistent with the initial sampling event. The VI pathway at Building 838 is an insignificant exposure pathway based on current use; however, based on the sub-slab soil gas results for HCB and PCE and given the potential for future VI, Building 838 will remain in VI Path Forward Building Group 2 (see Figure 5-3). Additional seasonal sampling will occur in 2018 and HCB and PCE will be added to Industrial Hygiene monitoring for the building.

Table 5.3.5-1. Sub-Slab Soil Gas Summary Results of Building 838

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	3	100%	66.1	56.0	8.2	120	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	838	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	5.1	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	838	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	3	33%	12.2	9.4	14	14	4.1	41	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	838	SS	1,1-Dichloroethane	75-34-3	UG/M3	3	67%	28.2	33.3	3.2	66	31	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	838	SS	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	838	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	22	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	838	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	67%	16.5	2.3	14	17	37	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	838	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	5.7	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	33%
Category 2	838	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	4.5	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	838	SS	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	3	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	838	SS	1,2-Dichloropropane	78-87-5	UG/M3	3	33%	8.57	8.10	6.5	6.5	3.4	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	838	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	67%	10.9	6.6	6.9	7.2	37	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	838	SS	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	1.6	17	No Screening Value Available	-	-	-
Category 2	838	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	4.5	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	838	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	4.5	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	838	SS	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	11	110	No Screening Value Available	-	-	-
Category 2	838	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.5	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	838	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	33%	23.1	20.5	20	20	8.8	90	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	838	SS	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	12	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	838	SS	2-Propanol	67-63-0	UG/M3	3	33%	27.9	20.7	42	42	8.1	75	No Screening Value Available	-	-	-
Category 2	838	SS	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	9.3	95	No Screening Value Available	-	-	-
Category 2	838	SS	4-Ethyltoluene	622-96-8	UG/M3	3	67%	13.8	4.1	11	12	37	37	No Screening Value Available	-	-	-
Category 2	838	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	3	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	838	SS	Acetone	67-64-1	UG/M3	3	100%	125	68	66	200	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	838	SS	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	3.8	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	838	SS	Benzene	71-43-2	UG/M3	3	67%	12.8	4.8	8.5	18	24	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	838	SS	Bromochloromethane	74-97-5	UG/M3	2	0%	-	-	-	-	16	17	No Screening Value Available	-	-	-
Category 2	838	SS	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	5	51	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	838	SS	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	7.7	78	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	838	SS	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	29	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	838	SS	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	9.3	95	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	838	SS	Carbon Tetrachloride	56-23-5	UG/M3	3	33%	11.3	11.3	7.4	7.4	4.7	48	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	838	SS	CFC-11	75-69-4	UG/M3	3	0%	-	-	-	-	4.2	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	838	SS	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	5.7	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	838	SS	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	5.2	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	838	SS	CFC-12	75-71-8	UG/M3	3	100%	67.0	64.4	18	140	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	838	SS	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	3.4	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	838	SS	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	7.9	80	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	838	SS	Chloroform	67-66-3	UG/M3	3	100%	66.6	67.6	6.8	140	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	838	SS	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	15	63	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	838	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	838	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	3.4	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	838	SS	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	3.7	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	838	SS	Cyclohexane	110-82-7	UG/M3	3	67%	17.3	10.2	10	29	26	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	350000	0%	0%
Category 2	838	SS	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	6.3	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	838	SS	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	21	220	No Screening Value Available	-	-	-
Category 2	838	SS	Ethanol	64-17-5	UG/M3	3	67%	21.5	7.3	14	22	57	57	No Screening Value Available	-	-	-
Category 2	838	SS	Ethylbenzene	100-41-4	UG/M3	3	67%	19.8	8.0	14	29	33	33	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	838	SS	Heptane	142-82-5	UG/M3	3	67%	28.8	24.4	14	57	31	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	838	SS	Hexachlorobutadiene	87-68-3	UG/M3	3	100%	1098	1820	35	3200	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	33%	0%
Category 2	838	SS	Hexane	110-54-3	UG/M3	3	100%	43.7	36.9	18	86	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	838	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	67%	45.5	30.3	43	77	33	33	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	838	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	11	27	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	838	SS	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	26	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	838	SS	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	7.8	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	838	SS	o-Xylene	95-47-6	UG/M3	3	67%	17.5	3.1	15	21	33	33	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	838	SS	Propylbenzene	103-65-1	UG/M3	3	0%	-	-	-	-	3.7	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%



**Table 5.3.5-1. Sub-Slab Soil Gas Summary Results of Building 838 (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	SS	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	3.2	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	838	SS	Tetrachloroethene	127-18-4	UG/M3	3	100%	11094	17272	82	31000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	33%	0%
Category 2	838	SS	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.2	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	838	SS	Toluene	108-88-3	UG/M3	3	100%	82.7	43.7	44	130	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	838	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	6.8	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	838	SS	Total Xylenes	1330-20-7	UG/M3	3	67%	63.0	32.8	58	98	66	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	838	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	3	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	838	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	3.4	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	838	SS	Trichloroethene	79-01-6	UG/M3	3	100%	415	520	5.8	1000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	838	SS	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	1.9	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.3.5-2. Indoor and Outdoor Air Summary Results for Building 838**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	3	0%	-	-	-	-	0.16	0.18	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	838	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	33%	0.145	0.065	0.22	0.22	0.2	0.23	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	838	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	0.16	0.18	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	838	IA	1,1-Dichloroethane	75-34-3	UG/M3	3	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	838	IA	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	0.059	0.066	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	838	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	5.5	6.2	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	838	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	33%	0.502	0.199	0.73	0.73	0.73	0.82	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	838	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	0.23	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	67%
Category 2	838	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	0.89	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	838	IA	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	838	IA	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	0.68	0.77	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	838	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	0%	-	-	-	-	0.73	0.82	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	838	IA	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	0.33	0.37	No Screening Value Available	-	-	-
Category 2	838	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	0.89	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	838	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	0.18	0.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	838	IA	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	0.53	0.6	No Screening Value Available	-	-	-
Category 2	838	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.4	3.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	838	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	100%	4.27	1.46	2.7	5.6	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	838	IA	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	3	3.4	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	838	IA	2-Propanol	67-63-0	UG/M3	3	100%	10.0	0.0	10	10	-	-	No Screening Value Available	-	-	-
Category 2	838	IA	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	2.3	2.6	No Screening Value Available	-	-	-
Category 2	838	IA	4-Ethyltoluene	622-96-8	UG/M3	3	0%	-	-	-	-	0.73	0.82	No Screening Value Available	-	-	-
Category 2	838	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	3	33%	0.418	0.167	0.61	0.61	0.61	0.68	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	838	IA	Acetone	67-64-1	UG/M3	3	100%	31.7	1.5	30	33	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	838	IA	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	0.77	0.86	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	838	IA	Benzene	71-43-2	UG/M3	3	100%	0.430	0.010	0.42	0.44	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	838	IA	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	0.99	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	838	IA	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	1.5	1.7	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	838	IA	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	2.9	3.2	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	838	IA	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	2.3	2.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	838	IA	Carbon Tetrachloride	56-23-5	UG/M3	3	100%	0.247	0.025	0.22	0.27	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	838	IA	CFC-11	75-69-4	UG/M3	3	100%	1.00	0.00	1	1	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	838	IA	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	1.1	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	838	IA	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	838	IA	CFC-12	75-71-8	UG/M3	3	100%	5.57	0.06	5.5	5.6	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	838	IA	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	0.68	0.77	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	838	IA	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	0.2	0.22	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	838	IA	Chloroform	67-66-3	UG/M3	3	100%	0.940	0.398	0.7	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	838	IA	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	1.5	1.7	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	838	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	0.12	0.13	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	838	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	0.67	0.76	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	838	IA	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	0.73	0.82	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	838	IA	Cyclohexane	110-82-7	UG/M3	3	0%	-	-	-	-	0.51	0.57	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	838	IA	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	1.3	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	838	IA	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	5.3	5.9	No Screening Value Available	-	-	-
Category 2	838	IA	Ethanol	64-17-5	UG/M3	3	100%	54.7	35.9	32	96	-	-	No Screening Value Available	-	-	-
Category 2	838	IA	Ethylbenzene	100-41-4	UG/M3	3	100%	0.273	0.006	0.27	0.28	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	Heptane	142-82-5	UG/M3	3	0%	-	-	-	-	0.61	0.68	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	838	IA	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	7.9	8.9	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	838	IA	Hexane	110-54-3	UG/M3	3	0%	-	-	-	-	0.52	0.59	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	838	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	100%	1.07	0.06	1	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	0.53	0.6	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	838	IA	Methylene Chloride	75-09-2	UG/M3	3	100%	12.3	0.6	12	13	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	838	IA	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	0.39	0.44	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	838	IA	o-Xylene	95-47-6	UG/M3	3	100%	0.557	0.031	0.53	0.59	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	Propylbenzene	103-65-1	UG/M3	3	0%	-	-	-	-	0.73	0.82	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	838	IA	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	0.63	0.71	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.3.5-2. Indoor and Outdoor Air Summary Results for Building 838 (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	IA	Tetrachloroethene	127-18-4	UG/M3	3	100%	4.57	1.44	3.5	6.2	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	838	IA	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.2	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	838	IA	Toluene	108-88-3	UG/M3	3	100%	0.810	0.078	0.76	0.9	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	838	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	1.34	1.52	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	838	IA	Total Xylenes	1330-20-7	UG/M3	3	100%	1.62	0.08	1.53	1.69	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	838	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	0.59	0.66	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	838	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	0.67	0.76	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	838	IA	Trichloroethene	79-01-6	UG/M3	3	100%	0.280	0.061	0.24	0.35	-	-	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	838	IA	Vinyl Chloride	75-01-4	UG/M3	3	100%	0.0487	0.0031	0.046	0.052	-	-	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	838	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	838	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	838	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	838	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	100%	0.170	-	0.17	0.17	-	-	-	-	-	-
Category 2	838	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	100%	0.280	-	0.28	0.28	-	-	-	-	-	-
Category 2	838	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 2	838	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	838	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 2	838	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	838	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	100%	0.330	-	0.33	0.33	-	-	-	-	-	-
Category 2	838	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	838	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	838	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.37	0.37	-	-	-	-
Category 2	838	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	838	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	100%	0.230	-	0.23	0.23	-	-	-	-	-	-
Category 2	838	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	838	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	838	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	4.20	-	4.2	4.2	-	-	-	-	-	-
Category 2	838	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	838	OA	2-Propanol	67-63-0	UG/M3	1	100%	7.20	-	7.2	7.2	-	-	-	-	-	-
Category 2	838	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	838	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	838	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.69	0.69	-	-	-	-
Category 2	838	OA	Acetone	67-64-1	UG/M3	1	100%	56.0	-	56	56	-	-	-	-	-	-
Category 2	838	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
Category 2	838	OA	Benzene	71-43-2	UG/M3	1	100%	1.50	-	1.5	1.5	-	-	-	-	-	-
Category 2	838	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	838	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	838	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	838	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	838	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	0.290	-	0.29	0.29	-	-	-	-	-	-
Category 2	838	OA	CFC-11	75-69-4	UG/M3	1	100%	0.980	-	0.98	0.98	-	-	-	-	-	-
Category 2	838	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	838	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	838	OA	CFC-12	75-71-8	UG/M3	1	100%	2.70	-	2.7	2.7	-	-	-	-	-	-
Category 2	838	OA	Chlorobenzene	108-90-7	UG/M3	1	100%	1.40	-	1.4	1.4	-	-	-	-	-	-
Category 2	838	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	838	OA	Chloroform	67-66-3	UG/M3	1	100%	0.600	-	0.6	0.6	-	-	-	-	-	-
Category 2	838	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	838	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	100%	3.30	-	3.3	3.3	-	-	-	-	-	-
Category 2	838	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	838	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	838	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 2	838	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	838	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	838	OA	Ethanol	64-17-5	UG/M3	1	100%	5.90	-	5.9	5.9	-	-	-	-	-	-
Category 2	838	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	0.190	-	0.19	0.19	-	-	-	-	-	-
Category 2	838	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.69	0.69	-	-	-	-

**Table 5.3.5-2. Indoor and Outdoor Air Summary Results for Building 838 (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	838	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	9	9	-	-	-	-
Category 2	838	OA	Hexane	110-54-3	UG/M3	1	100%	0.620	-	0.62	0.62	-	-	-	-	-	-
Category 2	838	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.29	0.29	-	-	-	-
Category 2	838	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	838	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	26.0	-	26	26	-	-	-	-	-	-
Category 2	838	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-
Category 2	838	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	838	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	838	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	838	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	2.10	-	2.1	2.1	-	-	-	-	-	-
Category 2	838	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	838	OA	Toluene	108-88-3	UG/M3	1	100%	0.270	-	0.27	0.27	-	-	-	-	-	-
Category 2	838	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.52	1.52	-	-	-	-
Category 2	838	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 2	838	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	838	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	838	OA	Trichloroethene	79-01-6	UG/M3	1	100%	1.30	-	1.3	1.3	-	-	-	-	-	-
Category 2	838	OA	Vinyl Chloride	75-01-4	UG/M3	1	100%	0.840	-	0.84	0.84	-	-	-	-	-	-

### **5.3.6 Zone 1 Additional VI Sampling Results Evaluation Summary**

The results of the five buildings in Zone 1 that required additional sampling in 2017 are summarized in the Table 5.3.6.1.

**Table 5.3.6-1. Zone 1 Additional VI Sampling Results Evaluation Summary**

Zone 1 Bldg	Category	Section No.	Sub-Slab Soil Gas AOI(s)	Indoor Air AOI(s)	Path Forward Bldg Group	
					Bldg Grouping	Conclusions
34	1	5.3.1	1,2,4-Trichlorobenzene	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
1335	1	5.3.2	Hexachlorobutadiene (HCB)	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
462	2	5.3.3	Trichloroethene (TCE) and Tetrachloroethene (PCE)	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
680	2	5.3.4	1,2-Dibromoethane (EDB), cis-1,2-Dichloroethene, Hexachlorobutadiene (HCB), Tetrachloroethene (PCE), and Trichloroethene (TCE)	Tetrahydrofuran	2, 3	Sub-slab soil gas AOIs identified; however, indoor air results were below screening levels. Additional sampling recommended. AOIs will be added to Industrial Hygiene monitoring. Indoor air AOI identified (Tetrahydrofuran); however, no evidence of VI.
838	2	5.3.5	Hexachlorobutadiene (HCB) and Tetrachloroethene (PCE)	--	2	Sub-slab soil gas AOIs identified; however, indoor air results were below screening levels. Additional sampling recommended. AOIs will be added to Industrial Hygiene monitoring.

## **5.4 Zone 2 Phase 1 Vapor Intrusion Pathway Building Categorization and Results Evaluation**

Zone 2, shown on Figures 4.3-1, 4.3-2, and 4.3-3, is approximately 283 acres in size and contains 151 total buildings and structures that were visited and evaluated for the potential for exposure via VI. Due to the amount of buildings, Zone 2 was split into Phase 1 and Phase 2. The 80 buildings in Zone 2 Phase 1 were visited and surveyed in February and March 2017. The Zone 2 Phase 1 priority buildings were sampled in April and May 2017 and are discussed and evaluated in this section. The 71 buildings in Zone 2 Phase 2 were visited in September 2017 and are discussed in Section 5.5.

### 5.4.1 Zone 2 Target Analyte List Verification Sampling Results

In order to verify the accuracy of the VI TAL, verification sampling was conducted in Zone 2 in March 2017. The sample locations were based on well locations and spatial distribution. Six soil-gas samples were collected via summa canister across Zone 2. Six groundwater samples were also collected from nearby wells for comparison. Figure 5-5 presents the soil gas and groundwater sample locations. Soil gas samples were named according to the corresponding groundwater monitoring well name.

Tables 5-3 and 5-4 present the soil gas and groundwater sample results, respectively. The six soil gas samples were analyzed for the 65 analytes on the VI TAL via EPA TO-15 and 23 were detected. Groundwater samples were analyzed for 184 analytes using EPA Method 8260 and 8270 (a total of 39 analytes were analyzed in both soil gas and groundwater samples). Forty-four analytes were detected in groundwater and of those 44, 18 were on the VI TAL. One hundred forty five additional analytes were analyzed in groundwater that were not included on the VI TAL. Of those 145 groundwater analytes, 26 SVOCs were detected. Each of those 26 detected groundwater analytes are not considered volatile or are not able to be analyzed by Method TO-15. Table 5-5 shows a summary of those 26 analytes along with their chemical and physical data. In addition, the designated methods listed in the MDEQ March 10, 2016 *Target Detection Limits and Designated Analytical Methods* document are presented for each analyte. The non-residential land use screening levels for the VI pathway provided in Appendix D-2 of the MDEQ May 2013 *Guidance Document for the Vapor Intrusion Pathway* were included for comparison purposes only. There were three analytes (benzene, PCE, and TCE) with exceedances of the 2013 soil gas screening levels.

The methodology and results were very similar to the Zone 1 TAL verification effort. The 2017 Zone 2 VI TAL verification sampling event achieved lower reporting limits for groundwater analytes than the 2016 Zone 1 TAL verification event (very few ND groundwater reporting limit exceedances were noted in Zone 2). The results of the VI TAL verification sampling demonstrated that the distribution of detects in soil gas and groundwater samples suggest smaller and separate vapor sources. Correlations were noted between the detected analytes in soil gas and groundwater samples and the extended TO-15 analyte list will be retained for ongoing evaluation. Based on the results of the TAL verification sampling activities, the VI TAL is sufficiently representative and appropriate.



## 5.4.2 Identification of Zone 2 Priority Buildings (Category 1 and 2)

Zone 2 Phase 1 contains 80 buildings and structures that were visited and evaluated for the potential for exposure via VI. Table 5-6 lists the buildings identified by building number and provides information regarding occupancy and use. Following the VI Categorization Flowchart (Figure 5-2), 18 out of the 80 buildings in Zone 2 Phase 1 were categorized as priority buildings (Category 1 and 2 buildings) and were identified for further evaluation. Figure 5-6 presents the priority buildings in Zone 2 Phase 1.

The 18 priority buildings in Zone 2 Phase 1 are as follows:

### Category 1:

- Building 833 – Craft Services Fab Shop includes offices, a sample preparation room, kitchen and locker rooms;
- Building 941 – Herbicide Inter Control Room (6-5940)/Specialty Intermediates includes an office, shop laboratory, and process area;
- Building 948 – Phenoxy Herbicides includes an office, laboratory, locker rooms, process area and a control room;
- Building 972 – Granular Formulation Plant includes an office, shop, laboratory and a truck garage;
- Building 1025 – Building 1025 Office Building includes offices;
- Building 1028 – Sulfonamides Control Room includes an office and laboratory; and
- Building 1233 – Garlon Plant Granular includes an office, shop, laboratory, and process area.

### Category 2:

- Building 1 – Dow Ag Office Space Plus includes offices, a laboratory, shop, warehouse, and process area;
- Building 477 – This building is used by staff from various other buildings and includes offices, a shop, and process area;
- Building 489 – Herbicide Liquid Formulations (6-5020) includes offices, laboratory, process area, and warehouse;
- Building 768 – Pilot Plant/Office/Labs includes offices, laboratory, process area and a warehouse;
- Building 827 – Growth Insecticides includes offices, laboratory, shop and a warehouse;
- Building 849 – 768 Building Warehouse includes offices and a warehouse;
- Building 858 – Dursban Production includes offices, kitchen, locker room, shop, library, laboratory, and process area;
- Building 934 – Liquid Formulations/858 Building after hours includes a large warehouse, small offices, and process area;

- Building 969 – Ag Chem Development includes offices, laboratory, manufacturing space, warehouse and process area;
- Building 1222 – Dursban Maintenance Shop includes offices, kitchen, and shop; and
- Building 1377 – Division #1 Warehouse includes offices, lunch room, and warehouse.

In April and May 2017, the Zone 2 Phase 1 priority buildings were sampled. In preparation for VI sampling, a building survey was conducted for each of these buildings, which included a PID screening that focused on potential migration pathways. Building maps or blue prints were used to develop building sampling plans. Table 5-7 presents the priority buildings, square footage, and number of samples collected. For each building, an equal number of co-located indoor air and sub-slab soil gas samples were collected. In addition, at least one outdoor air sample was collected at each building.

The Zone 2 Phase 1 VI results are presented in the following subsections as follows:

Category 1:

- Section 5.4.3 Building 833
- Section 5.4.4 Building 941
- Section 5.4.5 Building 948
- Section 5.4.6 Building 972
- Section 5.4.7 Building 1025
- Section 5.4.8 Building 1028
- Section 5.4.9 Building 1233

Category 2:

- Section 5.4.10 Building 1
- Section 5.4.11 Building 477
- Section 5.4.12 Building 489
- Section 5.4.13 Building 768
- Section 5.4.14 Building 827
- Section 5.4.15 Building 849
- Section 5.4.16 Building 858
- Section 5.4.17 Building 934
- Section 5.4.18 Building 969

- Section 5.4.19 Building 1222
- Section 5.4.20 Building 1377

### 5.4.3 Vapor Intrusion Evaluation for Building 833

#### BACKGROUND

Building 833 is a Category 2 building in Zone 2. This building has office space, sampling supply storage and a sample preparation area. It is known as the Craft Services Fab Shop (see Figure 5.4.3-1) and is located within the central portion of the facility designated as Zone 2. The building is single story tall and is connected to Building 983. It is approximately 5,220 ft<sup>2</sup> (485 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on October 5, 2016 and the results can be found in Appendix C. The building has an HVAC unit and one bay door that is only very rarely left open due to the HVAC. The land surrounding the building consists of asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners and sample preservatives. The full chemical inventory list is presented with the building survey in Appendix C.

#### DATA SUMMARY

On October 11, 2016, sub-slab soil gas samples were collected from three locations within the building. Indoor air samples were collected on October 11, 2016 at three locations, corresponding to the sub-slab soil gas sample locations, along with one outdoor air sample from the main air intakes. The sampling locations are shown on Figure 5.4.3-2. Summary statistics of the analytical results for sub-slab soil gas for Building 833 are presented on Table 5.4.3-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.3-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 45 of the 65 target analytes were ND in each of the three samples collected at Building 833. All of the ND analytes had reporting limits that met the respective screening levels. Therefore, the 45 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 20 analytes were detected in one or more of the three sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into two categories:

- Seventeen analytes detected below *de minimus* levels (<100 µg/m<sup>3</sup>); and
- Three were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 833-1. All three of the analytes detected above *de minimus* levels but below screening levels had detection frequencies of 100% (acetone, PCE, and total xylenes). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI; therefore, there are no AOIs in sub-slab soil gas at Building 833.

**Table 833-1. Summary of Sub-Slab Soil Gas Detects for Building 833**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
Acetone	100%	35 - 1100	0%	3400000
Tetrachloroethene (PCE)	100%	24 - 880	0%	23000
Total Xylenes	100%	32 - 280	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	67%	29 - 35	0%	3500000
1,2,4-Trimethylbenzene	100%	15 - 57	0%	130000
1,3,5-Trimethylbenzene	33%	4.3	0%	130000
1,4-Dioxane	67%	42 - 69	N/A	N/A
2-Butanone (Methyl Ethyl Ketone)	33%	22	0%	2900000
2-Propanol	33%	9.4	N/A	N/A
4-Ethyltoluene	100%	36 - 44	N/A	N/A
Benzene	100%	7.2 - 22	0%	2200
Cumene	33%	4.5	0%	1700
Cyclohexane	67%	8.8 - 18	0%	3500000
Ethanol	67%	45 - 64	N/A	N/A
Ethylbenzene	67%	12 - 35	0%	59000
Heptane	100%	11 - 40	0%	2000000
Hexane	100%	11 - 42	0%	410000
Propylbenzene	67%	6	0%	12000
Toluene	100%	25 - 77	0%	2900000
Trichloroethene	33%	4.7	0%	1200

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, three indoor air samples were collected the same day as the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 833-2 below shows the analytes detected in each of the three media sampled.

**Table 833-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>Toluene</i>	•	•	•
<i>2-Propanol</i>	•	•	
<i>Ethanol</i>	•	•	
<i>1,1,1-Trichloroethane</i>	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>1,4-Dioxane</i>	•		
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•		
<i>4-Ethyltoluene</i>	•		
Acetone	•		
Benzene	•		
Cumene	•		
Cyclohexane	•		
Ethylbenzene	•		
Heptane	•		
Hexane	•		
Propylbenzene	•		
Tetrachloroethene (PCE)	•		
Total Xylenes	•		
<i>Trichloroethene (TCE)</i>	•		
CFC-12		•	
Chloroform		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Sixty of the 65 indoor air analytes were ND in each of the samples. Seven of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, EDB, alpha-chlorotoluene, bromomethane, dibromochloromethane and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 53 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Five analytes were detected in the indoor air in Building 833 and there were no detected concentrations that exceeded screening levels (1,4-dioxane, 2-propanol, 4-ethyltoluene, and ethanol do not have screening levels available). One analyte was detected in the outdoor air sample.

Table 833-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 833-3. Vapor Intrusion Evaluation for Building 833**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in sub-slab soil gas above <i>de minimus</i> levels but below screening levels</b>				
Acetone	0%	<22	26000	<17
Tetrachloroethene (PCE)	0%	<6.2 - <6.3	180	<4.7
Total Xylenes	0%	<8 - <8.2	440	<6
<b>Detected in sub-slab soil gas below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	0%	<5 - <5.1	26000	<3.8
1,2,4-Trimethylbenzene	0%	<4.5 - <4.6	960	<3.4
1,3,5-Trimethylbenzene	0%	<4.5 - <4.6	960	<3.4
1,4-Dioxane	0%	<13	N/A	<10
2-Butanone (Methyl Ethyl Ketone)	0%	<11	22000	<8.2
2-Propanol	67%	11 - 13	N/A	<6.9
4-Ethyltoluene	0%	<4.5 - <4.6	N/A	<3.4
Benzene	0%	<2.9 - <3	16	<2.2
Cumene	0%	<4.5 - <4.6	13	<3.4
Cyclohexane	0%	<3.1 - <3.2	26000	<2.4
Ethanol	100%	9.7 - 10	N/A	<5.3
Ethylbenzene	0%	<4	440	<3
Heptane	0%	<3.7 - <3.8	15000	<2.9
Hexane	0%	<3.2 - <3.3	3100	<2.5
Propylbenzene	0%	<4.5 - <4.6	88	<3.4
Toluene	100%	5.7 - 7.1	22000	12
Trichloroethene (TCE)	0%	<4.9 - <5	8.8	<3.8

N/A = No screening value available

&lt; = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There was only one analyte detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for this analytes. Toluene in all three samples at results ranging from 5.7 - 7.1  $\mu\text{g}/\text{m}^3$  and in outdoor air at 12  $\mu\text{g}/\text{m}^3$ . All of the results for toluene were at least four orders of magnitude below the indoor air screening level.

Seven analytes were ND in all media; however, all of the ND reporting limits exceeded the indoor air screening levels and all of the sub-slab soil gas ND reporting limits for all seven analytes were below screening levels. The ND indoor air reporting limits for 1,1,2,2-tetrachloroethane (<6.3 - 6.4  $\mu\text{g}/\text{m}^3$ ) only slightly exceeded the screening level (2.4  $\mu\text{g}/\text{m}^3$ ). 1,2,4-Trichlorobenzene had indoor air reporting limits (<27 - <28  $\mu\text{g}/\text{m}^3$ ) that slightly exceeded the screening level (18  $\mu\text{g}/\text{m}^3$ ). The ND indoor air reporting limits for alpha-chlorotoluene (<4.7 - <4.8  $\mu\text{g}/\text{m}^3$ ) that slightly exceeded the screening level (2.8  $\mu\text{g}/\text{m}^3$ ). For bromomethane, the ND indoor air reporting limit (<36  $\mu\text{g}/\text{m}^3$ ) exceeded the screening level (22  $\mu\text{g}/\text{m}^3$ ). Dibromochloromethane had ND indoor air reporting limits (<7.8 - <8  $\mu\text{g}/\text{m}^3$ ) that slightly exceeded the screening level (5.6  $\mu\text{g}/\text{m}^3$ ). The ND indoor air reporting limits for HCB (<39 - <40  $\mu\text{g}/\text{m}^3$ ) compared to the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, the ND indoor air reporting limits for EDB (<7 - <7.2  $\mu\text{g}/\text{m}^3$ ) exceeded the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ). Since all seven ND analytes were ND in sub-slab soil gas and all of the sub-slab soil gas ND reporting limits were below screening levels, the indoor air ND

reporting limit exceedances for all seven ND analytes (including EDB and HCB) were eliminated from further evaluation.

## **CONCLUSIONS AND RECOMMENDATIONS**

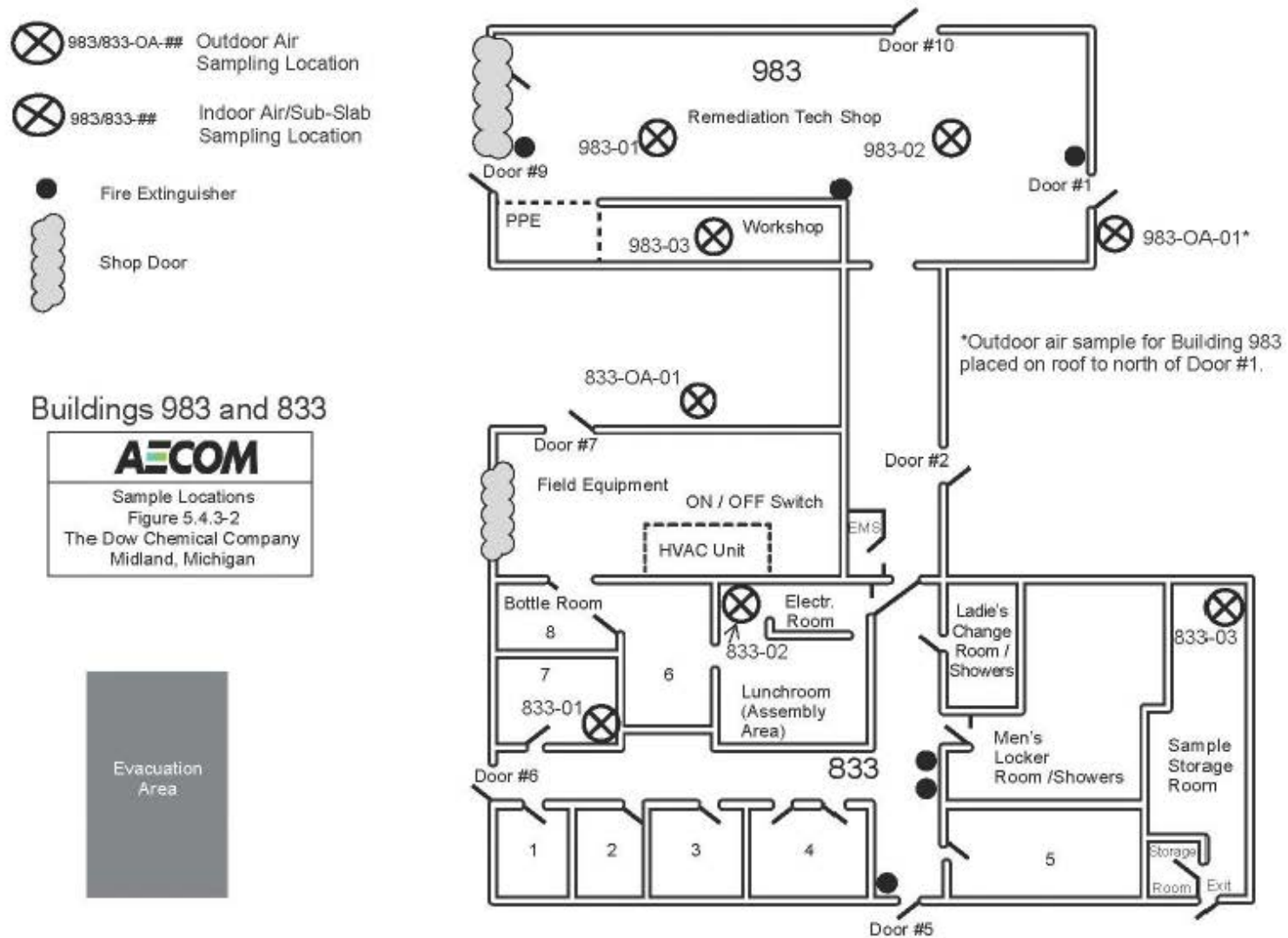
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 833 is an insignificant exposure pathway based on current use. Building 833 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.



**Figure 5.4.3-1. Building 833 Location**



**Figure 5.4.3-2. Building 833 Sample Locations**



**Table 5.4.3-1. Building 833 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	833	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	3	67%	21.9	17.7	29	35	3.6	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	833	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	4.6	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	833	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	3.6	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	833	SS	1,1-Dichloroethane	75-34-3	UG/M3	3	0%	-	-	-	-	2.7	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	833	SS	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	2.6	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	833	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	20	82	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	833	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	100%	30.0	23.4	15	57	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	833	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	5.1	21	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 1	833	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	4	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	833	SS	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	2.7	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	833	SS	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	3.1	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	833	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	33%	4.32	2.68	4.3	4.3	3.3	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	833	SS	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	1.5	6.1	No Screening Value Available	-	-	-
Category 1	833	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	4	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	833	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	4	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	833	SS	1,4-Dioxane	123-91-1	UG/M3	3	67%	38.6	32.2	42	69	9.6	9.6	No Screening Value Available	-	-	-
Category 1	833	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.1	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	833	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	33%	14.1	9.3	22	22	7.8	33	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	833	SS	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	11	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	833	SS	2-Propanol	67-63-0	UG/M3	3	33%	8.72	5.16	9.4	9.4	6.5	27	No Screening Value Available	-	-	-
Category 1	833	SS	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	8.3	35	No Screening Value Available	-	-	-
Category 1	833	SS	4-Ethyltoluene	622-96-8	UG/M3	3	100%	40.3	4.0	36	44	-	-	No Screening Value Available	-	-	-
Category 1	833	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	2.7	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	833	SS	Acetone	67-64-1	UG/M3	3	100%	578	533	35	1100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	833	SS	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	3.4	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	833	SS	Benzene	71-43-2	UG/M3	3	100%	12.9	8.0	7.2	22	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	833	SS	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	14	59	No Screening Value Available	-	-	-
Category 1	833	SS	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	4.4	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	833	SS	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	6.9	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	833	SS	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	26	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	833	SS	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	8.3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	833	SS	Carbon Tetrachloride	56-23-5	UG/M3	3	0%	-	-	-	-	4.2	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	833	SS	CFC-11	75-69-4	UG/M3	3	0%	-	-	-	-	3.7	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	833	SS	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	5.1	21	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	833	SS	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	4.6	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	833	SS	CFC-12	75-71-8	UG/M3	3	0%	-	-	-	-	3.3	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	833	SS	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	3.1	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	833	SS	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	7	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	833	SS	Chloroform	67-66-3	UG/M3	3	0%	-	-	-	-	3.2	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	833	SS	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	14	57	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	833	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	2.6	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	833	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	3	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	833	SS	Cumene	98-82-8	UG/M3	3	33%	4.53	2.45	4.5	4.5	4.2	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	833	SS	Cyclohexane	110-82-7	UG/M3	3	67%	10.5	6.8	8.8	18	9.5	9.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	833	SS	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	5.7	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	833	SS	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	19	79	No Screening Value Available	-	-	-
Category 1	833	SS	Ethanol	64-17-5	UG/M3	3	67%	37.2	31.5	45	64	5	5	No Screening Value Available	-	-	-
Category 1	833	SS	Ethylbenzene	100-41-4	UG/M3	3	67%	17.7	15.3	12	35	12	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	833	SS	Heptane	142-82-5	UG/M3	3	100%	25.3	14.5	11	40	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	833	SS	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	28	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	833	SS	Hexane	110-54-3	UG/M3	3	100%	26.3	15.5	11	42	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	833	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	100%	76.3	65.2	26	150	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	833	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	9.6	40	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	833	SS	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	23	96	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	833	SS	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	7	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	833	SS	o-Xylene	95-47-6	UG/M3	3	67%	52.0	67.9	20	130	12	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	833	SS	Propylbenzene	103-65-1	UG/M3	3	67%	6.33	0.58	6	6	14	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.3-1. Building 833 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	833	SS	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	2.8	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	833	SS	Tetrachloroethene	127-18-4	UG/M3	3	100%	312	492	24	880	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	833	SS	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2	8.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	833	SS	Toluene	108-88-3	UG/M3	3	100%	51.7	26.0	25	77	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	833	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	6	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	833	SS	Total Xylenes	1330-20-7	UG/M3	3	100%	128	133	32	280	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	833	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	2.6	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	833	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	3	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	833	SS	Trichloroethene	79-01-6	UG/M3	3	33%	4.67	2.85	4.7	4.7	3.6	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	833	SS	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	1.7	7.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.3-2. Building 833 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	833	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	3	0%	-	-	-	-	5	5.1	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	833	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	6.3	6.4	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	100%
Category 1	833	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	5	5.1	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	833	IA	1,1-Dichloroethane	75-34-3	UG/M3	3	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	833	IA	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	3.6	3.7	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	833	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	27	28	Vapor Intrusion Indoor Air Screening Levels	18	0%	100%
Category 1	833	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	833	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	7	7.2	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	833	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	5.5	5.6	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	833	IA	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	833	IA	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	4.2	4.3	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	833	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	833	IA	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	2	2.1	No Screening Value Available	-	-	-
Category 1	833	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	5.5	5.6	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	833	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	5.5	5.6	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	833	IA	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	13	13	No Screening Value Available	-	-	-
Category 1	833	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	4.3	4.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	833	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	0%	-	-	-	-	11	11	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	833	IA	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	15	15	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	833	IA	2-Propanol	67-63-0	UG/M3	3	67%	9.50	4.44	11	13	9	9	No Screening Value Available	-	-	-
Category 1	833	IA	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	11	12	No Screening Value Available	-	-	-
Category 1	833	IA	4-Ethyltoluene	622-96-8	UG/M3	3	0%	-	-	-	-	4.5	4.6	No Screening Value Available	-	-	-
Category 1	833	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	833	IA	Acetone	67-64-1	UG/M3	3	0%	-	-	-	-	22	22	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	833	IA	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	4.7	4.8	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	100%
Category 1	833	IA	Benzene	71-43-2	UG/M3	3	0%	-	-	-	-	2.9	3	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	833	IA	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	19	20	No Screening Value Available	-	-	-
Category 1	833	IA	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	6.1	6.3	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	833	IA	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	9.4	9.7	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	833	IA	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	36	36	Vapor Intrusion Indoor Air Screening Levels	22	0%	100%
Category 1	833	IA	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	11	12	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	833	IA	Carbon Tetrachloride	56-23-5	UG/M3	3	0%	-	-	-	-	5.8	5.9	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	833	IA	CFC-11	75-69-4	UG/M3	3	0%	-	-	-	-	5.1	5.2	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	833	IA	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	7	7.2	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	833	IA	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	6.4	6.5	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	833	IA	CFC-12	75-71-8	UG/M3	3	33%	4.78	4.34	9.8	9.8	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	833	IA	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	4.2	4.3	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	833	IA	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	9.6	9.9	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	833	IA	Chloroform	67-66-3	UG/M3	3	33%	3.35	1.86	5.5	5.5	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	833	IA	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	19	19	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	833	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	3.6	3.7	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	833	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	4.2	4.2	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	833	IA	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	833	IA	Cyclohexane	110-82-7	UG/M3	3	0%	-	-	-	-	3.1	3.2	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	833	IA	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	7.8	8	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	100%
Category 1	833	IA	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	26	26	No Screening Value Available	-	-	-
Category 1	833	IA	Ethanol	64-17-5	UG/M3	3	100%	9.90	0.17	9.7	10	-	-	No Screening Value Available	-	-	-
Category 1	833	IA	Ethylbenzene	100-41-4	UG/M3	3	0%	-	-	-	-	4	4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	833	IA	Heptane	142-82-5	UG/M3	3	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	833	IA	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	39	40	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	833	IA	Hexane	110-54-3	UG/M3	3	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	833	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	833	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	13	13	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	833	IA	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	32	32	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	833	IA	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	9.6	9.8	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	833	IA	o-Xylene	95-47-6	UG/M3	3	0%	-	-	-	-	4	4.1	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	833	IA	Propylbenzene	103-65-1	UG/M3	3	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.4.3-2. Building 833 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	833	IA	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	3.9	4	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	833	IA	Tetrachloroethene	127-18-4	UG/M3	3	0%	-	-	-	-	6.2	6.3	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	833	IA	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.7	2.8	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	833	IA	Toluene	108-88-3	UG/M3	3	100%	6.57	0.76	5.7	7.1	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	833	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	8.4	8.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	833	IA	Total Xylenes	1330-20-7	UG/M3	3	0%	-	-	-	-	8	8.2	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	833	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	3.6	3.7	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	833	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	4.2	4.2	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	833	IA	Trichloroethene	79-01-6	UG/M3	3	0%	-	-	-	-	4.9	5	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	833	IA	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	2.3	2.4	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	833	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	833	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	4.8	4.8	-	-	-	-
Category 1	833	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	833	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	833	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	833	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	21	21	-	-	-	-
Category 1	833	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	833	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 1	833	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	833	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	833	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	833	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	833	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 1	833	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	833	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	4.2	4.2	-	-	-	-
Category 1	833	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 1	833	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	833	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	8.2	8.2	-	-	-	-
Category 1	833	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	11	11	-	-	-	-
Category 1	833	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	6.9	6.9	-	-	-	-
Category 1	833	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	8.8	8.8	-	-	-	-
Category 1	833	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	833	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 1	833	OA	Acetone	67-64-1	UG/M3	1	0%	-	-	-	-	17	17	-	-	-	-
Category 1	833	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 1	833	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 1	833	OA	Bromochloromethane	74-97-5	UG/M3	1	0%	-	-	-	-	15	15	-	-	-	-
Category 1	833	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 1	833	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	7.2	7.2	-	-	-	-
Category 1	833	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	27	27	-	-	-	-
Category 1	833	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	8.7	8.7	-	-	-	-
Category 1	833	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	0%	-	-	-	-	4.4	4.4	-	-	-	-
Category 1	833	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	833	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 1	833	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	4.9	4.9	-	-	-	-
Category 1	833	OA	CFC-12	75-71-8	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	833	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	833	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	7.4	7.4	-	-	-	-
Category 1	833	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	833	OA	Chloromethane	74-87-3	UG/M3	1	0%	-	-	-	-	14	14	-	-	-	-
Category 1	833	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	833	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	833	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	833	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	833	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 1	833	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	20	20	-	-	-	-
Category 1	833	OA	Ethanol	64-17-5	UG/M3	1	0%	-	-	-	-	5.3	5.3	-	-	-	-

**Table 5.4.3-2. Building 833 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	833	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	833	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 1	833	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	30	30	-	-	-	-
Category 1	833	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 1	833	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	833	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	10	10	-	-	-	-
Category 1	833	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	24	24	-	-	-	-
Category 1	833	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	7.3	7.3	-	-	-	-
Category 1	833	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	833	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	833	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 1	833	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	4.7	4.7	-	-	-	-
Category 1	833	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.1	2.1	-	-	-	-
Category 1	833	OA	Toluene	108-88-3	UG/M3	1	100%	12.0	-	12	12	-	-	-	-	-	-
Category 1	833	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 1	833	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 1	833	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 1	833	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	833	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	833	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-



## 5.4.4 Vapor Intrusion Evaluation for Building 941

### BACKGROUND

Building 941 is a Category 1 building in Zone 2. It is a large building that includes office space, laboratory, and process area. It is known as the Specialty Intermediates/Herbicides Inter Control Room (see Figure 5.4.4-1) and is located within the central portion of the facility designated as Zone 2. The building is a single story and is approximately 10,360 ft<sup>2</sup> (962 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 7, 2017 and the results can be found in Appendix C. The building has two central air conditioning units with one air intake. There are two bay doors that are only opened to receive materials and equipment. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and a few slight detections were noted in the 0.1-ppm range in the ambient air of the control room and office east of the north door. The ambient air in the ladies room was 0.5 ppm and the drain in the ladies room yielded a 16.8 ppm reading. There were no other detections indicated throughout the screening of the building and while the ladies room reading was the largest reading during the PID screening, the other results were minimal. Open conduits were discovered under the refrigerator located on the western side of the control room just south of the most northern entrance to the switch room. The conduits were identified at the very end of the sampling event when the refrigerator was moved slightly in order for the sampling crew to safely access the proposed sub-slab soil gas sample location. Upon discussing the presence of the conduits with pertinent 941 personnel, the conduits were promptly capped.

A chemical inventory was completed during the building survey that identified degreasers, cleaners, motor oil, and insecticides. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On May 2, 2017, sub-slab soil gas samples were collected from nine locations within the building. Indoor air samples were collected on May 3, 2017 at nine locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.4-2. Summary statistics of the analytical results for sub-slab soil gas for Building 941 are presented on Table 5.4.4-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.4-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 28 of the 65 target analytes were ND in each of the nine samples collected at Building 941. All but two of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, 26 of the ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. Two ND analytes (EDB and HCB) had at least one reporting limit exceed the respective screening levels and will be further evaluated below. A total of 37 VOCs were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into three categories:

- Thirteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;



- Seventeen analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Seven analytes were detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 941-1. Of the seventeen analytes detected above *de minimus* levels but below screening levels, only two had detection frequencies of 100% (1,1,1-trichloroethene and 1,1-dichloroethene). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, AOIs in soil gas at Building 941 include PCE, TCE, cis-1,2-DCE, chloroform, carbon tetrachloride, 1,2-dichloroethane, and 1,1,2-trichloroethane.

**Table 941-1. Summary of Sub-Slab Soil Gas Detects for Building 941**

Analyte	Detection Frequency	Measured Range (µg/m <sup>3</sup> )	% Detections > Screening Level	Screening Level (µg/m <sup>3</sup> )
<b>Above nonresidential screening levels (analytes of interest)</b>				
1,1,2-Trichloroethane	78%	8.1 - 12000	22%	1100
1,2-Dichloroethane	56%	4 - 14000	22%	700
Carbon tetrachloride	44%	13 - 4800	22%	3000
Chloroform	100%	5.1 - 11000	33%	7600
cis-1,2-Dichloroethene	56%	20 - 9300	11%	4100
Tetrachloroethene (PCE)	100%	270 - 160000	11%	23000
Trichloroethene (TCE)	100%	25 - 65000	33%	1200
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	9.8 - 12000	0%	3500000
1,1-Dichloroethene	100%	11 - 9800	0%	120000
2,2,4-Trimethylpentane	56%	4 - 510	0%	2000000
4-Ethyltoluene	67%	5.5 - 110	N/A	N/A
Acetone	67%	93 - 300	0%	3400000
Benzene	67%	14 - 110	0%	2200
Bromodichloromethane	22%	190 - 290	0%	1000
Carbon Disulfide	67%	12 - 100	0%	410000
CFC-11	56%	8 - 140	0%	33000000
CFC-12	56%	3.8 - 3900	0%	29000000
Chloroethane	33%	13 - 4100	0%	5800000
Cyclohexane	89%	12 - 260	0%	3500000
Ethylbenzene	67%	11 - 140	0%	59000
Methylene Chloride	22%	330 - 1200	0%	39000
Toluene	67%	38 - 280	0%	2900000
Total Xylenes	67%	25.3 - 430	0%	58000
Vinyl Chloride	22%	110 - 120	0%	4100
<b>Below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	22%	9.8 - 56	0%	290000
1,2,4-Trimethylbenzene	67%	6.9 - 60	0%	130000
1,3,5-Trimethylbenzene	56%	4.1 - 37	0%	130000
1,3-Butadiene	11%	4.2	N/A	N/A
2-Butanone (Methyl Ethyl Ketone)	56%	13 - 36	0%	2900000
2-Propanol	22%	11 - 14	N/A	N/A
Cumene	33%	4 - 14	0%	1700
Ethanol	67%	13 - 36	N/A	N/A

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
Heptane	67%	17 - 42	0%	2000000
Hexane	67%	24 - 60	0%	410000
Naphthalene	33%	14 - 29	0%	1500
Styrene	22%	3.9 - 7.1	0%	32000
Tetrahydrofuran	33%	6.8 - 18	0%	11000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 941-2 below shows the analytes detected in each of the three media sampled.

**Table 941-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
1,2-Dichloroethane	X	•	•
Carbon Tetrachloride	X	•	•
Chloroform	X	•	•
Tetrachloroethene (PCE)	X	•	•
1,1-Dichloroethene	•	•	•
2-Butanone (Methyl Ethyl Ketone)	•	•	•
Acetone	•	•	•
Benzene	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
Ethanol	•	•	•
Ethylbenzene	•	•	•
Heptane	•	•	•
Hexane	•	•	•
Methylene Chloride	•	•	•
Styrene	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
Trichloroethene (TCE)	X	X	
1,1,2-Trichloroethane	X	•	
cis-1,2-Dichloroethene	X	•	
1,1,1-Trichloroethane	•	•	
2,2,4-Trimethylpentane	•	•	
2-Propanol	•	•	
Chloroethane	•	•	
Vinyl Chloride	•	•	
1,1-Dichloroethane	•		
1,2,4-Trimethylbenzene	•		
1,3,5-Trimethylbenzene	•		

**Table 941-2. Detections Matrix (Continued)**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>1,3-Butadiene</i>	•		
4-Ethyltoluene	•		
Bromodichloromethane	•		
Carbon Disulfide	•		
<i>Cumene</i>	•		
Cyclohexane	•		
<i>Naphthalene</i>	•		
<i>Tetrahydrofuran</i>	•		
Chloromethane		•	•
4-Methyl-2-pentanone		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-seven of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level. These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 35 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-eight analytes were detected in the indoor air in Building 941 and TCE was the only analyte with detected concentrations that exceeded the screening level (2-propanol, and ethanol do not have screening levels available). Therefore, TCE is an AOI in indoor air at Building 941. Nineteen analytes were detected in the outdoor air sample.

Table 941-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 941-3. Vapor Intrusion Evaluation for Building 941**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
1,1,2-Trichloroethane	100%	0.19 - 1.8	8.5	<0.18
1,2-Dichloroethane	100%	0.76 - 2.4	5.3	0.54
Carbon tetrachloride	100%	0.76 - 2.3	23	0.69
Chloroform	100%	0.3 - 3.4	57	0.18
cis-1,2-Dichloroethene	11%	0.13	31	<0.13
Tetrachloroethene (PCE)	100%	1.1 - 2.8	180	2
Trichloroethene (TCE)	100%	1 - 15	8.8	<0.44
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	0.25 - 2.8	26000	<0.18
1,1-Dichloroethene	100%	0.41 - 2	880	0.29
2,2,4-Trimethylpentane	78%	5.8 - 14	15000	<3.8
4-Ethyltoluene	0%	<0.77 - <0.83	N/A	<0.81
Acetone	100%	7.8 - 390	26000	13

**Table 941-3. Vapor Intrusion Evaluation for Building 941 (Continued)**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
Benzene	11%	0.67	16	0.5
Bromodichloromethane	0%	<1 - <1.1	7.6	<1.1
Carbon Disulfide	0%	<2.4 - <2.6	3100	<2.6
CFC-11	89%	1.2 - 1.7	250000	1.5
CFC-12	100%	1.2 - 2.4	220000	2.2
Chloroethane	100%	0.22 - 0.98	44000	<0.22
Cyclohexane	0%	<0.54 - <0.58	26000	<0.56
Ethylbenzene	100%	0.45 - 1	440	0.8
Methylene Chloride	100%	1.3 - 3.5	290	1.8
Toluene	100%	0.31 - 1.1	22000	0.89
Total Xylenes	89%	0.5 - 0.82	440	0.57
Vinyl Chloride	67%	0.041 - 0.058	31	<0.042
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	0%	<0.13 - <0.14	2200	<0.13
1,2,4-Trimethylbenzene	0%	<0.77 - 0.83	960	<0.81
1,3,5-Trimethylbenzene	0%	<0.77 - 0.83	960	<0.81
1,3-Butadiene	0%	<0.35 - <0.37	N/A	<0.36
2-Butanone (Methyl Ethyl Ketone)	67%	2.6 - 5.7	22000	2.5
2-Propanol	89%	2.4 - 22	N/A	<2
Cumene	0%	<0.77 - <0.83	13	<0.81
Ethanol	100%	10 - 290	N/A	7.7
Heptane	56%	0.64 - 1.2	15000	0.93
Hexane	33%	0.6 - 0.9	3100	1.3
Naphthalene	0%	<0.41 - <0.44	11	<0.43
Styrene	89%	0.74 - 1.4	240	0.98
Tetrahydrofuran	0%	<2.3 - <2.5	79	<2.4

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

Four detected results of TCE exceeded the indoor air screening level. TCE exceeded the sub-slab soil gas screening level in three samples. Two of the indoor air sample locations with exceedances correlate to sub-slab soil gas location exceedances (samples 941-2 and 941-4). Therefore, TCE is an AOI at Building 941 for both sub-slab soil gas and indoor air, as there is potential evidence of VI. The sample locations of the indoor air TCE exceedances were near the open conduits that were identified and capped after the sampling event. Building 941 was subsequently resampled four months after the initial event in September 2017 and all of the indoor air results were below the screening levels. Results from the September 2017 additional sampling event will be presented to MDEQ in early 2018 and will be evaluated in the 2018 Corrective Action Implementation Summary Report. Further sampling will also occur in 2018. There were no other analytes with detected results that exceed indoor air screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 19 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Twelve of the analytes had indoor air results that were very similar to concentrations detected in outdoor air (PCE, CFC-11, CFC-12, carbon tetrachloride ethylbenzene, methylene chloride, toluene, total xylenes, MEK, heptane, hexane, and

styrene). Three analytes had results that were slightly higher than outdoor air results (1,2-dichloroethane, chloroform, and 1,1-DCE) and two analytes had indoor air results that were higher in concentration than that detected in outdoor air, indicating that there is a potential for indoor sources (acetone and ethanol), which are discussed below.

Acetone was detected in the outdoor air sample at  $13 \mu\text{g}/\text{m}^3$  and was detected in all nine indoor air samples (detected results range from  $7.8 - 390 \mu\text{g}/\text{m}^3$ ). The detected concentrations at eight of the nine samples were within range of the outdoor air result ( $7.8 - 28 \mu\text{g}/\text{m}^3$ ). The remaining maximum detected concentration was an order of magnitude higher and E-flagged ( $390 \mu\text{g}/\text{m}^3$ ). This maximum detected result was in a sample located in the women's locker room. Common cleaning items and chemicals utilized in a laboratory contribute as indoor sources for acetone. The chemical inventory list for the women's locker room included air fresheners, disinfecting wipes, glass cleaner, and hand sanitizer. It is important to point out that all of the results for acetone were well below screening levels.

While ethanol does not have a screening level, it was detected in six of the nine sub-slab soil gas samples at a low level range of  $13 - 36 \mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from  $10 - 290 \mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). The two maximum detected concentrations (both E-flagged, indicating that the results are estimated) were an order of magnitude higher than any of the other results and occurred in samples collected in the two locker rooms. Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the locker rooms identified a number of materials likely to contain ethanol: air fresheners, cleaners, sanitizing spray, Scrubbing Bubbles, disinfecting wipes, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceeded the indoor air screening levels and three of the nine ND sub-slab soil gas reporting limits for EDB and HCB exceeded the soil gas screening levels. The ND indoor air reporting limits for HCB ( $8.4 - 9 \mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ) and six of nine ND reporting limits in sub-slab soil gas met the soil gas screening level. Similarly, the ND indoor air reporting limits for EDB ( $0.24 - 0.26 \mu\text{g}/\text{m}^3$ ) only very slightly exceeded the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ) and six of the nine sub-slab soil gas samples had ND reporting limits that met the soil gas screening level. Therefore, the indoor air ND reporting limit exceedances for EDB and HCB and the ND reporting limit exceedance of EDB in sub-slab soil gas were eliminated from further evaluation.

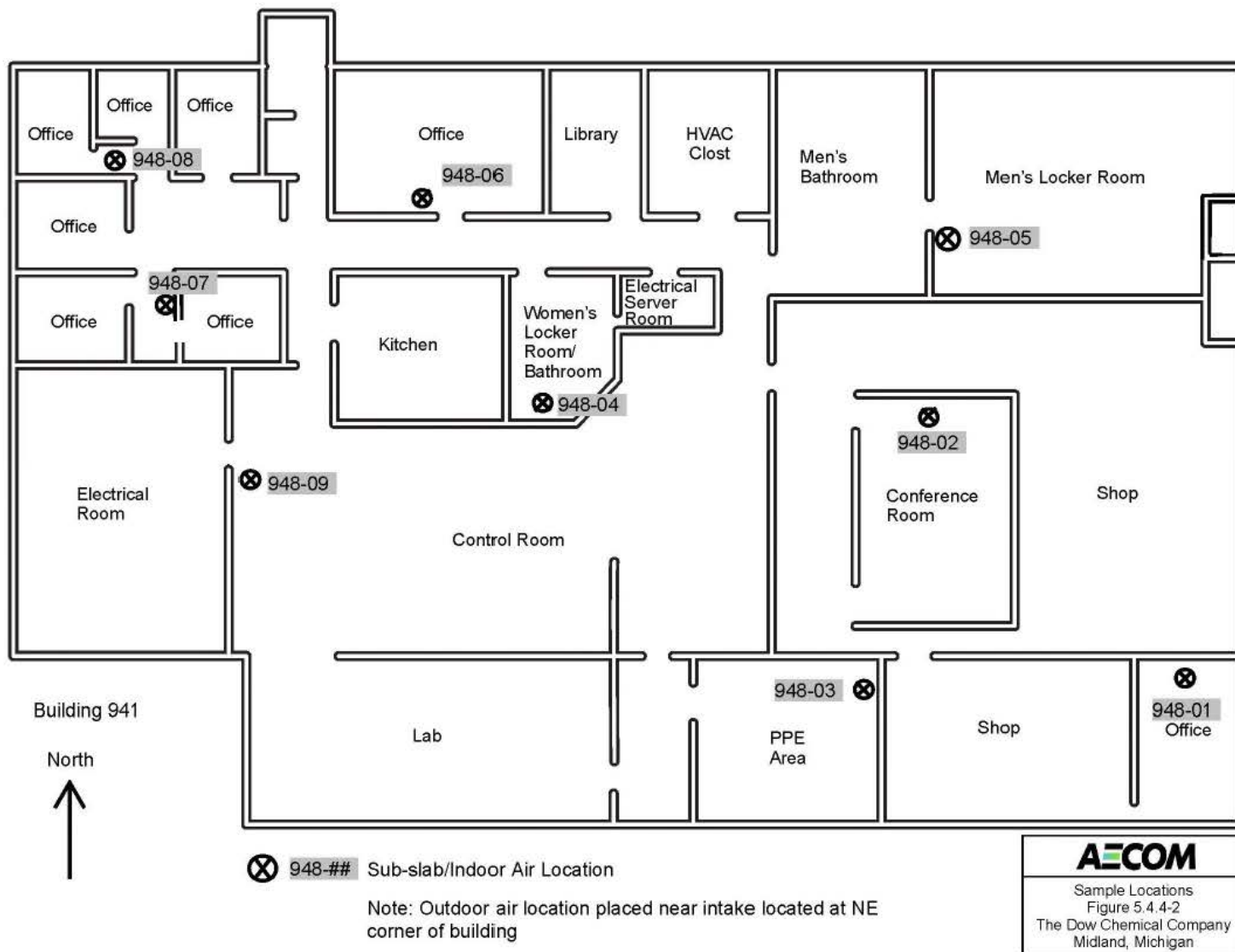
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, there is evidence of potential VI at Building 941. Therefore, Building 941 was placed in VI Path Forward Building Group 4 (see Figure 5-3) and further sampling was recommended. Additional sampling was completed in September 2017 and further seasonal sampling will occur in 2018. Results for the September 2017 additional sampling will be presented to MDEQ in early 2018 and will be documented in the 2018 Corrective Action Implementation Summary Report and 2019 Work Plan. Additionally, TCE, PCE, cis-1,2-DCE, chloroform, carbon tetrachloride, 1,2-dichloroethane, and 1,1,2-trichloroethane will be added to Industrial Hygiene monitoring for the building.

**Figure 5.4.4-1. Building 941 Location**



**Figure 5.4.4-2. Building 941 Sample Locations**





**Table 5.4.4-1. Building 941 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	941	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	100%	3204	5010	9.8	12000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	941	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.2	300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	941	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	78%	1545	3954	8.1	12000	4.6	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	22%	0%
Category 1	941	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	22%	31.8	35.9	9.8	56	3.1	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	941	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	100%	2462	3450	11	9800	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	941	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	22	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	941	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	67%	45.0	39.1	6.9	60	100	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	941	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	5.8	330	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	33%
Category 1	941	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.6	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	941	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	56%	2055	4649	4	14000	3.1	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	22%	0%
Category 1	941	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.5	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	941	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	56%	37.8	41.3	4.1	37	4.3	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	941	SS	1,3-Butadiene	106-99-0	UG/M3	9	11%	14.5	19.8	4.2	4.2	1.7	95	No Screening Value Available	-	-	-
Category 1	941	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.6	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	941	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.6	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	941	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	11	620	No Screening Value Available	-	-	-
Category 1	941	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	56%	103	172	4	510	3.6	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	941	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	56%	84.2	100.9	13	36	41	510	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	941	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	12	700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	941	SS	2-Propanol	67-63-0	UG/M3	9	22%	64.5	87.7	11	14	7.6	420	No Screening Value Available	-	-	-
Category 1	941	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.5	540	No Screening Value Available	-	-	-
Category 1	941	SS	4-Ethyltoluene	622-96-8	UG/M3	9	67%	48.8	45.4	5.5	110	100	210	No Screening Value Available	-	-	-
Category 1	941	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	3.1	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	941	SS	Acetone	67-64-1	UG/M3	9	67%	163	70	93	300	190	410	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	941	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	3.9	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	941	SS	Benzene	71-43-2	UG/M3	9	67%	42.7	33.2	14	110	65	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	941	SS	Bromochloromethane	74-97-5	UG/M3	6	0%	-	-	-	-	16	74	No Screening Value Available	-	-	-
Category 1	941	SS	Bromodichloromethane	75-27-4	UG/M3	9	22%	72.7	108.3	190	290	5.1	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	941	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	7.8	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	941	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	30	670	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	941	SS	Carbon Disulfide	75-15-0	UG/M3	9	67%	104	100	12	100	250	540	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	941	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	44%	1260	2031	13	4800	4.9	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	22%	0%
Category 1	941	SS	CFC-11	75-69-4	UG/M3	9	56%	61.7	55.9	8	140	4.3	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	941	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	5.8	330	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	941	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.3	300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	941	SS	CFC-12	75-71-8	UG/M3	9	56%	821	1428	3.8	3900	4.4	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	941	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.5	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	941	SS	Chloroethane	75-00-3	UG/M3	9	33%	864	1647	13	4100	8.2	450	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	941	SS	Chloroform	67-66-3	UG/M3	9	100%	3387	5055	5.1	11000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	33%	0%
Category 1	941	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	16	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	941	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	56%	1077	3084	20	9300	3.4	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	11%	0%
Category 1	941	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.4	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	941	SS	Cumene	98-82-8	UG/M3	9	33%	33.4	43.2	4	14	3.8	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	941	SS	Cyclohexane	110-82-7	UG/M3	9	89%	80.4	100.8	12	260	150	150	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	941	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.5	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	941	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	22	1200	No Screening Value Available	-	-	-
Category 1	941	SS	Ethanol	64-17-5	UG/M3	9	67%	59.8	59.6	13	36	150	320	No Screening Value Available	-	-	-
Category 1	941	SS	Ethylbenzene	100-41-4	UG/M3	9	67%	48.8	47.8	11	140	88	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	941	SS	Heptane	142-82-5	UG/M3	9	67%	40.1	28.5	17	42	84	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	941	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	32	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	33%
Category 1	941	SS	Hexane	110-54-3	UG/M3	9	67%	45.8	19.4	24	60	72	150	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	941	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	67%	74.9	88.8	19	300	88	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	941	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	941	SS	Methylene Chloride	75-09-2	UG/M3	9	22%	220	389	330	1200	26	590	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	941	SS	Naphthalene	91-20-3	UG/M3	9	33%	133	190	14	29	8.1	900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	941	SS	o-Xylene	95-47-6	UG/M3	9	67%	49.2	44.7	6.3	130	88	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%



**Table 5.4.4-1. Building 941 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	941	SS	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	3.7	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	941	SS	Styrene	100-42-5	UG/M3	9	22%	27.8	37.6	3.9	7.1	3.3	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	941	SS	Tetrachloroethene	127-18-4	UG/M3	9	100%	18921	52915	270	160000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	11%	0%
Category 1	941	SS	Tetrahydrofuran	109-99-9	UG/M3	9	33%	21.7	24.9	6.8	18	2.3	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	941	SS	Toluene	108-88-3	UG/M3	9	67%	82.6	76.0	38	280	77	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	941	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	6.8	400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	941	SS	Total Xylenes	1330-20-7	UG/M3	9	67%	124	130	25.3	430	176	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	941	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	941	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.4	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	941	SS	Trichloroethene	79-01-6	UG/M3	9	100%	17880	27159	25	65000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	33%	0%
Category 1	941	SS	Vinyl Chloride	75-01-4	UG/M3	9	22%	29.7	49.1	110	120	1.9	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.4-2. Building 941 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	941	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	100%	1.65	0.75	0.25	2.8	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	941	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	941	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	100%	0.956	0.479	0.19	1.8	-	-	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	941	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	941	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	100%	1.04	0.45	0.41	2	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	941	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.8	6.3	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	941	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	0%	-	-	-	-	0.77	0.83	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	941	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.24	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	941	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.94	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	941	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	100%	1.44	0.53	0.76	2.4	-	-	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	941	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.72	0.78	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	941	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	0.77	0.83	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	941	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.35	0.37	No Screening Value Available	-	-	-
Category 1	941	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.94	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	941	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	0.19	0.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	941	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.56	0.61	No Screening Value Available	-	-	-
Category 1	941	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	78%	9.32	4.98	5.8	14	3.7	3.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	941	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	67%	3.08	1.68	2.6	5.7	2.4	2.5	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	941	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.2	3.5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	941	IA	2-Propanol	67-63-0	UG/M3	9	89%	7.02	6.75	2.4	22	2.1	2.1	No Screening Value Available	-	-	-
Category 1	941	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.4	2.6	No Screening Value Available	-	-	-
Category 1	941	IA	4-Ethyltoluene	622-96-8	UG/M3	9	0%	-	-	-	-	0.77	0.83	No Screening Value Available	-	-	-
Category 1	941	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	11%	0.511	0.521	1.9	1.9	0.64	0.69	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	941	IA	Acetone	67-64-1	UG/M3	9	100%	60.3	123.8	7.8	390	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	941	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.81	0.87	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	941	IA	Benzene	71-43-2	UG/M3	9	11%	0.310	0.135	0.67	0.67	0.52	0.54	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	941	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	941	IA	Bromofom	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	1.7	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	941	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3	3.3	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	941	IA	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	2.4	2.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	941	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	1.52	0.50	0.76	2.3	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	941	IA	CFC-11	75-69-4	UG/M3	9	89%	1.40	0.38	1.2	1.7	0.94	0.94	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	941	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	941	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	941	IA	CFC-12	75-71-8	UG/M3	9	100%	2.20	0.38	1.2	2.4	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	941	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.72	0.78	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	941	IA	Chloroethane	75-00-3	UG/M3	9	100%	0.624	0.234	0.22	0.98	-	-	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	941	IA	Chloroform	67-66-3	UG/M3	9	100%	1.79	0.86	0.3	3.4	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	941	IA	Chloromethane	74-87-3	UG/M3	9	100%	1.75	0.44	0.76	2.3	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	941	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	11%	0.0717	0.0219	0.13	0.13	0.12	0.13	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	941	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.71	0.77	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	941	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.77	0.83	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	941	IA	Cyclohexane	110-82-7	UG/M3	9	0%	-	-	-	-	0.54	0.58	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	941	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.3	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	941	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.6	6	No Screening Value Available	-	-	-
Category 1	941	IA	Ethanol	64-17-5	UG/M3	9	100%	74.3	91.4	10	290	-	-	No Screening Value Available	-	-	-
Category 1	941	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	0.833	0.169	0.45	1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	941	IA	Heptane	142-82-5	UG/M3	9	56%	0.623	0.311	0.64	1.2	0.68	0.69	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	941	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.4	9	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	941	IA	Hexane	110-54-3	UG/M3	9	33%	0.431	0.225	0.6	0.9	0.57	0.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	941	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	89%	0.388	0.112	0.35	0.58	0.29	0.29	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	941	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.57	0.61	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	941	IA	Methylene Chloride	75-09-2	UG/M3	9	100%	2.63	0.60	1.3	3.5	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	941	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	0.41	0.44	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	941	IA	o-Xylene	95-47-6	UG/M3	9	89%	0.169	0.045	0.15	0.24	0.14	0.14	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	941	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.77	0.83	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.4.4-2. Building 941 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	941	IA	Styrene	100-42-5	UG/M3	9	89%	0.944	0.329	0.74	1.4	0.72	0.72	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	941	IA	Tetrachloroethene	127-18-4	UG/M3	9	100%	2.16	0.47	1.1	2.8	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	941	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	941	IA	Toluene	108-88-3	UG/M3	9	100%	0.654	0.211	0.31	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	941	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.42	1.54	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	941	IA	Total Xylenes	1330-20-7	UG/M3	9	89%	0.557	0.157	0.5	0.82	0.43	0.43	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	941	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.62	0.67	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	941	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.71	0.77	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	941	IA	Trichloroethene	79-01-6	UG/M3	9	100%	8.38	4.15	1	15	-	-	Vapor Intrusion Indoor Air Screening Levels	8.8	44%	0%
Category 1	941	IA	Vinyl Chloride	75-01-4	UG/M3	9	67%	0.0396	0.0148	0.041	0.058	0.04	0.043	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	941	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	941	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	941	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	941	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	941	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	100%	-	-	0.29	0.29	-	-	-	-	-	-
Category 1	941	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 1	941	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	941	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 1	941	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 1	941	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	100%	-	-	0.54	0.54	-	-	-	-	-	-
Category 1	941	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 1	941	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	941	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 1	941	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 1	941	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 1	941	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 1	941	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	941	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	-	-	2.5	2.5	-	-	-	-	-	-
Category 1	941	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	941	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 1	941	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	941	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	941	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 1	941	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	13	13	-	-	-	-	-	-
Category 1	941	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	941	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.5	0.5	-	-	-	-	-	-
Category 1	941	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	941	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 1	941	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	941	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	941	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.69	0.69	-	-	-	-	-	-
Category 1	941	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.5	1.5	-	-	-	-	-	-
Category 1	941	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	941	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	941	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 1	941	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 1	941	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	941	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.18	0.18	-	-	-	-	-	-
Category 1	941	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.7	1.7	-	-	-	-	-	-
Category 1	941	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	941	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	941	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	941	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.56	0.56	-	-	-	-
Category 1	941	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 1	941	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.8	5.8	-	-	-	-
Category 1	941	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	7.7	7.7	-	-	-	-	-	-

Table 5.4.4-2. Building 941 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	941	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.8	0.8	-	-	-	-	-	-
Category 1	941	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	0.93	0.93	-	-	-	-	-	-
Category 1	941	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.7	8.7	-	-	-	-
Category 1	941	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	1.3	1.3	-	-	-	-	-	-
Category 1	941	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.4	0.4	-	-	-	-	-	-
Category 1	941	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 1	941	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	-	-	1.8	1.8	-	-	-	-	-	-
Category 1	941	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 1	941	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.17	0.17	-	-	-	-	-	-
Category 1	941	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 1	941	OA	Styrene	100-42-5	UG/M3	1	100%	-	-	0.98	0.98	-	-	-	-	-	-
Category 1	941	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	-	-	2	2	-	-	-	-	-	-
Category 1	941	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	941	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.89	0.89	-	-	-	-	-	-
Category 1	941	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.48	1.48	-	-	-	-
Category 1	941	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	0.57	0.57	-	-	-	-	-	-
Category 1	941	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.65	0.65	-	-	-	-
Category 1	941	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	941	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-
Category 1	941	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.042	0.042	-	-	-	-

## 5.4.5 Vapor Intrusion Evaluation for Building 948

### BACKGROUND

Building 948 is a Category 2 building in Zone 2. This building has an office, laboratory, locker rooms, process area, and a control room. It is known as Phenoxy Herbicides (see Figure 5.4.5-1) and is located within the central portion of the facility designated as Zone 2. The building is two stories tall. It is approximately 7,970 ft<sup>2</sup> (740 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 7, 2017 and the results can be found in Appendix C. The building has central air conditioning and the air intake is along the front of the building. There are no bay doors. The land surrounding the building consists of asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). The chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 11, 2017, sub-slab soil gas samples were collected from nine locations within the office space within this manufacturing building. Indoor air samples were collected on April 10, 2017 at nine locations, corresponding to the sub-slab soil gas sample locations, along with one outdoor air sample from the main air intakes. The sampling locations are shown on Figure 5.4.5-2. Summary statistics of the analytical results for sub-slab soil gas for Building 948 are presented on Table 5.4.5-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.5-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 39 of the 65 target analytes were ND in each of the 9 samples collected at Building 948. Five ND soil gas analytes had at least one reporting limit that exceeded the respective screening levels and are discussed further in the evaluation below. Therefore, the 34 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 26 analytes were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into three categories:

- Nine analytes detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Twelve were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Five analytes were detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 948-1. Of the 12 analytes detected above *de minimus* levels but below screening levels, there are no analytes with detection frequencies of 100%. Two of the five analytes with at least one detected result that exceeds screening levels had detection frequencies of 100% (PCE and TCE). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, benzene, cis-1,2-DCE, cumene, PCE, and TCE are AOIs for sub-slab soil gas at Building 948.

**Table 948-1. Summary of Sub-Slab Soil Gas Detects for Building 948**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Benzene	44%	28 - 4700	11%	2200
cis-1,2-Dichloroethene	89%	24 - 5800	11%	4100
Cumene	44%	26 - 3100	22%	1700
Tetrachloroethene (PCE)	100%	380 - 230000	44%	23000
Trichloroethene (TCE)	100%	22 - 16000	44%	1200
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	67%	78 - 7800	0%	3500000
1,1-Dichloroethane	56%	28 - 830	0%	290000
4-Ethyltoluene	33%	270 - 1500	N/A	N/A
Acetone	44%	160 - 640	0%	3400000
CFC-12	44%	150 - 690	0%	29000000
Chloroform	44%	12 - 630	0%	7600
Ethylbenzene	56%	25 - 11000	0%	59000
Hexane	44%	32 - 190	0%	410000
Propylbenzene	22%	84 - 1800	0%	12000
Toluene	44%	90 - 1600	0%	2900000
Total Xylenes	44%	60.5 - 660	0%	58000
trans-1,2-Dichloroethene	44%	25 - 130	0%	41000
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	22%	13 - 15	0%	130000
1,3,5-Trimethylbenzene	11%	9.4	0%	130000
2-Butanone (Methyl Ethyl Ketone)	22%	31 - 42	0%	2900000
2-Propanol	11%	9.1	N/A	N/A
4-Methyl-2-pentanone	11%	4.8	0%	1800000
Carbon Disulfide	11%	20	0%	410000
Cyclohexane	33%	56 - 78	0%	3500000
Ethanol	22%	15 - 16	N/A	N/A
Heptane	33%	86 - 97	0%	2000000

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 948-2 below shows the analytes detected in each of the three media sampled.

**Table 948-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Tetrachloroethene (PCE)	X	X	•
Benzene	X	•	•
Acetone	•	•	•
CFC-12	•	•	•
<i>Ethanol</i>	•	•	•
Toluene	•	•	•
cis-1,2-Dichloroethene	X	•	
Trichloroethene (TCE)	X	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
<i>2-Propanol</i>	•	•	
<i>4-Methyl-2-pentanone</i>	•	•	
<i>Carbon Disulfide</i>	•	•	
Chloroform	•	•	
<i>Cyclohexane</i>	•	•	
Ethylbenzene	•	•	
<i>Heptane</i>	•	•	
Hexane	•	•	
Total Xylenes	•	•	
Cumene	X		
1,1,1-Trichloroethane	•		
1,1-Dichloroethane	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
4-Ethyltoluene	•		
Propylbenzene	•		
trans-1,2-Dichloroethene	•		
Carbon Tetrachloride		•	•
Chloromethane		•	•
1,1-Dichloroethene		•	
1,2-Dichloroethane		•	
1,4-Dichlorobenzene		•	
1,4-Dioxane		•	
CFC-11		•	
Methylene Chloride		•	
Styrene		•	
Vinyl Chloride		•	

• = Detected  
 = Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-seven of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 35 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-eight analytes were detected in the indoor air in Building 948 and there were no detected concentrations that exceeded the screening level, with the exception of PCE (1,4-dioxane, 2-propanol, and ethanol do not have screening levels available). PCE was detected in nine samples and six of those

detected concentrations exceeded the indoor air screening level. Eight analytes were detected in the outdoor air sample.

Table 948-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 948-3. Vapor Intrusion Evaluation for Building 948**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Benzene	56%	0.43 - 2.4	16	0.6
cis-1,2-Dichloroethene	67%	0.57 - 0.88	31	<0.2
Cumene	0%	<0.76 - <2	13	<1.3
Tetrachloroethene (PCE)	100%	21 - 330	180	5.1
Trichloroethene (TCE)	89%	0.19 - 1.1	8.8	<0.28
<b>Detected in sub-slab soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<0.17 - <0.45	26000	<0.28
1,1-Dichloroethane	0%	<0.12 - <0.33	2200	<0.21
4-Ethyltoluene	0%	<0.76 - <2	N/A	<1.3
Acetone	100%	13 - 38	26000	11
CFC-12	100%	2 - 2.6	220000	2.5
Chloroform	100%	0.27 - 0.8	57	<0.25
Ethylbenzene	100%	0.44 - 1.6	440	<0.22
Hexane	33%	0.54 - 7.1	3100	<0.91
Propylbenzene	0%	<0.76 - <2	88	<1.3
Toluene	100%	1 - 11	22000	0.37
Total Xylenes	100%	0.85 - 8.8	440	<0.67
trans-1,2-Dichloroethene	0%	<0.61 - <1.6	310	<1
<b>Detected in sub-slab soil gas below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	0%	<0.76 - <2	960	<1.3
1,3,5-Trimethylbenzene	0%	<0.76 - <2	960	<1.3
2-Butanone (Methyl Ethyl Ketone)	44%	2.4 - 9.4	22000	<3.8
2-Propanol	56%	5.8 - 10	N/A	<3.2
4-Methyl-2-pentanone	11%	1.4	13000	<1.1
Carbon Disulfide	11%	5.7	3100	4
Cyclohexane	11%	6.3	26000	<0.89
Ethanol	100%	16 - 160	N/A	8.5
Heptane	11%	11	15000	<1.1

N/A = No screening level available

< = Non-detect at the reporting limit provided

Six detected results of PCE exceeded the indoor air screening level. PCE also exceeded the sub-slab soil gas screening level in four samples and all four sub-slab soil gas sample location exceedances correlate with indoor air sample locations with exceedances (samples 948-4, 948-5, 948-7, and 948-8). Therefore, PCE is an AOI at Building 948 for both sub-slab soil gas and indoor air, as there is potential evidence of VI. PCE was also detected in outdoor air at  $5.1 \mu\text{g}/\text{m}^3$ , which is an order of magnitude lower



than the detected range of results in indoor air. There were no other analytes with detected results that exceed indoor air screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were eight analytes detected in both indoor air and outdoor air, including PCE, as discussed above. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Three of the analytes had indoor air results that were very similar to concentrations detected in outdoor air (benzene, CFC-12, and carbon disulfide). Four analytes had results that were higher than outdoor air results (PCE, acetone, toluene, and ethanol), indicating that there is a potential for indoor sources. The results for PCE were discussed above and acetone, toluene, and ethanol are discussed below.

Acetone was detected in the outdoor air sample at  $11 \mu\text{g}/\text{m}^3$  and was detected in all nine indoor air samples (detected results range from  $13 - 38 \mu\text{g}/\text{m}^3$ ). All of the detected concentrations in indoor air were an order of magnitude higher than the outdoor air result. Common cleaning items and chemicals utilized in a laboratory contribute as indoor sources for acetone. It is important to point out that all of the results for acetone were well below screening levels.

Toluene was detected in the outdoor air sample at  $0.37 \mu\text{g}/\text{m}^3$  and was detected in all nine indoor air samples (detected results range from  $1 - 11 \mu\text{g}/\text{m}^3$ ). All of the detected concentrations in indoor air occur within range of the outdoor air result. Spray paints and degreasers are common items that contain toluene, in addition to process uses and chemicals utilized in a laboratory can contribute as indoor sources for toluene. The results for toluene were at least three orders of magnitude below screening levels.

While ethanol does not have a screening level, it was detected in two of the nine sub-slab soil gas samples at a low level range of  $15 - 16 \mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from  $16 - 160 \mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes.

EDB and HCB were ND in indoor air and all of the ND reporting limits exceeded the indoor air screening levels. HCB was ND in sub-slab soil gas but had two out of nine soil gas ND reporting limits above the screening level. EDB was also ND in sub-slab soil gas with reporting limits that exceeded screening levels. Therefore, EDB, HCB, and three additional ND analytes in sub-slab soil gas with reporting limits that exceeded the sub-slab soil gas screening levels are discussed and evaluated in the section below.

## **BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION**

Vapor intrusion evaluations utilize attenuation factors ( $\alpha$ ), which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 948-1, there are two analytes detected at a 100% frequency in the sub-slab soil gas. The data for these analytes are given in Table 948-4. Attenuation factors based on both average and maximum values are shown.

**Table 948-4. VI Attenuation Factors for Building 948**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )	
		Tetrachloroethane	Trichloroethane
Indoor Air	948-IA-01	24	<0.25
	948-IA-02	21	0.19
	948-IA-03	36	0.21
	948-IA-04	330	1.1
	948-IA-05	330	1.1
	948-IA-06	310	1.1
	948-IA-07	310	1
	948-IA-08	250	0.88
	948-IA-09	310	1.1
	Average	213	<0.77
Sub-slab Soil Gas	948-SS-01	380	22
	948-SS-02	19000	870
	948-SS-03	3500	130
	948-SS-04	55000	2600
	948-SS-05	75000	2500
	948-SS-06	19000	460
	948-SS-07	230000	16000
	948-SS-08	220000	15000
	948-SS-09	11000	270
	Average	70,320	4,206
Attenuation Factors	Average	3.0E-03	<2.0E-04
	Maximum	1.0E-03	6.9E-05

1. Non-detect values were used to calculate the attenuation factor and the full RL value was used in each case.
2. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

The most conservative attenuation factor calculated for tetrachloroethane is based on the average value, which was selected as the best estimate of a conservative, building attenuation factor. If the maximum value is used, the attenuation factor is slightly smaller and less conservative. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 948 is 3.0E-03.

The building-specific attenuation factor was then used to estimate the indoor air concentrations for those analytes with at least one reporting limit that exceeds either the sub-slab soil gas and/or the indoor air screening levels, as shown in Table 948-5, where:

$$\text{Estimated indoor air concentration} = (\text{Sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 948-5. Estimated Indoor Air Concentrations for Non-Detected Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas and Indoor Air but RLs Exceed Screening Levels</b>					
1,1,2,2-Tetrachloroethane	<540	3.E-03	1.62	2.4	No
1,2-Dibromoethane (EDB)	<600	3.E-03	1.8	0.23	Yes
alpha-Chlorotoluene	<400	3.E-03	1.2	2.8	No
Hexachlorobutadiene	<3300	3.E-03	9.9	6.2	Yes
Naphthalene	<1600	3.E-03	4.8	11	No

Table 948-5 shows the estimated indoor air concentrations compared to the applicable indoor air screening levels. Based on the maximum ND sub-slab soil gas reporting limits for the five ND analytes, three ND analytes had estimated indoor air concentrations below relevant indoor air screening levels. Therefore, the three ND analytes (1,1,2,2-tetrachloroethane, alpha-chlorotoluene, and naphthalene) with estimated indoor air concentrations below the screening level were eliminated from further evaluation.

EDB had an estimated indoor air concentration ( $1.8 \mu\text{g}/\text{m}^3$ ) that exceeds the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). The actual measured ND reporting limits for the EDB indoor air samples ranged from  $0.24 - 0.63 \mu\text{g}/\text{m}^3$ , which are lower than the estimated indoor air concentration presented above. HCB had an estimated indoor air concentration ( $9.9 \mu\text{g}/\text{m}^3$ ) that exceeds the indoor air screening level ( $6.2 \mu\text{g}/\text{m}^3$ ). The actual measured ND reporting limits for the HCB indoor air samples ranged from  $8.2 - 22 \mu\text{g}/\text{m}^3$ . Due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB and HCB, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated.

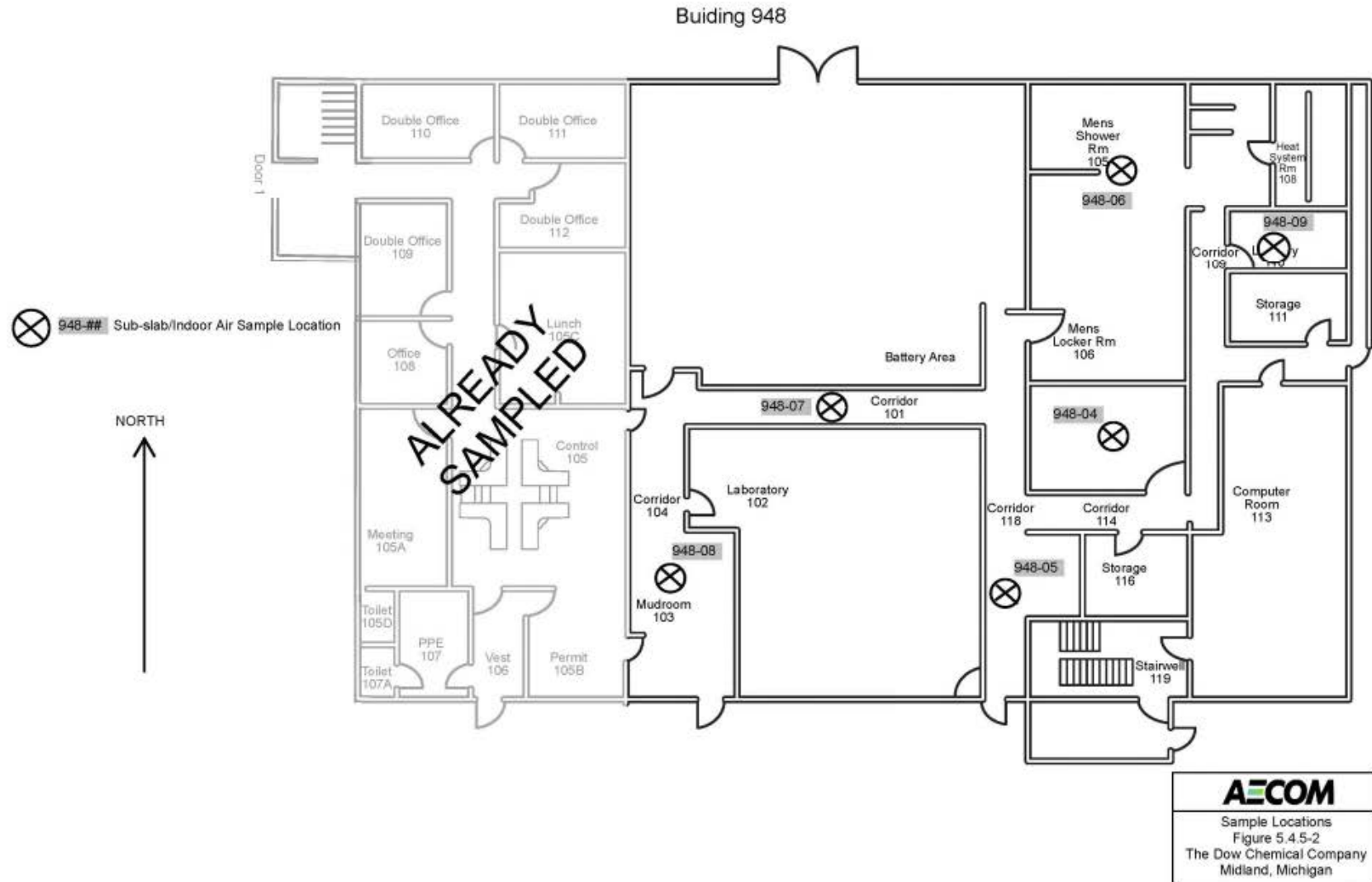
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and the indoor air results, there is evidence of potential VI at Building 948. Therefore, Building 948 was placed in VI Path Forward Building Group 4 (see Figure 5-3) and additional sampling will occur in 2018. Additionally, benzene, cis-1,2-DCE, cumene, PCE, and TCE will be added to Industrial Hygiene monitoring for the building.

**Figure 5.4.5-1. Building 948 Location**



Figure 5.4.5-2. Building 948 Sample Locations



**Table 5.4.5-1. Building 948 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	948	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	67%	1652	2668	78	7800	4.5	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	948	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.7	540	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	22%
Category 2	948	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.5	420	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	948	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	56%	177	263	28	830	3.3	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	948	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	3.3	310	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	948	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	24	2300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	948	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	22%	60.0	74.4	13	15	26	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	948	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	6.3	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	78%
Category 2	948	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	5	470	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	948	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	3.3	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	948	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.8	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	948	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	11%	58.4	75.6	9.4	9.4	7.5	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	948	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.8	170	No Screening Value Available	-	-	-
Category 2	948	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	5	470	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	948	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	5	470	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	948	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	12	1100	No Screening Value Available	-	-	-
Category 2	948	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.8	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	948	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	22%	145	179	31	42	62	920	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	948	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	14	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	948	SS	2-Propanol	67-63-0	UG/M3	9	11%	116	153	9.1	9.1	15	770	No Screening Value Available	-	-	-
Category 2	948	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	10	980	No Screening Value Available	-	-	-
Category 2	948	SS	4-Ethyltoluene	622-96-8	UG/M3	9	33%	352	602	270	1500	4	80	No Screening Value Available	-	-	-
Category 2	948	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	11%	48.7	64.0	4.8	4.8	6.3	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	948	SS	Acetone	67-64-1	UG/M3	9	44%	268	189	160	640	120	740	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	948	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	4.3	400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	22%
Category 2	948	SS	Benzene	71-43-2	UG/M3	9	44%	554	1555	28	4700	17	250	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	11%	0%
Category 2	948	SS	Bromochloromethane	74-97-5	UG/M3	5	0%	-	-	-	-	17	170	No Screening Value Available	-	-	-
Category 2	948	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	5.5	520	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	948	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	8.5	810	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	948	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	32	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	948	SS	Carbon Disulfide	75-15-0	UG/M3	9	11%	147	193	20	20	10	970	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	948	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	5.2	490	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	948	SS	CFC-11	75-69-4	UG/M3	9	0%	-	-	-	-	4.6	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	948	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	6.3	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	948	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.8	540	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	948	SS	CFC-12	75-71-8	UG/M3	9	44%	188	208	150	690	4.1	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	948	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.8	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	948	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	8.7	820	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	948	SS	Chloroform	67-66-3	UG/M3	9	44%	154	210	12	630	4	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	948	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	17	640	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	948	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	89%	1218	1809	24	5800	3.3	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	11%	0%
Category 2	948	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.7	350	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	948	SS	Cumene	98-82-8	UG/M3	9	44%	581	1110	26	3100	4	80	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	22%	0%
Category 2	948	SS	Cyclohexane	110-82-7	UG/M3	9	33%	60.6	47.9	56	78	18	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	948	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	7	660	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	948	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	23	2200	No Screening Value Available	-	-	-
Category 2	948	SS	Ethanol	64-17-5	UG/M3	9	22%	90.7	115.6	15	16	40	590	No Screening Value Available	-	-	-
Category 2	948	SS	Ethylbenzene	100-41-4	UG/M3	9	56%	1413	3623	25	11000	23	71	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	948	SS	Heptane	142-82-5	UG/M3	9	33%	76.6	57.4	86	97	22	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	948	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	35	3300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	22%
Category 2	948	SS	Hexane	110-54-3	UG/M3	9	44%	98.7	72.5	32	190	19	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	948	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	44%	102	153	43	490	23	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	948	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	12	280	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	948	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	29	1100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	948	SS	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	8.6	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	22%
Category 2	948	SS	o-Xylene	95-47-6	UG/M3	9	22%	55.0	65.7	16	22	23	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	948	SS	Propylbenzene	103-65-1	UG/M3	9	22%	241	588	84	1800	4	380	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.5-1. Building 948 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	948	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3.5	330	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	948	SS	Tetrachloroethene	127-18-4	UG/M3	9	100%	70320	91037	380	230000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	44%	0%
Category 2	948	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.4	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	948	SS	Toluene	108-88-3	UG/M3	9	44%	250	511	90	1600	20	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	948	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	7.4	700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	948	SS	Total Xylenes	1330-20-7	UG/M3	9	44%	157	211	60.5	660	46	680	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	948	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	44%	79.1	63.6	25	130	3.3	310	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	948	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.7	350	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	948	SS	Trichloroethene	79-01-6	UG/M3	9	100%	4206	6480	22	16000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	44%	0%
Category 2	948	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	2.1	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.5-2. Building 948 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	948	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	0.17	0.45	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	948	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.21	0.56	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	948	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.17	0.45	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	948	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.12	0.33	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	948	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	11%	0.0644	0.0174	0.08	0.08	0.07	0.16	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	948	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.7	15	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	948	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	0%	-	-	-	-	0.76	2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	948	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.24	0.63	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	948	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.92	2.5	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	948	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	44%	0.164	0.047	0.15	0.27	0.2	0.33	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	948	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.71	1.9	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	948	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	0.76	2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	948	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.34	0.91	No Screening Value Available	-	-	-
Category 2	948	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.92	2.5	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	948	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	11%	0.203	0.084	0.36	0.36	0.18	0.5	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	948	IA	1,4-Dioxane	123-91-1	UG/M3	9	11%	0.723	0.616	2.3	2.3	0.55	1.5	No Screening Value Available	-	-	-
Category 2	948	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.6	9.6	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	948	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	44%	3.72	2.34	2.4	9.4	3.5	6.1	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	948	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.2	8.4	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	948	IA	2-Propanol	67-63-0	UG/M3	9	56%	5.29	3.15	5.8	10	4	5.1	No Screening Value Available	-	-	-
Category 2	948	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.4	6.4	No Screening Value Available	-	-	-
Category 2	948	IA	4-Ethyltoluene	622-96-8	UG/M3	9	0%	-	-	-	-	0.76	2	No Screening Value Available	-	-	-
Category 2	948	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	11%	0.701	0.325	1.4	1.4	0.63	1.7	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	948	IA	Acetone	67-64-1	UG/M3	9	100%	22.1	8.2	13	38	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	948	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.8	2.1	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	948	IA	Benzene	71-43-2	UG/M3	9	56%	0.688	0.698	0.43	2.4	0.39	0.66	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	948	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1	2.8	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	948	IA	Bromofom	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	4.2	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	948	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3	8	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	948	IA	Carbon Disulfide	75-15-0	UG/M3	9	11%	2.82	1.26	5.7	5.7	2.8	6.4	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	948	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	0.581	0.134	0.38	0.71	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	948	IA	CFC-11	75-69-4	UG/M3	9	33%	1.06	0.26	1	1.6	1.3	2.3	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	948	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	3.2	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	948	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.22	0.58	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	948	IA	CFC-12	75-71-8	UG/M3	9	100%	2.33	0.21	2	2.6	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	948	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.71	1.9	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	948	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	0.2	0.54	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	948	IA	Chloroform	67-66-3	UG/M3	9	100%	0.491	0.142	0.27	0.8	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	948	IA	Chloromethane	74-87-3	UG/M3	9	100%	1.16	0.20	0.95	1.6	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	948	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	67%	0.496	0.329	0.57	0.88	0.12	0.19	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	948	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.7	1.9	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	948	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.76	2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	948	IA	Cyclohexane	110-82-7	UG/M3	9	11%	1.15	1.94	6.3	6.3	0.53	1.4	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	948	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.3	3.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	948	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.5	15	No Screening Value Available	-	-	-
Category 2	948	IA	Ethanol	64-17-5	UG/M3	9	100%	65.0	56.1	16	160	-	-	No Screening Value Available	-	-	-
Category 2	948	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	0.750	0.408	0.44	1.6	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	948	IA	Heptane	142-82-5	UG/M3	9	11%	1.75	3.47	11	11	0.63	1.7	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	948	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.2	22	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	948	IA	Hexane	110-54-3	UG/M3	9	33%	1.57	2.27	0.54	7.1	0.63	1.4	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	948	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	2.25	2.12	0.62	6.5	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	948	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.56	1.5	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	948	IA	Methylene Chloride	75-09-2	UG/M3	9	78%	5.70	4.01	1.7	12	1.2	1.6	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	948	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	0.4	1.1	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	948	IA	o-Xylene	95-47-6	UG/M3	9	100%	0.783	0.742	0.23	2.3	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	948	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.76	2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	948	IA	Styrene	100-42-5	UG/M3	9	11%	0.690	0.204	0.88	0.88	0.66	1.8	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%



**Table 5.4.5-2. Building 948 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	948	IA	Tetrachloroethene	127-18-4	UG/M3	9	100%	213	142	21	330	-	-	Vapor Intrusion Indoor Air Screening Levels	180	67%	0%
Category 2	948	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	6.1	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	948	IA	Toluene	108-88-3	UG/M3	9	100%	3.24	3.55	1	11	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	948	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.4	3.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	948	IA	Total Xylenes	1330-20-7	UG/M3	9	100%	3.03	2.86	0.85	8.8	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	948	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.61	1.6	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	948	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.7	1.9	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	948	IA	Trichloroethene	79-01-6	UG/M3	9	89%	0.756	0.442	0.19	1.1	0.25	0.25	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	948	IA	Vinyl Chloride	75-01-4	UG/M3	9	56%	0.0844	0.0534	0.097	0.15	0.039	0.1	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	948	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.28	0.28	-	-	-	-
Category 2	948	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 2	948	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.28	0.28	-	-	-	-
Category 2	948	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 2	948	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	0.1	0.1	-	-	-	-
Category 2	948	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	9.6	9.6	-	-	-	-
Category 2	948	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	948	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.4	0.4	-	-	-	-
Category 2	948	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	948	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 2	948	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	948	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	948	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 2	948	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	948	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.31	0.31	-	-	-	-
Category 2	948	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.93	0.93	-	-	-	-
Category 2	948	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	948	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	948	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	5.3	5.3	-	-	-	-
Category 2	948	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	948	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	948	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	948	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	948	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	11	11	-	-	-	-	-	-
Category 2	948	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	948	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.6	0.6	-	-	-	-	-	-
Category 2	948	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	948	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	948	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	5	5	-	-	-	-
Category 2	948	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	948	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.53	0.53	-	-	-	-	-	-
Category 2	948	OA	CFC-11	75-69-4	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	948	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 2	948	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 2	948	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.5	2.5	-	-	-	-	-	-
Category 2	948	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	948	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.34	0.34	-	-	-	-
Category 2	948	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 2	948	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.4	1.4	-	-	-	-	-	-
Category 2	948	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	948	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	948	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	948	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.89	0.89	-	-	-	-
Category 2	948	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 2	948	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	9.2	9.2	-	-	-	-
Category 2	948	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	8.5	8.5	-	-	-	-	-	-
Category 2	948	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	948	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-

Table 5.4.5-2. Building 948 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	948	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	14	14	-	-	-	-
Category 2	948	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.91	0.91	-	-	-	-
Category 2	948	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.45	0.45	-	-	-	-
Category 2	948	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.93	0.93	-	-	-	-
Category 2	948	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	948	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	948	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	948	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	948	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	948	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	-	-	5.1	5.1	-	-	-	-	-	-
Category 2	948	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	948	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.37	0.37	-	-	-	-	-	-
Category 2	948	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	948	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	948	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	948	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	948	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.28	0.28	-	-	-	-
Category 2	948	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.066	0.066	-	-	-	-

## 5.4.6 Vapor Intrusion Evaluation for Building 972

### BACKGROUND

Building 972 is a Category 1 building in Zone 2. It is a large building that includes office space, shop, laboratory, and a truck garage. It is known as the Granular Formulation Plant (see Figure 5.4.6-1) and is located within the central portion of the facility designated as Zone 2. The building is single story and is approximately 10,400 ft<sup>2</sup> (966 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on February 28, 2017 and the results can be found in Appendix C. The building has central air conditioning with one air intake located on the roof and heating provided by hot air circulation. There is one bay door that is left open in the summer months or if someone is working in the truck garage. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified degreasers, cleaners, personal toiletries, spray paint, acetic acid, and acid neutralizers. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 24, 2017, sub-slab soil gas samples were collected from nine locations within the building. Indoor air samples were collected on April 26, 2017 at nine locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.6-2. Summary statistics of the analytical results for sub-slab soil gas for Building 972 are presented on Table 5.4.6-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.6-2. The complete analytical reports for the sub-slab soil gas and indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 41 of the 65 target analytes were ND in each of the nine samples collected at Building 972. All of the ND sub-slab soil gas analytes had reporting limits that met the respective screening level. Therefore, all 41 of the ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 24 analytes were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Eighteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Six analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 972-1. Of the six analytes detected above *de minimus* levels but below screening levels, five had detection frequencies of 100% (acetone, CFC-11, ethylbenzene, toluene, and total xylenes). Only analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. At Building 972, there were no analytes with detected concentrations that exceeded a screening level; therefore, there are no sub-slab soil gas AOIs.

**Table 972-1. Summary of Sub-Slab Soil Gas Detects for Building 972**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
Acetone	100%	30 - 340	0%	3400000
CFC-11	100%	5.3 - 100	0%	33000000
CFC-12	89%	12 - 3000	0%	29000000
Ethylbenzene	100%	5.6 - 200	0%	59000
Toluene	100%	19 - 110	0%	2900000
Total Xylenes	100%	10.4 - 1170	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	67%	4.8 - 12	0%	130000
1,3,5-Trimethylbenzene	11%	4.8	0%	130000
2-Butanone (Methyl Ethyl Ketone)	67%	11 - 22	0%	2900000
2-Propanol	33%	7.3 - 22	N/A	N/A
4-Ethyltoluene	44%	4.3 - 10	N/A	N/A
4-Methyl-2-pentanone	11%	16	0%	1800000
Benzene	100%	7.7 - 43	0%	2200
Bromodichloromethane	11%	6.1	0%	1000
Carbon Disulfide	56%	16 - 62	0%	410000
Chloroform	22%	9.2 - 39	0%	7600
Cumene	11%	7.9	0%	1700
Cyclohexane	100%	6.1 - 40	0%	3500000
Ethanol	89%	11 - 80	N/A	N/A
Heptane	100%	6.5 - 36	0%	2000000
Hexane	100%	12 - 79	0%	410000
Propylbenzene	11%	7.3	0%	12000
Tetrachloroethene (PCE)	78%	6.6 - 21	0%	23000
Tetrahydrofuran	11%	6.3	0%	11000

N/A = Screening level not available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage, and/or use of volatiles indoors, air exchange with outdoor air). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and were analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 927-2 below shows the analytes detected in each of the three media sampled.

**Table 972-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	•
<i>2-Propanol</i>	•	•	•
Acetone	•	•	•
<i>Benzene</i>	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
<i>Ethanol</i>	•	•	•
<i>Ethylbenzene</i>	•	•	•
<i>Heptane</i>	•	•	•
<i>Hexane</i>	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>1,3,5-Trimethylbenzene</i>	•	•	
<i>4-Ethyltoluene</i>	•	•	
<i>4-Methyl-2-pentanone</i>	•	•	
<i>Chloroform</i>	•	•	
<i>Cyclohexane</i>	•	•	
<i>Propylbenzene</i>	•	•	
<i>Tetrachloroethene</i>	•	•	
<i>Bromodichloromethane</i>	•		
<i>Carbon Disulfide</i>	•		
<i>Cumene</i>	•		
<i>Tetrahydrofuran</i>	•		
Carbon Tetrachloride		•	•
Chloromethane		•	•
Methylene Chloride		•	•
1,1-Dichloroethene		•	
1,2-Dichloroethane		•	
1,2-Dichloropropane		•	
1,4-Dichlorobenzene		•	
2,2,4-Trimethylpentane		•	
Chlorobenzene		•	
Naphthalene		•	
Styrene		•	
Trichloroethene		•	

• = Detected  
 = Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-three of the 65 analytes were ND in each of the indoor air samples and 31 of the ND analytes had reporting limits that met the respective screening levels. Two of the ND indoor air analytes (EDB and HCB) had at least one ND reporting limit above the respective screening level. These ND reporting limit exceedances are discussed further in the VI evaluation below. Therefore, the 31 ND analytes were eliminated from further VI evaluation. There were 32 analytes detected in indoor air and are discussed below. One outdoor air sample was collected immediately upwind of the building with 15 analytes detected.

Table 972-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 972-3. Vapor Intrusion Evaluation for Building 972**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
Acetone	100%	18 - 100	26000	24
CFC-11	100%	1.1 - 1.7	250000	1.2
CFC-12	100%	2.8 - 6.5	220000	2.1
Ethylbenzene	100%	0.57 - 5	440	0.32
Toluene	100%	4.1 - 46	22000	3.4
Total Xylenes	100%	2 - 26.2	440	1.26
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	11%	4.9	960	<0.85
1,3,5-Trimethylbenzene	11%	1.4	960	<0.85
2-Butanone (Methyl Ethyl Ketone)	100%	4.8 - 12	22000	6.7
2-Propanol	100%	3.4 - 17	N/A	2.3
4-Ethyltoluene	11%	4.6	N/A	<0.85
4-Methyl-2-pentanone	67%	0.73 - 1.9	13000	<0.71
Benzene	100%	0.48 - 3.7	16	0.58
Bromodichloromethane	0%	<1.2	7.6	<1.2
Carbon Disulfide	0%	<2.5 - <2.8	3100	<2.7
Chloroform	89%	0.43 - 2.9	57	<0.17
Cumene	0%	<0.78 - <0.87	13	<0.85
Cyclohexane	11%	3.4	26000	<0.6
Ethanol	100%	17 - 84	N/A	9.4
Heptane	100%	1.9 - 8.7	15000	2.2
Hexane	100%	0.6 - 13	3100	0.62
Propylbenzene	11%	1.2	88	<0.85
Tetrachloroethene (PCE)	22%	0.43 - 0.68	180	<0.23
Tetrahydrofuran	0%	<2.3 - <2.6	79	<2.6

N/A = Screening level not available

< = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 15 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Six of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. The results for 2-propanol, toluene, and hexane, each detected at a frequency of 100%, indicated that all results with the exception of the detected concentration at Sample 972-IA-5 were in line with the outdoor air result. For each of these analytes, the result at Sample 972-IA-5 was the maximum detected concentration, which likely indicates an indoor source at that location. Ethylbenzene and total xylenes each had five and six samples, respectively, that were detected at very similar concentrations as the outdoor air result. The

remaining samples were higher detections but still at least one order of magnitude below the screening levels. Acetone was detected in all nine samples at concentrations that ranged from 18 - 100  $\mu\text{g}/\text{m}^3$ . Acetone was detected in outdoor air at 24  $\mu\text{g}/\text{m}^3$ . All but one of the indoor air results was in the same order of magnitude and there is the potential for indoor sources to be contributing to the presence of acetone. All of the results for acetone were at least two orders of magnitude below the screening level.

While ethanol does not have a screening level, it was detected in eight of the nine sub-slab soil gas samples at low levels ranging from 11 - 80  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from 17 - 84  $\mu\text{g}/\text{m}^3$ . Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, toilet bowl cleaner, Purex, etc.

EDB and HCB were ND in all media and all nine ND sub-slab soil gas reporting limits for both analytes met the soil gas screening level; however, all of the ND reporting limits exceeded the indoor air screening levels. The ND indoor air reporting limits for HCB (8.5 - 9.3  $\mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, the ND indoor air reporting limits for EDB (0.24 - 0.27  $\mu\text{g}/\text{m}^3$ ) only very slightly exceeded the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ). Therefore, the indoor air ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1 is an insignificant exposure pathway based on current use. Building 1 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.6-1. Building 972 Location**





**Figure 5.4.6-2. Building 972 Sample Locations**

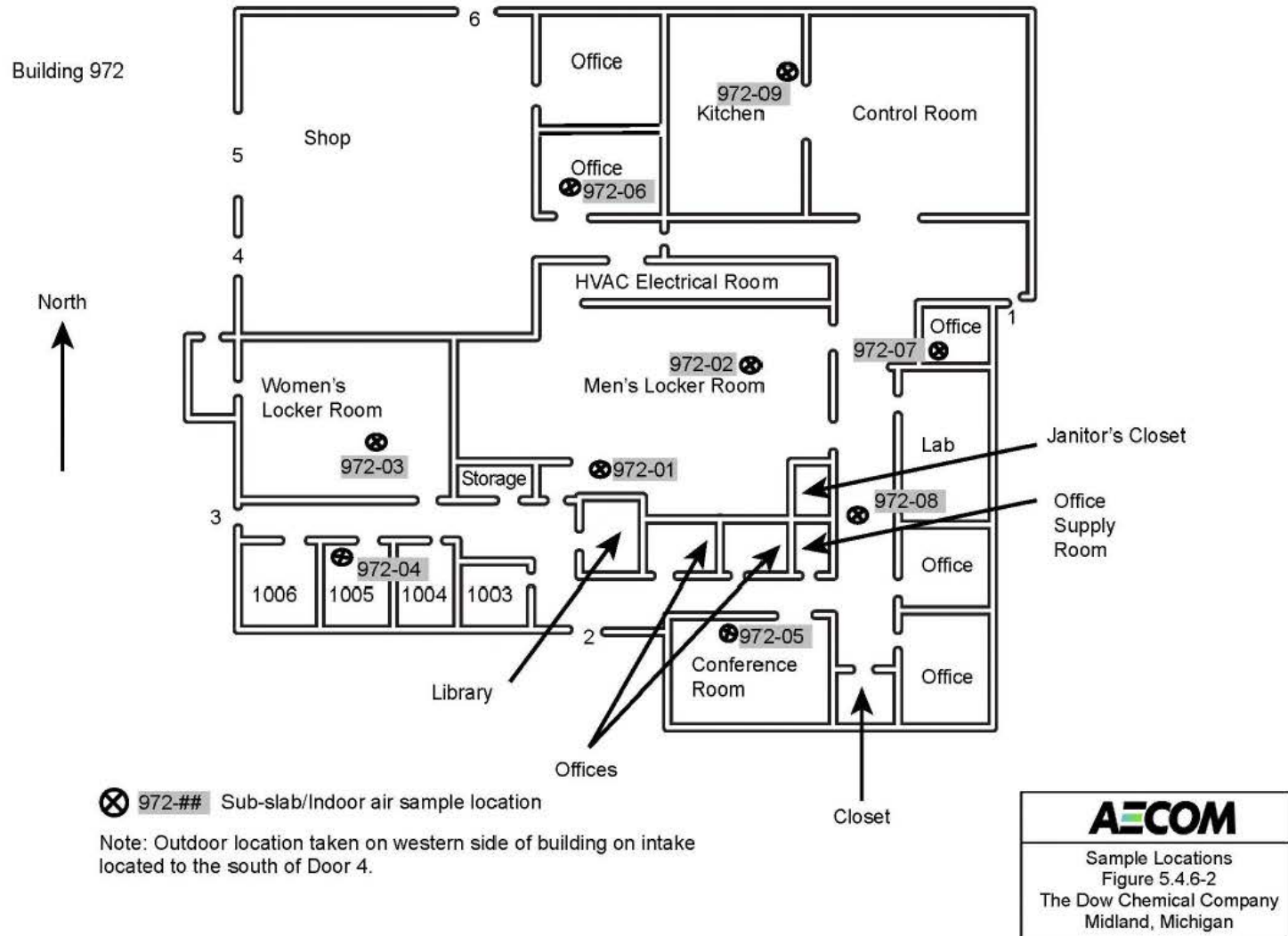


Table 5.4.6-1. Building 972 Sub-Slab Soil Gas Summary Results

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	972	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	4.1	9.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	972	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.1	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	972	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.1	9.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	972	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	3	7.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	972	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	3	6.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	972	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	22	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	972	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	67%	6.07	3.65	4.8	12	4	4.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	972	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	5.7	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 1	972	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.5	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	972	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	3	7.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	972	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.4	8.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	972	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	11%	2.63	1.12	4.8	4.8	3.7	8.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	972	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.6	3.9	No Screening Value Available	-	-	-
Category 1	972	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.5	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	972	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.5	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	972	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	11	25	No Screening Value Available	-	-	-
Category 1	972	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.5	8.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	972	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	67%	13.8	6.6	11	22	9.5	21	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	972	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	12	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	972	SS	2-Propanol	67-63-0	UG/M3	9	33%	7.31	5.82	7.3	22	7.6	17	No Screening Value Available	-	-	-
Category 1	972	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.3	22	No Screening Value Available	-	-	-
Category 1	972	SS	4-Ethyltoluene	622-96-8	UG/M3	9	44%	4.15	2.71	4.3	10	3.7	8.6	No Screening Value Available	-	-	-
Category 1	972	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	11%	3.50	4.73	16	16	3	7.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	972	SS	Acetone	67-64-1	UG/M3	9	100%	98.6	93.8	30	340	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	972	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	3.8	9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	972	SS	Benzene	71-43-2	UG/M3	9	100%	21.6	13.3	7.7	43	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	972	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	16	37	No Screening Value Available	-	-	-
Category 1	972	SS	Bromodichloromethane	75-27-4	UG/M3	9	11%	3.55	1.46	6.1	6.1	5	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	972	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	7.7	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	972	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	29	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	972	SS	Carbon Disulfide	75-15-0	UG/M3	9	56%	21.7	19.6	16	62	11	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	972	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	4.7	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	972	SS	CFC-11	75-69-4	UG/M3	9	100%	35.0	36.9	5.3	100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	972	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	5.7	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	972	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.2	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	972	SS	CFC-12	75-71-8	UG/M3	9	89%	647	1113	12	3000	3.8	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	972	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.4	8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	972	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	7.9	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	972	SS	Chloroform	67-66-3	UG/M3	9	22%	7.18	12.17	9.2	39	3.6	8.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	972	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	15	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	972	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	3	6.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	972	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.4	7.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	972	SS	Cumene	98-82-8	UG/M3	9	11%	2.97	2.00	7.9	7.9	3.7	8.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	972	SS	Cyclohexane	110-82-7	UG/M3	9	100%	21.5	11.7	6.1	40	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	972	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.3	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	972	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	21	50	No Screening Value Available	-	-	-
Category 1	972	SS	Ethanol	64-17-5	UG/M3	9	89%	26.5	22.8	11	80	13	13	No Screening Value Available	-	-	-
Category 1	972	SS	Ethylbenzene	100-41-4	UG/M3	9	100%	58.8	63.9	5.6	200	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	972	SS	Heptane	142-82-5	UG/M3	9	100%	19.5	11.6	6.5	36	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	972	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	32	75	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	972	SS	Hexane	110-54-3	UG/M3	9	100%	39.0	23.6	12	79	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	972	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	251	308	6.5	900	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	972	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	972	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	26	61	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	972	SS	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	7.8	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	972	SS	o-Xylene	95-47-6	UG/M3	9	100%	86.6	94.0	3.9	270	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.4.6-1. Building 972 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	972	SS	Propylbenzene	103-65-1	UG/M3	9	11%	2.91	1.82	7.3	7.3	3.7	8.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	972	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3.2	7.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	972	SS	Tetrachloroethene	127-18-4	UG/M3	9	78%	10.5	6.1	6.6	21	5	5.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	972	SS	Tetrahydrofuran	109-99-9	UG/M3	9	11%	1.97	1.69	6.3	6.3	2.2	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	972	SS	Toluene	108-88-3	UG/M3	9	100%	56.6	33.7	19	110	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	972	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	6.8	15.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	972	SS	Total Xylenes	1330-20-7	UG/M3	9	100%	337	401	10.4	1170	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	972	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3	6.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	972	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.4	7.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	972	SS	Trichloroethene	79-01-6	UG/M3	9	0%	-	-	-	-	4	9.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	972	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	1.9	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

Table 5.4.6-2. Building 972 Indoor Air and Outdoor Air Summary Results

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	972	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	972	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	972	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	972	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	972	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	11%	0.0371	0.0098	0.063	0.063	0.063	0.07	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	972	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.9	6.6	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	972	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	11%	0.918	1.493	4.9	4.9	0.79	0.87	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	972	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.24	0.27	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	972	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.96	1.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	972	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	11%	0.0878	0.0571	0.24	0.24	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	972	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	11%	0.496	0.302	1.3	1.3	0.74	0.82	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	972	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	11%	0.529	0.327	1.4	1.4	0.79	0.87	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	972	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.35	0.39	No Screening Value Available	-	-	-
Category 1	972	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.96	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	972	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	11%	0.118	0.046	0.24	0.24	0.19	0.21	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	972	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.57	0.64	No Screening Value Available	-	-	-
Category 1	972	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	11%	2.28	0.87	4.6	4.6	3.7	4.1	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	972	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	100%	7.38	2.26	4.8	12	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	972	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.2	3.6	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	972	IA	2-Propanol	67-63-0	UG/M3	9	100%	6.20	4.26	3.4	17	-	-	No Screening Value Available	-	-	-
Category 1	972	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.5	2.8	No Screening Value Available	-	-	-
Category 1	972	IA	4-Ethyltoluene	622-96-8	UG/M3	9	11%	0.885	1.393	4.6	4.6	0.79	0.87	No Screening Value Available	-	-	-
Category 1	972	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	67%	0.852	0.496	0.73	1.9	0.68	0.72	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	972	IA	Acetone	67-64-1	UG/M3	9	100%	56.0	30.2	18	100	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	972	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.82	0.92	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	972	IA	Benzene	71-43-2	UG/M3	9	100%	0.927	1.043	0.48	3.7	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	972	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	972	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	972	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3.1	3.4	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	972	IA	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	2.5	2.8	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	972	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	0.890	0.144	0.64	1	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	972	IA	CFC-11	75-69-4	UG/M3	9	100%	1.34	0.18	1.1	1.7	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	972	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	1.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	972	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.22	0.25	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	972	IA	CFC-12	75-71-8	UG/M3	9	100%	4.40	1.33	2.8	6.5	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	972	IA	Chlorobenzene	108-90-7	UG/M3	9	11%	0.502	0.337	1.4	1.4	0.73	0.81	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	972	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	972	IA	Chloroform	67-66-3	UG/M3	9	89%	0.913	0.814	0.43	2.9	0.17	0.17	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	972	IA	Chloromethane	74-87-3	UG/M3	9	100%	1.40	0.09	1.3	1.6	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	972	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	972	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.72	0.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	972	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.78	0.87	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	972	IA	Cyclohexane	110-82-7	UG/M3	9	11%	0.639	1.035	3.4	3.4	0.55	0.61	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	972	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.4	1.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	972	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.6	6.3	No Screening Value Available	-	-	-
Category 1	972	IA	Ethanol	64-17-5	UG/M3	9	100%	41.6	21.3	17	84	-	-	No Screening Value Available	-	-	-
Category 1	972	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	1.79	1.71	0.57	5	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	972	IA	Heptane	142-82-5	UG/M3	9	100%	2.84	2.21	1.9	8.7	-	-	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	972	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.5	9.4	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	972	IA	Hexane	110-54-3	UG/M3	9	100%	2.25	4.04	0.6	13	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	972	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	6.46	6.71	1.5	20	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	972	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.57	0.64	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	972	IA	Methylene Chloride	75-09-2	UG/M3	9	11%	1.04	1.34	4.6	4.6	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	972	IA	Naphthalene	91-20-3	UG/M3	9	11%	0.322	0.292	1.1	1.1	0.42	0.46	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	972	IA	o-Xylene	95-47-6	UG/M3	9	100%	1.99	2.06	0.49	6.2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	972	IA	Propylbenzene	103-65-1	UG/M3	9	11%	0.507	0.260	1.2	1.2	0.79	0.87	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

Table 5.4.6-2. Building 972 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	972	IA	Styrene	100-42-5	UG/M3	9	11%	0.468	0.312	1.3	1.3	0.68	0.75	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	972	IA	Tetrachloroethene	127-18-4	UG/M3	9	22%	0.213	0.204	0.43	0.68	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	972	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	972	IA	Toluene	108-88-3	UG/M3	9	100%	9.12	13.83	4.1	46	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	972	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.44	1.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	972	IA	Total Xylenes	1330-20-7	UG/M3	9	100%	8.44	8.78	1.99	26.2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	972	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.63	0.7	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	972	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.72	0.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	972	IA	Trichloroethene	79-01-6	UG/M3	9	11%	0.121	0.090	0.36	0.36	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	972	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	0.041	0.045	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	972	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 1	972	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 1	972	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 1	972	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	972	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	0.068	0.068	-	-	-	-
Category 1	972	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 1	972	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	972	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 1	972	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 1	972	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	972	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.8	0.8	-	-	-	-
Category 1	972	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	972	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.38	0.38	-	-	-	-
Category 1	972	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 1	972	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 1	972	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 1	972	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 1	972	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	-	-	6.7	6.7	-	-	-	-	-	-
Category 1	972	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	972	OA	2-Propanol	67-63-0	UG/M3	1	100%	-	-	2.3	2.3	-	-	-	-	-	-
Category 1	972	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 1	972	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	972	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.71	0.71	-	-	-	-
Category 1	972	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	24	24	-	-	-	-	-	-
Category 1	972	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.9	0.9	-	-	-	-
Category 1	972	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.58	0.58	-	-	-	-	-	-
Category 1	972	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	972	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 1	972	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	972	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 1	972	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.59	0.59	-	-	-	-	-	-
Category 1	972	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 1	972	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 1	972	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 1	972	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.1	2.1	-	-	-	-	-	-
Category 1	972	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.8	0.8	-	-	-	-
Category 1	972	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	972	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 1	972	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.3	1.3	-	-	-	-	-	-
Category 1	972	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	972	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 1	972	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	972	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 1	972	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 1	972	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 1	972	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	9.4	9.4	-	-	-	-	-	-

**Table 5.4.6-2. Building 972 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	972	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.32	0.32	-	-	-	-	-	-
Category 1	972	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 1	972	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	9.2	9.2	-	-	-	-
Category 1	972	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	0.62	0.62	-	-	-	-	-	-
Category 1	972	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.96	0.96	-	-	-	-	-	-
Category 1	972	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 1	972	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 1	972	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.45	0.45	-	-	-	-
Category 1	972	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.3	0.3	-	-	-	-	-	-
Category 1	972	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 1	972	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	972	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	972	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	972	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	3.4	3.4	-	-	-	-	-	-
Category 1	972	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.56	1.56	-	-	-	-
Category 1	972	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	1.26	1.26	-	-	-	-	-	-
Category 1	972	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 1	972	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 1	972	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	972	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.044	0.044	-	-	-	-

## 5.4.7 Vapor Intrusion Evaluation for Building 1025

### BACKGROUND

Building 1025 is a Category 1 building in Zone 2. It is a medium-sized single story office building. It is known as the Building 1025 Office Building (see Figure 5.4.7-1) and is located within the central portion of the facility designated as Zone 2. The building is approximately 8,350 ft<sup>2</sup> (776 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 7, 2017 and the results can be found in Appendix C. The building has central air conditioning with one air intake. There is one bay door that is left open on nice days but is closed for the majority of the time because the whole building is air conditioned. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified household cleaners and a leak detector. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 10, 2017, sub-slab soil gas samples were collected from six locations within the building. Indoor air samples were collected on April 11, 2017 at six locations corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.7-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1025 are presented on Table 5.4.7-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.7-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 41 of the 65 target analytes were ND in each of the six samples collected at Building 1025. All but one of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, 40 of the ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. One ND analyte (EDB) had at least one reporting limit exceed the respective screening levels and will be further evaluated below. A total of 24 analytes were detected in one or more of the six sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Eleven analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Thirteen were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1025-1. Of the 13 analytes detected above *de minimus* levels but below screening levels, six had detection frequencies of 100% (1,1,1-trichloroethane, ethylbenzene, hexane, PCE, toluene, and total xylenes). Only analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOI for VI. For Building 1025, there were no analytes with detected concentrations that exceeded a screening level; therefore, there are no sub-slab soil gas AOIs.

**Table 1025-1. Summary of Sub-Slab Soil Gas Detects for Building 1025**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	21 - 3500	0%	3500000
2-Butanone (Methyl Ethyl Ketone)	50%	13 - 200	0%	2900000
4-Ethyltoluene	17%	160	N/A	N/A
Acetone	83%	70 - 240	0%	3400000
Cumene	50%	9.6 - 310	0%	1700
Cyclohexane	83%	9.2 - 130	0%	3500000
Ethylbenzene	100%	21 - 11000	0%	59000
Heptane	83%	12 - 110	0%	2000000
Hexane	100%	24 - 260	0%	410000
Propylbenzene	33%	8.3 - 100	0%	12000
Tetrachloroethene (PCE)	100%	340 - 6600	0%	23000
Toluene	100%	35 - 450	0%	2900000
Total Xylenes	100%	67 - 47000	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	50%	7.4 - 54	0%	290000
1,2,4-Trimethylbenzene	50%	6.2 - 18	0%	130000
1,3,5-Trimethylbenzene	33%	4 - 5.4	0%	130000
Benzene	67%	9.7 - 24	0%	2200
Carbon Disulfide	67%	9.4 - 39	0%	410000
CFC-11	50%	10 - 16	0%	33000000
CFC-12	67%	6.9 - 99	0%	29000000
Chloroform	50%	4.7 - 20	0%	7600
Ethanol	50%	10 - 24	N/A	N/A
Naphthalene	17%	22	0%	1500
Trichloroethene (TCE)	17%	7.3	0%	1200

N/A = Screening level not available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage, and/or use of volatiles indoors, air exchange with outdoor air). Therefore, six indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1025-2 below shows the analytes detected in each of the three media sampled.



**Table 1025-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
<i>Benzene</i>	•	•	•
<i>CFC-11</i>	•	•	•
<i>CFC-12</i>	•	•	•
<i>Ethanol</i>	•	•	•
Ethylbenzene	•	•	•
Heptane	•	•	•
Hexane	•	•	•
Tetrachloroethene	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
1,1,1-Trichloroethane	•	•	
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>1,3,5-Trimethylbenzene</i>	•	•	
4-Ethyltoluene	•	•	
<i>Chloroform</i>	•	•	
<i>Trichloroethene</i>	•	•	
2-Butanone (Methyl Ethyl Ketone)	•		
<i>1,1-Dichloroethane</i>	•		
<i>Carbon Disulfide</i>	•		
Cumene	•		
Cyclohexane	•		
<i>Naphthalene</i>	•		
Propylbenzene	•		
1,1-Dichloroethene		•	•
Carbon Tetrachloride		•	•
Chloromethane		•	•
1,2-Dichloropropane		•	
1,4-Dichlorobenzene		•	
2-Propanol		•	
3-Chloropropene		•	
Methylene Chloride		•	
Styrene		•	
Vinyl Chloride		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-eight of the 65 indoor air analytes were ND in each of the samples. Thirty-six of the ND indoor air analytes had reporting limits that met the respective screening levels. Two of these 38 ND analytes (EDB and HCB) had reporting limits that exceeded screening levels and are discussed further below. The 36 ND analytes with adequate reporting limits were eliminated from further evaluation. There were 27 analytes detected in indoor air. None of the detected values for indoor air exceed applicable screening levels (ethanol and 2-propanol do not have screening levels available). Fourteen analytes were detected in the one outdoor air sample.

Table 1025-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table

below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1025-3. Vapor Intrusion Evaluation for Building 1025**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	17%	0.2	26000	<0.17
2-Butanone (Methyl Ethyl Ketone)	0%	<2.3 - <2.5	22000	<2.3
4-Ethyltoluene	17%	2.8	N/A	<0.78
Acetone	100%	37 - 260	26000	5.7
Cumene	0%	<0.76 - <0.84	13	<0.78
Cyclohexane	0%	<0.53 - <0.59	26000	<0.54
Ethylbenzene	100%	1 - 1.5	440	0.47
Heptane	83%	0.67 - 0.9	15000	0.74
Hexane	17%	0.82	3100	0.7
Propylbenzene	0%	<0.76 - <0.84	88	<0.78
Tetrachloroethene (PCE)	100%	5.7 - 6.9	180	2.1
Toluene	100%	0.88 - 2.8	22000	1
Total Xylenes	100%	2.52 - 9.9	440	0.89
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	0%	<0.12 - <0.14	2200	<0.13
1,2,4-Trimethylbenzene	17%	4.9	960	<0.78
1,3,5-Trimethylbenzene	17%	2.3	960	<0.78
Benzene	100%	0.51 - 0.79	16	0.58
Carbon Disulfide	0%	<2.4 - <2.7	3100	<2.5
CFC-11	100%	1 - 1.2	250000	0.98
CFC-12	100%	5.2 - 7.7	220000	2
Chloroform	100%	0.49 - 3.2	57	<0.15
Ethanol	100%	42 - 88	N/A	1.8
Naphthalene	0%	<0.41 - <0.45	11	0.41
Trichloroethene (TCE)	17%	0.96	8.8	<0.17

N/A = No screening level available

< = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 14 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Five of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. The results for ethylbenzene, PCE, total xylenes, and CFC-12 were slightly higher in indoor air but still similar to the outdoor air result. Acetone was detected in all six samples at concentrations that ranged from 37 - 260  $\mu\text{g}/\text{m}^3$ . Acetone was detected in outdoor air at 5.7  $\mu\text{g}/\text{m}^3$ . The maximum detected result of 260  $\mu\text{g}/\text{m}^3$  was an order of magnitude higher than the other five indoor air results, and the result was E-flagged. The results indicate that there is the potential for indoor sources to be contributing to the presence of acetone. All of the results for acetone were at least two orders of magnitude below the screening level.

While ethanol does not have a screening level, it was detected in three of the six sub-slab soil gas samples at low levels ranging from 10 - 24  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all six of the indoor air samples at concentrations ranging from 42 - 88  $\mu\text{g}/\text{m}^3$ . Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, cleaners, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceed the indoor air screening levels and for EDB, two of six ND sub-slab soil gas reporting limits exceed the soil gas screening level. HCB was eliminated from further VI evaluation since all sub-slab soil gas ND reporting limits met the screening level. Also, the ND indoor air reporting limits for HCB (8.3 - 9.2  $\mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, for EDB, the ND indoor air reporting limits (0.24 - 0.26  $\mu\text{g}/\text{m}^3$ ) only very slightly exceed the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ) and four of the six ND sub-slab soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently met screening levels for these two analytes. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation for Building 1025.

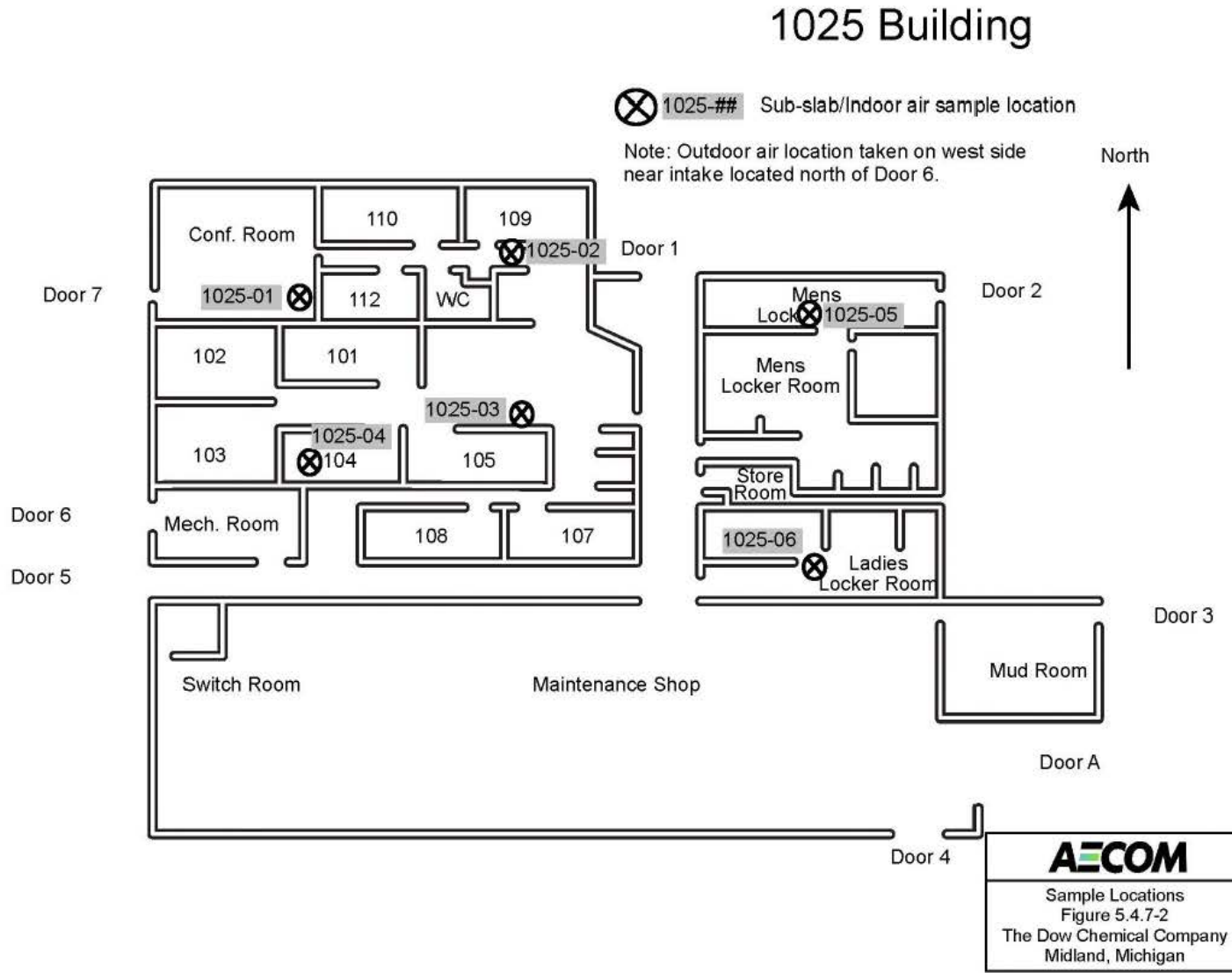
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1025 is an insignificant exposure pathway based on current use. Building 1025 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.7-1. Building 1025 Location**



Figure 5.4.7-2. Building 1025 Sample Locations



**Table 5.4.7-1. Building 1025 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1025	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	6	100%	722	1368	21	3500	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1025	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	5.1	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	1025	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	4.1	97	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	1025	SS	1,1-Dichloroethane	75-34-3	UG/M3	6	50%	21.9	20.1	7.4	54	4.7	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	1025	SS	1,1-Dichloroethene	75-35-4	UG/M3	6	0%	-	-	-	-	3	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	1025	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	22	530	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	1025	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	50%	18.9	15.1	6.2	18	12	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1025	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	5.7	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	33%
Category 2	1025	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	4.5	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	1025	SS	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	3	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	1025	SS	1,2-Dichloropropane	78-87-5	UG/M3	6	0%	-	-	-	-	3.4	82	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	1025	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	33%	15.2	17.2	4	5.4	5.7	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1025	SS	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	1.6	39	No Screening Value Available	-	-	-
Category 2	1025	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	4.5	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	1025	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	4.5	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	1025	SS	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	11	260	No Screening Value Available	-	-	-
Category 2	1025	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	0%	-	-	-	-	3.5	83	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1025	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	50%	71.0	72.9	13	200	30	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1025	SS	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	12	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	1025	SS	2-Propanol	67-63-0	UG/M3	6	0%	-	-	-	-	7.3	170	No Screening Value Available	-	-	-
Category 2	1025	SS	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	9.3	220	No Screening Value Available	-	-	-
Category 2	1025	SS	4-Ethyltoluene	622-96-8	UG/M3	6	17%	33.6	62.8	160	160	3.7	58	No Screening Value Available	-	-	-
Category 2	1025	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	6	0%	-	-	-	-	3	73	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	1025	SS	Acetone	67-64-1	UG/M3	6	83%	131	69	70	240	280	280	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	1025	SS	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	3.8	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	1025	SS	Benzene	71-43-2	UG/M3	6	67%	19.5	6.6	9.7	24	38	57	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	1025	SS	Bromochloromethane	74-97-5	UG/M3	5	0%	-	-	-	-	16	250	No Screening Value Available	-	-	-
Category 2	1025	SS	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	5	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	1025	SS	Bromoform	75-25-2	UG/M3	6	0%	-	-	-	-	7.7	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	1025	SS	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	29	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	1025	SS	Carbon Disulfide	75-15-0	UG/M3	6	67%	43.2	41.2	9.4	39	150	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1025	SS	Carbon Tetrachloride	56-23-5	UG/M3	6	0%	-	-	-	-	4.7	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	1025	SS	CFC-11	75-69-4	UG/M3	6	50%	20.8	17.5	10	16	6.5	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	1025	SS	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	5.7	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1025	SS	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	5.2	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1025	SS	CFC-12	75-71-8	UG/M3	6	67%	40.1	31.4	6.9	99	59	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	1025	SS	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	3.4	82	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1025	SS	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	7.9	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	1025	SS	Chloroform	67-66-3	UG/M3	6	50%	18.5	15.8	4.7	20	3.8	87	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	1025	SS	Chloromethane	74-87-3	UG/M3	6	0%	-	-	-	-	15	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	1025	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	0%	-	-	-	-	3	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	1025	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	3.4	81	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1025	SS	Cumene	98-82-8	UG/M3	6	50%	73.2	123.4	9.6	310	3.7	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	1025	SS	Cyclohexane	110-82-7	UG/M3	6	83%	39.3	45.7	9.2	130	41	41	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1025	SS	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	6.3	150	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	1025	SS	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	21	510	No Screening Value Available	-	-	-
Category 2	1025	SS	Ethanol	64-17-5	UG/M3	6	50%	28.3	22.3	10	24	19	130	No Screening Value Available	-	-	-
Category 2	1025	SS	Ethylbenzene	100-41-4	UG/M3	6	100%	2631	4376	21	11000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	1025	SS	Heptane	142-82-5	UG/M3	6	83%	42.9	38.1	12	110	49	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1025	SS	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	32	760	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	1025	SS	Hexane	110-54-3	UG/M3	6	100%	87.2	91.7	24	260	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1025	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	100%	8770	13898	53	35000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1025	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	11	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	1025	SS	Methylene Chloride	75-09-2	UG/M3	6	0%	-	-	-	-	26	410	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	1025	SS	Naphthalene	91-20-3	UG/M3	6	17%	48.0	70.3	22	22	7.8	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	1025	SS	o-Xylene	95-47-6	UG/M3	6	100%	2960	4742	14	12000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1025	SS	Propylbenzene	103-65-1	UG/M3	6	33%	24.5	38.3	8.3	100	3.7	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.7-1. Building 1025 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1025	SS	Styrene	100-42-5	UG/M3	6	0%	-	-	-	-	3.2	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	1025	SS	Tetrachloroethene	127-18-4	UG/M3	6	100%	1987	2328	340	6600	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	1025	SS	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.2	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	1025	SS	Toluene	108-88-3	UG/M3	6	100%	140	154	35	450	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1025	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	6.8	162	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1025	SS	Total Xylenes	1330-20-7	UG/M3	6	100%	11730	18639	67	47000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1025	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	0%	-	-	-	-	3	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1025	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	3.4	81	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1025	SS	Trichloroethene	79-01-6	UG/M3	6	17%	16.5	19.0	7.3	7.3	4.2	96	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	1025	SS	Vinyl Chloride	75-01-4	UG/M3	6	0%	-	-	-	-	1.9	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.7-2. Building 1025 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1025	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	6	17%	0.108	0.045	0.2	0.2	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1025	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	0.21	0.24	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	1025	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	1025	IA	1,1-Dichloroethane	75-34-3	UG/M3	6	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	1025	IA	1,1-Dichloroethene	75-35-4	UG/M3	6	100%	0.343	0.102	0.28	0.55	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	1025	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	5.8	6.4	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1025	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	17%	1.15	1.84	4.9	4.9	0.76	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1025	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	0.24	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	1025	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	0.93	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	1025	IA	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	1025	IA	1,2-Dichloropropane	78-87-5	UG/M3	6	17%	0.683	0.743	2.2	2.2	0.72	0.79	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1025	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	17%	0.720	0.774	2.3	2.3	0.76	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1025	IA	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	0.34	0.38	No Screening Value Available	-	-	-
Category 2	1025	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	0.93	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1025	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	6	17%	0.119	0.050	0.22	0.22	0.19	0.21	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	1025	IA	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	0.56	0.62	No Screening Value Available	-	-	-
Category 2	1025	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	0%	-	-	-	-	3.6	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1025	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	0%	-	-	-	-	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1025	IA	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	3.2	3.5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	1025	IA	2-Propanol	67-63-0	UG/M3	6	100%	3.52	0.90	2.2	4.6	-	-	No Screening Value Available	-	-	-
Category 2	1025	IA	3-Chloropropene	107-05-1	UG/M3	6	17%	1.55	0.66	2.9	2.9	2.4	2.7	No Screening Value Available	-	-	-
Category 2	1025	IA	4-Ethyltoluene	622-96-8	UG/M3	6	17%	0.803	0.978	2.8	2.8	0.76	0.84	No Screening Value Available	-	-	-
Category 2	1025	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	6	0%	-	-	-	-	0.63	0.7	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1025	IA	Acetone	67-64-1	UG/M3	6	100%	80.7	88.2	37	260	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1025	IA	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	0.8	0.89	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	1025	IA	Benzene	71-43-2	UG/M3	6	100%	0.608	0.101	0.51	0.79	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	1025	IA	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	1025	IA	Bromofom	75-25-2	UG/M3	6	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	1025	IA	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	3	3.3	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	1025	IA	Carbon Disulfide	75-15-0	UG/M3	6	0%	-	-	-	-	2.4	2.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1025	IA	Carbon Tetrachloride	56-23-5	UG/M3	6	100%	0.415	0.018	0.39	0.44	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	1025	IA	CFC-11	75-69-4	UG/M3	6	100%	1.10	0.06	1	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	1025	IA	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1025	IA	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1025	IA	CFC-12	75-71-8	UG/M3	6	100%	6.48	0.97	5.2	7.7	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	1025	IA	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	0.71	0.79	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1025	IA	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	0.2	0.23	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	1025	IA	Chloroform	67-66-3	UG/M3	6	100%	0.972	1.092	0.49	3.2	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	1025	IA	Chloromethane	74-87-3	UG/M3	6	100%	1.42	0.39	1.2	2.2	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	1025	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1025	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	0.7	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1025	IA	Cumene	98-82-8	UG/M3	6	0%	-	-	-	-	0.76	0.84	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1025	IA	Cyclohexane	110-82-7	UG/M3	6	0%	-	-	-	-	0.53	0.59	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1025	IA	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	1.3	1.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	1025	IA	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	5.5	6.1	No Screening Value Available	-	-	-
Category 2	1025	IA	Ethanol	64-17-5	UG/M3	6	100%	68.7	17.4	42	88	-	-	No Screening Value Available	-	-	-
Category 2	1025	IA	Ethylbenzene	100-41-4	UG/M3	6	100%	1.13	0.20	1	1.5	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1025	IA	Heptane	142-82-5	UG/M3	6	83%	0.693	0.198	0.67	0.9	0.64	0.64	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1025	IA	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	8.3	9.2	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	1025	IA	Hexane	110-54-3	UG/M3	6	17%	0.380	0.216	0.82	0.82	0.55	0.61	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1025	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	100%	2.95	2.09	1.9	7.2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1025	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	0.56	0.62	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1025	IA	Methylene Chloride	75-09-2	UG/M3	6	50%	0.908	0.369	1.1	1.4	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	1025	IA	Naphthalene	91-20-3	UG/M3	6	0%	-	-	-	-	0.41	0.45	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	1025	IA	o-Xylene	95-47-6	UG/M3	6	100%	1.03	0.82	0.62	2.7	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1025	IA	Propylbenzene	103-65-1	UG/M3	6	0%	-	-	-	-	0.76	0.84	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	1025	IA	Styrene	100-42-5	UG/M3	6	17%	0.412	0.152	0.72	0.72	0.66	0.73	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%



**Table 5.4.7-2. Building 1025 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1025	IA	Tetrachloroethene	127-18-4	UG/M3	6	100%	6.23	0.41	5.7	6.9	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	1025	IA	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	1025	IA	Toluene	108-88-3	UG/M3	6	100%	1.42	0.73	0.88	2.8	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1025	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	1.4	1.56	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1025	IA	Total Xylenes	1330-20-7	UG/M3	6	100%	3.98	2.91	2.52	9.9	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1025	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	0%	-	-	-	-	0.61	0.68	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1025	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	0.7	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1025	IA	Trichloroethene	79-01-6	UG/M3	6	17%	0.233	0.356	0.96	0.96	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	1025	IA	Vinyl Chloride	75-01-4	UG/M3	6	100%	0.0520	0.0035	0.049	0.058	-	-	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1025	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	1025	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	1025	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	1025	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	1025	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	100%	-	-	0.097	0.097	-	-	-	-	-	-
Category 2	1025	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 2	1025	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1025	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 2	1025	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.95	0.95	-	-	-	-
Category 2	1025	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	1025	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 2	1025	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1025	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.35	0.35	-	-	-	-
Category 2	1025	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.95	0.95	-	-	-	-
Category 2	1025	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 2	1025	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 2	1025	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.7	3.7	-	-	-	-
Category 2	1025	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	1025	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	1025	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	1.9	1.9	-	-	-	-
Category 2	1025	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	1025	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1025	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.65	0.65	-	-	-	-
Category 2	1025	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	5.7	5.7	-	-	-	-	-	-
Category 2	1025	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	1025	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.58	0.58	-	-	-	-	-	-
Category 2	1025	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	1025	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	1025	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 2	1025	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	1025	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.4	0.4	-	-	-	-	-	-
Category 2	1025	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	0.98	0.98	-	-	-	-	-	-
Category 2	1025	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	1025	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	1025	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2	2	-	-	-	-	-	-
Category 2	1025	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 2	1025	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 2	1025	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.15	0.15	-	-	-	-
Category 2	1025	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1	1	-	-	-	-	-	-
Category 2	1025	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 2	1025	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	1025	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1025	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.54	0.54	-	-	-	-
Category 2	1025	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	1025	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 2	1025	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	1.8	1.8	-	-	-	-	-	-
Category 2	1025	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.47	0.47	-	-	-	-	-	-
Category 2	1025	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	0.74	0.74	-	-	-	-	-	-

Table 5.4.7-2. Building 1025 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1025	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.4	8.4	-	-	-	-
Category 2	1025	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	0.7	0.7	-	-	-	-	-	-
Category 2	1025	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.66	0.66	-	-	-	-	-	-
Category 2	1025	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 2	1025	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	1025	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.41	0.41	-	-	-	-
Category 2	1025	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.23	0.23	-	-	-	-	-	-
Category 2	1025	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1025	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	1025	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	-	-	2.1	2.1	-	-	-	-	-	-
Category 2	1025	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	1025	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	1	1	-	-	-	-	-	-
Category 2	1025	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.44	1.44	-	-	-	-
Category 2	1025	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	0.89	0.89	-	-	-	-	-	-
Category 2	1025	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.63	0.63	-	-	-	-
Category 2	1025	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	1025	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	1025	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.04	0.04	-	-	-	-

## 5.4.8 Vapor Intrusion Evaluation for Building 1028

### BACKGROUND

Building 1028 is a Category 1 building in Zone 2. It is a medium-sized single story office building with a laboratory. It is known as the Sulfonamide Control Room (see Figure 5.4.8-1) and is located within the central portion of the facility designated as Zone 2. The building is approximately 5,250 ft<sup>2</sup> (488 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 16, 2017 and the results can be found in Appendix C. The building has central air conditioning with two units and the air intake is located at the southeast corner of the building. This building does not have any bay doors. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, penetrating oil lubricant and spray enamel and spray paint. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 13, 2017, sub-slab soil gas samples were collected from four locations within the building. Indoor air samples were collected on April 12, 2017 at four locations, corresponding to the sub-slab soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.8-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1028 are presented on Table 5.4.8-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.8-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 39 of the 65 target analytes were ND in each of the four samples collected at Building 1028. All of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, the 39 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 26 analytes were detected in one or more of the four sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into two categories:

- Sixteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Ten were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1028-1. Of the 10 analytes detected above *de minimus* levels but below screening levels, six had detection frequencies of 100% (1,1,1-trichloroethane, acetone, chloroform, PCE, toluene, and total xylenes). Only analytes present in the sub-slab soil gas at concentrations above the nonresidential screening levels are AOIs for VI; therefore, there are no AOIs in sub-slab soil gas at Building 1028.

**Table 1028-1. Summary of Sub-Slab Soil Gas Detects for Building 1028**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	7.6 - 590	0%	3500000
2-Propanol	25%	300	N/A	N/A
Acetone	100%	27 - 160	0%	3400000
Chloroform	100%	7.2 - 260	0%	7600
Cyclohexane	50%	10 - 500	0%	3500000
Heptane	50%	18 - 100	0%	2000000
Hexane	75%	5.3 - 190	0%	410000
Tetrachloroethene (PCE)	100%	13 - 760	0%	23000
Toluene	100%	5.7 - 150	0%	2900000
Total Xylenes	100%	7.7 - 203	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	75%	4.2 - 34	0%	290000
1,2,4-Trimethylbenzene	50%	8.7 - 18	0%	130000
1,3,5-Trimethylbenzene	25%	7.1	0%	130000
2-Butanone (Methyl Ethyl Ketone)	25%	15	0%	2900000
4-Ethyltoluene	50%	7.4 - 14	N/A	N/A
Benzene	75%	7.1 - 80	0%	2200
Carbon Disulfide	25%	82	0%	410000
Carbon Tetrachloride	50%	5.4 - 10	0%	3000
CFC-11	75%	7.3 - 31	0%	33000000
CFC-12	100%	5.4 - 45	0%	29000000
Cumene	25%	11	0%	1700
Ethanol	100%	12 - 19	N/A	N/A
Ethylbenzene	100%	4.4 - 30	0%	59000
Propylbenzene	25%	6.5	0%	12000
Styrene	25%	4.6	0%	32000
Trichloroethene (TCE)	25%	5.6	0%	1200

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, four indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1028-2 below shows the analytes detected in each of the three media sampled.

**Table 1028-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
<i>Benzene</i>	•	•	•
<i>Carbon Tetrachloride</i>	•	•	•
<i>CFC-11</i>	•	•	•
<i>CFC-12</i>	•	•	•
Chloroform	•	•	•
<i>Ethanol</i>	•	•	•
Toluene	•	•	•
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
2-Propanol	•	•	
<i>Ethylbenzene</i>	•	•	
Heptane	•	•	
Hexane	•	•	
Total Xylenes	•	•	
1,1,1-Trichloroethane	•		
<i>1,1-Dichloroethane</i>	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,3,5-Trimethylbenzene</i>	•		
<i>4-Ethyltoluene</i>	•		
<i>Carbon Disulfide</i>	•		
<i>Cumene</i>	•		
Cyclohexane	•		
<i>Propylbenzene</i>	•		
<i>Styrene</i>	•		
Tetrachloroethene	•		
<i>Trichloroethene</i>	•		
Chloromethane		•	•
Naphthalene			•

• = Detected  
 = Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Fifty of the 65 indoor air analytes were ND in each of the samples and 48 of the ND analytes had reporting limits that met the respective screening levels. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. The 48 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. There were 15 analytes detected in indoor air (2-propanol, 4-ethyltoluene, and ethanol do not have screening levels available). Ten analytes were detected in the one outdoor air sample.

Table 1028-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1028-3. Vapor Intrusion Evaluation for Building 1028**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in sub-slab soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<0.17 - <0.18	26000	<0.18
2-Propanol	100%	6.5 - 14	N/A	<2
Acetone	100%	12 - 76	26000	5.2
Chloroform	100%	0.24 - 0.48	57	0.23
Cyclohexane	0%	<0.55 - <0.58	26000	<0.55
Heptane	25%	0.77	15000	<0.66
Hexane	25%	0.73	3100	<0.57
Tetrachloroethene	0%	<0.22 - <0.23	180	<0.22
Toluene	100%	0.79 - 0.86	22000	0.71
Total Xylenes	100%	0.39 - 0.68	440	<0.42
<b>Detected in sub-slab soil gas below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	0%	<0.13 - <0.14	2200	<0.13
1,2,4-Trimethylbenzene	0%	<0.78 - <0.82	960	<0.79
1,3,5-Trimethylbenzene	0%	<0.78 - <0.82	960	<0.79
2-Butanone (Methyl Ethyl Ketone)	25%	4.2	22000	<2.4
4-Ethyltoluene	0%	<0.78 - <0.82	N/A	<0.79
Benzene	100%	0.37 - 0.39	16	0.4
Carbon Disulfide	0%	<2.5 - <2.6	3100	<2.5
Carbon Tetrachloride	100%	0.36 - 0.39	23	0.39
CFC-11	100%	0.95 - 1.1	250000	0.99
CFC-12	100%	3.9 - 4.4	220000	2
Cumene	0%	<0.78 - <0.82	13	<0.79
Ethanol	100%	8.2 - 25	N/A	3.1
Ethylbenzene	75%	0.15 - 0.17	440	0.14
Propylbenzene	0%	<0.78 - <0.82	88	<0.79
Styrene	0%	<0.68 - <0.72	240	<0.68
Trichloroethene	0%	<0.17 - <0.18	8.8	<0.17

N/A = No screening value available  
 < = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were nine analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Seven of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. Two of the analytes had indoor air results that were higher in concentration than that detected in outdoor air, indicating that there is a potential for indoor sources.

Acetone was detected in all four samples at results ranging from 12 - 76  $\mu\text{g}/\text{m}^3$  and in outdoor air at 5.2  $\mu\text{g}/\text{m}^3$ . Results that were an order of magnitude higher indicate that there is the potential for indoor sources to be contributing to the presence of acetone. All of the results for acetone were at least three orders of magnitude below the screening level. Acetone is present in common consumer products,

including cleaning products, particle board, adhesives, and paint remover. Furthermore, the chemical inventory from the building identified a number of materials likely to contain acetone, including cleaners.

While ethanol does not have a screening level, it was detected in all four sub-slab soil gas samples at low levels ranging from 12 - 19  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all four of the indoor air samples at concentrations ranging from 8.2 - 25  $\mu\text{g}/\text{m}^3$ . Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: disinfectant wipes, bathroom cleaner, hand cleaners, body wash, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceeded the indoor air screening levels and one of the nine ND sub-slab soil gas reporting limits for EDB exceeded the soil gas screening level. The ND indoor air reporting limits for HCB ( $<8.5 - 9 \mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ) and all of the ND reporting limits in sub-slab soil gas met the soil gas screening level. Similarly, the ND indoor air reporting limits for EDB ( $0.24 - 0.26 \mu\text{g}/\text{m}^3$ ) only very slightly exceeded the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ) and all of the sub-slab soil gas samples had ND reporting limits that met the soil gas screening level. Therefore, the indoor air ND reporting limit exceedances for EDB and HCB and the ND reporting limit exceedance of EDB in sub-slab soil gas were eliminated from further evaluation.

## CONCLUSIONS AND RECOMMENDATIONS

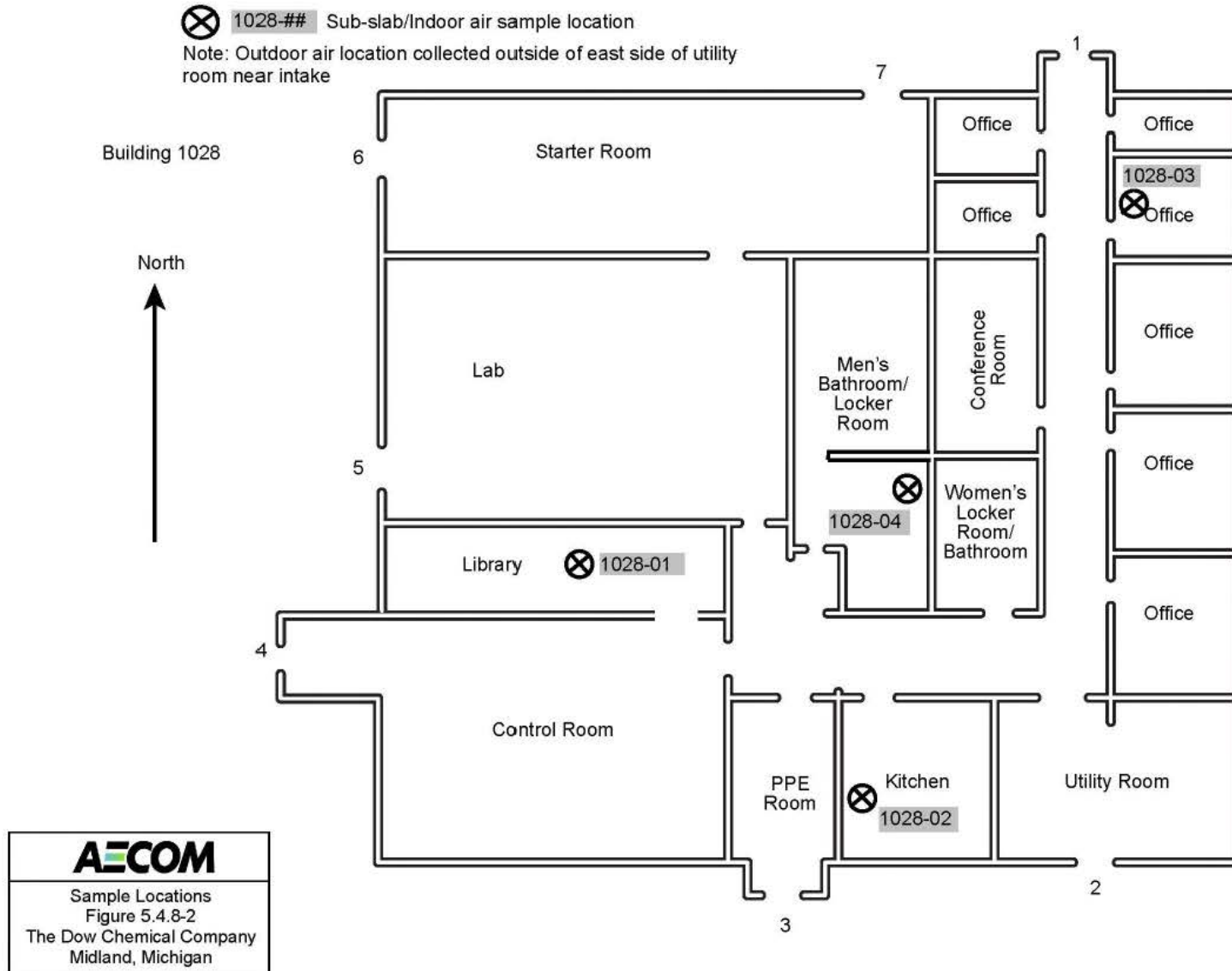
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1028 is an insignificant exposure pathway based on current use. Building 1028 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.8-1. Building 1028 Location**





**Figure 5.4.8-2. Building 1028 Sample Locations**



**Table 5.4.8-1. Building 1028 Sub-Slab Soil Gas Summary Results**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Level	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
1028	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	4	100%	223	270	7.6	590	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
1028	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.2	7.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
1028	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	4.1	5.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
1028	SS	1,1-Dichloroethane	75-34-3	UG/M3	4	75%	17.2	16.6	4.2	34	3.4	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
1028	SS	1,1-Dichloroethene	75-35-4	UG/M3	4	0%	-	-	-	-	3	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
1028	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	22	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
1028	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	50%	7.79	7.47	8.7	18	3.7	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
1028	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	5.8	8.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
1028	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	4.5	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
1028	SS	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	3	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
1028	SS	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	3.5	4.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
1028	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	25%	3.40	2.49	7.1	7.1	3.7	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
1028	SS	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	1.7	2.3	No Screening Value Available	-	-	-
1028	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	4.5	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
1028	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	4.5	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
1028	SS	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	11	15	No Screening Value Available	-	-	-
1028	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.5	4.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
1028	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	25%	7.61	4.97	15	15	8.9	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
1028	SS	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	12	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
1028	SS	2-Propanol	67-63-0	UG/M3	4	25%	78.2	147.9	300	300	7.4	10	No Screening Value Available	-	-	-
1028	SS	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	9.4	13	No Screening Value Available	-	-	-
1028	SS	4-Ethyltoluene	622-96-8	UG/M3	4	50%	6.46	5.59	7.4	14	3.7	5.2	No Screening Value Available	-	-	-
1028	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.1	4.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
1028	SS	Acetone	67-64-1	UG/M3	4	100%	82.3	64.3	27	160	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
1028	SS	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	3.9	5.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
1028	SS	Benzene	71-43-2	UG/M3	4	75%	25.6	36.7	7.1	80	2.4	2.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
1028	SS	Bromochloromethane	74-97-5	UG/M3	4	0%	-	-	-	-	16	22	No Screening Value Available	-	-	-
1028	SS	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5	7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
1028	SS	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	7.8	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
1028	SS	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	29	41	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
1028	SS	Carbon Disulfide	75-15-0	UG/M3	4	25%	24.6	38.3	82	82	9.4	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
1028	SS	Carbon Tetrachloride	56-23-5	UG/M3	4	50%	5.28	3.39	5.4	10	4.8	6.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
1028	SS	CFC-11	75-69-4	UG/M3	4	75%	12.2	12.8	7.3	31	4.2	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
1028	SS	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	5.8	8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
1028	SS	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	5.3	7.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100000	0%	0%
1028	SS	CFC-12	75-71-8	UG/M3	4	100%	17.0	18.8	5.4	45	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
1028	SS	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	3.5	4.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
1028	SS	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	8	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
1028	SS	Chloroform	67-66-3	UG/M3	4	100%	88.6	115.6	7.2	260	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
1028	SS	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	16	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
1028	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	0%	-	-	-	-	3	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
1028	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.4	4.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
1028	SS	Cumene	98-82-8	UG/M3	4	25%	4.38	4.43	11	11	3.7	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
1028	SS	Cyclohexane	110-82-7	UG/M3	4	50%	128	248	10	500	2.6	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
1028	SS	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	6.4	8.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
1028	SS	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	21	30	No Screening Value Available	-	-	-
1028	SS	Ethanol	64-17-5	UG/M3	4	100%	16.5	3.1	12	19	-	-	No Screening Value Available	-	-	-
1028	SS	Ethylbenzene	100-41-4	UG/M3	4	100%	12.0	12.2	4.4	30	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
1028	SS	Heptane	142-82-5	UG/M3	4	50%	30.4	47.0	18	100	3.1	4.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
1028	SS	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	32	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
1028	SS	Hexane	110-54-3	UG/M3	4	75%	56.2	90.0	5.3	190	2.7	2.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
1028	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	40.4	53.4	5.4	120	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
1028	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	11	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
1028	SS	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	26	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
1028	SS	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	7.9	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
1028	SS	o-Xylene	95-47-6	UG/M3	4	75%	25.4	38.5	6.4	83	4.6	4.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
1028	SS	Propylbenzene	103-65-1	UG/M3	4	25%	3.25	2.19	6.5	6.5	3.7	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.8-1. Building 1028 Sub-Slab Soil Gas Summary Results (Continued)**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Level	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
1028	SS	Styrene	100-42-5	UG/M3	4	25%	2.45	1.44	4.6	4.6	3.2	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
1028	SS	Tetrachloroethene	127-18-4	UG/M3	4	100%	284	335	13	760	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
1028	SS	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.2	3.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
1028	SS	Toluene	108-88-3	UG/M3	4	100%	51.7	66.3	5.7	150	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
1028	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	6.8	9.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
1028	SS	Total Xylenes	1330-20-7	UG/M3	4	100%	65.8	91.9	7.7	203	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
1028	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	3	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
1028	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.4	4.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
1028	SS	Trichloroethene	79-01-6	UG/M3	4	25%	3.04	1.71	5.6	5.6	4	4.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
1028	SS	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	1.9	2.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.8-2. Building 1028 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Level	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1028	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	4	0%	-	-	-	-	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1028	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	1028	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	1028	IA	1,1-Dichloroethane	75-34-3	UG/M3	4	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1028	IA	1,1-Dichloroethene	75-35-4	UG/M3	4	0%	-	-	-	-	0.063	0.067	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1028	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	5.9	6.2	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1028	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	0%	-	-	-	-	0.78	0.82	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1028	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	0.24	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1028	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	0.96	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1028	IA	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	1028	IA	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	0.73	0.78	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1028	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	0.78	0.82	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1028	IA	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	0.35	0.37	No Screening Value Available	-	-	-
Category 1	1028	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	0.96	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1028	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	0.19	0.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1028	IA	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	0.57	0.6	No Screening Value Available	-	-	-
Category 1	1028	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.7	3.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1028	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	25%	1.96	1.49	4.2	4.2	2.4	2.5	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1028	IA	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1028	IA	2-Propanol	67-63-0	UG/M3	4	100%	9.13	3.34	6.5	14	-	-	No Screening Value Available	-	-	-
Category 1	1028	IA	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	2.5	2.6	No Screening Value Available	-	-	-
Category 1	1028	IA	4-Ethyltoluene	622-96-8	UG/M3	4	0%	-	-	-	-	0.78	0.82	No Screening Value Available	-	-	-
Category 1	1028	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	0.65	0.69	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1028	IA	Acetone	67-64-1	UG/M3	4	100%	31.8	29.8	12	76	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1028	IA	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	0.82	0.87	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	1028	IA	Benzene	71-43-2	UG/M3	4	100%	0.378	0.010	0.37	0.39	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1028	IA	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	1.1	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	1028	IA	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	1.6	1.7	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1028	IA	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	3.1	3.3	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	1028	IA	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	2.5	2.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1028	IA	Carbon Tetrachloride	56-23-5	UG/M3	4	100%	0.380	0.014	0.36	0.39	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1028	IA	CFC-11	75-69-4	UG/M3	4	100%	1.01	0.06	0.95	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1028	IA	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1028	IA	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1028	IA	CFC-12	75-71-8	UG/M3	4	100%	4.03	0.25	3.9	4.4	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1028	IA	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	0.73	0.77	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1028	IA	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	0.21	0.22	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1028	IA	Chloroform	67-66-3	UG/M3	4	100%	0.325	0.114	0.24	0.48	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1028	IA	Chloromethane	74-87-3	UG/M3	4	100%	1.01	0.10	0.92	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1028	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	0%	-	-	-	-	0.13	0.13	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1028	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	0.72	0.76	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1028	IA	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	0.78	0.82	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1028	IA	Cyclohexane	110-82-7	UG/M3	4	0%	-	-	-	-	0.55	0.58	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1028	IA	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	1.4	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	1028	IA	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	5.6	6	No Screening Value Available	-	-	-
Category 1	1028	IA	Ethanol	64-17-5	UG/M3	4	100%	15.8	7.1	8.2	25	-	-	No Screening Value Available	-	-	-
Category 1	1028	IA	Ethylbenzene	100-41-4	UG/M3	4	75%	0.138	0.046	0.15	0.17	0.14	0.14	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1028	IA	Heptane	142-82-5	UG/M3	4	25%	0.444	0.218	0.77	0.77	0.66	0.69	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1028	IA	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	8.5	9	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1028	IA	Hexane	110-54-3	UG/M3	4	25%	0.399	0.221	0.73	0.73	0.57	0.59	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1028	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	0.418	0.074	0.32	0.48	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1028	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	0.57	0.6	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1028	IA	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1028	IA	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	0.42	0.44	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	1028	IA	o-Xylene	95-47-6	UG/M3	4	75%	0.155	0.059	0.16	0.2	0.14	0.14	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1028	IA	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	0.78	0.82	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	1028	IA	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	0.68	0.72	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.4.8-2. Building 1028 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Level	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1028	IA	Tetrachloroethene	127-18-4	UG/M3	4	0%	-	-	-	-	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1028	IA	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1028	IA	Toluene	108-88-3	UG/M3	4	100%	0.830	0.036	0.79	0.86	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1028	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	1.44	1.52	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1028	IA	Total Xylenes	1330-20-7	UG/M3	4	100%	0.573	0.133	0.39	0.68	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1028	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	0.63	0.67	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1028	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	0.72	0.76	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1028	IA	Trichloroethene	79-01-6	UG/M3	4	0%	-	-	-	-	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1028	IA	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	0.041	0.043	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1028	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1028	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	1028	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1028	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1028	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.064	0.064	-	-	-	-
Category 1	1028	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 1	1028	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 1	1028	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 1	1028	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.97	0.97	-	-	-	-
Category 1	1028	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1028	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1028	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 1	1028	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 1	1028	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.97	0.97	-	-	-	-
Category 1	1028	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 1	1028	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 1	1028	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 1	1028	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1028	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 1	1028	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 1	1028	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 1	1028	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 1	1028	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 1	1028	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	5.2	5.2	-	-	-	-	-	-
Category 1	1028	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.83	0.83	-	-	-	-
Category 1	1028	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.4	0.4	-	-	-	-	-	-
Category 1	1028	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	1028	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 1	1028	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1028	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 1	1028	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.39	0.39	-	-	-	-	-	-
Category 1	1028	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	0.99	0.99	-	-	-	-	-	-
Category 1	1028	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	1028	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	1028	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2	2	-	-	-	-	-	-
Category 1	1028	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1028	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 1	1028	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.23	0.23	-	-	-	-	-	-
Category 1	1028	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1	1	-	-	-	-	-	-
Category 1	1028	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1028	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 1	1028	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 1	1028	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.55	0.55	-	-	-	-
Category 1	1028	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 1	1028	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.7	5.7	-	-	-	-
Category 1	1028	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	3.1	3.1	-	-	-	-	-	-
Category 1	1028	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	1028	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-

**Table 5.4.8-2. Building 1028 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Level	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1028	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.6	8.6	-	-	-	-
Category 1	1028	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 1	1028	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.28	0.28	-	-	-	-
Category 1	1028	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 1	1028	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	1028	OA	Naphthalene	91-20-3	UG/M3	1	100%	-	-	0.82	0.82	-	-	-	-	-	-
Category 1	1028	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	1028	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 1	1028	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 1	1028	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	1028	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1028	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.71	0.71	-	-	-	-	-	-
Category 1	1028	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.46	1.46	-	-	-	-
Category 1	1028	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.42	0.42	-	-	-	-
Category 1	1028	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.64	0.64	-	-	-	-
Category 1	1028	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 1	1028	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 1	1028	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.041	0.041	-	-	-	-

## 5.4.9 Vapor Intrusion Evaluation for Building 1233

### BACKGROUND

Building 1233 is a Category 1 building in Zone 2. This building includes office space, shop, laboratory, and process area. It is known as Garlon Plant Granular (see Figure 5.4.9-1) and is located within the central portion of the facility designated as Zone 2. The office building is a single story and is approximately 5450 ft<sup>2</sup> (506 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 7, 2017 and the results can be found in Appendix C. The building has a central air conditioning unit with one air intake. The office building does not have any bay doors. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, gas duster, insecticides, and spray paint. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On May 1, 2017, sub-slab soil gas samples were collected from four locations within the building. Indoor air samples were collected on May 2, 2017 at four locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.9-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1233 are presented on Table 5.4.9-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.9-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 35 of the 65 target analytes were ND in each of the 4 samples collected at Building 1233. All but one of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, 34 of the ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. One ND analyte (EDB) had at least one reporting limit exceed the respective screening level and will be further evaluated below. A total of 30 analytes were detected in one or more of the four sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into three categories:

- Nine were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Seventeen were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- Four analytes were detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 1233-1. Of the 17 analytes detected above *de minimus* levels but below screening levels, 8 had detection frequencies of 100% (1,1,1-trichloroethane, CFC-11, CFC-12, chloroform, hexane, PCE, toluene, and total xylenes). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, AOIs for soil gas at Building 1233 include TCE, HCB, 1,2-dichloroethane and 1,2-dichloropropane.

**Table 1233-1. Summary of Sub-Slab Soil Gas Detects for Building 1233**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
1,2-Dichloroethane	100%	6.6 - 1000	25%	700
1,2-Dichloropropane	75%	32 - 2600	25%	2300
Hexachlorobutadiene (HCB)	75%	250 - 5200	50%	830
Trichloroethene (TCE)	100%	8.2 - 16000	50%	1200
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	60 - 2500	0%	3500000
1,1,2-Trichloroethane	50%	300 - 470	0%	1100
1,1-Dichloroethane	75%	46 - 180	0%	290000
1,1-Dichloroethene	50%	34 - 100	0%	120000
2,2,4-Trimethylpentane	50%	30 - 310	0%	2000000
Acetone	50%	61 - 170	0%	3400000
Carbon Disulfide	50%	17 - 170	0%	410000
Carbon Tetrachloride	75%	25 - 100	0%	3000
CFC-11	100%	140 - 350	0%	33000000
CFC-12	100%	45 - 6000	0%	29000000
Chloroform	100%	78 - 480	0%	7600
Ethylbenzene	50%	47 - 160	0%	59000
Hexane	100%	22 - 120	0%	410000
Tetrachloroethene (PCE)	100%	580 - 7100	0%	23000
Toluene	100%	63 - 1500	0%	2900000
Total Xylenes	100%	62 - 827	0%	58000
trans-1,2-Dichloroethene	50%	260 - 330	0%	41000
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	75%	4.3 - 58	0%	130000
1,3,5-Trimethylbenzene	25%	43	0%	130000
Benzene	75%	13 - 46	0%	2200
CFC-113	25%	15	0%	11000000
Chlorobenzene	25%	59	0%	41000
cis-1,2-Dichloroethene	50%	77 - 87	0%	4100
Cyclohexane	50%	16 - 58	0%	3500000
Ethanol	50%	8.8 - 27	N/A	N/A
Heptane	50%	24 - 77	0%	2000000

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, four indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1233-2 below shows the analytes detected in each of the three media sampled.



**Table 1233-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
1,1-Dichloroethene	•	•	•
Acetone	•	•	•
Carbon Tetrachloride	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
Chloroform	•	•	•
<i>Ethanol</i>	•	•	•
Toluene	•	•	•
Trichloroethene	X	•	
1,1,1-Trichloroethane	•	•	
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>Benzene</i>	•	•	
<i>Cyclohexane</i>	•	•	
Ethylbenzene	•	•	
<i>Heptane</i>	•	•	
Hexane	•	•	
Tetrachloroethene	•	•	
Total Xylenes	•	•	
1,2-Dichloroethane	X		
1,2-Dichloropropane	X		
1,1,2-Trichloroethane	•		
1,1-Dichloroethane	•		
<i>1,3,5-Trimethylbenzene</i>	•		
2,2,4-Trimethylpentane	•		
Carbon Disulfide	•		
<i>CFC-113</i>	•		
<i>Chlorobenzene</i>	•		
<i>cis-1,2-Dichloroethene</i>	•		
Hexachlorobutadiene	X		
trans-1,2-Dichloroethene	•		
2-Butanone (Methyl Ethyl Ketone)		•	•
Chloromethane		•	•
2-Propanol		•	
4-Ethyltoluene		•	
4-Methyl-2-pentanone		•	
Methylene Chloride		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty-one of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 39 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-four analytes were detected in the indoor air in Building 1233 and there were no detected concentrations that exceeded screening levels (ethanol did not have screening levels available). Ten analytes were detected in the outdoor air sample.

Table 1233-3 summarizes the indoor air results relative to the sub-slab soil gas detects since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1233-3. Vapor Intrusion Evaluation for Building 1233**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
1,2-Dichloroethane	0%	<0.13 - <0.2	5.3	<0.13
1,2-Dichloropropane	0%	<0.76 - 1.1	18	<0.77
Hexachlorobutadiene	0%	<8.7 - <13	6.2	<8.8
Trichloroethene	25%	0.22	8.8	<0.45
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	0.32 - 0.64	26000	<0.18
1,1,2-Trichloroethane	0%	<0.18 - <0.26	8.5	<0.18
1,1-Dichloroethane	0%	<0.13 - <0.2	2200	<0.13
1,1-Dichloroethene	75%	0.12 - 0.14	880	0.14
2,2,4-Trimethylpentane	0%	<3.8 - <5.7	15000	<3.9
Acetone	100%	16 - 67	26000	21
Carbon Disulfide	0%	<2.6 - <3.8	3100	<2.6
Carbon Tetrachloride	100%	0.57 - 0.6	23	0.6
CFC-11	75%	1.2 - 1.5	250000	1.2
CFC-12	100%	4.2 - 5.9	220000	2.2
Chloroform	100%	0.67 - 0.77	57	0.34
Ethylbenzene	100%	0.21 - 1.4	440	<0.14
Hexane	25%	4.6	3100	<0.58
Tetrachloroethene	50%	0.22 - 0.24	180	<0.22
Toluene	100%	0.48 - 9.3	22000	0.23
Total Xylenes	100%	0.88 - 7.8	440	<0.43
trans-1,2-Dichloroethene	0%	<0.65 - <0.96	310	<0.66
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	25%	1.2	960	<0.82
1,3,5-Trimethylbenzene	0%	<0.81 - <1.2	960	<0.82
Benzene	75%	0.59 - 1.5	16	<0.53
CFC-113	0%	<1.2 - <1.9	85000	<1.3
Chlorobenzene	0%	<0.76 - <1.1	310	<0.76
cis-1,2-Dichloroethene	0%	<0.13 - <0.19	31	<0.13
Cyclohexane	25%	0.62	26000	<0.57
Ethanol	100%	100 - 160	N/A	17
Heptane	50%	0.66 - 2.5	15000	<0.68

N/A = No screening level available

< = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were ten analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Five of the analytes had indoor air results that were very similar to concentrations detected in outdoor air (1,1-dichloroethene, carbon tetrachloride, CFC-11, CFC-12, and chloroform). Three of the analytes had indoor air results that were higher in concentration than that detected in outdoor air, indicating that there is a potential for indoor sources (acetone, toluene, and ethanol).

Toluene was detected at  $0.23 \mu\text{g}/\text{m}^3$  in the outdoor air sample and detected in all four indoor air samples at concentrations ranging from  $0.48 - 9.3 \mu\text{g}/\text{m}^3$ . Three of the detections were in the same order of magnitude as the outdoor air sample result ( $0.48 - 0.59 \mu\text{g}/\text{m}^3$ ). The maximum detection was an order of magnitude higher and was collected in the laundry room next door to the laboratory. The indoor air detections of toluene were at least four orders of magnitude below the screening level.

Acetone was detected in one of the outdoor air samples ( $21 \mu\text{g}/\text{m}^3$ ) and detected at similar concentrations in all four of the indoor air samples (detected results range from  $16 - 67 \mu\text{g}/\text{m}^3$ ). Common cleaning items and chemicals utilized in a laboratory contribute as indoor sources for acetone. However, it is important to point out that all of the results for acetone were well below screening levels.

While ethanol does not have a screening level, it was detected in two of four sub-slab soil gas samples at low levels ranging from  $8.8 - 27 \mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from  $100 - 160 \mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Scrubbing Bubbles, oven cleaner, Clorox disinfecting wipes, etc.

The ND indoor air results for EDB and HCB had all reporting limits exceeded the respective screening level. HCB has already been identified as an AOI for Building 1233 due to exceedances of the sub-slab soil gas screening level; however, HCB was not detected in indoor air and the ND indoor air reporting limits ( $8.7 - 13 \mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ). EDB was ND in all media sampled; however, two of four ND reporting limits in sub-slab soil gas samples exceeded the screening level ( $30 \mu\text{g}/\text{m}^3$ ). The indoor air reporting limits ( $0.25 - 0.37 \mu\text{g}/\text{m}^3$ ) only slightly exceeded the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). However, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB and HCB, further investigation will be conducted for these analytes once the facility-wide priority buildings have been sampled and evaluated.

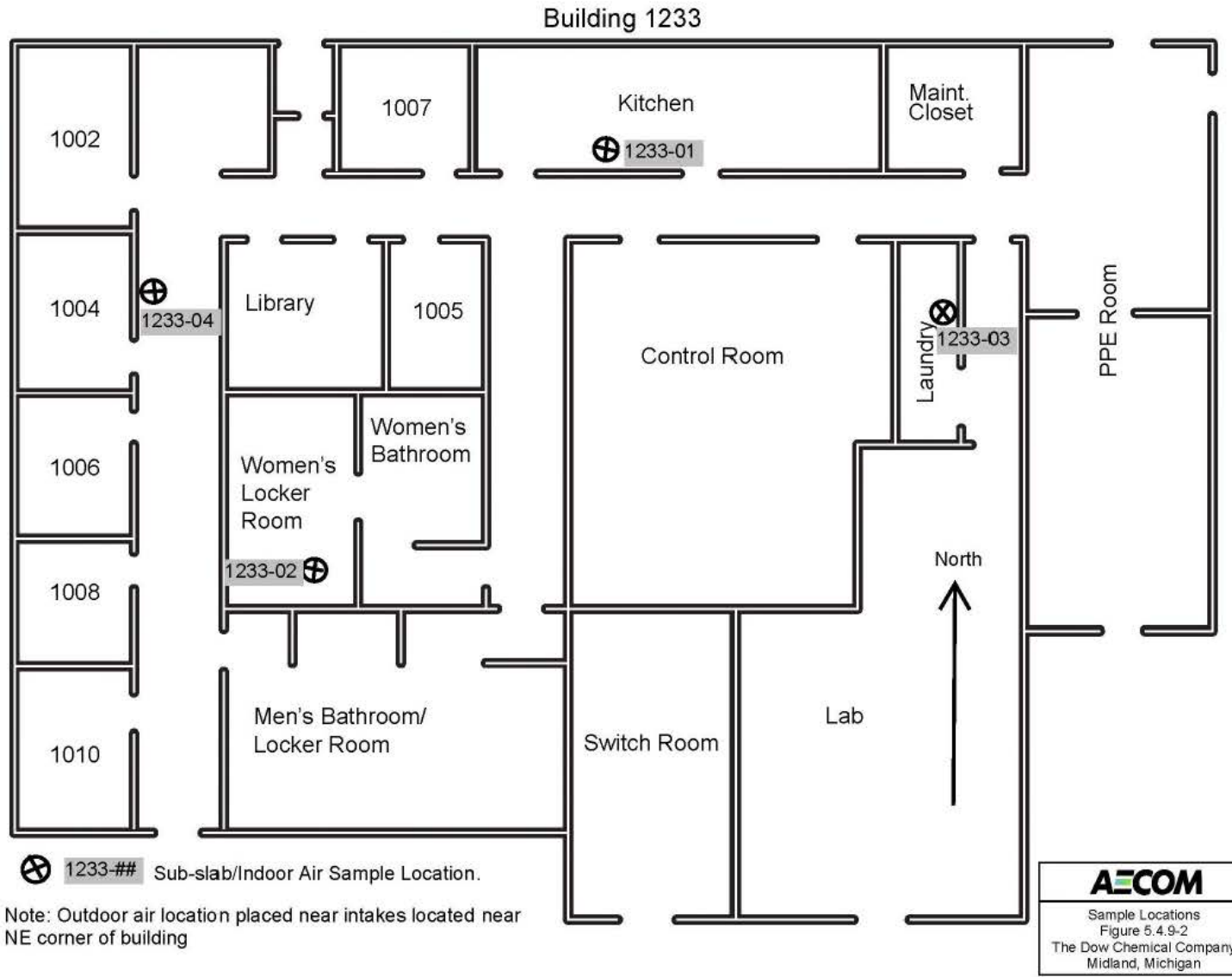
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 1233 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results for 1,2-dichloroethane, 1,2-dichloropropane, HCB, and TCE and given the potential for future VI, Building 1233 was placed in VI Path Forward Building Group 2 (see Figure 5-3) and additional sampling is recommended. Additionally, 1,2-dichloroethane, 1,2-dichloropropane, HCB, and TCE will be added to Industrial Hygiene monitoring for the building.

**Figure 5.4.9-1. Building 1233 Location**



Figure 5.4.9-2. Building 1233 Sample Locations



**Table 5.4.9-1. Building 1233 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1233	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	4	100%	775	1155	60	2500	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1233	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.8	78	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	1233	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	4	50%	194	231	300	470	4.6	8.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	1233	SS	1,1-Dichloroethane	75-34-3	UG/M3	4	75%	81.9	76.8	46	180	3.4	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1233	SS	1,1-Dichloroethene	75-35-4	UG/M3	4	50%	34.7	46.0	34	100	3.4	6.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1233	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	25	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1233	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	75%	24.6	24.6	4.3	58	56	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1233	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	6.5	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	50%
Category 1	1233	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	5.1	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1233	SS	1,2-Dichloroethane	107-06-2	UG/M3	4	100%	352	468	6.6	1000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	25%	0%
Category 1	1233	SS	1,2-Dichloropropane	78-87-5	UG/M3	4	75%	958	1228	32	2600	3.9	3.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	25%	0%
Category 1	1233	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	25%	19.3	19.7	43	43	4.2	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1233	SS	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	1.9	25	No Screening Value Available	-	-	-
Category 1	1233	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	5.1	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	1233	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	5.1	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	1233	SS	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	12	160	No Screening Value Available	-	-	-
Category 1	1233	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	50%	92.1	145.8	30	310	4	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1233	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	0%	-	-	-	-	10	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1233	SS	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	14	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1233	SS	2-Propanol	67-63-0	UG/M3	4	0%	-	-	-	-	8.4	110	No Screening Value Available	-	-	-
Category 1	1233	SS	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	11	140	No Screening Value Available	-	-	-
Category 1	1233	SS	4-Ethyltoluene	622-96-8	UG/M3	4	0%	-	-	-	-	4.2	56	No Screening Value Available	-	-	-
Category 1	1233	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.5	47	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1233	SS	Acetone	67-64-1	UG/M3	4	50%	109	52	61	170	140	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1233	SS	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	4.4	59	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	1233	SS	Benzene	71-43-2	UG/M3	4	75%	26.9	18.3	13	46	19	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	1233	SS	Bromochloromethane	74-97-5	UG/M3	4	0%	-	-	-	-	18	240	No Screening Value Available	-	-	-
Category 1	1233	SS	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5.7	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	1233	SS	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	8.8	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1233	SS	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	33	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	1233	SS	Carbon Disulfide	75-15-0	UG/M3	4	50%	73.6	67.9	17	170	75	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1233	SS	Carbon Tetrachloride	56-23-5	UG/M3	4	75%	56.3	33.5	25	100	72	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	1233	SS	CFC-11	75-69-4	UG/M3	4	100%	233	109	140	350	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	1233	SS	CFC-113	76-13-1	UG/M3	4	25%	21.2	16.9	15	15	6.5	87	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1233	SS	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	5.9	80	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1233	SS	CFC-12	75-71-8	UG/M3	4	100%	1739	2848	45	6000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	1233	SS	Chlorobenzene	108-90-7	UG/M3	4	25%	19.7	26.7	59	59	3.9	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1233	SS	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	9	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	1233	SS	Chloroform	67-66-3	UG/M3	4	100%	292	213	78	480	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1233	SS	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	18	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1233	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	50%	42.2	46.1	77	87	3.4	6.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1233	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.8	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1233	SS	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	4.2	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	1233	SS	Cyclohexane	110-82-7	UG/M3	4	50%	26.0	21.7	16	58	21	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1233	SS	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	7.2	97	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	1233	SS	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	24	320	No Screening Value Available	-	-	-
Category 1	1233	SS	Ethanol	64-17-5	UG/M3	4	50%	25.3	14.1	8.8	27	45	86	No Screening Value Available	-	-	-
Category 1	1233	SS	Ethylbenzene	100-41-4	UG/M3	4	50%	61.1	67.4	47	160	26	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1233	SS	Heptane	142-82-5	UG/M3	4	50%	34.1	29.1	24	77	24	47	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1233	SS	Hexachlorobutadiene	87-68-3	UG/M3	4	75%	1821	2386	250	5200	69	69	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	50%	0%
Category 1	1233	SS	Hexane	110-54-3	UG/M3	4	100%	64.3	43.8	22	120	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1233	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	249	354	48	780	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1233	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	12	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1233	SS	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	30	400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1233	SS	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	8.9	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	1233	SS	o-Xylene	95-47-6	UG/M3	4	50%	24.8	15.8	14	47	26	50	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1233	SS	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	4.2	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.9-1. Building 1233 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1233	SS	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	3.6	48	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1233	SS	Tetrachloroethene	127-18-4	UG/M3	4	100%	3300	3201	580	7100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1233	SS	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.5	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1233	SS	Toluene	108-88-3	UG/M3	4	100%	546	669	63	1500	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1233	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	7.6	104	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1233	SS	Total Xylenes	1330-20-7	UG/M3	4	100%	274	369	62	827	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1233	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	50%	149	171	260	330	3.4	6.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1233	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.8	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1233	SS	Trichloroethene	79-01-6	UG/M3	4	100%	6173	7693	8.2	16000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	50%	0%
Category 1	1233	SS	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	2.2	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.9-2. Building 1233 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1233	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	4	100%	0.430	0.143	0.32	0.64	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1233	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	0.22	0.33	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	1233	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	0.18	0.26	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	1233	IA	1,1-Dichloroethane	75-34-3	UG/M3	4	0%	-	-	-	-	0.13	0.2	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1233	IA	1,1-Dichloroethene	75-35-4	UG/M3	4	75%	0.107	0.040	0.12	0.14	0.096	0.096	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1233	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	6.1	9	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1233	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	25%	0.653	0.376	1.2	1.2	0.81	1.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1233	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	0.25	0.37	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1233	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	0.99	1.5	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1233	IA	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	0.13	0.2	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	1233	IA	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	0.76	1.1	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1233	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	0.81	1.2	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1233	IA	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	0.36	0.54	No Screening Value Available	-	-	-
Category 1	1233	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	0.99	1.5	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1233	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	0.2	0.29	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1233	IA	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	0.59	0.88	No Screening Value Available	-	-	-
Category 1	1233	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.8	5.7	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1233	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	75%	3.68	2.18	2.7	6.2	2.4	2.4	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1233	IA	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	3.4	5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1233	IA	2-Propanol	67-63-0	UG/M3	4	100%	8.43	2.13	5.5	10	-	-	No Screening Value Available	-	-	-
Category 1	1233	IA	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	2.6	3.8	No Screening Value Available	-	-	-
Category 1	1233	IA	4-Ethyltoluene	622-96-8	UG/M3	4	25%	0.628	0.328	1.1	1.1	0.81	1.2	No Screening Value Available	-	-	-
Category 1	1233	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	4	25%	0.509	0.246	0.86	0.86	0.67	1	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1233	IA	Acetone	67-64-1	UG/M3	4	100%	33.3	24.0	16	67	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1233	IA	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	0.85	1.2	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	1233	IA	Benzene	71-43-2	UG/M3	4	75%	0.770	0.496	0.59	1.5	0.78	0.78	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1233	IA	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	1.1	1.6	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	1233	IA	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	1.7	2.5	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1233	IA	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	3.2	4.7	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	1233	IA	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	2.6	3.8	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1233	IA	Carbon Tetrachloride	56-23-5	UG/M3	4	100%	0.585	0.013	0.57	0.6	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1233	IA	CFC-11	75-69-4	UG/M3	4	75%	1.15	0.33	1.2	1.5	1.4	1.4	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1233	IA	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	1.2	1.9	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1233	IA	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	0.23	0.34	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1233	IA	CFC-12	75-71-8	UG/M3	4	100%	5.18	0.75	4.2	5.9	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1233	IA	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	0.76	1.1	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1233	IA	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	0.22	0.32	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1233	IA	Chloroform	67-66-3	UG/M3	4	100%	0.710	0.042	0.67	0.77	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1233	IA	Chloromethane	74-87-3	UG/M3	4	100%	1.00	0.00	1	1	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1233	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	0%	-	-	-	-	0.13	0.19	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1233	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	0.74	1.1	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1233	IA	Cumene	98-82-8	UG/M3	4	0%	-	-	-	-	0.81	1.2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1233	IA	Cyclohexane	110-82-7	UG/M3	4	25%	0.401	0.160	0.62	0.62	0.56	0.84	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1233	IA	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	1.4	2.1	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	1233	IA	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	5.8	8.6	No Screening Value Available	-	-	-
Category 1	1233	IA	Ethanol	64-17-5	UG/M3	4	100%	125	30	100	160	-	-	No Screening Value Available	-	-	-
Category 1	1233	IA	Ethylbenzene	100-41-4	UG/M3	4	100%	0.768	0.621	0.21	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1233	IA	Heptane	142-82-5	UG/M3	4	50%	0.999	1.010	0.66	2.5	0.67	1	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1233	IA	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	8.7	13	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1233	IA	Hexane	110-54-3	UG/M3	4	25%	1.40	2.13	4.6	4.6	0.58	0.86	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1233	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	3.03	2.73	0.68	6.2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1233	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	0.59	0.88	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1233	IA	Methylene Chloride	75-09-2	UG/M3	4	75%	1.41	0.62	1.2	2.3	1.7	1.7	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1233	IA	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	0.43	0.64	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	1233	IA	o-Xylene	95-47-6	UG/M3	4	100%	0.883	0.772	0.2	1.6	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1233	IA	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	0.81	1.2	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	1233	IA	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	0.7	1	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%



**Table 5.4.9-2. Building 1233 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1233	IA	Tetrachloroethene	127-18-4	UG/M3	4	50%	0.184	0.059	0.22	0.24	0.22	0.33	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1233	IA	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.4	3.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1233	IA	Toluene	108-88-3	UG/M3	4	100%	2.73	4.38	0.48	9.3	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1233	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	1.48	2.2	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1233	IA	Total Xylenes	1330-20-7	UG/M3	4	100%	3.91	3.48	0.88	7.8	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1233	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	0.65	0.96	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1233	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	0.74	1.1	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1233	IA	Trichloroethene	79-01-6	UG/M3	4	25%	0.133	0.061	0.22	0.22	0.18	0.26	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1233	IA	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	0.042	0.062	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1233	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1233	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	1233	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1233	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1233	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	100%	-	-	0.14	0.14	-	-	-	-	-	-
Category 1	1233	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 1	1233	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 1	1233	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 1	1233	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 1	1233	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1233	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 1	1233	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 1	1233	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.37	0.37	-	-	-	-
Category 1	1233	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 1	1233	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 1	1233	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 1	1233	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 1	1233	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	-	-	5.2	5.2	-	-	-	-	-	-
Category 1	1233	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 1	1233	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 1	1233	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	1233	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 1	1233	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 1	1233	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	21	21	-	-	-	-	-	-
Category 1	1233	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.86	0.86	-	-	-	-
Category 1	1233	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	0.53	0.53	-	-	-	-
Category 1	1233	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 1	1233	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 1	1233	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 1	1233	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 1	1233	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.6	0.6	-	-	-	-	-	-
Category 1	1233	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 1	1233	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 1	1233	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	1233	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 1	1233	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 1	1233	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	1233	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.34	0.34	-	-	-	-	-	-
Category 1	1233	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	0.99	0.99	-	-	-	-	-	-
Category 1	1233	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1233	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 1	1233	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 1	1233	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 1	1233	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 1	1233	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 1	1233	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	17	17	-	-	-	-	-	-
Category 1	1233	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	1233	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-

**Table 5.4.9-2. Building 1233 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1233	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.8	8.8	-	-	-	-
Category 1	1233	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 1	1233	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.29	0.29	-	-	-	-
Category 1	1233	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 1	1233	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	1233	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-
Category 1	1233	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	1233	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 1	1233	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.71	0.71	-	-	-	-
Category 1	1233	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 1	1233	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1233	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.23	0.23	-	-	-	-	-	-
Category 1	1233	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 1	1233	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 1	1233	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 1	1233	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 1	1233	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.45	0.45	-	-	-	-
Category 1	1233	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.042	0.042	-	-	-	-

## 5.4.10 Vapor Intrusion Evaluation for Building 1

### BACKGROUND

Building 1 is a Category 1 building in Zone 2. It is a large building that includes office space, process area, warehouse, shop, and one control room. It is known as the Agrosociences Office, Production Plant, and Warehouse (see Figure 5.4.10-1) and is located within the central portion of the facility designated as Zone 2. The building is multiple stories and is approximately 13,100 ft<sup>2</sup> (1,217 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 14, 2017 and the results can be found in Appendix C. The building has central air conditioning with multiple air intakes located on the north side of the building. There are five bay doors located in the process and warehouse areas of the building, which is separated from the administrative area of the building. The bay doors are open mainly during shipments or the summer. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified degreasers, cleaners, spray paints, and a penetrating catalyst. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 27, 2017, sub-slab soil gas samples were collected from nine locations within the building. Indoor air samples were collected on April 28, 2017 at nine locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.10-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1 are presented on Table 5.4.10-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.10-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 42 of the 65 target analytes were ND in each of the nine samples collected at Building 1 and each of these analytes had reporting limits below the respective screening level. Therefore, all 42 ND soil gas analytes were eliminated from further VI evaluation. A total of 23 analytes were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, five chlorinated VOCs, eight petroleum hydrocarbons, and several common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Sixteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Seven analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1-1. Of the seven analytes detected above *de minimus* levels but below screening levels, six had detection frequencies of 100% (acetone, heptane, hexane, PCE, toluene, and total xylenes). Only analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, since all detections in sub-slab soil gas were below screening levels, there were no AOIs identified at Building 1.

**Table 1-1. Summary of Sub-Slab Soil Gas Detects for Building 1**

Analyte	Detection Frequency	Measured Range of Detects (µg/m <sup>3</sup> )	% Detections > Screening Level	Screening Level (µg/m <sup>3</sup> )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
Acetone	100%	120 - 420	0%	3400000
Chloroform	89%	7.1 - 100	0%	7600
Heptane	100%	25 - 130	0%	2000000
Hexane	100%	50 - 210	0%	410000
Tetrachloroethene	100%	89 - 760	0%	23000
Toluene	100%	45 - 190	0%	2900000
Total Xylenes	100%	23.5 - 110	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	100%	13 - 83	0%	3500000
1,2,4-Trimethylbenzene	100%	4.8 - 19	0%	130000
1,2-Dichloroethane	11%	3.6	0%	700
1,3,5-Trimethylbenzene	56%	4.5 - 11	0%	130000
2-Butanone (Methyl Ethyl Ketone)	100%	14 - 64	0%	2900000
2-Propanol	44%	8.3 - 9.5	N/A	N/A
4-Ethyltoluene	78%	4.7 - 12	N/A	N/A
Benzene	100%	12 - 45	0%	2200
Carbon Tetrachloride	33%	5.8 - 7.7	0%	3000
CFC-11	100%	7.8 - 43	0%	33000000
CFC-12	100%	7.4 - 79	0%	29000000
Cyclohexane	100%	15 - 67	0%	3500000
Ethanol	78%	9.8 - 64	N/A	N/A
Ethylbenzene	100%	9.6 - 47	0%	59000
Propylbenzene	22%	4.5 - 5.8	0%	12000
Trichloroethene	67%	4.4 - 37	0%	1200

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g. storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and were analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1-2 below shows the detected analytes in each of the three media sampled.

**Table 1-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>Acetone</i>	•	•	•
Carbon Tetrachloride	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
Ethanol	•	•	•
<i>Toluene</i>	•	•	•
1,1,1-Trichloroethane	•	•	
1,2,4-Trimethylbenzene	•	•	
2-Butanone (Methyl Ethyl Ketone)	•	•	
2-Propanol	•	•	
4-Ethyltoluene	•	•	
Benzene	•	•	
<i>Chloroform</i>	•	•	
Cyclohexane	•	•	
Ethylbenzene	•	•	
<i>Heptane</i>	•	•	
<i>Hexane</i>	•	•	
<i>Total Xylenes</i>	•	•	
Trichloroethene	•	•	
1,2-Dichloroethane	•		
1,3,5-Trimethylbenzene	•		
Propylbenzene	•		
<i>Tetrachloroethene</i>	•		
4-Methyl-2-pentanone		•	
Carbon Disulfide		•	
Chloromethane		•	•
Methylene Chloride		•	•

• = Detected  
 = Non-detect

*Italics = de minimus detections in sub-slab soil gas*

Forty-two of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had reporting limits above the respective screening level (EDB and HCB) and are discussed further in the VI evaluation below. Those 40 ND indoor air analytes with reporting limits that met screening levels were eliminated from further VI evaluation. The 23 detected indoor air analytes were all detected at concentrations less than their respective screening levels and were eliminated from further evaluation (2-propanol, 4-ethyltoluene, and ethanol do not have screening levels available). One outdoor air sample was collected immediately upwind of the building and eight analytes were detected.

Table 1-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1-3. Vapor Intrusion Evaluation for Building 1**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
Acetone	100%	13 - 71	26000	12
Chloroform	100%	0.2 - 0.98	57	<0.15
Heptane	44%	0.72 - 2.7	15000	<0.62
Hexane	100%	2.3 - 26	3100	<0.53
Tetrachloroethene	0%	<0.22 - <0.23	180	<0.2
Toluene	100%	9.7 - 86	22000	3.9
Total Xylenes	33%	3.7 - 9.8	440	<0.39
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	11%	0.39	26000	<0.16
1,2,4-Trimethylbenzene	11%	2.1	960	<0.74
1,2-Dichloroethane	0%	<0.13 - <0.14	5.3	<0.12
1,3,5-Trimethylbenzene	0%	<0.79 - <0.85	960	<0.74
2-Butanone (Methyl Ethyl Ketone)	89%	3 - 10	22000	<2.2
2-Propanol	33%	2.2 - 25	N/A	<1.8
4-Ethyltoluene	11%	2	N/A	<0.74
Benzene	11%	2.1	16	<0.48
Carbon Tetrachloride	100%	0.57 - 0.59	23	0.57
CFC-11	100%	1.2 - 1.4	250000	1.2
CFC-12	100%	2.1 - 2.2	220000	2.2
Cyclohexane	11%	1.2	26000	<0.52
Ethanol	100%	7.4 - 270	N/A	4
Ethylbenzene	22%	0.18 - 2	440	<0.13
Propylbenzene	0%	<0.79 - <0.85	88	<0.74
Trichloroethene	22%	0.36 - 0.7	8.8	<0.16

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were eight analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Three of the analytes had indoor air results that were very similar to concentrations detected in outdoor air (carbon tetrachloride, CFC-11, and CFC-12). Acetone was detected in all nine samples at concentrations that ranged from 13 - 71  $\mu\text{g}/\text{m}^3$ . Acetone was detected in outdoor air at 12  $\mu\text{g}/\text{m}^3$ . All of the indoor air sample results were within the same order of magnitude as the outdoor air result. The maximum detected result was in a sample collected in an office with printers, which may contribute to the presence of acetone. Additionally, within the building, there is a maintenance shop, a mechanical room and a laboratory. All of the results for acetone were at least three orders of magnitude below the screening level.

Toluene was detected in all nine samples at concentrations that ranged from 9.7 - 86  $\mu\text{g}/\text{m}^3$ . Toluene was detected in outdoor air at 3.9  $\mu\text{g}/\text{m}^3$ . All but one of the indoor air sample results were at least one order of magnitude higher than outdoor air, indicating there is the potential for indoor sources to be contributing to the presence of toluene, especially with a shop in the building. The two highest detected concentrations were from samples collected in the instrument shop and in the office directly connected to

the maintenance shop. All of the results for toluene were at least three orders of magnitude below the screening level.

While ethanol does not have a screening level, it was detected in seven of the nine sub-slab soil gas samples at low levels ranging from 9.8 - 64  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all nine of the indoor air samples at concentrations ranging from 7.4 - 270  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 4  $\mu\text{g}/\text{m}^3$ . Similar to acetone and toluene, the two highest detected concentrations of ethanol in indoor air were found in the office with the printers and the office immediately adjacent to the maintenance shop. Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: disinfectants, cleaners, etc.

All ND reporting limits for EDB and HCB in indoor air exceed the applicable screening level; however, neither of these analytes was detected in any media sampled and all of the sub-slab soil gas ND reporting limits were below screening levels. In addition, the indoor air reporting limits exceeded the screening levels by a low margin. For EDB, the indoor air reporting limits ranged from <0.24 - <0.27  $\mu\text{g}/\text{m}^3$  and the screening level is 0.23  $\mu\text{g}/\text{m}^3$ . The indoor air reporting limits for HCB ranged from <8.2 - <9.3  $\mu\text{g}/\text{m}^3$  compared to the screening level of 6.2  $\mu\text{g}/\text{m}^3$ . Therefore, EDB and HCB were eliminated from further evaluation.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1 is an insignificant exposure pathway based on current use. Building 1 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.20-1. Building 1 Location**







Table 5.4.10-1. Building 1 Sub-Slab Soil Gas Summary Results

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	100%	55.1	28.3	13	83	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.2	6.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 1	1	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.1	4.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	1	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	3.1	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	1	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	3	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	1	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	22	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	100%	9.43	4.59	4.8	19	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	5.8	6.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 1	1	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.6	5.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	1	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	11%	1.86	0.66	3.6	3.6	3.1	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	1	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.5	4.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	1	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	56%	4.89	3.28	4.5	11	3.8	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	1	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.7	2	No Screening Value Available	-	-	-
Category 1	1	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.6	5.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	1	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.6	5.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	1	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	11	13	No Screening Value Available	-	-	-
Category 1	1	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.6	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	100%	26.6	16.4	14	64	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	12	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	1	SS	2-Propanol	67-63-0	UG/M3	9	44%	6.13	2.54	8.3	9.5	7.5	8.8	No Screening Value Available	-	-	-
Category 1	1	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.5	11	No Screening Value Available	-	-	-
Category 1	1	SS	4-Ethyltoluene	622-96-8	UG/M3	9	78%	5.84	3.06	4.7	12	4	4.4	No Screening Value Available	-	-	-
Category 1	1	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1	SS	Acetone	67-64-1	UG/M3	9	100%	216	98	120	420	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	1	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	3.9	4.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	1	SS	Benzene	71-43-2	UG/M3	9	100%	21.9	11.8	12	45	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	1	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	16	19	No Screening Value Available	-	-	-
Category 1	1	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	5.1	6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	1	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	7.8	9.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	1	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	30	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	1	SS	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	9.5	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	33%	4.05	2.22	5.8	7.7	4.8	5.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	1	SS	CFC-11	75-69-4	UG/M3	9	100%	27.5	13.9	7.8	43	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	1	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	5.8	6.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.3	6.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	1	SS	CFC-12	75-71-8	UG/M3	9	100%	28.6	22.0	7.4	79	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	1	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.5	4.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	8	9.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	1	SS	Chloroform	67-66-3	UG/M3	9	89%	54.2	34.4	7.1	100	3.8	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	1	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	16	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	1	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	3	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	1	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.4	4.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1	SS	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	3.7	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	1	SS	Cyclohexane	110-82-7	UG/M3	9	100%	34.2	21.2	15	67	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	1	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.5	7.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	1	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	22	25	No Screening Value Available	-	-	-
Category 1	1	SS	Ethanol	64-17-5	UG/M3	9	78%	21.7	19.1	9.8	64	6.1	6.7	No Screening Value Available	-	-	-
Category 1	1	SS	Ethylbenzene	100-41-4	UG/M3	9	100%	18.4	12.2	9.6	47	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	1	SS	Heptane	142-82-5	UG/M3	9	100%	61.4	40.4	25	130	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	1	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	32	38	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 1	1	SS	Hexane	110-54-3	UG/M3	9	100%	102	64	50	210	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	1	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	33.2	21.9	18	85	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	1	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	26	31	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	1	SS	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	8	9.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	1	SS	o-Xylene	95-47-6	UG/M3	9	100%	10.2	6.4	5.5	25	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.4.10-1. Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1	SS	Propylbenzene	103-65-1	UG/M3	9	22%	2.73	1.41	4.5	5.8	3.7	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 1	1	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3.2	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	1	SS	Tetrachloroethene	127-18-4	UG/M3	9	100%	438	249	89	760	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 1	1	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.2	2.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	1	SS	Toluene	108-88-3	UG/M3	9	100%	82.4	46.8	45	190	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	1	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	6.8	8.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1	SS	Total Xylenes	1330-20-7	UG/M3	9	100%	43.4	28.2	23.5	110	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	1	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	1	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.4	4.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	1	SS	Trichloroethene	79-01-6	UG/M3	9	67%	12.9	13.1	4.4	37	4.1	4.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	1	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	1.9	2.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

Table 5.4.10-2. Building 1 Indoor Air and Outdoor Air Summary Results

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	11%	0.124	0.100	0.39	0.39	0.18	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	1	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.18	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	1	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	1	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	0.064	0.068	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	1	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	6	6.4	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	11%	0.599	0.563	2.1	2.1	0.79	0.85	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.25	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 1	1	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.97	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	1	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	1	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.74	0.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	1	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	0.79	0.85	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	1	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.36	0.38	No Screening Value Available	-	-	-
Category 1	1	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.97	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	0.19	0.21	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	1	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.58	0.62	No Screening Value Available	-	-	-
Category 1	1	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.8	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	89%	5.20	2.85	3	10	2.4	2.4	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	1	IA	2-Propanol	67-63-0	UG/M3	9	33%	5.48	8.81	2.2	25	2	2.1	No Screening Value Available	-	-	-
Category 1	1	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.5	2.7	No Screening Value Available	-	-	-
Category 1	1	IA	4-Ethyltoluene	622-96-8	UG/M3	9	11%	0.588	0.529	2	2	0.79	0.85	No Screening Value Available	-	-	-
Category 1	1	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	56%	0.584	0.246	0.69	1	0.68	0.69	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1	IA	Acetone	67-64-1	UG/M3	9	100%	29.8	18.4	13	71	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.83	0.9	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 1	1	IA	Benzene	71-43-2	UG/M3	9	11%	0.472	0.611	2.1	2.1	0.51	0.55	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	1	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 1	1	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.7	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	1	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3.1	3.4	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 1	1	IA	Carbon Disulfide	75-15-0	UG/M3	9	11%	1.68	1.13	4.7	4.7	2.5	2.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	0.577	0.009	0.57	0.59	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	1	IA	CFC-11	75-69-4	UG/M3	9	100%	1.27	0.07	1.2	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	1	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	1	IA	CFC-12	75-71-8	UG/M3	9	100%	2.12	0.04	2.1	2.2	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	1	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.74	0.8	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	1	IA	Chloroform	67-66-3	UG/M3	9	100%	0.536	0.238	0.2	0.98	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	1	IA	Chloromethane	74-87-3	UG/M3	9	100%	1.06	0.09	0.96	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	1	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.73	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.79	0.85	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	1	IA	Cyclohexane	110-82-7	UG/M3	9	11%	0.390	0.304	1.2	1.2	0.55	0.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	1	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.4	1.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 1	1	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.7	6.2	No Screening Value Available	-	-	-
Category 1	1	IA	Ethanol	64-17-5	UG/M3	9	100%	43.4	85.8	7.4	270	-	-	No Screening Value Available	-	-	-
Category 1	1	IA	Ethylbenzene	100-41-4	UG/M3	9	22%	0.298	0.639	0.18	2	0.14	0.15	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1	IA	Heptane	142-82-5	UG/M3	9	44%	0.750	0.763	0.72	2.7	0.66	0.7	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	1	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.6	9.2	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	1	IA	Hexane	110-54-3	UG/M3	9	100%	10.6	8.1	2.3	26	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	1	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	33%	0.983	2.370	0.3	7.3	0.28	0.3	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.58	0.62	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	1	IA	Methylene Chloride	75-09-2	UG/M3	9	100%	1.93	0.50	1.5	3.2	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	1	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	0.42	0.45	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	1	IA	o-Xylene	95-47-6	UG/M3	9	11%	0.342	0.809	2.5	2.5	0.14	0.15	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.79	0.85	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%

**Table 5.4.10-2. Building 1 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1	IA	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	0.68	0.74	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 1	1	IA	Tetrachloroethene	127-18-4	UG/M3	9	0%	-	-	-	-	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	1	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.4	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	1	IA	Toluene	108-88-3	UG/M3	9	100%	34.3	27.0	9.7	86	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	1	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.46	1.56	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1	IA	Total Xylenes	1330-20-7	UG/M3	9	33%	1.33	3.18	0.37	9.8	0.42	0.45	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	1	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.64	0.68	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	1	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.73	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	1	IA	Trichloroethene	79-01-6	UG/M3	9	22%	0.187	0.212	0.36	0.7	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 1	1	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	0.041	0.044	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	1	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 1	1	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 1	1	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 1	1	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 1	1	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	0.06	0.06	-	-	-	-
Category 1	1	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	5.6	5.6	-	-	-	-
Category 1	1	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 1	1	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.91	0.91	-	-	-	-
Category 1	1	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 1	1	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 1	1	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.33	0.33	-	-	-	-
Category 1	1	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.91	0.91	-	-	-	-
Category 1	1	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 1	1	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.54	0.54	-	-	-	-
Category 1	1	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 1	1	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 1	1	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.1	3.1	-	-	-	-
Category 1	1	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 1	1	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 1	1	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	12	12	-	-	-	-	-	-
Category 1	1	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 1	1	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	0.48	0.48	-	-	-	-
Category 1	1	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 1	1	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 1	1	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	2.9	2.9	-	-	-	-
Category 1	1	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 1	1	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.57	0.57	-	-	-	-	-	-
Category 1	1	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 1	1	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 1	1	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 1	1	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 1	1	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 1	1	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 1	1	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.15	0.15	-	-	-	-
Category 1	1	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1	1	-	-	-	-	-	-
Category 1	1	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 1	1	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 1	1	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.52	0.52	-	-	-	-
Category 1	1	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 1	1	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 1	1	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	4	4	-	-	-	-	-	-

**Table 5.4.10-2. Building 1 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	1	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 1	1	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8	8	-	-	-	-
Category 1	1	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.53	0.53	-	-	-	-
Category 1	1	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 1	1	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.54	0.54	-	-	-	-
Category 1	1	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 1	1	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.4	0.4	-	-	-	-
Category 1	1	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 1	1	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 1	1	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.64	0.64	-	-	-	-
Category 1	1	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 1	1	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 1	1	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	3.9	3.9	-	-	-	-	-	-
Category 1	1	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.36	1.36	-	-	-	-
Category 1	1	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.39	0.39	-	-	-	-
Category 1	1	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 1	1	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 1	1	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 1	1	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.038	0.038	-	-	-	-

## 5.4.11 Vapor Intrusion Evaluation for Building 477

### BACKGROUND

Building 477 is a Category 2 building in Zone 2. This building is primarily process area but includes office space and a shop. It is known as Garlon Process Area (see Figure 5.4.11-1) and is located within the central portion of the facility designated as Zone 2. The building has multiple stories with the small office space on the first floor. It is approximately 14,830 ft<sup>2</sup> (1,380 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 7, 2017 and the results can be found in Appendix C. The building has a HVAC unit with one air intake. The office building has two bay doors that may be left open in nice weather. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, cutting fluid, lubricant sprays, and spray paint. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On May 1, 2017, sub-slab soil gas samples were collected from four locations within the building. Indoor air samples were collected on May 2, 2017 at four locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.11-2. Summary statistics of the analytical results for sub-slab soil gas for Building 477 are presented on Table 5.4.11-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.11-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 42 of the 65 target analytes were ND in each of the four samples collected at Building 477. All of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, all 42 of the ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 23 analytes were detected in one or more of the four sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Eighteen were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Five were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 477-1. Of the five analytes detected above *de minimus* levels but below screening levels, three had detection frequencies of 100% (acetone, hexane, and PCE). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI; therefore, there are no AOIs in sub-slab soil gas at Building 477.

**Table 477-1. Summary of Sub-Slab Soil Gas Detects for Building 477**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
2-Propanol	25%	150	N/A	N/A
Acetone	100%	37 - 410	0%	3400000
Hexane	100%	5 - 140	0%	410000
Tetrachloroethene	100%	7.8 - 440	0%	23000
Total Xylenes	75%	5.5 - 194	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	75%	9.1 - 20	0%	3500000
1,1-Dichloroethane	25%	64	0%	290000
1,2,4-Trimethylbenzene	25%	9.3	0%	130000
1,3-Butadiene	25%	2.1	N/A	N/A
2-Butanone (Methyl Ethyl Ketone)	25%	11	0%	2900000
4-Ethyltoluene	25%	7.2	N/A	N/A
Benzene	75%	2.9 - 9.1	0%	2200
CFC-12	100%	4.2 - 7.3	0%	2900000
Chlorobenzene	25%	3.9	0%	41000
Chloroform	75%	7.4 - 20	0%	7600
cis-1,2-Dichloroethene	25%	18	0%	4100
Cumene	75%	4.5 - 5.1	0%	1700
Cyclohexane	50%	5.8 - 13	0%	3500000
Ethanol	50%	12 - 28	N/A	N/A
Ethylbenzene	50%	3.9 - 35	0%	59000
Heptane	75%	5.2 - 54	0%	2000000
Toluene	100%	5.8 - 84	0%	2900000
Trichloroethene	25%	85	0%	1200

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, four indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 477-2 below shows the analytes detected in each of the three media sampled.



**Table 477-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
<i>CFC-12</i>	•	•	•
<i>Ethanol</i>	•	•	•
<i>Toluene</i>	•	•	•
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
<i>4-Ethyltoluene</i>	•	•	
<i>Benzene</i>	•	•	
<i>Chloroform</i>	•	•	
<i>Cumene</i>	•	•	
<i>Cyclohexane</i>	•	•	
<i>Ethylbenzene</i>	•	•	
<i>Heptane</i>	•	•	
Hexane	•	•	
Tetrachloroethene (PCE)	•	•	
Total Xylenes	•	•	
<i>1,1,1-Trichloroethane</i>	•		
<i>1,1-Dichloroethane</i>	•		
<i>1,3-Butadiene</i>	•		
2-Propanol	•		
<i>Chlorobenzene</i>	•		
<i>cis-1,2-Dichloroethene</i>	•		
<i>Trichloroethene (TCE)</i>	•		
1,1-Dichloroethene		•	•
Carbon Tetrachloride		•	•
CFC-11		•	•
Chloromethane		•	•
Methylene Chloride		•	•
1,2-Dichloroethane		•	
1,3,5-Trimethylbenzene		•	
1,4-Dichlorobenzene		•	
2,2,4-Trimethylpentane		•	
4-Methyl-2-pentanone		•	
Naphthalene		•	
Propylbenzene		•	
Styrene		•	

• = Detected  
 = Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-six of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 34 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-nine analytes were detected in the indoor air in Building 477 and there were no detected concentrations that exceeded screening levels (ethanol, 2-propanol, 1,3-butadiene, and 4-ethyltoluene do not have screening levels available). Nine analytes were detected in the outdoor air sample.

Table 477-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 477-3. Vapor Intrusion Evaluation for Building 477**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
2-Propanol	0%	<1.9 - <2.1	N/A	<2
Acetone	100%	17 - 28	26000	13
Hexane	100%	1.6 - 26	3100	<0.58
Tetrachloroethene	100%	0.88 - 1.2	180	<0.22
Total Xylenes	100%	1.83 - 31.9	440	<0.43
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	0%	<0.17 - <0.19	26000	<0.18
1,1-Dichloroethane	0%	<0.12 - <0.14	2200	<0.13
1,2,4-Trimethylbenzene	100%	5.8 - 27	960	<0.82
1,3-Butadiene	0%	<0.34 - <0.38	N/A	<0.37
2-Butanone (Methyl Ethyl Ketone)	50%	2.7 - 3.3	22000	<2.4
4-Ethyltoluene	100%	6.9 - 27	N/A	<0.82
Benzene	100%	0.54 - 6.3	16	<0.53
CFC-12	100%	3.3 - 3.8	220000	2.2
Chlorobenzene	0%	<0.71 - <0.8	310	<0.76
Chloroform	100%	0.68 - 0.97	57	<0.16
cis-1,2-Dichloroethene	0%	<0.12 - <0.14	31	<0.13
Cumene	25%	1.2	13	<0.82
Cyclohexane	25%	2	26000	<0.57
Ethanol	100%	16 - 100	N/A	4.4
Ethylbenzene	100%	0.3 - 5.4	440	<0.14
Heptane	25%	6.9	15000	<0.68
Toluene	100%	7.6 - 42	22000	0.32
Trichloroethene	0%	<0.41 - 0.47	8.8	<0.45

N/A = No Screening Level Available

< = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were nine analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Two of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. Toluene was detected in all four samples at concentrations that ranged from 7.6 - 42  $\mu\text{g}/\text{m}^3$ . Toluene was detected in outdoor air at 0.32  $\mu\text{g}/\text{m}^3$ . All of the indoor air sample results were at least one order of magnitude higher than outdoor air, indicating there is the potential for indoor sources to be contributing to the presence of toluene, especially with a shop in the building. All of the results for toluene were at least three orders of magnitude below the screening level.

While ethanol does not have a screening level, it was detected in two of the four sub-slab soil gas samples at low levels ranging from 12 - 28  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all four of the indoor air samples at concentrations ranging from 16 - 100  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 4.4  $\mu\text{g}/\text{m}^3$ . Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, cleaners, etc.

All ND reporting limits for EDB and HCB in indoor air exceed the applicable screening level; however, neither of these analytes was detected in any media sampled and all of the sub-slab soil gas ND reporting limits were below screening levels. In addition, the indoor air reporting limits exceeded the screening levels by a low margin. For EDB, the indoor air reporting limits ranged from  $<0.24$  -  $<0.27$   $\mu\text{g}/\text{m}^3$  and the screening level is 0.23  $\mu\text{g}/\text{m}^3$ . The indoor air reporting limits for HCB ranged from  $<8.2$  -  $<9.3$   $\mu\text{g}/\text{m}^3$  compared to the screening level of 6.2  $\mu\text{g}/\text{m}^3$ . Therefore, EDB and HCB were eliminated from further evaluation.

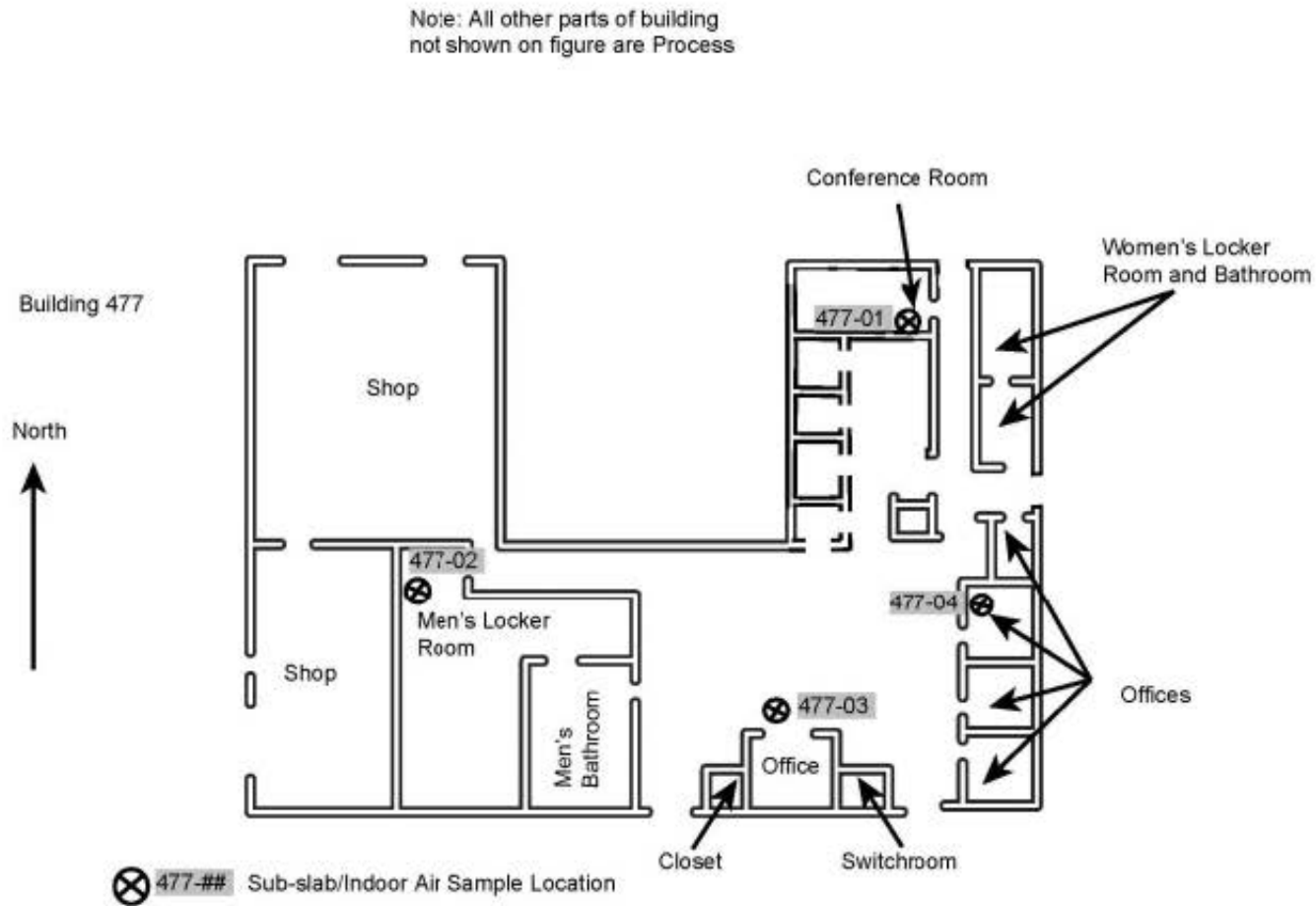
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 477 is an insignificant exposure pathway based on current use. Building 477 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.11-1. Building 477 Location**



**Figure 5.4.11-2. Building 477 Sample Locations**



Note: Outdoor air taken on top of roof outside door from kitchen/control room. Intake located on east side of building located near said doorway.

<b>AECOM</b>
Sample Locations Figure 5.4.11-2 The Dow Chemical Company Midland, Michigan

**Table 5.4.11-1. Building 477 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	477	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	4	75%	11.6	7.7	9.1	20	4.4	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	477	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	5.5	5.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	477	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	4.4	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	477	SS	1,1-Dichloroethane	75-34-3	UG/M3	4	25%	17.2	31.2	64	64	3.2	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	477	SS	1,1-Dichloroethene	75-35-4	UG/M3	4	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	477	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	24	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	477	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	25%	3.81	3.66	9.3	9.3	3.9	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	477	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	6.1	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 2	477	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	4.8	5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	477	SS	1,2-Dichloroethane	107-06-2	UG/M3	4	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	477	SS	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	477	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	0%	-	-	-	-	3.9	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	477	SS	1,3-Butadiene	106-99-0	UG/M3	4	25%	1.20	0.60	2.1	2.1	1.8	1.8	No Screening Value Available	-	-	-
Category 2	477	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	4.8	5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	477	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	4	0%	-	-	-	-	4.8	5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	477	SS	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	12	12	No Screening Value Available	-	-	-
Category 2	477	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	0%	-	-	-	-	3.7	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	477	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	25%	6.38	3.08	11	11	9.6	9.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	477	SS	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	13	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	477	SS	2-Propanol	67-63-0	UG/M3	4	25%	40.5	73.0	150	150	7.9	8.1	No Screening Value Available	-	-	-
Category 2	477	SS	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	10	10	No Screening Value Available	-	-	-
Category 2	477	SS	4-Ethyltoluene	622-96-8	UG/M3	4	25%	3.29	2.61	7.2	7.2	3.9	4	No Screening Value Available	-	-	-
Category 2	477	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	4	0%	-	-	-	-	3.3	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	477	SS	Acetone	67-64-1	UG/M3	4	100%	137	182	37	410	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	477	SS	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	4.1	4.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	477	SS	Benzene	71-43-2	UG/M3	4	75%	4.93	3.50	2.9	9.1	2.6	2.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	477	SS	Bromochloromethane	74-97-5	UG/M3	4	0%	-	-	-	-	17	17	No Screening Value Available	-	-	-
Category 2	477	SS	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	5.4	5.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	477	SS	Bromoform	75-25-2	UG/M3	4	0%	-	-	-	-	8.3	8.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	477	SS	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	31	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	477	SS	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	10	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	477	SS	Carbon Tetrachloride	56-23-5	UG/M3	4	0%	-	-	-	-	5	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	477	SS	CFC-11	75-69-4	UG/M3	4	0%	-	-	-	-	4.5	4.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	477	SS	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	6.1	6.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	477	SS	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	5.6	5.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	477	SS	CFC-12	75-71-8	UG/M3	4	100%	6.23	1.38	4.2	7.3	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	477	SS	Chlorobenzene	108-90-7	UG/M3	4	25%	2.39	1.01	3.9	3.9	3.7	3.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	477	SS	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	8.4	8.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	477	SS	Chloroform	67-66-3	UG/M3	4	75%	9.50	7.57	7.4	20	4	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	477	SS	Chloromethane	74-87-3	UG/M3	4	0%	-	-	-	-	16	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	477	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	25%	5.73	8.18	18	18	3.2	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	477	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	3.6	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	477	SS	Cumene	98-82-8	UG/M3	4	75%	4.04	1.42	4.5	5.1	3.9	3.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	477	SS	Cyclohexane	110-82-7	UG/M3	4	50%	5.40	5.47	5.8	13	2.8	2.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	477	SS	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	6.8	7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	477	SS	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	23	23	No Screening Value Available	-	-	-
Category 2	477	SS	Ethanol	64-17-5	UG/M3	4	50%	11.5	11.8	12	28	6.1	6.2	No Screening Value Available	-	-	-
Category 2	477	SS	Ethylbenzene	100-41-4	UG/M3	4	50%	10.6	16.3	3.9	35	3.5	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	477	SS	Heptane	142-82-5	UG/M3	4	75%	18.2	24.2	5.2	54	3.3	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	477	SS	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	34	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	477	SS	Hexane	110-54-3	UG/M3	4	100%	44.8	64.2	5	140	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	477	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	75%	40.4	73.1	3.7	150	3.5	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	477	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	12	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	477	SS	Methylene Chloride	75-09-2	UG/M3	4	0%	-	-	-	-	28	29	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	477	SS	Naphthalene	91-20-3	UG/M3	4	0%	-	-	-	-	8.4	8.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	477	SS	o-Xylene	95-47-6	UG/M3	4	25%	12.3	21.1	44	44	3.5	3.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	477	SS	Propylbenzene	103-65-1	UG/M3	4	0%	-	-	-	-	3.9	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.11-1. Building 477 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	477	SS	Styrene	100-42-5	UG/M3	4	0%	-	-	-	-	3.4	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	477	SS	Tetrachloroethene	127-18-4	UG/M3	4	100%	208	206	7.8	440	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	477	SS	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.4	2.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	477	SS	Toluene	108-88-3	UG/M3	4	100%	48.7	38.4	5.8	84	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	477	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	7.2	7.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	477	SS	Total Xylenes	1330-20-7	UG/M3	4	75%	52.8	94.2	5.5	194	7	7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	477	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	3.2	3.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	477	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	3.6	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	477	SS	Trichloroethene	79-01-6	UG/M3	4	25%	22.9	41.4	85	85	4.3	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	477	SS	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	2	2.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.11-2. Building 477 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	477	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	4	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	477	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	4	0%	-	-	-	-	0.21	0.24	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	477	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	4	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	477	IA	1,1-Dichloroethane	75-34-3	UG/M3	4	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	477	IA	1,1-Dichloroethene	75-35-4	UG/M3	4	100%	0.130	0.021	0.098	0.14	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	477	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	4	0%	-	-	-	-	5.7	6.4	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	477	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	4	100%	12.7	9.8	5.8	27	-	-	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	477	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	4	0%	-	-	-	-	0.24	0.27	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	477	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	4	0%	-	-	-	-	0.92	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	477	IA	1,2-Dichloroethane	107-06-2	UG/M3	4	25%	0.0900	0.0400	0.15	0.15	0.14	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	477	IA	1,2-Dichloropropane	78-87-5	UG/M3	4	0%	-	-	-	-	0.71	0.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	477	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	4	100%	4.35	3.25	2.5	9.2	-	-	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	477	IA	1,3-Butadiene	106-99-0	UG/M3	4	0%	-	-	-	-	0.34	0.38	No Screening Value Available	-	-	-
Category 2	477	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	4	0%	-	-	-	-	0.92	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	477	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	4	25%	0.166	0.129	0.36	0.36	0.2	0.21	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	477	IA	1,4-Dioxane	123-91-1	UG/M3	4	0%	-	-	-	-	0.55	0.63	No Screening Value Available	-	-	-
Category 2	477	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	4	25%	3.59	3.21	8.4	8.4	3.9	4.1	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	477	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	4	50%	2.10	1.07	2.7	3.3	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	477	IA	2-Hexanone	591-78-6	UG/M3	4	0%	-	-	-	-	3.2	3.6	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	477	IA	2-Propanol	67-63-0	UG/M3	4	0%	-	-	-	-	1.9	2.1	No Screening Value Available	-	-	-
Category 2	477	IA	3-Chloropropene	107-05-1	UG/M3	4	0%	-	-	-	-	2.4	2.7	No Screening Value Available	-	-	-
Category 2	477	IA	4-Ethyltoluene	622-96-8	UG/M3	4	100%	13.4	9.3	6.9	27	-	-	No Screening Value Available	-	-	-
Category 2	477	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	4	100%	1.06	0.16	0.95	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	477	IA	Acetone	67-64-1	UG/M3	4	100%	21.8	4.9	17	28	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	477	IA	alpha-Chlorotoluene	100-44-7	UG/M3	4	0%	-	-	-	-	0.8	0.9	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	477	IA	Benzene	71-43-2	UG/M3	4	100%	2.01	2.86	0.54	6.3	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	477	IA	Bromodichloromethane	75-27-4	UG/M3	4	0%	-	-	-	-	1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	477	IA	Bromofom	75-25-2	UG/M3	4	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	477	IA	Bromomethane	74-83-9	UG/M3	4	0%	-	-	-	-	3	3.4	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	477	IA	Carbon Disulfide	75-15-0	UG/M3	4	0%	-	-	-	-	2.4	2.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	477	IA	Carbon Tetrachloride	56-23-5	UG/M3	4	100%	0.610	0.008	0.6	0.62	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	477	IA	CFC-11	75-69-4	UG/M3	4	100%	1.25	0.06	1.2	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	477	IA	CFC-113	76-13-1	UG/M3	4	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	477	IA	CFC-114	76-14-2	UG/M3	4	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	477	IA	CFC-12	75-71-8	UG/M3	4	100%	3.55	0.29	3.3	3.8	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	477	IA	Chlorobenzene	108-90-7	UG/M3	4	0%	-	-	-	-	0.71	0.8	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	477	IA	Chloroethane	75-00-3	UG/M3	4	0%	-	-	-	-	0.2	0.23	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	477	IA	Chloroform	67-66-3	UG/M3	4	100%	0.813	0.145	0.68	0.97	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	477	IA	Chloromethane	74-87-3	UG/M3	4	100%	1.15	0.06	1.1	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	477	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	4	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	477	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	4	0%	-	-	-	-	0.7	0.79	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	477	IA	Cumene	98-82-8	UG/M3	4	25%	0.605	0.397	1.2	1.2	0.76	0.86	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	477	IA	Cyclohexane	110-82-7	UG/M3	4	25%	0.720	0.853	2	2	0.58	0.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	477	IA	Dibromochloromethane	124-48-1	UG/M3	4	0%	-	-	-	-	1.3	1.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	477	IA	Dibromomethane	74-95-3	UG/M3	4	0%	-	-	-	-	5.5	6.2	No Screening Value Available	-	-	-
Category 2	477	IA	Ethanol	64-17-5	UG/M3	4	100%	48.3	37.7	16	100	-	-	No Screening Value Available	-	-	-
Category 2	477	IA	Ethylbenzene	100-41-4	UG/M3	4	100%	1.62	2.52	0.3	5.4	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	477	IA	Heptane	142-82-5	UG/M3	4	25%	1.99	3.28	6.9	6.9	0.69	0.71	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	477	IA	Hexachlorobutadiene	87-68-3	UG/M3	4	0%	-	-	-	-	8.2	9.3	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	477	IA	Hexane	110-54-3	UG/M3	4	100%	7.93	12.05	1.6	26	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	477	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	4	100%	7.03	11.32	1.1	24	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	477	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	4	0%	-	-	-	-	0.56	0.63	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	477	IA	Methylene Chloride	75-09-2	UG/M3	4	100%	6.30	2.39	4.4	9.8	-	-	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	477	IA	Naphthalene	91-20-3	UG/M3	4	25%	0.443	0.438	1.1	1.1	0.44	0.46	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	477	IA	o-Xylene	95-47-6	UG/M3	4	100%	2.80	3.44	0.73	7.9	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	477	IA	Propylbenzene	103-65-1	UG/M3	4	100%	2.83	2.10	1.4	5.9	-	-	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%



**Table 5.4.11-2. Building 477 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	477	IA	Styrene	100-42-5	UG/M3	4	25%	0.438	0.148	0.66	0.66	0.72	0.74	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	477	IA	Tetrachloroethene	127-18-4	UG/M3	4	100%	1.10	0.15	0.88	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	477	IA	Tetrahydrofuran	109-99-9	UG/M3	4	0%	-	-	-	-	2.3	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	477	IA	Toluene	108-88-3	UG/M3	4	100%	21.8	16.3	7.6	42	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	477	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	4	0%	-	-	-	-	1.4	1.58	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	477	IA	Total Xylenes	1330-20-7	UG/M3	4	100%	9.83	14.73	1.83	31.9	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	477	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	4	0%	-	-	-	-	0.61	0.69	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	477	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	4	0%	-	-	-	-	0.7	0.79	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	477	IA	Trichloroethene	79-01-6	UG/M3	4	0%	-	-	-	-	0.41	0.47	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	477	IA	Vinyl Chloride	75-01-4	UG/M3	4	0%	-	-	-	-	0.039	0.044	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	477	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	477	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	477	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	477	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	477	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	100%	-	-	0.24	0.24	-	-	-	-	-	-
Category 2	477	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 2	477	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	477	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 2	477	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	477	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	477	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	477	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	477	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.37	0.37	-	-	-	-
Category 2	477	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	477	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	477	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	477	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	477	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	477	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	477	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 2	477	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	477	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	477	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	477	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	13	13	-	-	-	-	-	-
Category 2	477	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.86	0.86	-	-	-	-
Category 2	477	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	0.53	0.53	-	-	-	-
Category 2	477	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	477	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	477	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	477	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	477	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.61	0.61	-	-	-	-	-	-
Category 2	477	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 2	477	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	477	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	477	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 2	477	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	477	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	477	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 2	477	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	0.99	0.99	-	-	-	-	-	-
Category 2	477	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	477	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 2	477	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	477	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 2	477	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	477	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 2	477	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	4.4	4.4	-	-	-	-	-	-
Category 2	477	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-

Table 5.4.11-2. Building 477 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	477	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	477	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.8	8.8	-	-	-	-
Category 2	477	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 2	477	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.29	0.29	-	-	-	-
Category 2	477	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	477	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	-	-	2.5	2.5	-	-	-	-	-	-
Category 2	477	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-
Category 2	477	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	477	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	477	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.71	0.71	-	-	-	-
Category 2	477	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	477	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	477	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.32	0.32	-	-	-	-	-	-
Category 2	477	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 2	477	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 2	477	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	477	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.75	0.75	-	-	-	-
Category 2	477	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.45	0.45	-	-	-	-
Category 2	477	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.042	0.042	-	-	-	-

## 5.4.12 Vapor Intrusion Evaluation for Building 489

### BACKGROUND

Building 489 is a Category 2 building in Zone 2. This building has process area, warehouse, laboratory, and office space. It is known as Herbicide Liquid Formulation (see Figure 5.4.12-1) and is located within the central portion of the facility designated as Zone 2. The building is two stories tall but the office space is on the first floor in the northern portion of the building, together with a small block of offices within the warehouse. It is approximately 44,670 ft<sup>2</sup> (4,150 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 13, 2017 and the results can be found in Appendix C. The building has two central air conditioning units, in addition to individual air conditioning units. The air intake is located on the roof. There are a total of five bay doors and they are located near office space. The bay doors are opened when moving large loads or containers in and out of the warehouse space. The land surrounding the building consists of asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, rat poison, penetrating catalyst, degreasers, spray paint, insecticide, and isobutylene bump gas. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On May 10, 2017, sub-slab soil gas samples were collected from nine locations within the office space within this manufacturing building. Indoor air samples were collected on May 11, 2017 at nine locations, corresponding to the sub-slab soil gas sample locations, along with one outdoor air sample from the main air intakes. The sampling locations are shown on Figure 5.4.12-2. Summary statistics of the analytical results for sub-slab soil gas for Building 489 are presented on Table 5.4.12-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.12-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 37 of the 65 target analytes were ND in each of the nine samples collected at Building 489. All ND sub-slab soil gas analytes had reporting limits that met the respective screening levels. Therefore, all 37 ND analytes were eliminated from further VI evaluation. A total of 28 analytes were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into two categories:

- Nineteen analytes detected below *de minimus* levels (<100 µg/m<sup>3</sup>); and
- Nine were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 489-1. Of the nine analytes detected above *de minimus* levels but below screening levels, three had detection frequencies of 100% (acetone, CFC-12, PCE). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI; therefore, there are no AOIs in sub-slab soil gas at Building 489.

**Table 489-1. Summary of Sub-Slab Soil Gas Detects for Building 489**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	22%	11 - 140	0%	3500000
2-Propanol	67%	13 - 320	N/A	N/A
4-Methyl-2-pentanone	56%	13 - 160	0%	1800000
Acetone	100%	56 - 2100	0%	3400000
CFC-12	100%	5.9 - 4600	0%	29000000
Ethylbenzene	67%	3.5 - 190	0%	59000
Tetrachloroethene (PCE)	100%	10 - 710	0%	23000
Toluene	89%	29 - 2500	0%	2900000
Total Xylenes	56%	6 - 1710	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	11%	28	0%	290000
1,1-Dichloroethene	11%	23	0%	120000
1,2,4-Trimethylbenzene	11%	7.1	0%	130000
1,3,5-Trimethylbenzene	11%	5	0%	130000
1,4-Dioxane	11%	12	N/A	N/A
2-Butanone (Methyl Ethyl Ketone)	22%	11 - 45	0%	2900000
4-Ethyltoluene	22%	7.9 - 89	N/A	N/A
Benzene	67%	4.8 - 34	0%	2200
Carbon Disulfide	11%	72	0%	410000
Carbon Tetrachloride	11%	5.5	0%	3000
Chloroform	33%	13 - 37	0%	7600
Cumene	33%	12 - 72	0%	1700
Cyclohexane	56%	4.3 - 35	0%	3500000
Ethanol	67%	8.5 - 66	N/A	N/A
Heptane	67%	3.6 - 45	0%	2000000
Hexane	89%	22 - 88	0%	410000
Naphthalene	11%	8.8	0%	1500
Propylbenzene	11%	24	0%	12000
Trichloroethene (TCE)	11%	19	0%	1200

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes.

Additionally, one outdoor air sample was collected immediately upwind of the building. Table 489-2 below shows the analytes detected in each of the three media sampled.

**Table 489-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
<i>Carbon Tetrachloride</i>	•	•	•
CFC-12	•	•	•
<i>Chloroform</i>	•	•	•
<i>Ethanol</i>	•	•	•
Ethylbenzene	•	•	•
Tetrachloroethene (PCE)	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
<i>Trichloroethene (TCE)</i>	•	•	•
1,1,1-Trichloroethane	•	•	
<i>1,1-Dichloroethene</i>	•	•	
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>1,3,5-Trimethylbenzene</i>	•	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
2-Propanol	•	•	
<i>4-Ethyltoluene</i>	•	•	
4-Methyl-2-pentanone	•	•	
<i>Benzene</i>	•	•	
<i>Cyclohexane</i>	•	•	
<i>Heptane</i>	•	•	
<i>Hexane</i>	•	•	
<i>Naphthalene</i>	•	•	
<i>1,4-Dioxane</i>	•		•
<i>1,1-Dichloroethane</i>	•		
<i>Carbon Disulfide</i>	•		
<i>Cumene</i>	•		
<i>Propylbenzene</i>	•		
CFC-11		•	•
Chloromethane		•	•
Methylene Chloride		•	•
Styrene		•	•
Tetrahydrofuran		X	
1,2-Dichloroethane		•	
1,3-Butadiene		•	
2,2,4-Trimethylpentane		•	
2-Hexanone		•	
3-Chloropropene		•	
Chloroethane		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-one of the 65 indoor air analytes were ND in each of the samples. Seven of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (1,2,4-trichlorobenzene, EDB, alpha-chlorotoluene, bromodichloromethane, bromomethane, dibromochloromethane, and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. The 24 ND analytes with reporting limits that met the respective screening levels were eliminated from further

evaluation. Thirty-four analytes were detected in the indoor air in Building 489 and one analyte had one detected concentration that exceeded screening levels (tetrahydrofuran). Therefore, tetrahydrofuran is an AOI for indoor air at Building 489. 2-Propanol, 1,4-dioxane, 4-ethyltoluene and ethanol do not have screening levels available. Fifteen analytes were detected in the outdoor air sample.

Table 489-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 489-3. Vapor Intrusion Evaluation for Building 489**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in sub-slab soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	22%	0.62 - 3.7	26000	0.18
2-Propanol	100%	2.1 - 430	N/A	<2.1
4-Methyl-2-pentanone	11%	0.89	13000	<0.69
Acetone	100%	9.7 - 320	26000	14
CFC-12	100%	2 - 17	220000	3
Ethylbenzene	89%	0.6 - 2.4	440	0.72
Tetrachloroethene (PCE)	100%	1 - 8.8	180	4.4
Toluene	100%	0.56 - 46	22000	0.58
Total Xylenes	78%	0.68 - 9.8	440	0.55
<b>Detected in sub-slab soil gas below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	0%	<0.12 - <1.3	2200	<0.14
1,1-Dichloroethene	11%	0.083	880	<0.067
1,2,4-Trimethylbenzene	33%	1.4 - 2.9	960	<0.82
1,3,5-Trimethylbenzene	11%	0.88	960	<0.82
1,4-Dioxane	0%	<0.54 - <5.9	N/A	0.72
2-Butanone (Methyl Ethyl Ketone)	44%	3 - 81	22000	<2.5
4-Ethyltoluene	33%	0.84 - 2.3	N/A	<0.82
Benzene	89%	0.52 - 2.4	16	<0.54
Carbon Disulfide	0%	<2.3 - <25	3100	<2.6
Carbon Tetrachloride	89%	0.64 - 0.72	23	0.74
Chloroform	67%	0.3 - 1.1	57	0.22
Cumene	0%	<0.74 - <0.8	13	<0.82
Cyclohexane	33%	0.73 - 4.4	26000	<0.58
Ethanol	100%	38 - 9200	N/A	7
Heptane	44%	0.79 - 3	15000	<0.69
Hexane	56%	0.74 - 56	3100	<0.59
Naphthalene	33%	0.89 - 1.1	11	<0.44
Propylbenzene	0%	<0.74 - <8	88	<0.82
Trichloroethene (TCE)	67%	0.33 - 0.76	8.8	0.21

N/A = No screening level available

< = Non-detect at the reporting limit provided

One detected result of tetrahydrofuran exceeded the indoor air screening level. This was the only detection of tetrahydrofuran in indoor air at a concentration of 260  $\mu\text{g}/\text{m}^3$  compared to a screening level of 79  $\mu\text{g}/\text{m}^3$ . Tetrahydrofuran was ND in the remaining eight samples in indoor air with reporting limits that

met the screening level. Tetrahydrofuran was ND in sub-slab soil gas with reporting limits that met the screening level and was therefore eliminated from further VI evaluation. Since the outdoor air sample collected indicated that tetrahydrofuran was also ND, it is not likely present due to migration from outdoor air. The fact that a single indoor air sample has more tetrahydrofuran than the sub-slab soil gas samples is indicative of an indoor source for this chemical (i.e., its presence in the indoor air is not due to VI). Tetrahydrofuran is found in numerous consumer products, including waterproofing compounds, lubricating oils, paint and varnish removers, adhesives, cleaners, etc. The chemical inventory from the building identified a number of materials likely to contain tetrahydrofuran (adhesive spray, various lubricants, and cleaners, etc.). Furthermore, due to the relatively high single concentration (E-flagged result) of tetrahydrofuran being detected in the Mill Shop of the building (sample 4), it is more likely that a product containing tetrahydrofuran was being used at or near the time of sampling. Therefore, tetrahydrofuran was eliminated from further evaluation since there was no evidence of VI. There were no other analytes with detected results that exceed indoor air screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 15 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Five of the analytes had indoor air results that were very similar to concentrations detected in outdoor air (ethylbenzene, PCE, carbon tetrachloride, chloroform, and TCE). One analyte had indoor air results that were slightly higher than the outdoor air result (1,1,1-trichloroethane). The four remaining analytes had indoor air results that were higher in concentration than that detected in outdoor air, indicating that there is a potential for indoor sources (acetone, CFC-12, toluene, and total xylenes).

1,1,1-Trichloroethane was detected in two of the indoor air samples at concentrations ranging from 0.62 - 3.7  $\mu\text{g}/\text{m}^3$  and in outdoor air at 0.18  $\mu\text{g}/\text{m}^3$ . It is possible that there was an indoor source influencing the detection that occurred in a sample collected within an office in the maintenance shop area that was also adjacent to process area.

Acetone was detected in the outdoor air sample at 14  $\mu\text{g}/\text{m}^3$  and was detected in all nine of the indoor samples (detected results range from 9.7 - 320  $\mu\text{g}/\text{m}^3$ ). The detected concentrations at four of the nine samples were within the same order of magnitude as the detection in outdoor air (9.7 - 97  $\mu\text{g}/\text{m}^3$ ). The remaining five detected concentrations were an order of magnitude higher and were all E-flagged, indicating that the result was estimated (180 - 320  $\mu\text{g}/\text{m}^3$ ). One of the samples was collected in the mill shop and the remaining four samples were collected in office areas near the maintenance shop. Common cleaning items and chemicals utilized in a laboratory contribute as indoor sources for acetone. However, it's important to point out that all of the results for acetone were well below screening levels.

CFC-12 was detected in the outdoor sample at 3  $\mu\text{g}/\text{m}^3$  and was detected in all nine indoor air samples at concentrations ranging from 2 - 17  $\mu\text{g}/\text{m}^3$ . The five samples with the higher detected concentrations are in the same location as those discussed above for acetone including one sample in the mill shop and four samples in the office areas near the maintenance shop. The indoor air detections of CFC-12 were at least four orders of magnitude below the screening level.

Toluene was detected in the outdoor sample at 0.58  $\mu\text{g}/\text{m}^3$  and was detected in all nine indoor air samples at concentrations ranging from 0.56 - 46  $\mu\text{g}/\text{m}^3$ . The maximum detection occurred in the sample collected in the mill shop. The remaining samples ranged included two additional samples that were an order of magnitude higher than the other results (15 and 16  $\mu\text{g}/\text{m}^3$ ) with the remaining results ranging from 0.56 - 4.8  $\mu\text{g}/\text{m}^3$ . The indoor air detections of toluene were at least three orders of magnitude below the screening level.

Total xylenes was detected in the outdoor sample at 0.55  $\mu\text{g}/\text{m}^3$  and was detected in seven out of nine indoor air samples at concentrations ranging from 0.68 - 9.8  $\mu\text{g}/\text{m}^3$ . The maximum detection occurred in a sample collected in the offices near the maintenance shop. The indoor air detections of toluene were at least two orders of magnitude below the screening level.

While ethanol does not have a screening level, it was detected in six of the nine sub-slab soil gas samples at a low level range of 8.5 - 66  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from 38 - 9200  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). The maximum detected concentration is an order of magnitude higher than any of the other results and it occurred in a sample collected in the warehouse portion of the building. Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: sanitizing spray, Scrubbing Bubbles, cleaners, etc.

There were seven ND analytes with at least one reporting limit that exceeded indoor air screening levels (1,2,4-trichlorobenzene, EDB, alpha-chlorotoluene, bromodichloromethane, bromomethane, dibromochloromethane, and HCB); however, none of these analytes was detected in any media sampled and all of the sub-slab soil gas ND reporting limits were below screening levels. In addition, 1,2,4-trichlorobenzene, alpha-chlorotoluene, bromodichloromethane, bromomethane, and dibromochloromethane each had only one reporting limit (all from indoor air sample number 489-IA-02) that exceeded the screening level. The remaining eight samples had reporting limits that were below the screening levels for those five analytes. For EDB and HCB, in all samples with the exception of 489-IA-02, the indoor air reporting limits exceeded the screening levels by a low margin. For EDB, one sample reporting limit met the screening level and the remaining indoor air reporting limits ranged from <0.23 - 0.26  $\mu\text{g}/\text{m}^3$  and the screening level is 0.23  $\mu\text{g}/\text{m}^3$  (the maximum reporting limit for EDB in sample 489-IA-02 was 2.5  $\mu\text{g}/\text{m}^3$ ). The indoor air reporting limits for HCB ranged from <8 - <9.1  $\mu\text{g}/\text{m}^3$  compared to the screening level of 6.2  $\mu\text{g}/\text{m}^3$  (the maximum reporting limit for HCB in sample 489-IA-02 was 87  $\mu\text{g}/\text{m}^3$ ). Therefore, all of the ND reporting limit exceedances in indoor air are eliminated for all seven ND analytes, including EDB and HCB.

## CONCLUSIONS AND RECOMMENDATIONS

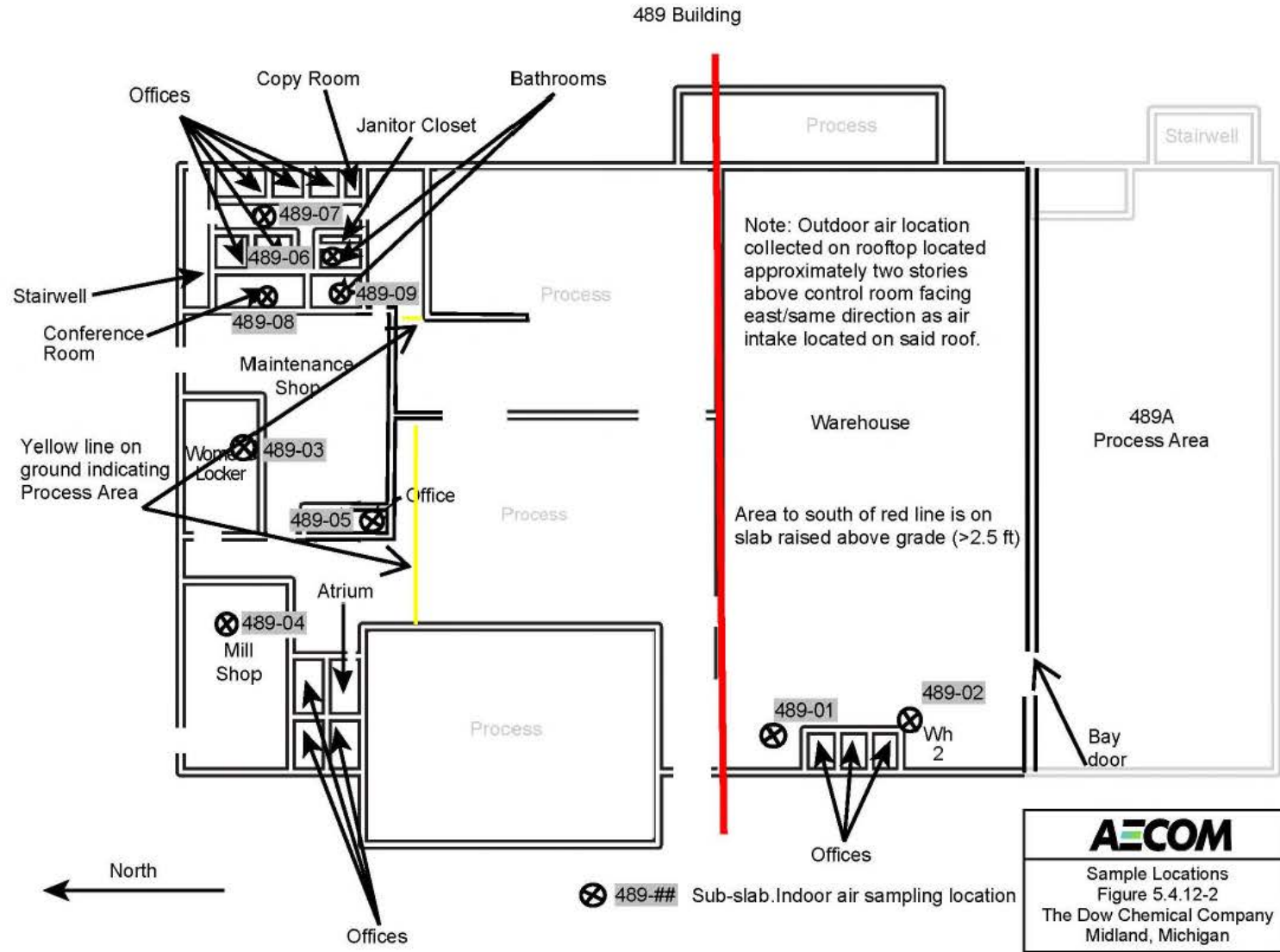
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 489 is an insignificant exposure pathway based on current use. Tetrahydrofuran was identified as an AOI in indoor air; however, there was no evidence of VI based on the single tetrahydrofuran exceedance. Building 489 was placed in VI Path Forward Building Group 3 (see Figure 5-3) and further investigation into the tetrahydrofuran result in indoor air will be conducted.



**Figure 5.4.12-1. Building 489 Location**



Figure 5.4.12-2. Building 489 Sample Locations



**Table 5.4.12-1. Building 489 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	489	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	22%	21.4	44.6	11	140	4.2	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	489	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.3	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	489	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.2	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	489	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	11%	6.76	8.35	28	28	3.1	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	489	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	11%	6.03	6.78	23	23	3.1	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	489	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	23	99	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	489	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	11%	5.40	2.84	7.1	7.1	3.9	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	489	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	6	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 2	489	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.6	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	489	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	3.1	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	489	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.6	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	489	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	11%	5.17	2.77	5	5	3.9	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	489	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.7	7.4	No Screening Value Available	-	-	-
Category 2	489	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.6	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	489	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.6	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	489	SS	1,4-Dioxane	123-91-1	UG/M3	9	11%	14.8	8.2	12	12	11	48	No Screening Value Available	-	-	-
Category 2	489	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.6	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	489	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	22%	15.1	12.8	11	45	9.3	38	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	489	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	13	55	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	489	SS	2-Propanol	67-63-0	UG/M3	9	67%	55.1	99.9	13	320	31	33	No Screening Value Available	-	-	-
Category 2	489	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.7	42	No Screening Value Available	-	-	-
Category 2	489	SS	4-Ethyltoluene	622-96-8	UG/M3	9	22%	14.5	28.1	7.9	89	3.9	16	No Screening Value Available	-	-	-
Category 2	489	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	56%	27.5	50.6	13	160	3.2	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	489	SS	Acetone	67-64-1	UG/M3	9	100%	475	667	56	2100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	489	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	4	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	489	SS	Benzene	71-43-2	UG/M3	9	67%	11.1	11.6	4.8	34	2.5	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	489	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	16	71	No Screening Value Available	-	-	-
Category 2	489	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	5.2	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	489	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	8	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	489	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	30	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	489	SS	Carbon Disulfide	75-15-0	UG/M3	9	11%	19.7	20.9	72	72	9.6	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	489	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	11%	6.50	3.61	5.5	5.5	4.9	21	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	489	SS	CFC-11	75-69-4	UG/M3	9	0%	-	-	-	-	4.4	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	489	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	5.9	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	489	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.4	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	489	SS	CFC-12	75-71-8	UG/M3	9	100%	1688	1946	5.9	4600	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	489	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.6	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	489	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	8.2	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	489	SS	Chloroform	67-66-3	UG/M3	9	33%	11.4	11.3	13	37	3.8	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	489	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	16	69	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	489	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	3.1	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	489	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.5	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	489	SS	Cumene	98-82-8	UG/M3	9	33%	15.2	22.3	12	72	3.9	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	489	SS	Cyclohexane	110-82-7	UG/M3	9	56%	8.97	10.01	4.3	35	2.7	11	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	489	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.6	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	489	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	22	95	No Screening Value Available	-	-	-
Category 2	489	SS	Ethanol	64-17-5	UG/M3	9	67%	24.3	20.6	8.5	66	6	24	No Screening Value Available	-	-	-
Category 2	489	SS	Ethylbenzene	100-41-4	UG/M3	9	67%	34.1	59.9	3.5	190	3.4	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	489	SS	Heptane	142-82-5	UG/M3	9	67%	12.3	13.2	3.6	45	3.2	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	489	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	33	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	489	SS	Hexane	110-54-3	UG/M3	9	89%	32.3	23.2	22	88	2.8	2.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	489	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	56%	135	362	4.3	1100	3.4	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	489	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	48	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	489	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	27	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	489	SS	Naphthalene	91-20-3	UG/M3	9	11%	10.9	6.0	8.8	8.8	8.1	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	489	SS	o-Xylene	95-47-6	UG/M3	9	22%	72.6	201.6	9.8	610	3.4	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	489	SS	Propylbenzene	103-65-1	UG/M3	9	11%	6.60	7.07	24	24	3.8	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.12-1. Building 489 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	489	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3.3	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	489	SS	Tetrachloroethene	127-18-4	UG/M3	9	100%	214	252	10	710	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	489	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	9.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	489	SS	Toluene	108-88-3	UG/M3	9	89%	317	819	29	2500	3	3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	489	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	7	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	489	SS	Total Xylenes	1330-20-7	UG/M3	9	56%	207	564	6	1710	6.8	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	489	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3.1	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	489	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.5	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	489	SS	Trichloroethene	79-01-6	UG/M3	9	11%	6.88	5.59	19	19	4.2	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	489	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	2	8.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.12-2. Building 489 Indoor Air and Outdoor Air Summary Results**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
489	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	22%	0.639	1.186	0.62	3.7	0.16	1.8	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
489	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.2	2.2	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
489	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.16	1.8	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
489	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.12	1.3	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
489	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	11%	0.0707	0.0968	0.083	0.083	0.062	0.65	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
489	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.6	60	Vapor Intrusion Indoor Air Screening Levels	18	0%	11%
489	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	33%	1.38	1.35	1.4	2.9	0.77	8	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
489	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.23	2.5	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	89%
489	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.9	9.8	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
489	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	78%	0.199	0.172	0.14	0.17	0.12	1.3	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
489	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.69	7.5	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
489	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	11%	0.856	1.190	0.88	0.88	0.77	8	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
489	IA	1,3-Butadiene	106-99-0	UG/M3	9	67%	0.662	0.499	0.35	0.8	0.36	3.6	No Screening Value Available	-	-	-
489	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.9	9.8	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
489	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	0.18	2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
489	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.54	5.9	No Screening Value Available	-	-	-
489	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	11%	4.01	5.66	3.8	3.8	3.5	38	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
489	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	44%	13.5	25.8	3	81	2.2	24	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
489	IA	2-Hexanone	591-78-6	UG/M3	9	11%	3.51	4.91	3.4	3.4	3.1	33	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
489	IA	2-Propanol	67-63-0	UG/M3	9	100%	50.9	142.2	2.1	430	-	-	No Screening Value Available	-	-	-
489	IA	3-Chloropropene	107-05-1	UG/M3	9	11%	2.79	3.89	3.3	3.3	2.3	26	No Screening Value Available	-	-	-
489	IA	4-Ethyltoluene	622-96-8	UG/M3	9	33%	1.24	1.27	0.84	2.3	0.77	8	No Screening Value Available	-	-	-
489	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	11%	0.731	0.999	0.89	0.89	0.61	6.7	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
489	IA	Acetone	67-64-1	UG/M3	9	100%	161	118	9.7	320	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
489	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.78	8.4	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	11%
489	IA	Benzene	71-43-2	UG/M3	9	89%	1.06	0.84	0.52	2.4	5.2	5.2	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
489	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1	11	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	11%
489	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	17	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
489	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	2.9	32	Vapor Intrusion Indoor Air Screening Levels	22	0%	11%
489	IA	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	2.3	25	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
489	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	89%	0.709	0.112	0.64	0.72	2	2	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
489	IA	CFC-11	75-69-4	UG/M3	9	89%	1.68	1.10	1.1	1.4	9.2	9.2	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
489	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.1	12	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
489	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.21	2.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
489	IA	CFC-12	75-71-8	UG/M3	9	100%	9.89	7.06	2	17	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
489	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.69	7.5	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
489	IA	Chloroethane	75-00-3	UG/M3	9	11%	0.234	0.329	0.26	0.26	0.2	2.2	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
489	IA	Chloroform	67-66-3	UG/M3	9	67%	0.458	0.335	0.3	1.1	0.16	1.6	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
489	IA	Chloromethane	74-87-3	UG/M3	9	100%	9.00	6.70	2.1	26	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
489	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	0.12	1.3	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
489	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.68	7.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
489	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.74	8	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
489	IA	Cyclohexane	110-82-7	UG/M3	9	33%	1.17	1.47	0.73	4.4	0.54	5.6	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
489	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.3	14	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	11%
489	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.3	58	No Screening Value Available	-	-	-
489	IA	Ethanol	64-17-5	UG/M3	9	100%	1119	3031	38	9200	-	-	No Screening Value Available	-	-	-
489	IA	Ethylbenzene	100-41-4	UG/M3	9	89%	1.04	0.56	0.6	2.4	1.4	1.4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
489	IA	Heptane	142-82-5	UG/M3	9	44%	1.39	1.23	0.79	3	0.65	6.7	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
489	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8	87	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
489	IA	Hexane	110-54-3	UG/M3	9	56%	8.03	18.13	0.74	56	0.57	5.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
489	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	78%	1.87	2.35	0.48	7.4	0.28	2.8	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
489	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.54	5.9	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
489	IA	Methylene Chloride	75-09-2	UG/M3	9	89%	4.41	1.58	2.3	7.3	11	11	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
489	IA	Naphthalene	91-20-3	UG/M3	9	33%	0.679	0.662	0.89	1.1	0.41	4.3	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
489	IA	o-Xylene	95-47-6	UG/M3	9	78%	0.713	0.765	0.2	2.4	0.14	1.4	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
489	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.74	8	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
489	IA	Styrene	100-42-5	UG/M3	9	78%	1.48	0.87	0.79	1.9	0.69	6.9	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
489	IA	Tetrachloroethene	127-18-4	UG/M3	9	100%	3.20	2.59	1	8.8	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%



**Table 5.4.12-2. Building 489 Indoor Air and Outdoor Air Summary Results (Continued)**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
489	IA	Tetrahydrofuran	109-99-9	UG/M3	9	11%	31.2	85.9	260	260	2.2	24	Vapor Intrusion Indoor Air Screening Levels	79	11%	0%
489	IA	Toluene	108-88-3	UG/M3	9	100%	9.88	14.58	0.56	46	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
489	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.36	14.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
489	IA	Total Xylenes	1330-20-7	UG/M3	9	78%	2.59	3.11	0.68	9.8	0.42	4.2	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
489	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.59	6.5	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
489	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.68	7.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
489	IA	Trichloroethene	79-01-6	UG/M3	9	67%	0.409	0.273	0.33	0.76	0.17	1.8	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
489	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	0.038	0.42	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
489	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
489	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
489	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
489	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
489	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	0.067	0.067	-	-	-	-
489	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
489	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
489	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
489	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
489	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
489	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
489	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
489	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.37	0.37	-	-	-	-
489	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
489	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
489	OA	1,4-Dioxane	123-91-1	UG/M3	1	100%	-	-	0.72	0.72	-	-	-	-	-	-
489	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
489	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
489	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
489	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2.1	2.1	-	-	-	-
489	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
489	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
489	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.69	0.69	-	-	-	-
489	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	14	14	-	-	-	-	-	-
489	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.87	0.87	-	-	-	-
489	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	0.54	0.54	-	-	-	-
489	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
489	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
489	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
489	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
489	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.74	0.74	-	-	-	-	-	-
489	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.3	1.3	-	-	-	-	-	-
489	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
489	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
489	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	3	3	-	-	-	-	-	-
489	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
489	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
489	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.22	0.22	-	-	-	-	-	-
489	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	2.6	2.6	-	-	-	-	-	-
489	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
489	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
489	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
489	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
489	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
489	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
489	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	7	7	-	-	-	-	-	-
489	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.72	0.72	-	-	-	-	-	-
489	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.69	0.69	-	-	-	-
489	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	9	9	-	-	-	-
489	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-

**Table 5.4.12-2. Building 489 Indoor Air and Outdoor Air Summary Results (Continued)**

Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
							Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
489	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.38	0.38	-	-	-	-	-	-
489	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
489	OA	Methylene Chloride	75-09-2	UG/M3	1	100%	-	-	2.3	2.3	-	-	-	-	-	-
489	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-
489	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.17	0.17	-	-	-	-	-	-
489	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
489	OA	Styrene	100-42-5	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
489	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	-	-	4.4	4.4	-	-	-	-	-	-
489	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
489	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.58	0.58	-	-	-	-	-	-
489	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.52	1.52	-	-	-	-
489	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	0.55	0.55	-	-	-	-	-	-
489	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
489	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
489	OA	Trichloroethene	79-01-6	UG/M3	1	100%	-	-	0.21	0.21	-	-	-	-	-	-
489	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.043	0.043	-	-	-	-

### 5.4.13 Vapor Intrusion Evaluation for Building 768

#### BACKGROUND

Building 768 is a Category 2 building in Zone 2. This building is a warehouse, laboratory, and process area with office space. It is known as the Pilot Plant Office/Lab (see Figure 5.4.13-1) and is located within the central portion of the facility designated as Zone 2. The process and warehouse area is two stories tall but the office space is on the first story. It is approximately 14,090 ft<sup>2</sup> (1,310 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the west.

A building survey was performed on February 27, 2017 and the results can be found in Appendix C. The building has a central air conditioning unit with one air intake at the top of the building in the center of the roof. There is a kitchen range hood fan in the kitchen space. The process area portion of the building has an elevator. There are six bay doors but they are all located in the process/warehouse portion of the building. These bay doors are only left open in hot weather during the summer. The land surrounding the building is covered in asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, degreasers, and rust cutting spray. The full chemical inventory list is presented with the building survey in Appendix C.

#### DATA SUMMARY

On April 20, 2017, sub-slab soil gas samples were collected from six locations within the building. Indoor air samples were collected on April 21, 2017 at six locations, corresponding to the sub-slab soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.13-2. Summary statistics of the analytical results for sub-slab soil gas for Building 768 are presented on Table 5.4.13-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.13-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

#### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 39 of the 65 target analytes were ND in each of the 6 samples collected at Building 768. All but one of the ND sub-slab soil gas analytes had reporting limits that met the respective screening level. Therefore, the 38 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. One analyte (1,2-dibromomethane) had at least one reporting limit that exceeded the sub-slab soil gas screening level and is discussed further below. A total of 26 analytes were detected in one or more of the 6 sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Seventeen were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Nine were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 768-1. Of the nine analytes detected above *de minimus* levels but below screening levels, four had detection frequencies of 100% (CFC-12, hexane, PCE, and toluene). Only the analytes present in the sub-slab soil gas at concentrations above the non-



residential screening levels are AOIs for VI. Therefore, there are no AOIs in sub-slab soil gas at Building 768.

**Table 768-1. Summary of Sub-Slab Soil Gas Detects for Building 768**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	83%	12 - 320	0%	3500000
Acetone	83%	67 - 170	0%	3400000
Carbon Tetrachloride	83%	14 - 280	0%	3000
CFC-12	100%	210 - 6000	0%	29000000
Chloroform	83%	39 - 360	0%	7600
Hexane	100%	21 - 120	0%	410000
Tetrachloroethene (PCE)	100%	69 - 2600	0%	23000
Toluene	100%	34 - 120	0%	2900000
Trichloroethene (TCE)	83%	63 - 410	0%	1200
<b>Below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	83%	9.6 - 94	0%	290000
1,2,4-Trimethylbenzene	67%	8 - 26	0%	130000
1,2-Dichloropropane	17%	4.6	0%	2300
1,3,5-Trimethylbenzene	67%	3.8 - 12	0%	130000
2,2,4-Trimethylpentane	33%	8.1 - 36	0%	2000000
2-Butanone (Methyl Ethyl Ketone)	50%	12 - 27	0%	2900000
4-Ethyltoluene	67%	5.4 - 16	N/A	N/A
Benzene	83%	6.4 - 20	0%	2200
CFC-11	17%	17	0%	33000000
cis-1,2-Dichloroethene	67%	4.4 - 34	0%	4100
Cyclohexane	83%	12- 36	0%	3500000
Ethanol	67%	8.2 - 30	N/A	N/A
Ethylbenzene	83%	8.6 - 32	0%	59000
Heptane	83%	21 - 88	0%	2000000
Propylbenzene	17%	5	0%	12000
Total Xylenes	100%	22.9 - 82	0%	58000
trans-1,2-Dichloroethene	33%	15 - 18	0%	41000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, six indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 768-2 below shows the analytes detected in each of the three media sampled.

**Table 768-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
Carbon Tetrachloride	•	•	•
<i>CFC-11</i>	•	•	•
CFC-12	•	•	•
Chloroform	•	•	•
<i>Ethanol</i>	•	•	•
Tetrachloroethene (PCE)	•	•	•
Toluene	•	•	•
<i>1,3,5-Trimethylbenzene</i>	•	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
Hexane	•	•	
Trichloroethene (TCE)	•	•	
1,1,1-Trichloroethane	•		
<i>1,1-Dichloroethane</i>	•		
<i>1,2,4-Trimethylbenzene</i>	•		
<i>1,2-Dichloropropane</i>	•		
<i>2,2,4-Trimethylpentane</i>	•		
<i>4-Ethyltoluene</i>	•		
<i>Benzene</i>	•		
<i>cis-1,2-Dichloroethene</i>	•		
<i>Cyclohexane</i>	•		
<i>Ethylbenzene</i>	•		
<i>Heptane</i>	•		
<i>Propylbenzene</i>	•		
<i>Total Xylenes</i>	•		
<i>trans-1,2-Dichloroethene</i>	•		
Chloromethane		•	•
Tetrahydrofuran		•	•
1,2-Dichloroethane		•	
2-Propanol		•	
Methylene Chloride		•	
Vinyl Chloride		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty-seven of the 65 analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 45 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Eighteen analytes were detected in the indoor air in Building 768 and there were no detected concentrations that exceeded screening levels (ethanol and 4-ethyltoluene do not have screening levels available). Ten analytes were detected in the outdoor air sample.

Table 768-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 768-3. Vapor Intrusion Evaluation for Building 768**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<0.17 - <0.37	26000	<0.17
Acetone	100%	19 - 35	26000	8.9
Carbon Tetrachloride	100%	0.58 - 0.62	23	0.59
CFC-12	100%	2.4 - 3.5	220000	2.2
Chloroform	33%	0.33 - 0.49	57	0.15
Hexane	17%	0.59	3100	<0.55
Tetrachloroethene (PCE)	17%	0.96	180	0.33
Toluene	83%	0.22 - 5.8	22000	0.54
Trichloroethene (TCE)	17%	0.19	8.8	<0.17
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	0%	<0.13 - <0.28	2200	<0.13
1,2,4-Trimethylbenzene	0%	<0.78 - <1.7	960	<0.77
1,2-Dichloropropane	0%	<0.73 - <1.6	18	<0.72
1,3,5-Trimethylbenzene	17%	2.2	960	<0.77
2,2,4-Trimethylpentane	0%	<3.7 - <7.9	15000	<3.6
2-Butanone (Methyl Ethyl Ketone)	100%	3.7 - 10	22000	<2.3
4-Ethyltoluene	0%	<0.78 - <1.7	N/A	<0.77
Benzene	0%	<0.51 - <1.1	16	<0.5
CFC-11	83%	1.2 - 1.7	250000	1.1
cis-1,2-Dichloroethene	0%	<0.13 - <0.27	31	<0.12
Cyclohexane	0%	<0.55 - <1.2	26000	<0.54
Ethanol	100%	26 - 1100	N/A	3
Ethylbenzene	0%	<0.14 - <0.3	440	<0.14
Heptane	0%	<0.65 - <1.4	15000	<0.64
Propylbenzene	0%	<0.78 - <1.7	88	<0.77
Total Xylenes	0%	<0.42 - <0.89	440	<0.41
trans-1,2-Dichloroethene	0%	<0.63 - <1.3	310	<0.62

N/A = No screening level available  
 < = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were ten analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Four of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. Toluene was detected in five of the six samples at concentrations that ranged from 0.22 - 5.8  $\mu\text{g}/\text{m}^3$ . Toluene was detected in outdoor air at 0.54  $\mu\text{g}/\text{m}^3$ . All but one of the indoor air sample results were the same order of magnitude as the outdoor air sample and one was an order of magnitude higher than outdoor air, indicating there is the potential for indoor source to be contributing to the presence of toluene near that sample. All of the results for toluene were at least three orders of magnitude below the screening level.

Acetone was detected in all six samples at results ranging from 19 - 35  $\mu\text{g}/\text{m}^3$  and in outdoor air at 8.9  $\mu\text{g}/\text{m}^3$ . The results indicate that there is the potential for indoor sources to be contributing to the

presence of acetone. All of the results for acetone were at least two orders of magnitude below the screening level. Acetone is present in common consumer products, including cleaning products, particle board, adhesives, and paint remover. Furthermore, the chemical inventory from the building identified a number of materials likely to contain acetone, including multipurpose cleaners, floor cleaners, and surface disinfectant.

While ethanol does not have a screening level, it was detected in four of six sub-slab soil gas samples at low levels ranging from 8.2 - 30  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all six of the indoor air samples at concentrations ranging from 26 - 1100  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 3  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, cleaners, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceed the indoor air screening levels and for EDB, one of six ND sub-slab soil gas reporting limits exceed the soil gas screening level. HCB was eliminated from further VI evaluation since all sub-slab soil gas ND reporting limits met the screening level. Also, the ND indoor air reporting limits for HCB (8.5 - 18  $\mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, for EDB, the ND indoor air reporting limits (0.24 - 0.52  $\mu\text{g}/\text{m}^3$ ) only very slightly exceed the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ). Additionally, five of six ND sub-slab soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently met screening levels for these two analytes. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation for Building 768.

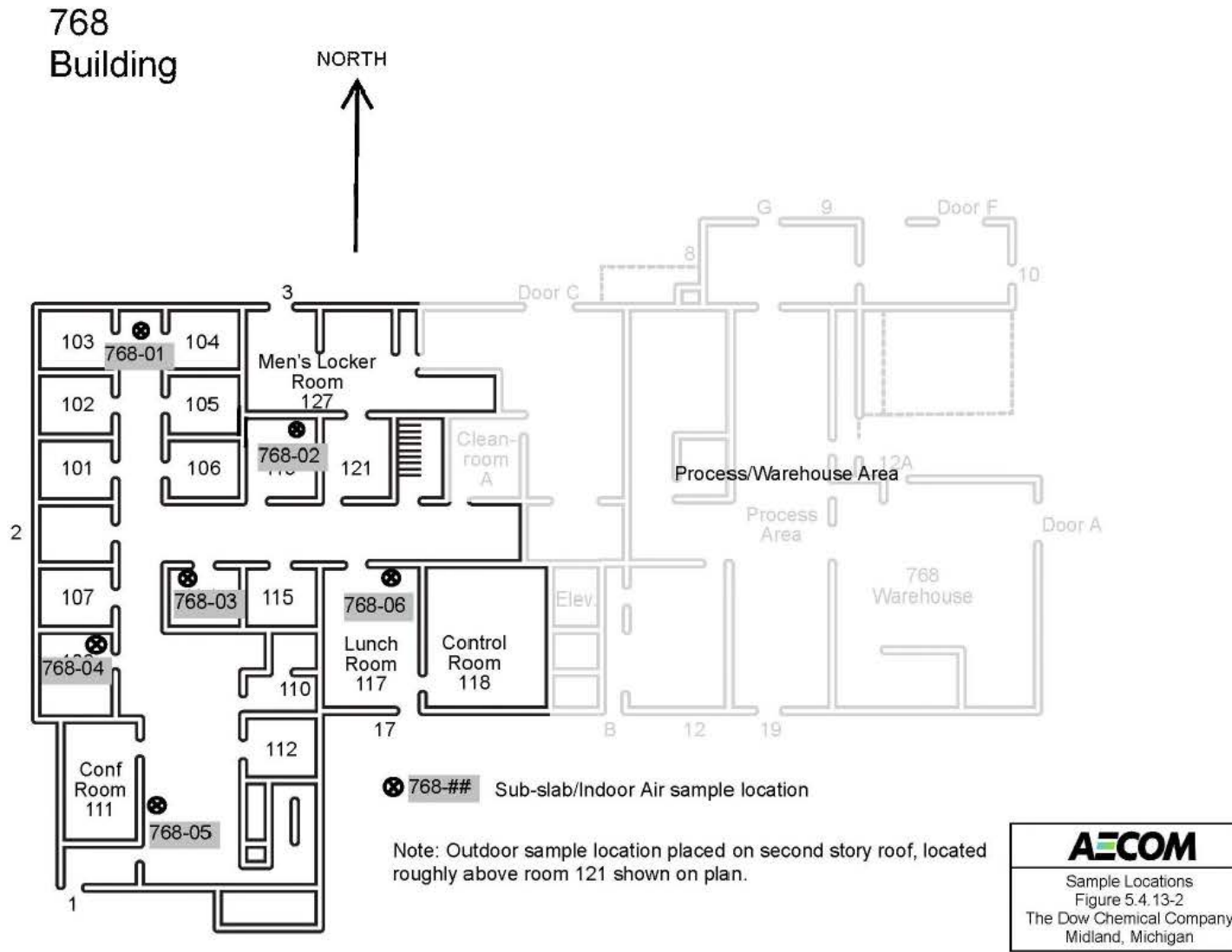
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 768 is an insignificant exposure pathway based on current use. Building 768 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.13-1. Building 768 Location**



**Figure 5.4.13-2. Building 768 Sample Locations**



**Table 5.4.13-1. Building 768 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	768	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	6	83%	72.7	121.8	12	320	28	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	768	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	5.2	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	768	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	4.1	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	768	SS	1,1-Dichloroethane	75-34-3	UG/M3	6	83%	32.8	32.0	9.6	94	20	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	768	SS	1,1-Dichloroethene	75-35-4	UG/M3	6	0%	-	-	-	-	3	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	768	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	22	150	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	768	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	67%	12.7	7.2	8	26	12	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	768	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	5.8	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	17%
Category 2	768	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	4.6	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	768	SS	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	3.1	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	768	SS	1,2-Dichloropropane	78-87-5	UG/M3	6	17%	4.74	3.62	4.6	4.6	3.5	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	768	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	67%	7.92	3.60	3.8	12	12	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	768	SS	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	1.7	11	No Screening Value Available	-	-	-
Category 2	768	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	4.6	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	768	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	4.6	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	768	SS	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	11	73	No Screening Value Available	-	-	-
Category 2	768	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	33%	11.1	12.7	8.1	36	3.6	24	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	768	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	50%	17.8	8.7	12	27	16	60	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	768	SS	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	12	83	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	768	SS	2-Propanol	67-63-0	UG/M3	6	0%	-	-	-	-	7.5	50	No Screening Value Available	-	-	-
Category 2	768	SS	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	9.5	63	No Screening Value Available	-	-	-
Category 2	768	SS	4-Ethyltoluene	622-96-8	UG/M3	6	67%	9.12	4.32	5.4	16	12	25	No Screening Value Available	-	-	-
Category 2	768	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	6	0%	-	-	-	-	3.1	21	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	768	SS	Acetone	67-64-1	UG/M3	6	83%	98.0	41.5	67	170	120	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	768	SS	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	3.9	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	768	SS	Benzene	71-43-2	UG/M3	6	83%	11.1	4.9	6.4	20	16	16	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	768	SS	Bromochloromethane	74-97-5	UG/M3	6	0%	-	-	-	-	16	110	No Screening Value Available	-	-	-
Category 2	768	SS	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	5.1	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	768	SS	Bromoform	75-25-2	UG/M3	6	0%	-	-	-	-	7.8	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	768	SS	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	30	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	768	SS	Carbon Disulfide	75-15-0	UG/M3	6	0%	-	-	-	-	9.5	63	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	768	SS	Carbon Tetrachloride	56-23-5	UG/M3	6	83%	61.3	107.2	14	280	32	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	768	SS	CFC-11	75-69-4	UG/M3	6	17%	7.38	6.57	17	17	4.3	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	768	SS	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	5.8	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	768	SS	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	5.3	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	768	SS	CFC-12	75-71-8	UG/M3	6	100%	2178	2135	210	6000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	768	SS	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	3.5	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	768	SS	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	8	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	768	SS	Chloroform	67-66-3	UG/M3	6	83%	101	129	39	360	25	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	768	SS	Chloromethane	74-87-3	UG/M3	6	0%	-	-	-	-	16	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	768	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	67%	15.2	13.1	4.4	34	3	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	768	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	3.4	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	768	SS	Cumene	98-82-8	UG/M3	6	0%	-	-	-	-	3.7	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	768	SS	Cyclohexane	110-82-7	UG/M3	6	83%	17.8	9.9	12	36	17	17	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	768	SS	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	6.5	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	768	SS	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	22	140	No Screening Value Available	-	-	-
Category 2	768	SS	Ethanol	64-17-5	UG/M3	6	67%	16.4	9.7	8.2	30	10	38	No Screening Value Available	-	-	-
Category 2	768	SS	Ethylbenzene	100-41-4	UG/M3	6	83%	15.9	8.4	8.6	32	22	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	768	SS	Heptane	142-82-5	UG/M3	6	83%	36.3	27.2	21	88	21	21	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	768	SS	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	32	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	768	SS	Hexane	110-54-3	UG/M3	6	100%	55.3	34.6	21	120	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	768	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	100%	30.3	17.1	17	64	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	768	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	11	73	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	768	SS	Methylene Chloride	75-09-2	UG/M3	6	0%	-	-	-	-	26	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	768	SS	Naphthalene	91-20-3	UG/M3	6	0%	-	-	-	-	8	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	768	SS	o-Xylene	95-47-6	UG/M3	6	67%	9.72	4.65	5.9	18	10	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	768	SS	Propylbenzene	103-65-1	UG/M3	6	17%	5.13	3.97	5	5	3.7	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.13-1. Building 768 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	768	SS	Styrene	100-42-5	UG/M3	6	0%	-	-	-	-	3.2	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	768	SS	Tetrachloroethene	127-18-4	UG/M3	6	100%	938	887	69	2600	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	768	SS	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.2	15	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	768	SS	Toluene	108-88-3	UG/M3	6	100%	59.7	31.7	34	120	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	768	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	6.8	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	768	SS	Total Xylenes	1330-20-7	UG/M3	6	100%	40.1	21.5	22.9	82	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	768	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	33%	8.15	7.25	15	18	3	20	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	768	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	3.4	23	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	768	SS	Trichloroethene	79-01-6	UG/M3	6	83%	228	167	63	410	27	27	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	768	SS	Vinyl Chloride	75-01-4	UG/M3	6	0%	-	-	-	-	1.9	13	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.13-2. Building 768 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	768	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	6	0%	-	-	-	-	0.17	0.37	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	768	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	0.22	0.47	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	768	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	0.17	0.37	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	768	IA	1,1-Dichloroethane	75-34-3	UG/M3	6	0%	-	-	-	-	0.13	0.28	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	768	IA	1,1-Dichloroethene	75-35-4	UG/M3	6	0%	-	-	-	-	0.063	0.13	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	768	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	5.9	13	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	768	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	0%	-	-	-	-	0.78	1.7	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	768	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	0.24	0.52	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	768	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	0.96	2	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	768	IA	1,2-Dichloroethane	107-06-2	UG/M3	6	17%	0.0950	0.0431	0.16	0.16	0.13	0.28	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	768	IA	1,2-Dichloropropane	78-87-5	UG/M3	6	0%	-	-	-	-	0.73	1.6	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	768	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	17%	0.779	0.718	2.2	2.2	0.78	1.7	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	768	IA	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	0.35	0.75	No Screening Value Available	-	-	-
Category 2	768	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	0.96	2	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	768	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	0.19	0.41	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	768	IA	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	0.57	1.2	No Screening Value Available	-	-	-
Category 2	768	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	0%	-	-	-	-	3.7	7.9	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	768	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	100%	5.52	2.31	3.7	10	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	768	IA	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	3.2	7	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	768	IA	2-Propanol	67-63-0	UG/M3	6	67%	6.68	9.10	2	24	2	2.1	No Screening Value Available	-	-	-
Category 2	768	IA	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	2.5	5.3	No Screening Value Available	-	-	-
Category 2	768	IA	4-Ethyltoluene	622-96-8	UG/M3	6	0%	-	-	-	-	0.78	1.7	No Screening Value Available	-	-	-
Category 2	768	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	6	0%	-	-	-	-	0.65	1.4	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	768	IA	Acetone	67-64-1	UG/M3	6	100%	26.3	6.8	19	35	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	768	IA	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	0.82	1.8	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	768	IA	Benzene	71-43-2	UG/M3	6	0%	-	-	-	-	0.51	1.1	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	768	IA	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	1.1	2.3	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	768	IA	Bromofom	75-25-2	UG/M3	6	0%	-	-	-	-	1.6	3.5	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	768	IA	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	3.1	6.6	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	768	IA	Carbon Disulfide	75-15-0	UG/M3	6	0%	-	-	-	-	2.5	5.3	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	768	IA	Carbon Tetrachloride	56-23-5	UG/M3	6	100%	0.592	0.018	0.58	0.62	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	768	IA	CFC-11	75-69-4	UG/M3	6	83%	1.24	0.25	1.2	1.7	1.9	1.9	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	768	IA	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	1.2	2.6	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	768	IA	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	0.22	0.48	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	768	IA	CFC-12	75-71-8	UG/M3	6	100%	2.78	0.40	2.4	3.5	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	768	IA	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	0.73	1.6	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	768	IA	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	0.21	0.45	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	768	IA	Chloroform	67-66-3	UG/M3	6	33%	0.204	0.170	0.33	0.49	0.16	0.33	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	768	IA	Chloromethane	74-87-3	UG/M3	6	100%	1.01	0.07	0.96	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	768	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	0%	-	-	-	-	0.13	0.27	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	768	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	0.72	1.5	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	768	IA	Cumene	98-82-8	UG/M3	6	0%	-	-	-	-	0.78	1.7	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	768	IA	Cyclohexane	110-82-7	UG/M3	6	0%	-	-	-	-	0.55	1.2	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	768	IA	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	1.4	2.9	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	768	IA	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	5.6	12	No Screening Value Available	-	-	-
Category 2	768	IA	Ethanol	64-17-5	UG/M3	6	100%	258	418	26	1100	-	-	No Screening Value Available	-	-	-
Category 2	768	IA	Ethylbenzene	100-41-4	UG/M3	6	0%	-	-	-	-	0.14	0.3	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	768	IA	Heptane	142-82-5	UG/M3	6	0%	-	-	-	-	0.65	1.4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	768	IA	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	8.5	18	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	768	IA	Hexane	110-54-3	UG/M3	6	17%	0.393	0.157	0.59	0.59	0.56	1.2	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	768	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	0%	-	-	-	-	0.28	0.59	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	768	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	0.57	1.2	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	768	IA	Methylene Chloride	75-09-2	UG/M3	6	17%	0.975	0.694	2.3	2.3	1.1	2.4	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	768	IA	Naphthalene	91-20-3	UG/M3	6	0%	-	-	-	-	0.42	0.89	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	768	IA	o-Xylene	95-47-6	UG/M3	6	0%	-	-	-	-	0.14	0.3	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	768	IA	Propylbenzene	103-65-1	UG/M3	6	0%	-	-	-	-	0.78	1.7	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	768	IA	Styrene	100-42-5	UG/M3	6	0%	-	-	-	-	0.68	1.4	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.4.13-2. Building 768 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	768	IA	Tetrachloroethene	127-18-4	UG/M3	6	17%	0.273	0.340	0.96	0.96	0.22	0.46	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	768	IA	Tetrahydrofuran	109-99-9	UG/M3	6	83%	7.00	5.61	4.3	18	5	5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	768	IA	Toluene	108-88-3	UG/M3	6	83%	1.23	2.24	0.22	5.8	0.26	0.26	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	768	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	1.44	3	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	768	IA	Total Xylenes	1330-20-7	UG/M3	6	0%	-	-	-	-	0.42	0.89	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	768	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	0%	-	-	-	-	0.63	1.3	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	768	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	0.72	1.5	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	768	IA	Trichloroethene	79-01-6	UG/M3	6	17%	0.121	0.050	0.19	0.19	0.17	0.36	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	768	IA	Vinyl Chloride	75-01-4	UG/M3	6	17%	0.0318	0.0177	0.063	0.063	0.041	0.087	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	768	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	768	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 2	768	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	768	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	768	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.062	0.062	-	-	-	-
Category 2	768	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	5.8	5.8	-	-	-	-
Category 2	768	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	768	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 2	768	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.94	0.94	-	-	-	-
Category 2	768	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	768	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	768	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	768	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.34	0.34	-	-	-	-
Category 2	768	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.94	0.94	-	-	-	-
Category 2	768	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 2	768	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.56	0.56	-	-	-	-
Category 2	768	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.6	3.6	-	-	-	-
Category 2	768	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	768	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	768	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	1.9	1.9	-	-	-	-
Category 2	768	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	768	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	768	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.64	0.64	-	-	-	-
Category 2	768	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	8.9	8.9	-	-	-	-	-	-
Category 2	768	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	768	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	0.5	0.5	-	-	-	-
Category 2	768	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	768	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.6	1.6	-	-	-	-
Category 2	768	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 2	768	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	768	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.59	0.59	-	-	-	-	-	-
Category 2	768	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	768	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	768	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	768	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 2	768	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	768	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	768	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.15	0.15	-	-	-	-	-	-
Category 2	768	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1	1	-	-	-	-	-	-
Category 2	768	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 2	768	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.71	0.71	-	-	-	-
Category 2	768	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	768	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.54	0.54	-	-	-	-
Category 2	768	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	768	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.5	5.5	-	-	-	-
Category 2	768	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	3	3	-	-	-	-	-	-
Category 2	768	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	768	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.64	0.64	-	-	-	-

**Table 5.4.13-2. Building 768 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	768	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.3	8.3	-	-	-	-
Category 2	768	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.55	0.55	-	-	-	-
Category 2	768	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	0%	-	-	-	-	0.27	0.27	-	-	-	-
Category 2	768	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.56	0.56	-	-	-	-
Category 2	768	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	768	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.41	0.41	-	-	-	-
Category 2	768	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	768	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	768	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	768	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	-	-	0.33	0.33	-	-	-	-	-	-
Category 2	768	OA	Tetrahydrofuran	109-99-9	UG/M3	1	100%	-	-	5.8	5.8	-	-	-	-	-	-
Category 2	768	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.54	0.54	-	-	-	-	-	-
Category 2	768	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.42	1.42	-	-	-	-
Category 2	768	OA	Total Xylenes	1330-20-7	UG/M3	1	0%	-	-	-	-	0.41	0.41	-	-	-	-
Category 2	768	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 2	768	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.71	0.71	-	-	-	-
Category 2	768	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	768	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.04	0.04	-	-	-	-

## 5.4.14 Vapor Intrusion Evaluation for Building 827

### BACKGROUND

Building 827 is a Category 1 building in Zone 2. It is a large two-story building that includes office space, a laboratory, shop, and warehouse space. It is known as the Growth Insecticides building (see Figure 5.4.14-1) and is located within the central portion of the facility designated as Zone 2. The building is approximately 5,000 ft<sup>2</sup> (465 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on February 28, 2017 and the results can be found in Appendix C. The building has central air conditioning with two HVAC systems in the administrative portion of the building. One HVAC services the administrative portion of the building with the laboratory and the other services the remainder of the building. The administrative air intake is located on the roof and the second air intake for the remainder of the building is located on the south side of the building in the southwest corner of the warehouse. There are four bay doors in the shop and warehouse portion of the building that is left open all summer. The land surrounding the building is covered in asphalt with a few decorative garden boxes out in front of the administrative building.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified degreasers, cleaners, rain and stain protector, penetration catalysts, rust breakers, heavy duty traffic paint, and lithium chloride. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On May 12, 2017, sub-slab soil gas samples were collected from 14 locations within the building. Indoor air samples were collected on May 10, 2017 at 14 locations, corresponding to the sub-slab soil gas sample locations, along with two outdoor air samples from the main air intakes. The sampling locations are shown on Figure 5.4.14-2. Summary statistics of the analytical results for sub-slab soil gas for Building 827 are presented on Table 5.4.14-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.14-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 42 of the 65 target analytes were ND in each of the 14 samples collected at Building 827. All but three of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, 39 of the ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. ND reporting limits for 1,1,2,2-tetrachloroethane, EDB, and HCB exceeded the screening value and will be further evaluated below. A total of 23 analytes were detected in one or more of the 14 sub-slab samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into three categories:

- Fourteen analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Eight analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 827-1. Of the eight analytes detected above *de minimus* levels but below screening levels, only one had a detection frequency of 100% (CFC-12) was detected in all 14 samples (100% detection frequency). Only analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, the AOI in sub-slab soil gas at Building 827 is PCE. PCE was detected in all 14 sub-slab samples and two detections exceeded the screening level.

**Table 827-1. Summary of Sub-Slab Soil Gas Detects for Building 827**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Tetrachloroethene (PCE)	100%	28 - 170,000	14%	23000
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	71%	6.7 - 1,100	0%	3500000
Acetone	79%	28 - 220	0%	3400000
Carbon Disulfide	36%	11 - 120	0%	410000
CFC-11	93%	5.6 - 280	0%	33000000
CFC-12	100%	4.4 - 11,000	0%	29000000
Hexane	79%	41 - 120	0%	410000
Toluene	79%	33 - 180	0%	2900000
Trichloroethene (TCE)	43%	4 - 1,100	0%	1200
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	57%	4.1 - 12	0%	130000
1,3,5-Trimethylbenzene	14%	7.9 - 8.2	0%	130000
2,2,4-Trimethylpentane	36%	4.5 - 84	0%	2000000
2-Butanone (Methyl Ethyl Ketone)	29%	12 - 31	0%	2900000
2-Propanol	14%	13	N/A	N/A
4-Ethyltoluene	43%	3.9 - 8.2	N/A	N/A
Benzene	79%	6 - 35	0%	2200
Carbon Tetrachloride	7%	11	0%	3000
Chloroform	7%	83	0%	7600
Cyclohexane	79%	11 - 50	0%	3500000
Ethanol	71%	9.6 - 83	N/A	N/A
Ethylbenzene	79%	4.3 - 38	0%	59000
Heptane	79%	12 - 88	0%	2000000
Total Xylenes	79%	11.2 - 78	0%	58000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, 14 indoor air samples were collected two days before the sub-slab soil gas sample locations were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, two outdoor air samples were collected immediately upwind of the building. Table 827-2 below shows the analytes detected in each of the three media sampled.

**Table 827-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	•
Acetone	•	•	•
<i>Benzene</i>	•	•	•
<i>Carbon Tetrachloride</i>	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
<i>Ethylbenzene</i>	•	•	•
<i>Heptane</i>	•	•	•
Hexane	•	•	•
Toluene	•	•	•
<i>Total Xylenes</i>	•	•	•
Tetrachloroethene (PCE)	X	•	
Trichloroethene (TCE)	•	X	
1,1,1-Trichloroethane	•	•	
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>1,3,5-Trimethylbenzene</i>	•	•	
<i>2,2,4-Trimethylpentane</i>	•	•	
Carbon Disulfide	•	•	
<i>Chloroform</i>	•	•	
<i>Cyclohexane</i>	•	•	
<i>2-Propanol</i>	•		
<i>4-Ethyltoluene</i>	•		
<i>Ethanol</i>	•		•
1,1-Dichloroethene		•	•
Chloromethane		•	•
Methylene Chloride		•	•
1,1,2-Trichloroethane		•	
1,2-Dichlorobenzene		•	
1,2-Dichloroethane		•	
1,4-Dichlorobenzene		•	
4-Methyl-2-pentanone		•	
cis-1,2-Dichloroethene		•	
Naphthalene		•	
Propylbenzene		•	
Styrene		•	
Tetrahydrofuran		•	
Vinyl Chloride		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Twenty-eight of the 65 indoor air analytes were ND in each of the samples. Seven of the ND indoor air analytes had at least one ND reporting limit above the respective screening level. These ND reporting limit exceedances are discussed further below. Those 21 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. Thirty-seven analytes were detected in indoor air with two detections (both for TCE) that exceeded screening levels (2-propanol, 4-ethyltoluene, and ethanol did not have screening levels available). Fifteen analytes were detected in at least one of the two outdoor air samples.

Table 827-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 827-3. Vapor Intrusion Evaluation for Building 827**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Tetrachloroethene (PCE)	93%	0.21 - 9.5	180	<0.24
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	7%	4.3	26000	<0.19
Acetone	100%	17 - 120	26000	14 - 19
Carbon Disulfide	7%	3.4	3100	<2.7
CFC-11	100%	1.6 - 100	250000	1.3 - 1.6
CFC-12	100%	2.2 - 2.8	250000	2.3
Hexane	79%	0.58 - 18	3100	0.66
Toluene	100%	1.3 - 35	22000	1.3 - 1.7
Trichloroethene (TCE)	100%	0.19 - 32	8.8	<0.19
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	14%	5.5 - 7	960	<0.86
1,3,5-Trimethylbenzene	14%	1.5 - 1.8	960	<0.86
2,2,4-Trimethylpentane	29%	6.9 - 1300	15000	<4.1
2-Butanone (Methyl Ethyl Ketone)	64%	2.3 - 17	22000	3.9
2-Propanol	100%	4.3 - 39	N/A	<2.1
4-Ethyltoluene	71%	0.72 - 69	N/A	<0.86
Benzene	100%	0.55 - 7.3	16	0.71 - 2
Carbon Tetrachloride	93%	0.59 - 0.72	23	0.62 - 0.63
Chloroform	93%	0.16 - 8.4	57	<0.17
Cyclohexane	21%	0.64 - 6.2	26000	<0.6
Ethanol	100%	11 - 230	N/A	6.8 - 9
Ethylbenzene	100%	0.54 - 58	440	0.3 - 0.38
Heptane	93%	0.71 - 6.9	15000	0.75 - 0.98
Total Xylenes	100%	0.6 - 27.7	440	0.64 - 0.87

N/A = No screening level available

< = Non-detect at the reporting limit provided

All but one of the analytes detected in indoor air were present at concentrations less than the indoor air screening level. TCE was detected in all 14 indoor air samples and two detected concentrations exceeded the screening level ( $8.8 \mu\text{g}/\text{m}^3$ ). Sample 827-IA-4 had an indoor air detection of  $32 \mu\text{g}/\text{m}^3$  and was collected in the women's restroom near the conference room. It is important to note that the measured indoor air result at this sample location does not represent a work day exposure due to the limited time spent by any one individual within that space. While TCE was detected in sub-slab soil gas at the co-located sample ( $110 \mu\text{g}/\text{m}^3$ ), it was detected at a concentration an order of magnitude lower than the sub-slab soil gas screening level ( $1,200 \mu\text{g}/\text{m}^3$ ). The other TCE indoor air exceedance (sample 827-IA-14 at  $12 \mu\text{g}/\text{m}^3$ ) was in the shop area where there are suspected sources of TCE (e.g., degreasers, etc.). TCE was ND ( $<8.6 \mu\text{g}/\text{m}^3$ ) in soil gas at the co-located sub-slab soil gas sample location. The remaining 12 TCE detections in indoor air were all well below the screening level and two orders of magnitude less than the exceedances (ranged from  $0.19 \mu\text{g}/\text{m}^3$  -  $0.27 \mu\text{g}/\text{m}^3$ ). Overall, in sub-slab soil

gas, TCE was detected in six out of 14 samples at concentrations ranging from 4 - 1,100  $\mu\text{g}/\text{m}^3$ , which were all below the sub-slab soil gas screening level. Therefore, there is no evidence of VI due to TCE in Building 827 at the two sample locations that had indoor air results that exceeded the indoor air screening level. However, since TCE was detected in sub-slab soil gas it will remain an indoor air AOI for Building 827 and further investigation into the TCE indoor air results will be conducted.

There were no other analytes with detected results that exceed indoor air screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 14 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Four of the analytes had similar detected concentrations to those seen in outdoor air (CFC-12, MEK, benzene, and carbon tetrachloride). Heptane was detected in 13 of the 14 total samples and all but two samples had results that were similar to concentrations detected in outdoor air. The other two samples were slightly higher than the other indoor air samples. Hexane was detected in 11 out of 14 samples, with nine results in the same order of magnitude as the outdoor air sample and two samples with results an order of magnitude higher. All detected concentrations of heptane were at least four orders of magnitude less than the screening level and the results for hexane were all at least two orders of magnitude less than the screening level.

Six analytes had results that were higher than outdoor air results (acetone, CFC-11, toluene, ethanol, ethylbenzene, and total xylenes), indicating that there is a potential for indoor sources. Acetone was detected in the outdoor air samples at 14 - 19  $\mu\text{g}/\text{m}^3$  and was detected in all 14 indoor air samples (detected results range from 17 - 120  $\mu\text{g}/\text{m}^3$ ). All but two of the detected concentrations in indoor air were the same order of magnitude as the outdoor air results. Common cleaning items and chemicals utilized in a laboratory contribute as indoor sources for acetone. Furthermore, all of the results for acetone were well below screening levels.

CFC-11 was detected in the outdoor air samples at 1.3 - 1.6  $\mu\text{g}/\text{m}^3$  and was detected in all 14 indoor air samples (detected results range from 1.6 - 100  $\mu\text{g}/\text{m}^3$ ). All but two of the detected concentrations in indoor air were the same order of magnitude as the outdoor air results. Samples 827-IA-4 and 827-IA-14 were an order of magnitude higher. However, all of the detected concentrations were at least three orders of magnitude less than the screening level.

Toluene, ethylbenzene, and total xylenes were each detected in all 14 indoor air samples. Toluene and total xylenes were each detected in 12 of the samples at concentrations that were similar to the outdoor air samples (1.3 - 1.7  $\mu\text{g}/\text{m}^3$  and 0.64 - 0.87  $\mu\text{g}/\text{m}^3$ , respectively). For toluene, the results in Sample 827-IA-02 and 827-IA-05 were an order of magnitude higher than in both the outdoor air results and the other 12 indoor air results. For total xylenes, the results in Sample 827-IA-02 and 827-IA-04 were an order of magnitude higher than outdoor air and the other 12 samples in indoor air. Sample 827-IA-02 was collected in the building entrance area immediately adjacent to the laboratory. Sample 827-IA-04 was collected in the women's restroom and sample 827-IA-05 was collected in a small office. There were 13 sample results for ethylbenzene that were similar in concentration and to outdoor air results; however, the result in Sample 827-IA-04 was an order of magnitude higher. Spray paints and degreasers are common items that contain toluene, in addition to process uses and chemicals utilized in a laboratory can contribute as indoor sources for toluene. Furthermore, the results for toluene, ethylbenzene, and total xylenes were well below screening levels.

While ethanol does not have a screening level, it was detected in ten of the fourteen sub-slab soil gas samples at a low level range of 9.6 - 83  $\mu\text{g}/\text{m}^3$  (below *de minimus* levels). Ethanol was detected in all of the indoor air samples at concentrations ranging from 11 - 230  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes.



There were seven indoor air ND analytes with at least one reporting limit that exceeded the screening levels. Five of the seven ND analytes (1,2,4-trichlorobenzene, alpha-chlorotoluene, bromodichloromethane, bromomethane, and dibromochlorotoluene) were ND in all media and each had only one reporting limit in indoor air that exceeded the screening levels, all at Sample 827-IA-04. These ND analytes were eliminated from further evaluation since all sub-slab soil gas ND reporting limits met the screening level.

EDB and HCB were ND in all media; however, all of the ND reporting limits in indoor air for HCB and 12 out of 14 reporting limits for EDB exceeded the indoor air screening levels. HCB was eliminated from further VI evaluation since only two out of 14 sub-slab soil gas samples had reporting limits that exceeded the screening level. Also, all but one of the ND indoor air reporting limits for HCB (8.4 - 9.2  $\mu\text{g}/\text{m}^3$ ) only slightly exceeded the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). The maximum reporting limit for HCB was 75  $\mu\text{g}/\text{m}^3$  and occurred in Sample 827-IA-04. Similarly, for EDB, the ND indoor air reporting limits, with the exception of the maximum reporting limit, ranged from 0.22 - 0.28  $\mu\text{g}/\text{m}^3$  which only slightly exceeded the screening level of 0.23  $\mu\text{g}/\text{m}^3$ . The maximum reporting limit (2.2  $\mu\text{g}/\text{m}^3$ ) was also from Sample 827-IA-04. Eleven of the ND reporting limits in sub-slab soil gas met the soil gas screening level for EDB. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently met screening levels for EDB and HCB. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation.

1,1,2,2-Tetrachloroethane also had one sub-slab soil gas reporting limit exceed the applicable sub-slab soil gas screening level. 1,1,2,2-Tetrachloroethane was ND in all media with 13 of 14 sub-slab soil gas reporting limits that met the screening level. In addition, all of the indoor air reporting limits for 1,1,2,2-tetrachloroethane met the screening levels. Therefore, the one sub-slab soil gas reporting limit exceedance for 1,1,2,2-tetrachloroethane is eliminated from further evaluation.

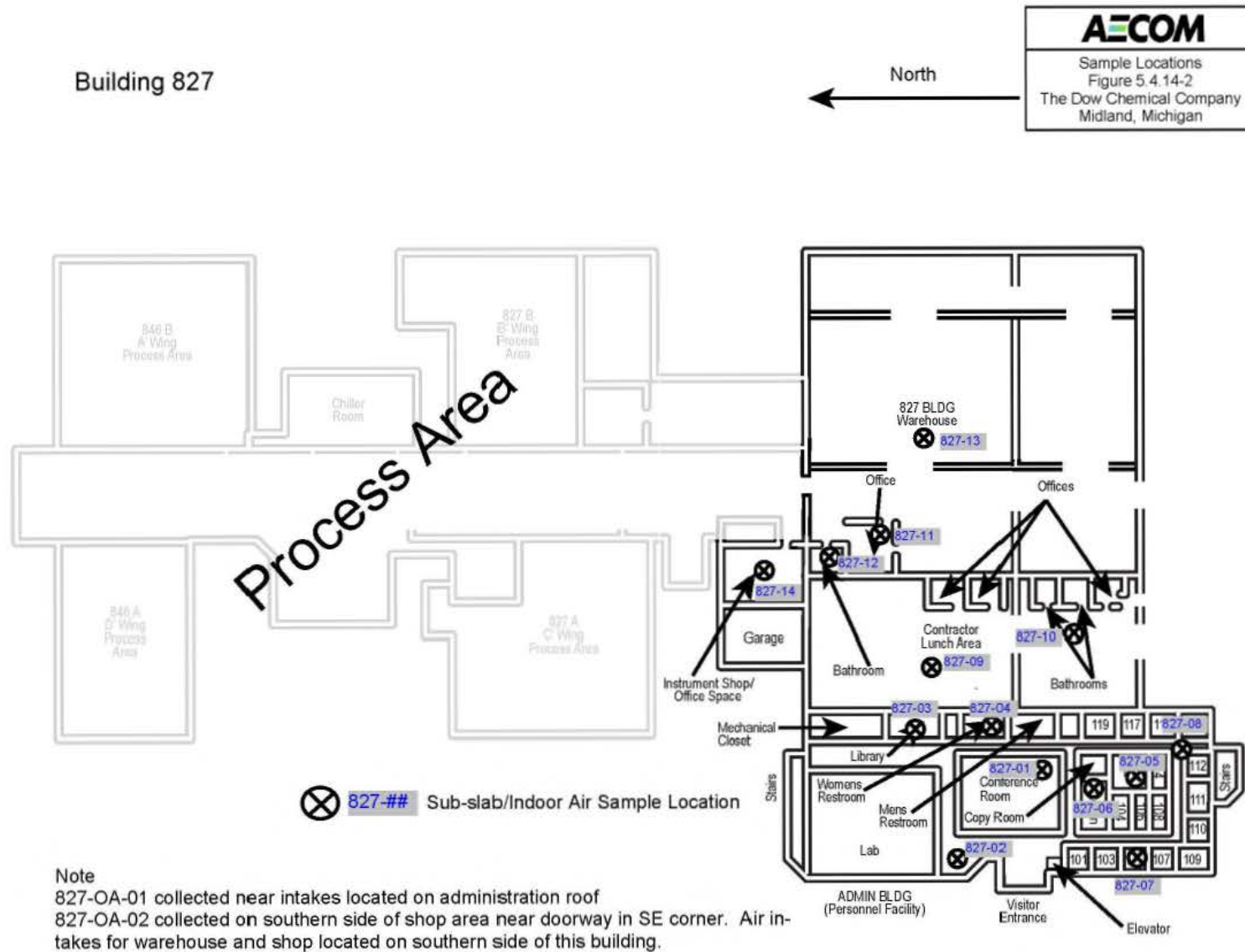
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas results, the VI pathway at Building 827 is an insignificant exposure pathway based on current use; however, based on the sub-slab soil gas exceedances for PCE, the indoor air exceedances for TCE, and given the potential for future VI, Building 827 was placed in VI Path Forward Building Group 2 (see Figure 5-3) and additional sampling is recommended. Further investigation into the TCE exceedances in indoor air will be conducted. Additionally, PCE will be added to Industrial Hygiene monitoring for the building.

Figure 5.4.14-1. Building 827 Location



Figure 5.4.14-2. Building 827 Sample Locations



**Table 5.4.14-1. Building 827 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	827	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	14	71%	213	279	6.7	1100	4.5	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	827	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	14	0%	-	-	-	-	5	330	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	7%
Category 1	827	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	14	0%	-	-	-	-	4	260	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 1	827	SS	1,1-Dichloroethane	75-34-3	UG/M3	14	0%	-	-	-	-	3	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 1	827	SS	1,1-Dichloroethene	75-35-4	UG/M3	14	0%	-	-	-	-	2.9	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 1	827	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	14	0%	-	-	-	-	22	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	827	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	14	57%	23.7	37.1	4.1	12	4.1	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	827	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	14	0%	-	-	-	-	5.6	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	29%
Category 1	827	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	14	0%	-	-	-	-	4.4	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 1	827	SS	1,2-Dichloroethane	107-06-2	UG/M3	14	0%	-	-	-	-	3	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 1	827	SS	1,2-Dichloropropane	78-87-5	UG/M3	14	0%	-	-	-	-	3.4	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 1	827	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	14	14%	21.8	38.0	7.9	8.2	3.6	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 1	827	SS	1,3-Butadiene	106-99-0	UG/M3	14	0%	-	-	-	-	1.6	110	No Screening Value Available	-	-	-
Category 1	827	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	14	0%	-	-	-	-	4.4	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 1	827	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	14	0%	-	-	-	-	4.4	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 1	827	SS	1,4-Dioxane	123-91-1	UG/M3	14	0%	-	-	-	-	10	700	No Screening Value Available	-	-	-
Category 1	827	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	14	36%	29.1	38.8	4.5	84	3.4	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	827	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	14	29%	54.6	89.9	12	31	8.8	570	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	827	SS	2-Hexanone	591-78-6	UG/M3	14	0%	-	-	-	-	12	790	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 1	827	SS	2-Propanol	67-63-0	UG/M3	14	14%	43.8	76.8	13	13	7.3	480	No Screening Value Available	-	-	-
Category 1	827	SS	3-Chloropropene	107-05-1	UG/M3	14	0%	-	-	-	-	9.1	610	No Screening Value Available	-	-	-
Category 1	827	SS	4-Ethyltoluene	622-96-8	UG/M3	14	43%	22.7	37.6	3.9	8.2	3.7	240	No Screening Value Available	-	-	-
Category 1	827	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	14	0%	-	-	-	-	3	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	827	SS	Acetone	67-64-1	UG/M3	14	79%	108	80	28	220	370	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 1	827	SS	alpha-Chlorotoluene	100-44-7	UG/M3	14	0%	-	-	-	-	3.8	250	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 1	827	SS	Benzene	71-43-2	UG/M3	14	79%	22.5	21.8	6	35	50	150	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 1	827	SS	Bromochloromethane	74-97-5	UG/M3	12	0%	-	-	-	-	15	330	No Screening Value Available	-	-	-
Category 1	827	SS	Bromodichloromethane	75-27-4	UG/M3	14	0%	-	-	-	-	4.9	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 1	827	SS	Bromoform	75-25-2	UG/M3	14	0%	-	-	-	-	7.5	500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 1	827	SS	Bromomethane	74-83-9	UG/M3	14	0%	-	-	-	-	28	750	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 1	827	SS	Carbon Disulfide	75-15-0	UG/M3	14	36%	66.1	95.4	11	120	9.1	600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	827	SS	Carbon Tetrachloride	56-23-5	UG/M3	14	7%	27.7	48.6	11	11	4.6	300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 1	827	SS	CFC-11	75-69-4	UG/M3	14	93%	83.8	76.8	5.6	280	220	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 1	827	SS	CFC-113	76-13-1	UG/M3	14	0%	-	-	-	-	5.6	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	827	SS	CFC-114	76-14-2	UG/M3	14	0%	-	-	-	-	5.1	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 1	827	SS	CFC-12	75-71-8	UG/M3	14	100%	1948	3265	4.4	11000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 1	827	SS	Chlorobenzene	108-90-7	UG/M3	14	0%	-	-	-	-	3.4	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	827	SS	Chloroethane	75-00-3	UG/M3	14	0%	-	-	-	-	7.7	510	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 1	827	SS	Chloroform	67-66-3	UG/M3	14	7%	26.9	41.3	83	83	3.6	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 1	827	SS	Chloromethane	74-87-3	UG/M3	14	0%	-	-	-	-	15	400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 1	827	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	14	0%	-	-	-	-	2.9	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 1	827	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	14	0%	-	-	-	-	3.3	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	827	SS	Cumene	98-82-8	UG/M3	14	0%	-	-	-	-	3.6	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 1	827	SS	Cyclohexane	110-82-7	UG/M3	14	79%	30.8	23.4	11	50	54	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 1	827	SS	Dibromochloromethane	124-48-1	UG/M3	14	0%	-	-	-	-	6.2	410	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 1	827	SS	Dibromomethane	74-95-3	UG/M3	14	0%	-	-	-	-	21	1400	No Screening Value Available	-	-	-
Category 1	827	SS	Ethanol	64-17-5	UG/M3	14	71%	47.3	54.6	9.6	83	63	360	No Screening Value Available	-	-	-
Category 1	827	SS	Ethylbenzene	100-41-4	UG/M3	14	79%	26.2	31.1	4.3	38	68	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 1	827	SS	Heptane	142-82-5	UG/M3	14	79%	41.1	29.7	12	88	64	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 1	827	SS	Hexachlorobutadiene	87-68-3	UG/M3	14	0%	-	-	-	-	31	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	14%
Category 1	827	SS	Hexane	110-54-3	UG/M3	14	79%	65.5	26.5	41	120	56	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 1	827	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	14	79%	33.3	29.7	9.4	60	68	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	827	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	14	0%	-	-	-	-	10	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 1	827	SS	Methylene Chloride	75-09-2	UG/M3	14	0%	-	-	-	-	25	670	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 1	827	SS	Naphthalene	91-20-3	UG/M3	14	0%	-	-	-	-	7.6	1000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 1	827	SS	o-Xylene	95-47-6	UG/M3	14	64%	21.9	32.3	3.3	13	3.6	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	827	SS	Propylbenzene	103-65-1	UG/M3	14	0%	-	-	-	-	3.6	240	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.14-1. Building 827 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	827	SS	5.4.	100-42-5	UG/M3	14	0%	-	-	-	-	3.1	210	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 1	827	SS	Tetrachloroethene	127-18-4	UG/M3	14	100%	25411	59403	28	170000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	14%	0%
Category 1	827	SS	Tetrahydrofuran	109-99-9	UG/M3	14	0%	-	-	-	-	2.2	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 1	827	SS	Toluene	108-88-3	UG/M3	14	79%	68.5	40.5	33	180	59	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 1	827	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	14	0%	-	-	-	-	6.6	440	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	827	SS	Total Xylenes	1330-20-7	UG/M3	14	79%	55.2	61.0	11.2	78	136	420	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 1	827	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	14	0%	-	-	-	-	2.9	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 1	827	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	14	0%	-	-	-	-	3.3	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 1	827	SS	Trichloroethene	79-01-6	UG/M3	14	43%	162	363	4	1100	3.9	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 1	827	SS	Vinyl Chloride	75-01-4	UG/M3	14	0%	-	-	-	-	1.9	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.14-2. Building 827 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	827	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	14	7%	0.436	1.126	4.3	4.3	0.16	1.5	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	827	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	14	0%	-	-	-	-	0.2	1.9	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 1	827	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	14	14%	0.411	0.886	1.5	3.2	0.16	0.2	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 1	827	IA	1,1-Dichloroethane	75-34-3	UG/M3	14	0%	-	-	-	-	0.12	1.1	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 1	827	IA	1,1-Dichloroethene	75-35-4	UG/M3	14	100%	5.44	15.63	0.13	58	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 1	827	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	14	0%	-	-	-	-	5.4	52	Vapor Intrusion Indoor Air Screening Levels	18	0%	7%
Category 1	827	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	14	14%	1.46	2.20	5.5	7	0.74	6.9	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	827	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	14	0%	-	-	-	-	0.22	2.2	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	86%
Category 1	827	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	14	7%	0.844	1.032	1.7	1.7	0.88	8.5	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 1	827	IA	1,2-Dichloroethane	107-06-2	UG/M3	14	21%	0.142	0.143	0.18	0.3	0.12	1.1	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 1	827	IA	1,2-Dichloropropane	78-87-5	UG/M3	14	0%	-	-	-	-	0.68	6.5	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 1	827	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	14	14%	0.806	0.885	1.5	1.8	0.74	6.9	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 1	827	IA	1,3-Butadiene	106-99-0	UG/M3	14	0%	-	-	-	-	0.32	3.1	No Screening Value Available	-	-	-
Category 1	827	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	14	0%	-	-	-	-	0.88	8.5	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	827	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	14	7%	0.160	0.200	0.2	0.2	0.18	1.7	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 1	827	IA	1,4-Dioxane	123-91-1	UG/M3	14	0%	-	-	-	-	0.53	5.1	No Screening Value Available	-	-	-
Category 1	827	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	14	29%	110	347	6.9	1300	3.5	4.3	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	827	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	14	64%	4.28	4.37	2.3	17	2.5	21	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	827	IA	2-Hexanone	591-78-6	UG/M3	14	0%	-	-	-	-	3	29	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 1	827	IA	2-Propanol	67-63-0	UG/M3	14	100%	13.8	12.2	4.3	39	-	-	No Screening Value Available	-	-	-
Category 1	827	IA	3-Chloropropene	107-05-1	UG/M3	14	0%	-	-	-	-	2.3	22	No Screening Value Available	-	-	-
Category 1	827	IA	4-Ethyltoluene	622-96-8	UG/M3	14	71%	9.45	20.49	0.72	69	0.83	0.91	No Screening Value Available	-	-	-
Category 1	827	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	14	14%	0.618	0.710	0.73	1.3	0.6	5.8	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	827	IA	Acetone	67-64-1	UG/M3	14	100%	51.2	35.1	17	120	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	827	IA	alpha-Chlorotoluene	100-44-7	UG/M3	14	0%	-	-	-	-	0.76	7.3	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	7%
Category 1	827	IA	Benzene	71-43-2	UG/M3	14	100%	1.89	2.10	0.55	7.3	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 1	827	IA	Bromodichloromethane	75-27-4	UG/M3	14	0%	-	-	-	-	0.98	9.4	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	7%
Category 1	827	IA	Bromoform	75-25-2	UG/M3	14	0%	-	-	-	-	1.5	14	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 1	827	IA	Bromomethane	74-83-9	UG/M3	14	0%	-	-	-	-	2.8	27	Vapor Intrusion Indoor Air Screening Levels	22	0%	7%
Category 1	827	IA	Carbon Disulfide	75-15-0	UG/M3	14	7%	2.11	2.62	3.4	3.4	2.3	22	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	827	IA	Carbon Tetrachloride	56-23-5	UG/M3	14	93%	0.654	0.080	0.59	0.72	1.8	1.8	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 1	827	IA	CFC-11	75-69-4	UG/M3	14	100%	11.7	27.4	1.6	100	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 1	827	IA	CFC-113	76-13-1	UG/M3	14	0%	-	-	-	-	1.1	11	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	827	IA	CFC-114	76-14-2	UG/M3	14	0%	-	-	-	-	0.2	2	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 1	827	IA	CFC-12	75-71-8	UG/M3	14	100%	2.46	0.16	2.2	2.8	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 1	827	IA	Chlorobenzene	108-90-7	UG/M3	14	0%	-	-	-	-	0.68	6.5	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	827	IA	Chloroethane	75-00-3	UG/M3	14	0%	-	-	-	-	0.19	1.9	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 1	827	IA	Chloroform	67-66-3	UG/M3	14	93%	0.945	2.233	0.16	8.4	0.18	0.18	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 1	827	IA	Chloromethane	74-87-3	UG/M3	14	100%	1.46	0.24	1.1	2	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 1	827	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	14	14%	0.314	0.724	0.92	2.7	0.12	0.15	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	827	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	14	0%	-	-	-	-	0.67	6.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	827	IA	Cumene	98-82-8	UG/M3	14	0%	-	-	-	-	0.72	6.9	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 1	827	IA	Cyclohexane	110-82-7	UG/M3	14	21%	1.26	2.03	0.64	6.2	0.52	4.8	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 1	827	IA	Dibromochloromethane	124-48-1	UG/M3	14	0%	-	-	-	-	1.2	12	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	7%
Category 1	827	IA	Dibromomethane	74-95-3	UG/M3	14	0%	-	-	-	-	5.2	50	No Screening Value Available	-	-	-
Category 1	827	IA	Ethanol	64-17-5	UG/M3	14	100%	60.9	64.0	11	230	-	-	No Screening Value Available	-	-	-
Category 1	827	IA	Ethylbenzene	100-41-4	UG/M3	14	100%	8.05	17.44	0.54	58	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	827	IA	Heptane	142-82-5	UG/M3	14	93%	1.89	1.89	0.71	6.9	5.8	5.8	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 1	827	IA	Hexachlorobutadiene	87-68-3	UG/M3	14	0%	-	-	-	-	7.8	75	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 1	827	IA	Hexane	110-54-3	UG/M3	14	79%	3.09	5.55	0.58	18	0.6	5	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 1	827	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	14	100%	3.71	6.49	0.44	21	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	827	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	14	0%	-	-	-	-	0.53	5.1	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 1	827	IA	Methylene Chloride	75-09-2	UG/M3	14	36%	1.59	1.61	1.4	5.3	1	9.8	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 1	827	IA	Naphthalene	91-20-3	UG/M3	14	14%	0.396	0.448	0.53	0.76	0.39	3.7	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 1	827	IA	o-Xylene	95-47-6	UG/M3	14	93%	1.16	2.08	0.16	6.7	1.2	1.2	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	827	IA	Propylbenzene	103-65-1	UG/M3	14	14%	0.749	0.837	1.1	1.4	0.74	6.9	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 1	827	IA	Styrene	100-42-5	UG/M3	14	21%	0.764	0.849	0.87	2.4	0.64	6	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%



**Table 5.4.14-2. Building 827 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	827	IA	Tetrachloroethene	127-18-4	UG/M3	14	93%	1.16	2.50	0.21	9.5	0.25	0.25	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 1	827	IA	Tetrahydrofuran	109-99-9	UG/M3	14	7%	1.98	2.48	2.6	2.6	2.2	21	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 1	827	IA	Toluene	108-88-3	UG/M3	14	100%	7.20	10.76	1.3	35	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 1	827	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	14	0%	-	-	-	-	1.34	12.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	827	IA	Total Xylenes	1330-20-7	UG/M3	14	100%	4.87	8.56	0.6	27.7	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 1	827	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	14	0%	-	-	-	-	0.58	5.6	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 1	827	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	14	0%	-	-	-	-	0.67	6.4	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 1	827	IA	Trichloroethene	79-01-6	UG/M3	14	100%	3.33	8.83	0.19	32	-	-	Vapor Intrusion Indoor Air Screening Levels	8.8	14%	0%
Category 1	827	IA	Vinyl Chloride	75-01-4	UG/M3	14	79%	1.13	3.23	0.047	12	0.038	0.047	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 1	827	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	0.18	0.19	-	-	-	-
Category 1	827	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	0.23	0.24	-	-	-	-
Category 1	827	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	0.18	0.19	-	-	-	-
Category 1	827	OA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	827	OA	1,1-Dichloroethene	75-35-4	UG/M3	2	50%	0.0658	0.0456	0.098	0.098	0.067	0.067	-	-	-	-
Category 1	827	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	6.3	6.4	-	-	-	-
Category 1	827	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	0.84	0.86	-	-	-	-
Category 1	827	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	0.26	0.27	-	-	-	-
Category 1	827	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	1	1	-	-	-	-
Category 1	827	OA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 1	827	OA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	0.78	0.8	-	-	-	-
Category 1	827	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	0.84	0.86	-	-	-	-
Category 1	827	OA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	0.38	0.38	-	-	-	-
Category 1	827	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	1	1	-	-	-	-
Category 1	827	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	0.2	0.21	-	-	-	-
Category 1	827	OA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	0.61	0.63	-	-	-	-
Category 1	827	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	4	4.1	-	-	-	-
Category 1	827	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	50%	2.58	1.87	3.9	3.9	2.5	2.5	-	-	-	-
Category 1	827	OA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	3.5	3.6	-	-	-	-
Category 1	827	OA	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	2.1	2.1	-	-	-	-
Category 1	827	OA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 1	827	OA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	0.84	0.86	-	-	-	-
Category 1	827	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	0.7	0.71	-	-	-	-
Category 1	827	OA	Acetone	67-64-1	UG/M3	2	100%	16.5	3.5	14	19	-	-	-	-	-	-
Category 1	827	OA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	0.88	0.9	-	-	-	-
Category 1	827	OA	Benzene	71-43-2	UG/M3	2	100%	1.36	0.91	0.71	2	-	-	-	-	-	-
Category 1	827	OA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	1.1	1.2	-	-	-	-
Category 1	827	OA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 1	827	OA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	3.3	3.4	-	-	-	-
Category 1	827	OA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	2.6	2.7	-	-	-	-
Category 1	827	OA	Carbon Tetrachloride	56-23-5	UG/M3	2	100%	0.625	0.007	0.62	0.63	-	-	-	-	-	-
Category 1	827	OA	CFC-11	75-69-4	UG/M3	2	100%	1.45	0.21	1.3	1.6	-	-	-	-	-	-
Category 1	827	OA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 1	827	OA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 1	827	OA	CFC-12	75-71-8	UG/M3	2	100%	2.30	0.00	2.3	2.3	-	-	-	-	-	-
Category 1	827	OA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	0.78	0.8	-	-	-	-
Category 1	827	OA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	0.22	0.23	-	-	-	-
Category 1	827	OA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 1	827	OA	Chloromethane	74-87-3	UG/M3	2	100%	1.15	0.07	1.1	1.2	-	-	-	-	-	-
Category 1	827	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	0.13	0.14	-	-	-	-
Category 1	827	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	0.77	0.79	-	-	-	-
Category 1	827	OA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	0.84	0.86	-	-	-	-
Category 1	827	OA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	0.58	0.6	-	-	-	-
Category 1	827	OA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	1.4	1.5	-	-	-	-
Category 1	827	OA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	6	6.2	-	-	-	-
Category 1	827	OA	Ethanol	64-17-5	UG/M3	2	100%	7.90	1.56	6.8	9	-	-	-	-	-	-
Category 1	827	OA	Ethylbenzene	100-41-4	UG/M3	2	100%	0.340	0.057	0.3	0.38	-	-	-	-	-	-
Category 1	827	OA	Heptane	142-82-5	UG/M3	2	100%	0.865	0.163	0.75	0.98	-	-	-	-	-	-

**Table 5.4.14-2. Building 827 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 1	827	OA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	9.1	9.3	-	-	-	-
Category 1	827	OA	Hexane	110-54-3	UG/M3	2	50%	0.483	0.251	0.66	0.66	0.61	0.61	-	-	-	-
Category 1	827	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	100%	0.560	0.113	0.48	0.64	-	-	-	-	-	-
Category 1	827	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	0.61	0.63	-	-	-	-
Category 1	827	OA	Methylene Chloride	75-09-2	UG/M3	2	50%	1.00	0.57	1.4	1.4	1.2	1.2	-	-	-	-
Category 1	827	OA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	0.44	0.46	-	-	-	-
Category 1	827	OA	o-Xylene	95-47-6	UG/M3	2	100%	0.195	0.049	0.16	0.23	-	-	-	-	-	-
Category 1	827	OA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	0.84	0.86	-	-	-	-
Category 1	827	OA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	0.72	0.74	-	-	-	-
Category 1	827	OA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	0.23	0.24	-	-	-	-
Category 1	827	OA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.5	2.6	-	-	-	-
Category 1	827	OA	Toluene	108-88-3	UG/M3	2	100%	1.50	0.28	1.3	1.7	-	-	-	-	-	-
Category 1	827	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	1.54	1.58	-	-	-	-
Category 1	827	OA	Total Xylenes	1330-20-7	UG/M3	2	100%	0.755	0.163	0.64	0.87	-	-	-	-	-	-
Category 1	827	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	0.67	0.69	-	-	-	-
Category 1	827	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	0.77	0.79	-	-	-	-
Category 1	827	OA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	0.18	0.19	-	-	-	-
Category 1	827	OA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	0.043	0.044	-	-	-	-



## 5.4.15 Vapor Intrusion Evaluation for Building 849

### BACKGROUND

Building 849 is a Category 2 building in Zone 2. This building is a warehouse with a small office space. It is known as the 768 Building Warehouse (see Figure 5.4.15-1) and is located within the central portion of the facility designated as Zone 2. The building is only single story tall. It is approximately 8,360 ft<sup>2</sup> (777 m<sup>2</sup>) and sits on a 2.5 - 3 ft above grade slab. People who work in this building are only present for approximately one hour at a time. The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the west.

A building survey was performed on March 3, 2017 and the results can be found in Appendix C. The building has individual air conditioning units with the office air intake associated with the individual unit (in the northeast corner of the northeast office) and there is an air intake for the warehouse air conditioner on the roof. There are a total of five bay doors in the warehouse portion of the building that are only left open when occupied during the summer months. The land surrounding the building is a combination of asphalt and gravel.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners and a penetrating catalyst. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 21, 2017, sub-slab soil gas samples were collected from six locations within the building. Indoor air samples were collected on April 20, 2017 at six locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.15-2. Summary statistics of the analytical results for sub-slab soil gas for Building 849 are presented on Table 5.4.15-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.15-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 40 of the 65 target analytes were ND in each of the six samples collected at Building 849. All but one of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, the 39 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. One analyte (EDB) had at least one reporting limit that exceeded the sub-slab soil gas screening level and is discussed further below. A total of 25 analytes were detected in one or more of the 6 sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Eighteen were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Seven were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 849-1. Of the seven analytes detected above *de minimus* levels but below screening levels, three had detection frequencies of 100% (acetone, ethylbenzene, and total xylenes). Only the analytes present in the sub-slab soil gas at concentrations

above the non-residential screening levels are AOIs for VI. Therefore, there are no AOIs in sub-slab soil gas at Building 849.

**Table 849-1. Summary of Sub-Slab Soil Gas Detects for Building 849**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,2,4-Trimethylbenzene	67%	7.8 - 290	0%	130000
1,3,5-Trimethylbenzene	67%	5.6 - 210	0%	130000
4-Ethyltoluene	83%	5.8 - 140	N/A	N/A
Acetone	100%	240 - 420	0%	3400000
Ethylbenzene	100%	8.8 - 2100	0%	59000
Tetrachloroethene	83%	54 - 180	0%	23000
Total Xylenes	100%	17.3 - 12200	0%	58000
<b>Below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	67%	18 - 25	0%	3500000
1,3-Butadiene	33%	3 - 3.4	N/A	N/A
2-Butanone (Methyl Ethyl Ketone)	67%	17 - 24	0%	2900000
2-Propanol	83%	10 - 43	N/A	N/A
4-Methyl-2-pentanone	17%	5.3	0%	1800000
Benzene	83%	3.6 - 19	0%	2200
CFC-11	50%	5.4 - 24	0%	33000000
CFC-12	67%	4 - 95	0%	29000000
Chlorobenzene	17%	9	0%	41000
Chloroform	17%	17	0%	7600
Cumene	50%	6.5 - 13	0%	1700
Cyclohexane	67%	5.4 - 14	0%	3500000
Ethanol	67%	14 - 92	N/A	N/A
Heptane	83%	7.6 - 33	0%	2000000
Hexane	83%	15 - 60	0%	410000
Naphthalene	17%	9.6	0%	1500
Propylbenzene	50%	6.6 - 22	0%	12000
Toluene	100%	16 - 76	0%	2900000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, six indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 849-2 below shows the analytes detected in each of the three media sampled.

**Table 849-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	•
Acetone	•	•	•
<i>Benzene</i>	•	•	•
<i>CFC-11</i>	•	•	•
<i>CFC-12</i>	•	•	•
<i>Ethanol</i>	•	•	•
<i>Heptane</i>	•	•	•
<i>Hexane</i>	•	•	•
<i>Toluene</i>	•	•	•
Total Xylenes	•	•	•
1,3,5-Trimethylbenzene	•	•	
<i>2-Propanol</i>	•	•	
Ethylbenzene	•	•	
<i>Naphthalene</i>	•	•	
<i>1,1,1-Trichloroethane</i>	•		
1,2,4-Trimethylbenzene	•		
<i>1,3-Butadiene</i>	•		
4-Ethyltoluene	•		
<i>4-Methyl-2-pentanone</i>	•		
<i>Chlorobenzene</i>	•		
<i>Chloroform</i>	•		
<i>Cumene</i>	•		
<i>Cyclohexane</i>	•		
<i>Propylbenzene</i>	•		
Tetrachloroethene	•		
Carbon Tetrachloride		•	•
Chloromethane		•	•
1,2-Dichloropropane		•	
Carbon Disulfide		•	
Methylene Chloride		•	
Styrene		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty-five of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 43 ND indoor air analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty analytes were detected in the indoor air in Building 849 and there were no detected concentrations that exceeded screening levels (4-ethyltoluene, 1,3-butadiene, 2-propanol, and ethanol do not have screening levels available). Twelve analytes were detected in the outdoor air sample.

Table 849-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 849-3. Vapor Intrusion Evaluation for Building 849**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,2,4-Trimethylbenzene	0%	<0.79 - <1.1	960	<0.81
1,3,5-Trimethylbenzene	100%	6.5 - 39	960	<0.81
4-Ethyltoluene	0%	<0.79 - <1.1	N/A	<0.81
Acetone	100%	7.9 - 30	26000	25
Ethylbenzene	100%	0.36 - 1.4	440	<0.14
Tetrachloroethene	0%	<0.22 - <0.31	180	<0.22
Total Xylenes	100%	1.05 - 5.1	440	0.4
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1,1-Trichloroethane	0%	<0.18 - <0.25	26000	<0.18
1,3-Butadiene	0%	<0.36 - <0.5	N/A	<0.36
2-Butanone (Methyl Ethyl Ketone)	83%	4.7 - 8.5	22000	6.5
2-Propanol	67%	2.8 - 80	N/A	<2
4-Methyl-2-pentanone	0%	<0.66 - <0.92	13000	<0.67
Benzene	100%	0.57 - 1.9	16	0.54
CFC-11	100%	1.6 - 3.1	250000	1.1
CFC-12	100%	2.1 - 2.9	220000	2.1
Chlorobenzene	0%	<0.74 - <1	310	<0.76
Chloroform	0%	<0.16 - <0.22	57	<0.16
Cumene	0%	<0.79 - <1.1	13	<0.81
Cyclohexane	0%	<0.55 - <0.78	26000	<0.56
Ethanol	100%	9.1 - 30	N/A	6.7
Heptane	50%	0.67 - 0.96	15000	0.8
Hexane	83%	0.67 - 3.1	3100	0.81
Naphthalene	17%	0.49	11	<0.43
Propylbenzene	0%	<0.79 - <1.1	88	<0.81
Toluene	100%	0.85 - 1.6	22000	0.65

N/A = No screening level available  
 < = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 12 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Eight of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. Total xylenes was detected in all six indoor air samples at concentrations that ranged from 1.05 - 5.1  $\mu\text{g}/\text{m}^3$  and was detected in outdoor air at 0.4  $\mu\text{g}/\text{m}^3$ . All of the indoor air sample results were an order of magnitude higher than the outdoor air sample, indicating there is the potential for indoor source to be contributing to the presence of total xylenes. All of the results for total xylenes were at least two orders of magnitude below the screening level.

While ethanol does not have a screening level, it was detected in four of six sub-slab soil gas samples at low levels ranging from 14 - 92  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all six of the indoor air samples at concentrations ranging from 9.1 - 30  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 6.7  $\mu\text{g}/\text{m}^3$ . Ethanol is

present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, cleaners, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceed the indoor air screening levels and for EDB, one of six ND sub-slab soil gas reporting limits exceed the soil gas screening level. HCB was eliminated from further VI evaluation since all sub-slab soil gas ND reporting limits met the screening level. Also, the ND indoor air reporting limits for HCB ( $8.6 - 12 \mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ). Similarly, for EDB, the ND indoor air reporting limits ( $0.25 - 0.35 \mu\text{g}/\text{m}^3$ ) only very slightly exceed the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). Additionally, five of six ND sub-slab soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently met screening levels for these two analytes. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation for Building 849.

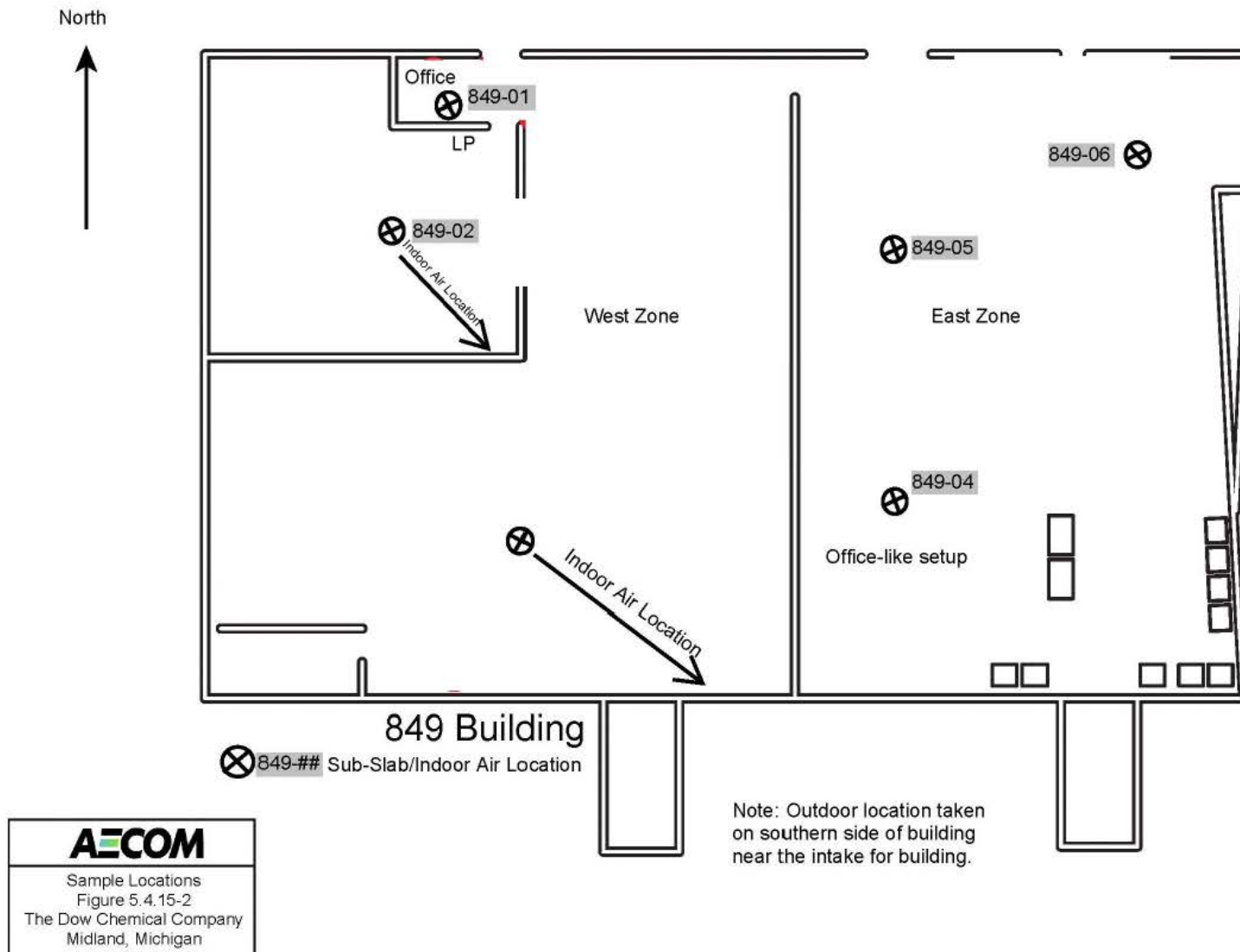
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 849 is an insignificant exposure pathway based on current use. Building 849 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.15-1. Building 849 Location**



Figure 5.4.15-2. Building 849 Sample Locations



**Table 5.4.15-1. Building 849 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	849	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	6	67%	19.5	9.3	18	25	5	59	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	849	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	5.5	74	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	849	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	4.4	59	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	849	SS	1,1-Dichloroethane	75-34-3	UG/M3	6	0%	-	-	-	-	3.2	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	849	SS	1,1-Dichloroethene	75-35-4	UG/M3	6	0%	-	-	-	-	3.2	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	849	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	24	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	849	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	67%	74.8	112.7	7.8	290	5.5	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	849	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	6.2	83	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	17%
Category 2	849	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	4.8	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	849	SS	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	3.2	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	849	SS	1,2-Dichloropropane	78-87-5	UG/M3	6	0%	-	-	-	-	3.7	50	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	849	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	67%	52.8	80.8	5.6	210	4.5	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	849	SS	1,3-Butadiene	106-99-0	UG/M3	6	33%	3.61	4.24	3	3.4	2	24	No Screening Value Available	-	-	-
Category 2	849	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	4.8	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	849	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	4.8	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	849	SS	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	12	150	No Screening Value Available	-	-	-
Category 2	849	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	0%	-	-	-	-	3.8	50	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	849	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	67%	26.4	20.0	17	24	13	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	849	SS	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	13	180	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	849	SS	2-Propanol	67-63-0	UG/M3	6	83%	22.5	18.7	10	43	100	100	No Screening Value Available	-	-	-
Category 2	849	SS	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	10	130	No Screening Value Available	-	-	-
Category 2	849	SS	4-Ethyltoluene	622-96-8	UG/M3	6	83%	42.0	52.2	5.8	140	53	53	No Screening Value Available	-	-	-
Category 2	849	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	6	17%	5.86	8.02	5.3	5.3	3.6	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	849	SS	Acetone	67-64-1	UG/M3	6	100%	322	72	240	420	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	849	SS	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	4.2	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	849	SS	Benzene	71-43-2	UG/M3	6	83%	11.6	5.9	3.6	19	34	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	849	SS	Bromochloromethane	74-97-5	UG/M3	6	0%	-	-	-	-	17	230	No Screening Value Available	-	-	-
Category 2	849	SS	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	5.4	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	849	SS	Bromoform	75-25-2	UG/M3	6	0%	-	-	-	-	8.3	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	849	SS	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	31	420	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	849	SS	Carbon Disulfide	75-15-0	UG/M3	6	0%	-	-	-	-	10	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	849	SS	Carbon Tetrachloride	56-23-5	UG/M3	6	0%	-	-	-	-	5.1	68	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	849	SS	CFC-11	75-69-4	UG/M3	6	50%	12.1	11.8	5.4	24	5.2	60	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	849	SS	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	6.2	82	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	849	SS	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	5.6	75	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	849	SS	CFC-12	75-71-8	UG/M3	6	67%	28.7	40.6	4	95	4.4	4.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	849	SS	Chlorobenzene	108-90-7	UG/M3	6	17%	7.05	8.97	9	9	4.1	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	849	SS	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	8.5	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	849	SS	Chloroform	67-66-3	UG/M3	6	17%	8.73	10.30	17	17	4.3	52	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	849	SS	Chloromethane	74-87-3	UG/M3	6	0%	-	-	-	-	17	220	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	849	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	0%	-	-	-	-	3.2	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	849	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	3.6	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	849	SS	Cumene	98-82-8	UG/M3	6	50%	9.86	9.12	6.5	13	4.4	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	849	SS	Cyclohexane	110-82-7	UG/M3	6	67%	9.12	6.27	5.4	14	3.2	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	849	SS	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	6.8	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	849	SS	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	23	300	No Screening Value Available	-	-	-
Category 2	849	SS	Ethanol	64-17-5	UG/M3	6	67%	32.0	31.9	14	92	8.5	81	No Screening Value Available	-	-	-
Category 2	849	SS	Ethylbenzene	100-41-4	UG/M3	6	100%	417	834	8.8	2100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	849	SS	Heptane	142-82-5	UG/M3	6	83%	17.9	9.5	7.6	33	44	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	849	SS	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	34	460	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	849	SS	Hexane	110-54-3	UG/M3	6	83%	30.2	16.4	15	60	38	38	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	849	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	100%	1921	3828	12	9600	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	849	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	12	160	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	849	SS	Methylene Chloride	75-09-2	UG/M3	6	0%	-	-	-	-	28	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	849	SS	Naphthalene	91-20-3	UG/M3	6	17%	14.1	20.1	9.6	9.6	9.3	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	849	SS	o-Xylene	95-47-6	UG/M3	6	100%	561	1033	5.3	2600	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	849	SS	Propylbenzene	103-65-1	UG/M3	6	50%	12.1	10.3	6.6	22	4.4	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%



**Table 5.4.15-1. Building 849 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	849	SS	Styrene	100-42-5	UG/M3	6	0%	-	-	-	-	3.4	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	849	SS	Tetrachloroethene	127-18-4	UG/M3	6	83%	92.1	58.3	54	180	73	73	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	849	SS	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.4	32	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	849	SS	Toluene	108-88-3	UG/M3	6	100%	46.0	20.5	16	76	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	849	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	7.2	98	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	849	SS	Total Xylenes	1330-20-7	UG/M3	6	100%	2482	4859	17.3	12200	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	849	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	0%	-	-	-	-	3.2	43	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	849	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	3.6	49	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	849	SS	Trichloroethene	79-01-6	UG/M3	6	0%	-	-	-	-	4.3	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	849	SS	Vinyl Chloride	75-01-4	UG/M3	6	0%	-	-	-	-	2	27	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.15-2. Building 849 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	849	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	6	0%	-	-	-	-	0.18	0.25	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	849	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	0.22	0.31	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	849	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	0.18	0.25	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	849	IA	1,1-Dichloroethane	75-34-3	UG/M3	6	0%	-	-	-	-	0.13	0.18	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	849	IA	1,1-Dichloroethene	75-35-4	UG/M3	6	0%	-	-	-	-	0.064	0.09	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	849	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	6	8.4	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	849	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	0%	-	-	-	-	0.79	1.1	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	849	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	0.25	0.35	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	849	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	0.97	1.4	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	849	IA	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	0.13	0.18	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	849	IA	1,2-Dichloropropane	78-87-5	UG/M3	6	17%	0.577	0.406	1.4	1.4	0.75	1	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	849	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	100%	18.1	12.6	6.5	39	-	-	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	849	IA	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	0.36	0.5	No Screening Value Available	-	-	-
Category 2	849	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	0.97	1.4	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	849	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	0.19	0.27	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	849	IA	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	0.58	0.81	No Screening Value Available	-	-	-
Category 2	849	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	0%	-	-	-	-	3.8	5.3	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	849	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	83%	5.44	2.45	4.7	8.5	2.5	2.5	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	849	IA	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	3.3	4.6	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	849	IA	2-Propanol	67-63-0	UG/M3	6	67%	30.4	33.4	2.8	80	2.1	2.8	No Screening Value Available	-	-	-
Category 2	849	IA	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	2.5	3.5	No Screening Value Available	-	-	-
Category 2	849	IA	4-Ethyltoluene	622-96-8	UG/M3	6	0%	-	-	-	-	0.79	1.1	No Screening Value Available	-	-	-
Category 2	849	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	6	0%	-	-	-	-	0.66	0.92	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	849	IA	Acetone	67-64-1	UG/M3	6	100%	20.3	7.5	7.9	30	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	849	IA	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	0.83	1.2	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	849	IA	Benzene	71-43-2	UG/M3	6	100%	0.872	0.512	0.57	1.9	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	849	IA	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	1.1	1.5	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	849	IA	Bromoform	75-25-2	UG/M3	6	0%	-	-	-	-	1.7	2.3	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	849	IA	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	3.1	4.4	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	849	IA	Carbon Disulfide	75-15-0	UG/M3	6	17%	2.25	2.33	7	7	2.5	2.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	849	IA	Carbon Tetrachloride	56-23-5	UG/M3	6	100%	0.588	0.020	0.56	0.62	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	849	IA	CFC-11	75-69-4	UG/M3	6	100%	2.02	0.60	1.6	3.1	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	849	IA	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	1.2	1.7	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	849	IA	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	0.22	0.32	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	849	IA	CFC-12	75-71-8	UG/M3	6	100%	2.40	0.30	2.1	2.9	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	849	IA	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	0.74	1	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	849	IA	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	0.21	0.3	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	849	IA	Chloroform	67-66-3	UG/M3	6	0%	-	-	-	-	0.16	0.22	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	849	IA	Chloromethane	74-87-3	UG/M3	6	100%	1.08	0.10	0.99	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	849	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	0%	-	-	-	-	0.13	0.18	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	849	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	0.73	1	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	849	IA	Cumene	98-82-8	UG/M3	6	0%	-	-	-	-	0.79	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	849	IA	Cyclohexane	110-82-7	UG/M3	6	0%	-	-	-	-	0.55	0.78	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	849	IA	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	1.4	1.9	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	849	IA	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	5.7	8	No Screening Value Available	-	-	-
Category 2	849	IA	Ethanol	64-17-5	UG/M3	6	100%	14.0	7.9	9.1	30	-	-	No Screening Value Available	-	-	-
Category 2	849	IA	Ethylbenzene	100-41-4	UG/M3	6	100%	0.567	0.410	0.36	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	849	IA	Heptane	142-82-5	UG/M3	6	50%	0.588	0.248	0.67	0.96	0.67	0.93	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	849	IA	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	8.6	12	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	849	IA	Hexane	110-54-3	UG/M3	6	83%	1.13	1.00	0.67	3.1	0.57	0.57	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	849	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	100%	1.38	1.29	0.75	4	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	849	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	0.58	0.81	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	849	IA	Methylene Chloride	75-09-2	UG/M3	6	17%	0.708	0.211	1.1	1.1	1.1	1.6	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	849	IA	Naphthalene	91-20-3	UG/M3	6	17%	0.277	0.109	0.49	0.49	0.42	0.59	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	849	IA	o-Xylene	95-47-6	UG/M3	6	100%	0.482	0.306	0.3	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	849	IA	Propylbenzene	103-65-1	UG/M3	6	0%	-	-	-	-	0.79	1.1	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	849	IA	Styrene	100-42-5	UG/M3	6	83%	1.89	0.87	1.7	2.8	0.69	0.69	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.4.15-2. Building 849 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	849	IA	Tetrachloroethene	127-18-4	UG/M3	6	0%	-	-	-	-	0.22	0.31	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	849	IA	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.4	3.3	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	849	IA	Toluene	108-88-3	UG/M3	6	100%	1.21	0.28	0.85	1.6	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	849	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	1.46	2	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	849	IA	Total Xylenes	1330-20-7	UG/M3	6	100%	1.86	1.59	1.05	5.1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	849	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	0%	-	-	-	-	0.64	0.9	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	849	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	0.73	1	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	849	IA	Trichloroethene	79-01-6	UG/M3	6	0%	-	-	-	-	0.17	0.24	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	849	IA	Vinyl Chloride	75-01-4	UG/M3	6	0%	-	-	-	-	0.041	0.058	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	849	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	849	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	849	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	849	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	849	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.065	0.065	-	-	-	-
Category 2	849	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	849	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	849	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.25	0.25	-	-	-	-
Category 2	849	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 2	849	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	849	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	849	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	849	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.36	0.36	-	-	-	-
Category 2	849	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.99	0.99	-	-	-	-
Category 2	849	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	849	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 2	849	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.8	3.8	-	-	-	-
Category 2	849	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	-	-	6.5	6.5	-	-	-	-	-	-
Category 2	849	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	849	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 2	849	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	849	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	849	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	849	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	25	25	-	-	-	-	-	-
Category 2	849	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.85	0.85	-	-	-	-
Category 2	849	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.54	0.54	-	-	-	-	-	-
Category 2	849	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	849	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	849	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	849	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	849	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.58	0.58	-	-	-	-	-	-
Category 2	849	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	849	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	849	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	849	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.1	2.1	-	-	-	-	-	-
Category 2	849	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	849	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	849	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 2	849	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	849	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	849	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 2	849	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	849	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.56	0.56	-	-	-	-
Category 2	849	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	849	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.8	5.8	-	-	-	-
Category 2	849	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	6.7	6.7	-	-	-	-	-	-
Category 2	849	OA	Ethylbenzene	100-41-4	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	849	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	0.8	0.8	-	-	-	-	-	-

Table 5.4.15-2. Building 849 Indoor Air and Outdoor Air Summary Results (Continued)

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	849	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.7	8.7	-	-	-	-
Category 2	849	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	0.81	0.81	-	-	-	-	-	-
Category 2	849	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.33	0.33	-	-	-	-	-	-
Category 2	849	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 2	849	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	849	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.43	0.43	-	-	-	-
Category 2	849	OA	o-Xylene	95-47-6	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	849	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.81	0.81	-	-	-	-
Category 2	849	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 2	849	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	849	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.4	2.4	-	-	-	-
Category 2	849	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.65	0.65	-	-	-	-	-	-
Category 2	849	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.48	1.48	-	-	-	-
Category 2	849	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	0.4	0.4	-	-	-	-	-	-
Category 2	849	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.65	0.65	-	-	-	-
Category 2	849	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.74	0.74	-	-	-	-
Category 2	849	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	849	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.042	0.042	-	-	-	-

## 5.4.16 Vapor Intrusion Evaluation for Building 858

### BACKGROUND

Building 858 is a Category 2 building in Zone 2. This building is a manufacturing building with process, laboratory, and shop areas, in addition to office space, a kitchen, library, and a locker room. It is known as Dursban Production (see Figure 5.4.16-1) and is located within the central portion of the facility designated as Zone 2. The building is multiple stories tall but the office space is on the first floor. It is approximately 14,910 ft<sup>2</sup> (1,385 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on February 27, 2017 and the results can be found in Appendix C. The building has central air conditioning with three units. The air intakes for all three units are located on the roof and one chiller is on the west side of the building. There are a total of three bay doors in the process and shop portions of the building that may be left open all day during the summer months. The land surrounding the building is a combination of asphalt and gravel.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, lubricants, rust breakers, and spray paints. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 18, 2017, sub-slab soil gas samples were collected from six locations within the office space within this manufacturing building. Indoor air samples were collected on April 17, 2017 at six locations, corresponding to the soil gas sample locations, along with two outdoor air samples from the main air intakes. The sampling locations are shown on Figure 5.4.16-2. Summary statistics of the analytical results for sub-slab soil gas for Building 858 are presented on Table 5.4.16-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.16-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 37 of the 65 target analytes were non-detect (ND) in each of the 6 samples collected at Building 858. Nineteen ND soil gas analytes had at least one reporting limit that exceeded the respective screening level. These reporting limit exceedances are discussed further in the Building-Specific Attenuation Factor evaluation below. The remaining 18 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 28 analytes were detected in one or more of the six sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into three categories:

- Five analytes were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation;
- Twenty-three were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 858-1. Of the 23 analytes detected above *de minimus* levels but below screening levels, only one had a detection frequency of 100% (CFC-12). Only

the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, benzene is an AOI in sub-slab soil gas at Building 858.

**Table 858-1. Summary of Sub-Slab Soil Gas Detects for Building 858**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Value	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Benzene	67%	4.4 - 15000	33%	2200
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	33%	14 - 220	0%	3500000
1,1-Dichloroethane	50%	6.5 - 380	0%	290000
1,1-Dichloroethene	17%	250	0%	120000
1,2,4-Trimethylbenzene	33%	5 - 180	0%	130000
1,2-Dichloropropane	17%	1300	0%	2300
1,3,5-Trimethylbenzene	17%	150	0%	130000
4-Ethyltoluene	33%	560 - 7100	N/A	N/A
Acetone	50%	61 - 470	0%	3400000
CFC-11	33%	300 - 450	0%	33000000
CFC-12	100%	48 - 660000	0%	29000000
Chloroform	33%	300 - 1400	0%	7600
cis-1,2-Dichloroethene	17%	120	0%	4100
Cyclohexane	83%	3.2 - 18000	0%	3500000
Ethylbenzene	67%	4.7 - 21000	0%	59000
Heptane	50%	4.4 - 37000	0%	2000000
Hexane	83%	8 - 25000	0%	410000
Methylene Chloride	17%	13000	0%	39000
Toluene	67%	26 - 12000	0%	2900000
Total Xylenes	67%	5.75 - 11000	0%	58000
trans-1,2-Dichloroethene	17%	1700	0%	41000
Vinyl Chloride	17%	750	0%	4100
<b>Below <i>de minimus</i> levels</b>				
2-Butanone (Methyl Ethyl Ketone)	17%	15	0%	2900000
4-Methyl-2-pentanone	17%	4.9	0%	1800000
Carbon Tetrachloride	33%	13 - 16	0%	3000
Cumene	33%	5.2 - 240	0%	1700
Ethanol	17%	13	N/A	N/A
Tetrachloroethene (PCE)	33%	46 - 74	0%	23000

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, six indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, two outdoor air samples were collected immediately upwind of the building. Table 858-2 below shows the analytes detected in each of the three media sampled.

**Table 858-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Benzene	X	•	•
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	•
Acetone	•	•	•
<i>Carbon Tetrachloride</i>	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
<i>Ethanol</i>	•	•	•
Toluene	•	•	•
1,1,1-Trichloroethane	•	•	
1,2,4-Trimethylbenzene	•	•	
1,3,5-Trimethylbenzene	•	•	
4-Ethyltoluene	•	•	
<i>4-Methyl-2-pentanone</i>	•	•	
Chloroform	•	•	
Ethylbenzene	•	•	
Heptane	•	•	
Hexane	•	•	
Methylene Chloride	•	•	
<i>Tetrachloroethene (PCE)</i>	•	•	
Total Xylenes	•	•	
1,1-Dichloroethane	•		
1,1-Dichloroethene	•		
1,2-Dichloropropane	•		
cis-1,2-Dichloroethene	•		
Cumene	•		
Cyclohexane	•		
trans-1,2-Dichloroethene	•		
Vinyl Chloride	•		
Chloromethane		•	•
2,2,4-Trimethylpentane		•	
2-Propanol		•	
Bromodichloromethane		•	
Naphthalene		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 38 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-five analytes were detected in the indoor air in Building 858 and there were no detected concentrations that exceeded screening levels (4-ethyltoluene and ethanol do not have screening levels available). Nine analytes were detected in one or both of the outdoor air samples.

Table 858-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample

results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 858-3. Vapor Intrusion Evaluation for Building 858**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Benzene	100%	0.68 - 1.5	16	0.54
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	33%	0.31 - 0.46	26000	<0.16 - <0.18
1,1-Dichloroethane	0%	<0.12 - <0.14	2200	<0.12 - <0.13
1,1-Dichloroethene	0%	<0.061 - <0.068	880	<0.059 - <0.065
1,2,4-Trimethylbenzene	17%	2.3	960	<0.73 - <0.8
1,2-Dichloropropane	0%	<0.71 - <0.79	18	<0.69 - <0.75
1,3,5-Trimethylbenzene	17%	0.77	960	<0.73 - <0.8
4-Ethyltoluene	33%	0.98 - 2.5	N/A	<0.73 - <0.8
Acetone	100%	18 - 100	26000	15 - 17
CFC-11	100%	1.1 - 1.2	250000	1.1
CFC-12	100%	3.4 - 5.3	220000	2
Chloroform	100%	1 - 5.3	57	<0.14 - <0.16
cis-1,2-Dichloroethene	0%	<0.12 - <0.14	31	<0.12 - <0.13
Cyclohexane	0%	<0.53 - <0.59	26000	<0.51 - <0.56
Ethylbenzene	100%	0.2 - 1.3	440	<0.13 - <0.14
Heptane	50%	0.75 - 1.3	15000	<0.61 - <0.67
Hexane	83%	0.69 - 5.2	3100	<0.52 - <0.57
Methylene Chloride	50%	1.3 - 1.5	290	<1 - <1.1
Toluene	100%	0.81 - 6.5	22000	0.28 - 0.37
Total Xylenes	100%	0.74 - 6.8	440	<0.39 - <0.42
trans-1,2-Dichloroethene	0%	<0.61 - <0.68	310	<0.59 - <0.65
Vinyl Chloride	0%	<0.039 - <0.044	31	<0.038 - <0.042
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
2-Butanone (Methyl Ethyl Ketone)	83%	2.4 - 6.6	22000	4.4 - 4.6
4-Methyl-2-pentanone	17%	0.8	13000	<0.61 - <0.67
Carbon Tetrachloride	100%	0.58 - 0.64	23	0.55 - 0.57
Cumene	0%	<0.76 - <0.84	13	<0.73 - <0.8
Ethanol	100%	13 - 32	N/A	3.5 - 5.3
Tetrachloroethene	17%	0.46	180	<0.2 - <0.22

N/A = No screening level available

< = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were nine analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Five of the analytes had indoor air results that were very similar to concentrations detected in outdoor air (benzene, CFC-11, MEK, carbon tetrachloride, and CFC-12). Three of the analytes had indoor air results that were higher in



concentration than that detected in outdoor air, indicating that there is a potential for indoor sources (acetone, toluene, and ethanol).

Toluene was detected in both of the outdoor samples at concentrations ranging from 0.28 - 0.37  $\mu\text{g}/\text{m}^3$  and was detected in all six indoor air samples at concentrations ranging from 0.81 - 6.5  $\mu\text{g}/\text{m}^3$ . The maximum detection was an order of magnitude higher and was collected in the hallway near the laboratory and men's locker room. The indoor air detections of toluene were at least four orders of magnitude below the screening level.

Acetone was detected in both of the outdoor air samples (15 - 17  $\mu\text{g}/\text{m}^3$ ) and was detected in all six of the indoor samples (detected results range from 18 - 100  $\mu\text{g}/\text{m}^3$ ). The detected concentrations at four of the six samples were similar to the concentrations detected in outdoor air (18 - 28  $\mu\text{g}/\text{m}^3$ ). The maximum detected concentration (100  $\mu\text{g}/\text{m}^3$ ) occurred at two sample locations, both locations near the laboratory. Common cleaning items and chemicals utilized in a laboratory contribute as indoor sources for acetone. However, it is important to point out that all of the results for acetone were well below screening levels.

While ethanol does not have a screening level, it was detected in one of the six sub-slab soil gas samples at a low level of 13  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from 13 - 32  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: Scrubbing Bubbles, hand sanitizer, cleaners, etc.

The ND indoor air results for EDB and HCB had at least one reporting limit above the respective screening level. These two analytes, along with the 17 additional analytes that had at least one reporting limit exceed the sub-slab soil gas screening levels, are evaluated further in the Building-Specific Attenuation Factor Evaluation below.

## **BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION**

VI evaluations utilize attenuation factors ( $\alpha$ ), which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 858-1, there was only one analyte detected at a 100% frequency in the sub-slab soil gas. The data for this analyte are given in Table 858-4. Attenuation factors based on both average and maximum values are shown.

**Table 858-4. VI Attenuation Factors for Building 858**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )
		CFC-12
Indoor Air	858-IA-01	3.4
	858-IA-02	3.4
	858-IA-03	4.2
	858-IA-04	4.9
	858-IA-05	5.3
	858-IA-06	3.8
	Average	4.17
Sub-slab Soil Gas	858-SS-01	48
	858-SS-02	62
	858-SS-03	660000
	858-SS-04	380000
	858-SS-05	540000
	858-SS-06	2200
	Average	263718
Attenuation Factors	Average	2.E-05
	Maximum	8.0E-06

1. Non-detect values were used to calculate the attenuation factor and the full RL value was used in each case.
2. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

The most conservative attenuation factor calculated for CFC-12 is based on the average value, which was selected as the best estimate of a conservative, building attenuation factor. If the maximum value is used, the attenuation factor is slightly smaller and less conservative. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 858 is 2E-05.

The building-specific attenuation factor was then used to estimate the indoor air concentrations for the 19 analytes with ND reporting limits that exceed either the sub-slab soil gas screening levels or the indoor air screening levels (or both, in the case of EDB and HCB), as shown in Table 858-5, where:

$$\text{Estimated indoor air concentration} = (\text{Sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 858-5. Estimated Indoor Air Concentrations for Non-Detected Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas but RLs Exceed Screening Levels</b>					
1,1,2,2-Tetrachloroethane	5600	2.0E-05	0.11	2.4	No
1,1,2-Trichloroethane	4500	2.0E-05	0.09	8.5	No
1,2,4-Trichlorobenzene	24000	2.0E-05	0.48	18	No
1,2-Dibromoethane (EDB)	6300	2.0E-05	0.13	0.23	No
1,2-Dichloroethane	3300	2.0E-05	0.07	5.3	No
1,2-Dichloropropane	3800	2.0E-05	0.08	18	No
1,3-Dichlorobenzene	4900	2.0E-05	0.10	13	No
1,4-Dichlorobenzene	4900	2.0E-05	0.10	20	No
alpha-Chlorotoluene	4200	2.0E-05	0.08	2.8	No
Benzene	2600	2.0E-05	0.05	16	No
Bromodichloromethane	5500	2.0E-05	0.11	7.6	No
Bromomethane	13000	2.0E-05	0.26	22	No
Carbon tetrachloride	5200	2.0E-05	0.10	23	No
Cumene	4000	2.0E-05	0.08	13	No
Dibromochloromethane	7000	2.0E-05	0.14	5.6	No
Hexachlorobutadiene (HCB)	35000	2.0E-05	0.70	6.2	No
Naphthalene	17000	2.0E-05	0.34	11	No
Total 1,3-Dichloropropene	7400	2.0E-05	0.15	34	No
Trichloroethene (TCE)	4400	2.0E-05	0.09	8.8	No

In order to be conservative, the estimated indoor air concentrations for the analytes listed in Table 858-5 were based on the maximum ND sub-slab soil gas reporting limit. The estimated indoor air concentrations did not exceed the indoor air screening levels for any of the 19 ND analytes. HCB was ND in all media sampled; however, four of six ND reporting limits in sub-slab soil gas samples exceeded the screening criteria ( $830 \mu\text{g}/\text{m}^3$ ). HCB was not detected in indoor air and the ND indoor air reporting limits ( $<8.2 - 9.1 \mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ). Similarly, EDB was ND in all media sampled; however, four of six ND reporting limits in sub-slab soil gas samples exceeded the screening criteria ( $30 \mu\text{g}/\text{m}^3$ ). The indoor air reporting limits ( $0.24 - 0.26 \mu\text{g}/\text{m}^3$ ) only slightly exceeded the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). Throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB and HCB and further investigation for these two analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated. Based on the estimated indoor air concentrations documented in Table 858-5, the sub-slab soil gas reporting limits that exceeded the sub-slab soil gas screening levels for the remaining 17 analytes are eliminated from further evaluation since there is no evidence of VI.

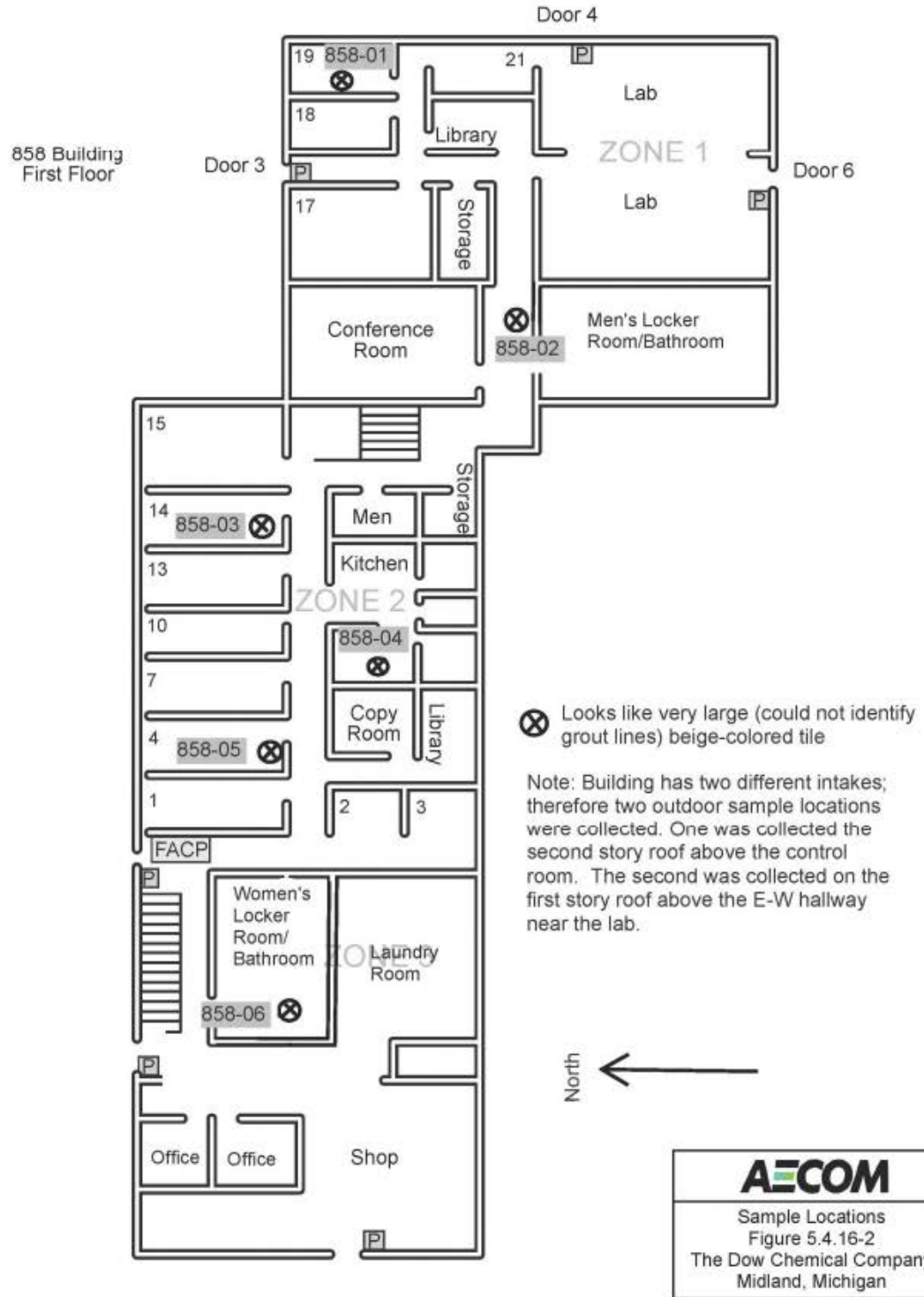
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 858 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results for benzene and given the potential for future VI, Building 858 was placed in VI Path Forward Building Group 2 (see Figure 5-3) and additional sampling is recommended. Additionally, benzene will be added to Industrial Hygiene monitoring for the building.

**Figure 5.4.16-1. Building 858 Location**



Figure 5.4.16-2. Building 858 Sample Locations



**Table 5.4.16-1. Building 858 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	858	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	6	33%	1129	1140	14	220	84	4500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	858	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	5.5	5600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	50%
Category 2	858	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	4.4	4500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	50%
Category 2	858	SS	1,1-Dichloroethane	75-34-3	UG/M3	6	50%	868	813	6.5	380	3100	3300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	858	SS	1,1-Dichloroethene	75-35-4	UG/M3	6	17%	826	817	250	250	3.2	3200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	858	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	24	24000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 2	858	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	33%	1006	1036	5	180	4	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	858	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	6.2	6300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	67%
Category 2	858	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	4.8	4900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	858	SS	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	3.2	3300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	50%
Category 2	858	SS	1,2-Dichloropropane	78-87-5	UG/M3	6	17%	1134	902	1300	1300	3.7	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	50%
Category 2	858	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	17%	1001	1042	150	150	4	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	858	SS	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	1.8	1800	No Screening Value Available	-	-	-
Category 2	858	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	4.8	4900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	50%
Category 2	858	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	4.8	4900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	50%
Category 2	858	SS	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	12	12000	No Screening Value Available	-	-	-
Category 2	858	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	0%	-	-	-	-	3.8	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	200000	0%	0%
Category 2	858	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	17%	2360	2547	15	15	9.5	9700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	858	SS	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	13	13000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	858	SS	2-Propanol	67-63-0	UG/M3	6	0%	-	-	-	-	7.9	8100	No Screening Value Available	-	-	-
Category 2	858	SS	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	10	10000	No Screening Value Available	-	-	-
Category 2	858	SS	4-Ethyltoluene	622-96-8	UG/M3	6	33%	1919	2685	560	7100	4	3900	No Screening Value Available	-	-	-
Category 2	858	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	6	17%	823	888	4.9	4.9	3.3	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	858	SS	Acetone	67-64-1	UG/M3	6	50%	2014	1944	61	470	7400	7800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	858	SS	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	4.2	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	50%
Category 2	858	SS	Benzene	71-43-2	UG/M3	6	67%	3886	5851	4.4	15000	2500	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	33%	33%
Category 2	858	SS	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	17	330	No Screening Value Available	-	-	-
Category 2	858	SS	Bromodichloromethane	75-27-4	UG/M3	6	0%	-	-	-	-	5.4	5500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	50%
Category 2	858	SS	Bromoform	75-25-2	UG/M3	6	0%	-	-	-	-	8.3	8500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	858	SS	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	31	13000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	50%
Category 2	858	SS	Carbon Disulfide	75-15-0	UG/M3	6	0%	-	-	-	-	10	10000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	858	SS	Carbon Tetrachloride	56-23-5	UG/M3	6	33%	1271	1365	13	16	97	5200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	50%
Category 2	858	SS	CFC-11	75-69-4	UG/M3	6	33%	1249	1087	300	450	87	4600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 2	858	SS	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	6.2	6300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	858	SS	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	5.6	5700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	858	SS	CFC-12	75-71-8	UG/M3	6	100%	263718	301437	48	660000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	858	SS	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	3.7	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	858	SS	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	8.5	8600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	858	SS	Chloroform	67-66-3	UG/M3	6	33%	1256	872	300	1400	75	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	858	SS	Chloromethane	74-87-3	UG/M3	6	0%	-	-	-	-	17	6800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	858	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	17%	804	837	120	120	3.2	3200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	858	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	3.6	3700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	858	SS	Cumene	98-82-8	UG/M3	6	33%	1016	1027	5.2	240	4	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	50%
Category 2	858	SS	Cyclohexane	110-82-7	UG/M3	6	83%	4743	6895	3.2	18000	2700	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	858	SS	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	6.8	7000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	50%
Category 2	858	SS	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	23	23000	No Screening Value Available	-	-	-
Category 2	858	SS	Ethanol	64-17-5	UG/M3	6	17%	1513	1631	13	13	6.1	6200	No Screening Value Available	-	-	-
Category 2	858	SS	Ethylbenzene	100-41-4	UG/M3	6	67%	4139	8297	4.7	21000	3400	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	858	SS	Heptane	142-82-5	UG/M3	6	50%	7051	14699	4.4	37000	3.3	3200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	858	SS	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	34	35000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	50%
Category 2	858	SS	Hexane	110-54-3	UG/M3	6	83%	5337	9714	8	25000	2800	2800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	858	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	67%	2197	3515	4	9200	3400	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	858	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	12	3000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	858	SS	Methylene Chloride	75-09-2	UG/M3	6	17%	4922	4784	13000	13000	28	11000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	858	SS	Naphthalene	91-20-3	UG/M3	6	0%	-	-	-	-	8.4	17000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	50%
Category 2	858	SS	o-Xylene	95-47-6	UG/M3	6	33%	921	898	4	320	3.5	3600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.4.16-1. Building 858 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics				Screening Criteria					
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	858	SS	Propylbenzene	103-65-1	UG/M3	6	0%	-	-	-	-	4	4000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	858	SS	Styrene	100-42-5	UG/M3	6	0%	-	-	-	-	3.4	3500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	858	SS	Tetrachloroethene	127-18-4	UG/M3	6	33%	1378	1449	46	74	100	5600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	858	SS	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.4	2400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	858	SS	Toluene	108-88-3	UG/M3	6	67%	2871	4555	26	12000	2900	3000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	858	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	7.2	7400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	50%
Category 2	858	SS	Total Xylenes	1330-20-7	UG/M3	6	67%	3118	4161	5.75	11000	6800	6800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	858	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	17%	1067	827	1700	1700	3.2	3200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	858	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	3.6	3700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	858	SS	Trichloroethene	79-01-6	UG/M3	6	0%	-	-	-	-	4.3	4400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	50%
Category 2	858	SS	Vinyl Chloride	75-01-4	UG/M3	6	17%	634	501	750	750	2	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.16-2. Building 858 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	858	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	6	33%	0.189	0.159	0.31	0.46	0.18	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	858	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	6	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	858	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	6	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	858	IA	1,1-Dichloroethane	75-34-3	UG/M3	6	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	858	IA	1,1-Dichloroethene	75-35-4	UG/M3	6	0%	-	-	-	-	0.061	0.068	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	858	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	6	0%	-	-	-	-	5.7	6.3	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	858	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	6	17%	0.722	0.773	2.3	2.3	0.79	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	858	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	6	0%	-	-	-	-	0.24	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	858	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	6	0%	-	-	-	-	0.92	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	858	IA	1,2-Dichloroethane	107-06-2	UG/M3	6	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	858	IA	1,2-Dichloropropane	78-87-5	UG/M3	6	0%	-	-	-	-	0.71	0.79	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	858	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	6	17%	0.467	0.149	0.77	0.77	0.79	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	858	IA	1,3-Butadiene	106-99-0	UG/M3	6	0%	-	-	-	-	0.34	0.38	No Screening Value Available	-	-	-
Category 2	858	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	6	0%	-	-	-	-	0.92	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	858	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	6	0%	-	-	-	-	0.18	0.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	858	IA	1,4-Dioxane	123-91-1	UG/M3	6	0%	-	-	-	-	0.55	0.62	No Screening Value Available	-	-	-
Category 2	858	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	6	100%	46.0	36.4	21	93	-	-	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	858	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	6	83%	3.35	1.83	2.4	6.6	2.4	2.4	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	858	IA	2-Hexanone	591-78-6	UG/M3	6	0%	-	-	-	-	3.2	3.5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	858	IA	2-Propanol	67-63-0	UG/M3	6	100%	7.23	2.71	3.8	9.6	-	-	No Screening Value Available	-	-	-
Category 2	858	IA	3-Chloropropene	107-05-1	UG/M3	6	0%	-	-	-	-	2.4	2.7	No Screening Value Available	-	-	-
Category 2	858	IA	4-Ethyltoluene	622-96-8	UG/M3	6	33%	0.850	0.840	0.98	2.5	0.79	0.84	No Screening Value Available	-	-	-
Category 2	858	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	6	17%	0.411	0.191	0.8	0.8	0.63	0.7	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	858	IA	Acetone	67-64-1	UG/M3	6	100%	48.8	39.8	18	100	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	858	IA	alpha-Chlorotoluene	100-44-7	UG/M3	6	0%	-	-	-	-	0.8	0.88	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	858	IA	Benzene	71-43-2	UG/M3	6	100%	0.843	0.323	0.68	1.5	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	858	IA	Bromodichloromethane	75-27-4	UG/M3	6	17%	0.650	0.270	1.2	1.2	1	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	858	IA	Bromoform	75-25-2	UG/M3	6	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	858	IA	Bromomethane	74-83-9	UG/M3	6	0%	-	-	-	-	3	3.3	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	858	IA	Carbon Disulfide	75-15-0	UG/M3	6	0%	-	-	-	-	2.4	2.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	858	IA	Carbon Tetrachloride	56-23-5	UG/M3	6	100%	0.607	0.021	0.58	0.64	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	858	IA	CFC-11	75-69-4	UG/M3	6	100%	1.15	0.05	1.1	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	858	IA	CFC-113	76-13-1	UG/M3	6	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	858	IA	CFC-114	76-14-2	UG/M3	6	0%	-	-	-	-	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	858	IA	CFC-12	75-71-8	UG/M3	6	100%	4.17	0.79	3.4	5.3	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	858	IA	Chlorobenzene	108-90-7	UG/M3	6	0%	-	-	-	-	0.71	0.79	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	858	IA	Chloroethane	75-00-3	UG/M3	6	0%	-	-	-	-	0.2	0.22	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	858	IA	Chloroform	67-66-3	UG/M3	6	100%	2.10	1.64	1	5.3	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	858	IA	Chloromethane	74-87-3	UG/M3	6	100%	1.17	0.14	1	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	858	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	6	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	858	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	6	0%	-	-	-	-	0.7	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	858	IA	Cumene	98-82-8	UG/M3	6	0%	-	-	-	-	0.76	0.84	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	858	IA	Cyclohexane	110-82-7	UG/M3	6	0%	-	-	-	-	0.53	0.59	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	858	IA	Dibromochloromethane	124-48-1	UG/M3	6	0%	-	-	-	-	1.3	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	858	IA	Dibromomethane	74-95-3	UG/M3	6	0%	-	-	-	-	5.5	6.1	No Screening Value Available	-	-	-
Category 2	858	IA	Ethanol	64-17-5	UG/M3	6	100%	25.2	7.0	13	32	-	-	No Screening Value Available	-	-	-
Category 2	858	IA	Ethylbenzene	100-41-4	UG/M3	6	100%	0.412	0.436	0.2	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	858	IA	Heptane	142-82-5	UG/M3	6	50%	0.650	0.388	0.75	1.3	0.66	0.7	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	858	IA	Hexachlorobutadiene	87-68-3	UG/M3	6	0%	-	-	-	-	8.2	9.1	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	858	IA	Hexane	110-54-3	UG/M3	6	83%	1.69	1.85	0.69	5.2	0.6	0.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	858	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	6	100%	1.30	1.72	0.51	4.8	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	858	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	6	0%	-	-	-	-	0.56	0.62	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	858	IA	Methylene Chloride	75-09-2	UG/M3	6	50%	0.992	0.452	1.3	1.5	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	858	IA	Naphthalene	91-20-3	UG/M3	6	17%	0.307	0.222	0.76	0.76	0.42	0.45	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	858	IA	o-Xylene	95-47-6	UG/M3	6	100%	0.533	0.719	0.21	2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	858	IA	Propylbenzene	103-65-1	UG/M3	6	0%	-	-	-	-	0.76	0.84	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	858	IA	Styrene	100-42-5	UG/M3	6	0%	-	-	-	-	0.66	0.73	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%



**Table 5.4.16-2. Building 858 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	858	IA	Tetrachloroethene	127-18-4	UG/M3	6	17%	0.169	0.142	0.46	0.46	0.22	0.23	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	858	IA	Tetrahydrofuran	109-99-9	UG/M3	6	0%	-	-	-	-	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	858	IA	Toluene	108-88-3	UG/M3	6	100%	1.97	2.23	0.81	6.5	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	858	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	6	0%	-	-	-	-	1.4	1.56	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	858	IA	Total Xylenes	1330-20-7	UG/M3	6	100%	1.83	2.44	0.74	6.8	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	858	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	6	0%	-	-	-	-	0.61	0.68	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	858	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	6	0%	-	-	-	-	0.7	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	858	IA	Trichloroethene	79-01-6	UG/M3	6	0%	-	-	-	-	0.16	0.18	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	858	IA	Vinyl Chloride	75-01-4	UG/M3	6	0%	-	-	-	-	0.039	0.044	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	858	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	2	0%	-	-	-	-	0.16	0.18	-	-	-	-
Category 2	858	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	2	0%	-	-	-	-	0.2	0.22	-	-	-	-
Category 2	858	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	2	0%	-	-	-	-	0.16	0.18	-	-	-	-
Category 2	858	OA	1,1-Dichloroethane	75-34-3	UG/M3	2	0%	-	-	-	-	0.12	0.13	-	-	-	-
Category 2	858	OA	1,1-Dichloroethane	75-35-4	UG/M3	2	0%	-	-	-	-	0.059	0.065	-	-	-	-
Category 2	858	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	2	0%	-	-	-	-	5.5	6	-	-	-	-
Category 2	858	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	2	0%	-	-	-	-	0.73	0.8	-	-	-	-
Category 2	858	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	2	0%	-	-	-	-	0.23	0.25	-	-	-	-
Category 2	858	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	2	0%	-	-	-	-	0.9	0.98	-	-	-	-
Category 2	858	OA	1,2-Dichloroethane	107-06-2	UG/M3	2	0%	-	-	-	-	0.12	0.13	-	-	-	-
Category 2	858	OA	1,2-Dichloropropane	78-87-5	UG/M3	2	0%	-	-	-	-	0.69	0.75	-	-	-	-
Category 2	858	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	2	0%	-	-	-	-	0.73	0.8	-	-	-	-
Category 2	858	OA	1,3-Butadiene	106-99-0	UG/M3	2	0%	-	-	-	-	0.33	0.36	-	-	-	-
Category 2	858	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	2	0%	-	-	-	-	0.9	0.98	-	-	-	-
Category 2	858	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	2	0%	-	-	-	-	0.18	0.2	-	-	-	-
Category 2	858	OA	1,4-Dioxane	123-91-1	UG/M3	2	0%	-	-	-	-	0.54	0.59	-	-	-	-
Category 2	858	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	2	0%	-	-	-	-	3.5	3.8	-	-	-	-
Category 2	858	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	2	100%	4.50	0.14	4.4	4.6	-	-	-	-	-	-
Category 2	858	OA	2-Hexanone	591-78-6	UG/M3	2	0%	-	-	-	-	3	3.3	-	-	-	-
Category 2	858	OA	2-Propanol	67-63-0	UG/M3	2	0%	-	-	-	-	1.8	2	-	-	-	-
Category 2	858	OA	3-Chloropropene	107-05-1	UG/M3	2	0%	-	-	-	-	2.3	2.6	-	-	-	-
Category 2	858	OA	4-Ethyltoluene	622-96-8	UG/M3	2	0%	-	-	-	-	0.73	0.8	-	-	-	-
Category 2	858	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	2	0%	-	-	-	-	0.61	0.67	-	-	-	-
Category 2	858	OA	Acetone	67-64-1	UG/M3	2	100%	16.0	1.4	15	17	-	-	-	-	-	-
Category 2	858	OA	alpha-Chlorotoluene	100-44-7	UG/M3	2	0%	-	-	-	-	0.77	0.84	-	-	-	-
Category 2	858	OA	Benzene	71-43-2	UG/M3	2	50%	0.390	0.212	0.54	0.54	0.48	0.48	-	-	-	-
Category 2	858	OA	Bromodichloromethane	75-27-4	UG/M3	2	0%	-	-	-	-	1	1.1	-	-	-	-
Category 2	858	OA	Bromoform	75-25-2	UG/M3	2	0%	-	-	-	-	1.5	1.7	-	-	-	-
Category 2	858	OA	Bromomethane	74-83-9	UG/M3	2	0%	-	-	-	-	2.9	3.2	-	-	-	-
Category 2	858	OA	Carbon Disulfide	75-15-0	UG/M3	2	0%	-	-	-	-	2.3	2.5	-	-	-	-
Category 2	858	OA	Carbon Tetrachloride	56-23-5	UG/M3	2	100%	0.560	0.014	0.55	0.57	-	-	-	-	-	-
Category 2	858	OA	CFC-11	75-69-4	UG/M3	2	100%	1.10	0.00	1.1	1.1	-	-	-	-	-	-
Category 2	858	OA	CFC-113	76-13-1	UG/M3	2	0%	-	-	-	-	1.1	1.2	-	-	-	-
Category 2	858	OA	CFC-114	76-14-2	UG/M3	2	0%	-	-	-	-	0.21	0.23	-	-	-	-
Category 2	858	OA	CFC-12	75-71-8	UG/M3	2	100%	2.00	0.00	2	2	-	-	-	-	-	-
Category 2	858	OA	Chlorobenzene	108-90-7	UG/M3	2	0%	-	-	-	-	0.68	0.75	-	-	-	-
Category 2	858	OA	Chloroethane	75-00-3	UG/M3	2	0%	-	-	-	-	0.2	0.22	-	-	-	-
Category 2	858	OA	Chloroform	67-66-3	UG/M3	2	0%	-	-	-	-	0.14	0.16	-	-	-	-
Category 2	858	OA	Chloromethane	74-87-3	UG/M3	2	100%	1.10	0.00	1.1	1.1	-	-	-	-	-	-
Category 2	858	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	2	0%	-	-	-	-	0.12	0.13	-	-	-	-
Category 2	858	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	2	0%	-	-	-	-	0.68	0.74	-	-	-	-
Category 2	858	OA	Cumene	98-82-8	UG/M3	2	0%	-	-	-	-	0.73	0.8	-	-	-	-
Category 2	858	OA	Cyclohexane	110-82-7	UG/M3	2	0%	-	-	-	-	0.51	0.56	-	-	-	-
Category 2	858	OA	Dibromochloromethane	124-48-1	UG/M3	2	0%	-	-	-	-	1.3	1.4	-	-	-	-
Category 2	858	OA	Dibromomethane	74-95-3	UG/M3	2	0%	-	-	-	-	5.3	5.8	-	-	-	-
Category 2	858	OA	Ethanol	64-17-5	UG/M3	2	100%	4.40	1.27	3.5	5.3	-	-	-	-	-	-
Category 2	858	OA	Ethylbenzene	100-41-4	UG/M3	2	0%	-	-	-	-	0.13	0.14	-	-	-	-
Category 2	858	OA	Heptane	142-82-5	UG/M3	2	0%	-	-	-	-	0.61	0.67	-	-	-	-

**Table 5.4.16-2. Building 858 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	858	OA	Hexachlorobutadiene	87-68-3	UG/M3	2	0%	-	-	-	-	7.9	8.7	-	-	-	-
Category 2	858	OA	Hexane	110-54-3	UG/M3	2	0%	-	-	-	-	0.52	0.57	-	-	-	-
Category 2	858	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	2	0%	-	-	-	-	0.26	0.28	-	-	-	-
Category 2	858	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	2	0%	-	-	-	-	0.54	0.59	-	-	-	-
Category 2	858	OA	Methylene Chloride	75-09-2	UG/M3	2	0%	-	-	-	-	1	1.1	-	-	-	-
Category 2	858	OA	Naphthalene	91-20-3	UG/M3	2	0%	-	-	-	-	0.39	0.43	-	-	-	-
Category 2	858	OA	o-Xylene	95-47-6	UG/M3	2	0%	-	-	-	-	0.13	0.14	-	-	-	-
Category 2	858	OA	Propylbenzene	103-65-1	UG/M3	2	0%	-	-	-	-	0.73	0.8	-	-	-	-
Category 2	858	OA	Styrene	100-42-5	UG/M3	2	0%	-	-	-	-	0.63	0.69	-	-	-	-
Category 2	858	OA	Tetrachloroethene	127-18-4	UG/M3	2	0%	-	-	-	-	0.2	0.22	-	-	-	-
Category 2	858	OA	Tetrahydrofuran	109-99-9	UG/M3	2	0%	-	-	-	-	2.2	2.4	-	-	-	-
Category 2	858	OA	Toluene	108-88-3	UG/M3	2	100%	0.325	0.064	0.28	0.37	-	-	-	-	-	-
Category 2	858	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	2	0%	-	-	-	-	1.36	1.48	-	-	-	-
Category 2	858	OA	Total Xylenes	1330-20-7	UG/M3	2	0%	-	-	-	-	0.39	0.42	-	-	-	-
Category 2	858	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	2	0%	-	-	-	-	0.59	0.65	-	-	-	-
Category 2	858	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	2	0%	-	-	-	-	0.68	0.74	-	-	-	-
Category 2	858	OA	Trichloroethene	79-01-6	UG/M3	2	0%	-	-	-	-	0.16	0.18	-	-	-	-
Category 2	858	OA	Vinyl Chloride	75-01-4	UG/M3	2	0%	-	-	-	-	0.038	0.042	-	-	-	-

## 5.4.17 Vapor Intrusion Evaluation for Building 934

### BACKGROUND

Building 934 is a Category 2 building in Zone 2. This building is a large warehouse with a small office space and process area. It is known as Liquid Formulation/858 Building After Hours (see Figure 5.4.17-1) and is located within the central portion of the facility designated as Zone 2. The building is only single story tall. It is approximately 40,250 ft<sup>2</sup> (3,740 m<sup>2</sup>) and sits on a 3.5 ft thick slab above grade. The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 1, 2017 and the results can be found in Appendix C. The building has central air conditioning with two units. The air intakes for both units are located on the roof. There are a total of 16 bay doors in the warehouse portion of the building that are only left open during the summer months. The land surrounding the building is a combination of asphalt and gravel.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, adhesive sprays, insecticides, and spray paint. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 26, 2017, sub-slab soil gas samples were collected from three locations within the small office space within this warehouse building. Indoor air samples were collected on April 25, 2017 at three locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.17-2. Summary statistics of the analytical results for sub-slab soil gas for Building 934 are presented on Table 5.4.17-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.17-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 41 of the 65 target analytes were ND in each of the three samples collected at Building 934. All of the ND soil gas analytes had reporting limits that met the respective screening level. Therefore, all 41 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 24 analytes were detected in one or more of the three sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into two categories:

- Eighteen were detected below *de minimus* levels (<100 µg/m<sup>3</sup>) and were eliminated from further evaluation; and
- Six were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 934-1. All six analytes detected above *de minimus* levels but below screening levels had detection frequencies of 100% (1,1,1-trichloroethane, acetone, CFC-11, heptane, hexane, and toluene). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, there are no AOIs in sub-slab soil gas at Building 934.

**Table 934-1. Summary of Sub-Slab Soil Gas Detects for Building 934**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	100%	1300 - 1400	0%	3500000
Acetone	100%	80 - 120	0%	3400000
CFC-11	100%	67 - 170	0%	33000000
Heptane	100%	59 - 110	0%	2000000
Hexane	100%	120 - 240	0%	410000
Toluene	100%	97 - 140	0%	2900000
<b>Below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	100%	9.2 - 69	0%	290000
1,2,4-Trimethylbenzene	100%	5.4 - 10	0%	130000
1,3,5-Trimethylbenzene	67%	4.6 - 6.8	0%	130000
2-Butanone (Methyl Ethyl Ketone)	100%	16 - 26	0%	2900000
2-Propanol	67%	8.5 - 8.6	N/A	N/A
4-Ethyltoluene	33%	5	N/A	N/A
Benzene	100%	19 - 41	0%	2200
Carbon Disulfide	33%	15	0%	410000
CFC-12	100%	47 - 62	0%	29000000
Chloroform	33%	6.4	0%	7600
Cyclohexane	100%	35 - 92	0%	3500000
Ethanol	100%	11 - 27	N/A	N/A
Ethylbenzene	100%	13 - 20	0%	59000
Propylbenzene	33%	4.6	0%	12000
Tetrachloroethene (PCE)	100%	17 - 36	0%	23000
Tetrahydrofuran	100%	5.8 - 33	0%	11000
Total Xylenes	100%	29.3 - 57	0%	58000
Trichloroethene (TCE)	33%	8.3	0%	1200

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, three indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 934-2 below shows the analytes detected in each of the three media sampled.

**Table 934-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>1,2,4-Trimethylbenzene</i>	•	•	•
<i>1,3,5-Trimethylbenzene</i>	•	•	•
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	•
<i>4-Ethyltoluene</i>	•	•	•
Acetone	•	•	•
<i>Benzene</i>	•	•	•
CFC-11	•	•	•
<i>CFC-12</i>	•	•	•
<i>Chloroform</i>	•	•	•
<i>Ethanol</i>	•	•	•
<i>Ethylbenzene</i>	•	•	•
Heptane	•	•	•
Hexane	•	•	•
<i>Propylbenzene</i>	•	•	•
Toluene	•	•	•
<i>Total Xylenes</i>	•	•	•
1,1,1-Trichloroethane	•	•	
<i>2-Propanol</i>	•	•	
<i>Cyclohexane</i>	•	•	
<i>1,1-Dichloroethane</i>	•		
<i>Carbon Disulfide</i>	•		
<i>Tetrachloroethene (PCE)</i>	•		
<i>Tetrahydrofuran</i>	•		
<i>Trichloroethene (TCE)</i>	•		
Carbon Tetrachloride		•	•
Chloromethane		•	•
4-Methyl-2-pentanone		•	
Chloroethane		•	
Cumene		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty-one of the 65 analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 39 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-four analytes were detected in the indoor air in Building 934 and there were no detected concentrations that exceeded screening levels (2-propanol, 4-ethyltoluene, and ethanol do not have screening levels available). Eighteen analytes were detected in the outdoor air sample.

Table 934-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 934-3. Vapor Intrusion Evaluation for Building 934**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	67%	0.2 - 0.34	26000	<0.18
Acetone	100%	60 - 63	26000	25
CFC-11	100%	1.3 - 1.4	250000	1.1
Heptane	100%	0.75 - 1.1	15000	0.91
Hexane	67%	0.69 - 0.89	3100	0.63
Toluene	100%	5.2 - 6.2	22000	1.5
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
1,1-Dichloroethane	0%	<0.13 - <0.15	2200	<0.14
1,2,4-Trimethylbenzene	100%	16 - 19	960	6.9
1,3,5-Trimethylbenzene	100%	4.4 - 6	960	3.5
2-Butanone (Methyl Ethyl Ketone)	100%	12 - 15	22000	9.8
2-Propanol	100%	29 - 36	N/A	<2.1
4-Ethyltoluene	100%	17 - 20	N/A	7
Benzene	100%	0.6 - 0.72	16	0.56
Carbon Disulfide	0%	<2.6 - <2.9	3100	<2.6
CFC-12	100%	8.1 - 9.8	220000	2.2
Chloroform	100%	1.5 - 1.9	57	0.24
Cyclohexane	100%	3 - 3.4	26000	<0.58
Ethanol	100%	96 - 130	N/A	9
Ethylbenzene	100%	0.47 - 0.53	440	0.18
Propylbenzene	100%	3.6 - 4.4	88	1.7
Tetrachloroethene	0%	<0.22 - <0.25	180	<0.23
Tetrahydrofuran	0%	<2.4 - <2.7	79	<2.5
Total Xylenes	100%	3.2 - 3.9	440	1.22
Trichloroethene	0%	<0.18 - <0.2	8.8	<0.18

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

As with sub-slab soil gas, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 18 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Nine of the analytes had indoor air results that were very similar to concentrations detected in outdoor air. Three of the analytes had indoor air results that are similar to concentrations detected in outdoor air but were slightly higher but still indicative of influence by outdoor air (toluene, CFC-12, and chloroform).

Acetone, 1,2,4-trimethylbenzene, 4-ethyltoluene, and ethanol were each detected at higher concentrations in indoor air than in outdoor air. Acetone was detected in all three samples at results ranging from 60 - 63  $\mu\text{g}/\text{m}^3$  and in outdoor air at 25  $\mu\text{g}/\text{m}^3$ . While the results are in the same order of magnitude, they indicate that there is the potential for indoor sources to be contributing to the presence of acetone. All of the results for acetone were at least three orders of magnitude below the screening level. Acetone is present in common consumer products, including cleaning products, particle board, adhesives, and paint remover. Furthermore, the chemical inventory from the building identified a number of materials likely to contain acetone, including cleaners.

1,2,4-Trimethylbenzene was detected in all three samples at concentrations that ranged from 16 - 19  $\mu\text{g}/\text{m}^3$ . 1,2,4-Trimethylbenzene was detected in outdoor air at 6.9  $\mu\text{g}/\text{m}^3$ . It was also detected in all three sub-slab soil gas samples with results ranging from 5.4 - 10  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has an order of magnitude more 1,2,4-trimethylbenzene than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). All of the results for 1,2,4-trimethylbenzene were at least two orders of magnitude below the screening level.

While 4-ethyltoluene does not have a screening level, it was detected in one of the three sub-slab soil gas samples at a low level of 5  $\mu\text{g}/\text{m}^3$ . 4-Ethyltoluene was detected in all three of the indoor air samples at concentrations ranging from 17 - 20  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 7  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more 4-ethyltoluene than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI).

Ethanol does not have a screening level. It was detected in all three sub-slab soil gas samples at low levels ranging from 11 - 27  $\mu\text{g}/\text{m}^3$ . Ethanol was also detected in all three of the indoor air samples at concentrations ranging from 96 - 130  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 9  $\mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, cleaners, etc.

All ND reporting limits for EDB and HCB in indoor air exceed the applicable screening level; however, neither of these analytes was detected in any media sampled and all of the sub-slab soil gas ND reporting limits were below screening levels. The ND indoor air reporting limits for HCB in five of the samples (<8.7 - 9.8  $\mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level (6.2  $\mu\text{g}/\text{m}^3$ ) and all of the ND reporting limits in sub-slab soil gas met the soil gas screening level. The maximum reporting limit for HCB was 18  $\mu\text{g}/\text{m}^3$ . Similarly, the ND indoor air reporting limits for EDB (0.25 - 0.28  $\mu\text{g}/\text{m}^3$ ) only very slightly exceeded the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ) and all of the sub-slab soil gas samples had ND reporting limits that met the soil gas screening level. Therefore, the indoor air ND reporting limit exceedances for EDB and HCB and the ND reporting limit exceedance of EDB in sub-slab soil gas were eliminated from further evaluation.

## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 934 is an insignificant exposure pathway based on current use. Building 934 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.

**Figure 5.4.17-1. Building 934 Location**





**Figure 5.4.17-2. Building 934 Sample Locations**

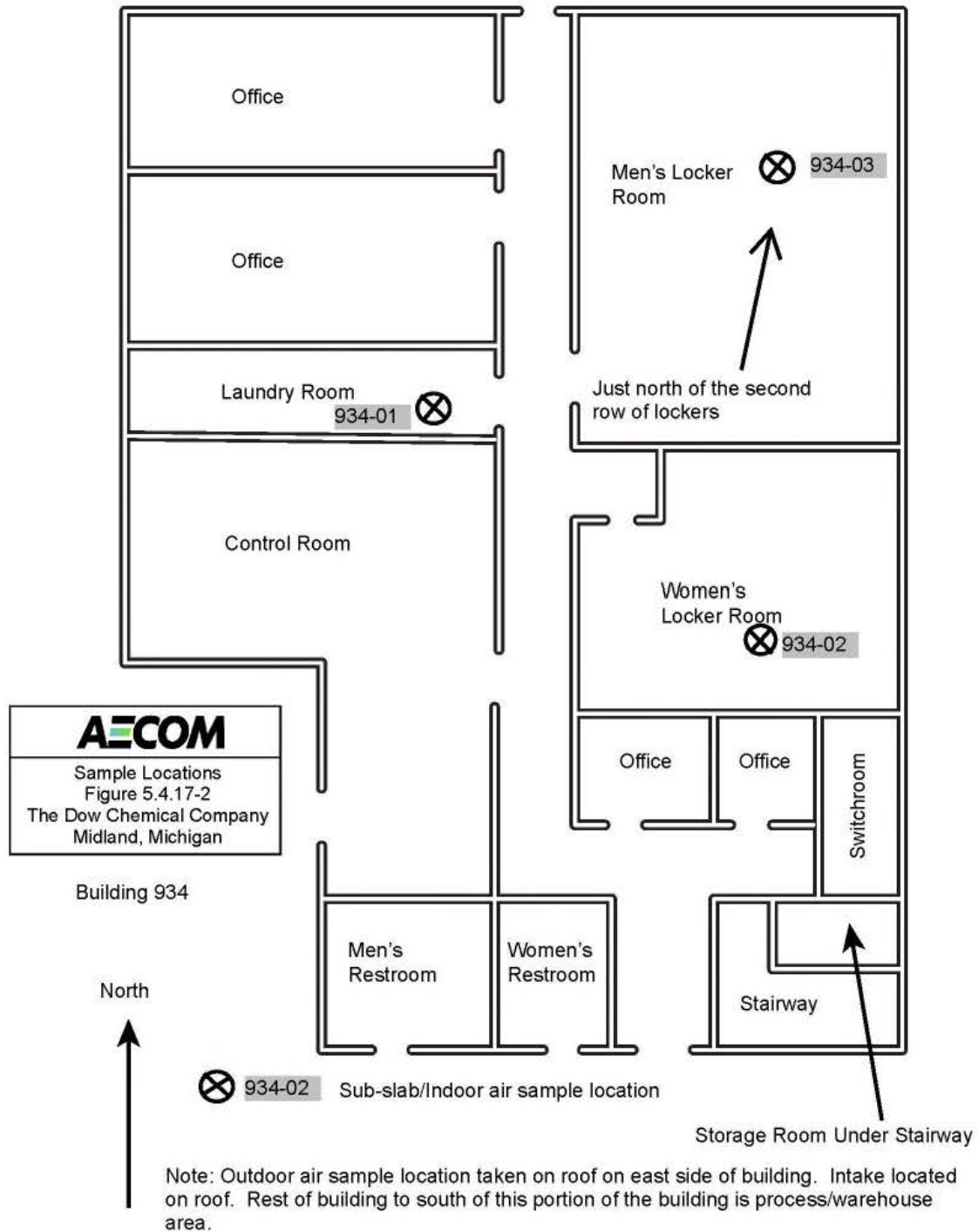


Table 5.4.17-1. Sub-Slab Gas Summary Results

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	934	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	3	100%	1367	58	1300	1400	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	934	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	5.5	5.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	934	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	4.4	4.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	934	SS	1,1-Dichloroethane	75-34-3	UG/M3	3	100%	34.4	31.0	9.2	69	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	934	SS	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	934	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	24	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	934	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	100%	8.07	2.39	5.4	10	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	934	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	6.2	6.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	0%
Category 2	934	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	4.8	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	934	SS	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	3.2	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	934	SS	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	3.7	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	934	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	67%	4.50	2.35	4.6	6.8	4.2	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	934	SS	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	1.8	1.9	No Screening Value Available	-	-	-
Category 2	934	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	4.8	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	934	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	4.8	5.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	934	SS	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	12	12	No Screening Value Available	-	-	-
Category 2	934	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.8	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	934	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	100%	19.7	5.5	16	26	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	934	SS	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	13	14	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	934	SS	2-Propanol	67-63-0	UG/M3	3	67%	7.02	2.66	8.5	8.6	7.9	7.9	No Screening Value Available	-	-	-
Category 2	934	SS	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	10	11	No Screening Value Available	-	-	-
Category 2	934	SS	4-Ethyltoluene	622-96-8	UG/M3	3	33%	3.07	1.67	5	5	4.2	4.2	No Screening Value Available	-	-	-
Category 2	934	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	3	0%	-	-	-	-	3.3	3.5	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	934	SS	Acetone	67-64-1	UG/M3	3	100%	99.7	20.0	80	120	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	934	SS	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	4.2	4.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	934	SS	Benzene	71-43-2	UG/M3	3	100%	28.0	11.5	19	41	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	934	SS	Bromochloromethane	74-97-5	UG/M3	3	0%	-	-	-	-	17	18	No Screening Value Available	-	-	-
Category 2	934	SS	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	5.4	5.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	934	SS	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	8.3	8.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	934	SS	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	31	33	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	934	SS	Carbon Disulfide	75-15-0	UG/M3	3	33%	8.33	5.77	15	15	10	10	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	934	SS	Carbon Tetrachloride	56-23-5	UG/M3	3	0%	-	-	-	-	5.1	5.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	934	SS	CFC-11	75-69-4	UG/M3	3	100%	122	52	67	170	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	934	SS	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	6.2	6.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	934	SS	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	5.6	6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	934	SS	CFC-12	75-71-8	UG/M3	3	100%	55.7	7.8	47	62	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	934	SS	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	3.7	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	934	SS	Chloroethane	75-00-3	UG/M3	3	0%	-	-	-	-	8.5	9.1	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	934	SS	Chloroform	67-66-3	UG/M3	3	33%	3.53	2.48	6.4	6.4	4.2	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	934	SS	Chloromethane	74-87-3	UG/M3	3	0%	-	-	-	-	17	18	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	934	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	934	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	3.6	3.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	934	SS	Cumene	98-82-8	UG/M3	3	0%	-	-	-	-	4	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	934	SS	Cyclohexane	110-82-7	UG/M3	3	100%	57.3	30.4	35	92	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	934	SS	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	6.8	7.3	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	934	SS	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	23	24	No Screening Value Available	-	-	-
Category 2	934	SS	Ethanol	64-17-5	UG/M3	3	100%	20.0	8.2	11	27	-	-	No Screening Value Available	-	-	-
Category 2	934	SS	Ethylbenzene	100-41-4	UG/M3	3	100%	17.0	3.6	13	20	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	934	SS	Heptane	142-82-5	UG/M3	3	100%	79.7	26.8	59	110	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	934	SS	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	34	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	934	SS	Hexane	110-54-3	UG/M3	3	100%	163	67	120	240	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	934	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	100%	31.3	8.5	23	40	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	934	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	12	12	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	934	SS	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	28	30	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	934	SS	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	8.4	9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	934	SS	o-Xylene	95-47-6	UG/M3	3	100%	11.8	5.4	6.3	17	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	934	SS	Propylbenzene	103-65-1	UG/M3	3	33%	2.93	1.44	4.6	4.6	4.2	4.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.17-1. Building 934 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	934	SS	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	3.4	3.7	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	934	SS	Tetrachloroethene	127-18-4	UG/M3	3	100%	28.0	9.8	17	36	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	934	SS	Tetrahydrofuran	109-99-9	UG/M3	3	100%	15.1	15.5	5.8	33	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	934	SS	Toluene	108-88-3	UG/M3	3	100%	116	22	97	140	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	934	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	7.2	7.8	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	934	SS	Total Xylenes	1330-20-7	UG/M3	3	100%	43.1	13.9	29.3	57	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	934	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	3.2	3.4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	934	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	3.6	3.9	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	934	SS	Trichloroethene	79-01-6	UG/M3	3	33%	4.30	3.46	8.3	8.3	4.6	4.6	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	934	SS	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	2	2.2	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.17-2. Building 934 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	934	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	3	67%	0.213	0.121	0.2	0.34	0.2	0.2	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	934	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	3	0%	-	-	-	-	0.22	0.25	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	934	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	3	0%	-	-	-	-	0.18	0.2	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	934	IA	1,1-Dichloroethane	75-34-3	UG/M3	3	0%	-	-	-	-	0.13	0.15	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	934	IA	1,1-Dichloroethene	75-35-4	UG/M3	3	0%	-	-	-	-	0.065	0.073	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	934	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	3	0%	-	-	-	-	6.1	6.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	934	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	3	100%	17.3	1.5	16	19	-	-	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	934	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	3	0%	-	-	-	-	0.25	0.28	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	934	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	3	0%	-	-	-	-	0.99	1.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	934	IA	1,2-Dichloroethane	107-06-2	UG/M3	3	0%	-	-	-	-	0.13	0.15	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	934	IA	1,2-Dichloropropane	78-87-5	UG/M3	3	0%	-	-	-	-	0.76	0.85	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	934	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	3	100%	5.23	0.80	4.4	6	-	-	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	934	IA	1,3-Butadiene	106-99-0	UG/M3	3	0%	-	-	-	-	0.36	0.41	No Screening Value Available	-	-	-
Category 2	934	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	3	0%	-	-	-	-	0.99	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	934	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	3	0%	-	-	-	-	0.2	0.22	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	934	IA	1,4-Dioxane	123-91-1	UG/M3	3	0%	-	-	-	-	0.59	0.66	No Screening Value Available	-	-	-
Category 2	934	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	3	0%	-	-	-	-	3.8	4.3	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	934	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	3	100%	13.0	1.7	12	15	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	934	IA	2-Hexanone	591-78-6	UG/M3	3	0%	-	-	-	-	3.4	3.8	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	934	IA	2-Propanol	67-63-0	UG/M3	3	100%	33.3	3.8	29	36	-	-	No Screening Value Available	-	-	-
Category 2	934	IA	3-Chloropropene	107-05-1	UG/M3	3	0%	-	-	-	-	2.6	2.9	No Screening Value Available	-	-	-
Category 2	934	IA	4-Ethyltoluene	622-96-8	UG/M3	3	100%	18.3	1.5	17	20	-	-	No Screening Value Available	-	-	-
Category 2	934	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	3	33%	0.463	0.189	0.68	0.68	0.67	0.75	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	934	IA	Acetone	67-64-1	UG/M3	3	100%	61.3	1.5	60	63	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	934	IA	alpha-Chlorotoluene	100-44-7	UG/M3	3	0%	-	-	-	-	0.85	0.95	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	934	IA	Benzene	71-43-2	UG/M3	3	100%	0.670	0.062	0.6	0.72	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	934	IA	Bromodichloromethane	75-27-4	UG/M3	3	0%	-	-	-	-	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	934	IA	Bromoform	75-25-2	UG/M3	3	0%	-	-	-	-	1.7	1.9	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	934	IA	Bromomethane	74-83-9	UG/M3	3	0%	-	-	-	-	3.2	3.6	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	934	IA	Carbon Disulfide	75-15-0	UG/M3	3	0%	-	-	-	-	2.6	2.9	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	934	IA	Carbon Tetrachloride	56-23-5	UG/M3	3	100%	0.957	0.384	0.73	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	934	IA	CFC-11	75-69-4	UG/M3	3	100%	1.33	0.06	1.3	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	934	IA	CFC-113	76-13-1	UG/M3	3	0%	-	-	-	-	1.2	1.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	934	IA	CFC-114	76-14-2	UG/M3	3	0%	-	-	-	-	0.23	0.26	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	934	IA	CFC-12	75-71-8	UG/M3	3	100%	8.93	0.85	8.1	9.8	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	934	IA	Chlorobenzene	108-90-7	UG/M3	3	0%	-	-	-	-	0.76	0.85	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	934	IA	Chloroethane	75-00-3	UG/M3	3	100%	0.883	0.078	0.82	0.97	-	-	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	934	IA	Chloroform	67-66-3	UG/M3	3	100%	1.73	0.21	1.5	1.9	-	-	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	934	IA	Chloromethane	74-87-3	UG/M3	3	100%	1.40	0.00	1.4	1.4	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	934	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	3	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	934	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	3	0%	-	-	-	-	0.74	0.84	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	934	IA	Cumene	98-82-8	UG/M3	3	33%	0.562	0.233	0.83	0.83	0.81	0.9	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	934	IA	Cyclohexane	110-82-7	UG/M3	3	100%	3.20	0.20	3	3.4	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	934	IA	Dibromochloromethane	124-48-1	UG/M3	3	0%	-	-	-	-	1.4	1.6	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	934	IA	Dibromomethane	74-95-3	UG/M3	3	0%	-	-	-	-	5.8	6.5	No Screening Value Available	-	-	-
Category 2	934	IA	Ethanol	64-17-5	UG/M3	3	100%	112	17	96	130	-	-	No Screening Value Available	-	-	-
Category 2	934	IA	Ethylbenzene	100-41-4	UG/M3	3	100%	0.510	0.035	0.47	0.53	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	934	IA	Heptane	142-82-5	UG/M3	3	100%	0.983	0.202	0.75	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	934	IA	Hexachlorobutadiene	87-68-3	UG/M3	3	0%	-	-	-	-	8.7	9.8	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	934	IA	Hexane	110-54-3	UG/M3	3	67%	0.628	0.297	0.69	0.89	0.61	0.61	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	934	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	3	100%	1.97	0.23	1.7	2.1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	934	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	3	0%	-	-	-	-	0.59	0.66	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	934	IA	Methylene Chloride	75-09-2	UG/M3	3	0%	-	-	-	-	1.1	1.3	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	934	IA	Naphthalene	91-20-3	UG/M3	3	0%	-	-	-	-	0.43	0.48	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	934	IA	o-Xylene	95-47-6	UG/M3	3	100%	1.70	0.17	1.5	1.8	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	934	IA	Propylbenzene	103-65-1	UG/M3	3	100%	3.97	0.40	3.6	4.4	-	-	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	934	IA	Styrene	100-42-5	UG/M3	3	0%	-	-	-	-	0.7	0.78	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.4.17-2. Building 934 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	934	IA	Tetrachloroethene	127-18-4	UG/M3	3	0%	-	-	-	-	0.22	0.25	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	934	IA	Tetrahydrofuran	109-99-9	UG/M3	3	0%	-	-	-	-	2.4	2.7	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	934	IA	Toluene	108-88-3	UG/M3	3	100%	5.67	0.50	5.2	6.2	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	934	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	3	0%	-	-	-	-	1.48	1.68	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	934	IA	Total Xylenes	1330-20-7	UG/M3	3	100%	3.67	0.40	3.2	3.9	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	934	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	3	0%	-	-	-	-	0.65	0.73	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	934	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	3	0%	-	-	-	-	0.74	0.84	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	934	IA	Trichloroethene	79-01-6	UG/M3	3	0%	-	-	-	-	0.18	0.2	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	934	IA	Vinyl Chloride	75-01-4	UG/M3	3	0%	-	-	-	-	0.042	0.047	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	934	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	934	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	934	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	934	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	934	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.067	0.067	-	-	-	-
Category 2	934	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.3	6.3	-	-	-	-
Category 2	934	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	100%	-	-	6.9	6.9	-	-	-	-	-	-
Category 2	934	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 2	934	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	934	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	934	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	934	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	100%	-	-	3.5	3.5	-	-	-	-	-	-
Category 2	934	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.38	0.38	-	-	-	-
Category 2	934	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	934	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	934	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.61	0.61	-	-	-	-
Category 2	934	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	934	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	-	-	9.8	9.8	-	-	-	-	-	-
Category 2	934	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	934	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2.1	2.1	-	-	-	-
Category 2	934	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	934	OA	4-Ethyltoluene	622-96-8	UG/M3	1	100%	-	-	7	7	-	-	-	-	-	-
Category 2	934	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.7	0.7	-	-	-	-
Category 2	934	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	25	25	-	-	-	-	-	-
Category 2	934	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.88	0.88	-	-	-	-
Category 2	934	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.56	0.56	-	-	-	-	-	-
Category 2	934	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	934	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	934	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	934	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	934	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.74	0.74	-	-	-	-	-	-
Category 2	934	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	934	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	934	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 2	934	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 2	934	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	934	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	934	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.24	0.24	-	-	-	-	-	-
Category 2	934	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	934	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	934	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	934	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.84	0.84	-	-	-	-
Category 2	934	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 2	934	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	934	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	6	6	-	-	-	-
Category 2	934	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	9	9	-	-	-	-	-	-
Category 2	934	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.18	0.18	-	-	-	-	-	-
Category 2	934	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	0.91	0.91	-	-	-	-	-	-

**Table 5.4.17-2. Building 934 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	934	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	9.1	9.1	-	-	-	-
Category 2	934	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	0.63	0.63	-	-	-	-	-	-
Category 2	934	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.6	0.6	-	-	-	-	-	-
Category 2	934	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.61	0.61	-	-	-	-
Category 2	934	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	934	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-
Category 2	934	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.62	0.62	-	-	-	-	-	-
Category 2	934	OA	Propylbenzene	103-65-1	UG/M3	1	100%	-	-	1.7	1.7	-	-	-	-	-	-
Category 2	934	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	934	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	934	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	934	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	1.5	1.5	-	-	-	-	-	-
Category 2	934	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.54	1.54	-	-	-	-
Category 2	934	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	1.22	1.22	-	-	-	-	-	-
Category 2	934	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	934	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	934	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	934	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.043	0.043	-	-	-	-

## 5.4.18 Vapor Intrusion Evaluation for Building 969

### BACKGROUND

Building 969 is a Category 2 building in Zone 2. This building has manufacturing, warehouse laboratory, process area, and office space. It is known as Ag Chem Development (see Figure 5.4.18-1) and is located within the central portion of the facility designated as Zone 2. The building is multiple stories tall but the office space is on the first floor. The warehouse area is built on a 3.5 ft raised slab. It is approximately 20,250 ft<sup>2</sup> (1,880 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 16, 2017 and the results can be found in Appendix C. The building has central air conditioning with four units. The air intakes are located on the roof. There are a total of seven bay doors in the process and warehouse portions of the building that may be left open at various times. The bay doors are not connected to the office areas. The land surrounding the building is comprised of asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified; however, there were a few very minor detections (results <0.5) in the men's and women's bathrooms, kitchenette area, and one office. A chemical inventory was completed during the building survey that identified cleaners, anti-static spray, ice eliminator, and lubricants. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 18, 2017, sub-slab soil gas samples were collected from nine locations within the office space within this manufacturing building. Indoor air samples were collected on April 17, 2017 at nine locations, corresponding to the soil gas sample locations, along with one outdoor air sample from the main air intakes. The sampling locations are shown on Figure 5.4.18-2. Summary statistics of the analytical results for sub-slab soil gas for Building 969 are presented on Table 5.4.18-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.18-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 41 of the 65 target analytes were ND in each of the nine samples collected at Building 969. EDB had two of nine ND reporting limits that exceeded the screening level and is discussed further below. Therefore, the 40 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 24 analytes were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds were divided into three categories:

- Eight analytes detected below *de minimus* levels (<100 µg/m<sup>3</sup>);
- Fifteen were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation; and
- One analyte was detected above non-residential screening levels.

The sub-slab soil gas results are summarized in Table 969-1. Of the 15 analytes detected above *de minimus* levels but below screening levels, five had detection frequencies of 100% (benzene, CFC-12, ethylbenzene, toluene, and total xylenes). Only the analytes present in the sub-slab soil gas at

concentrations above the non-residential screening levels are AOIs for VI; therefore, benzene is an AOI in sub-slab soil gas at Building 969.

**Table 969-1. Summary of Sub-Slab Soil Gas Detects for Building 969**

Analyte	Detection Frequency	Measured Range of Detects ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Benzene	100%	3.6 - 3800	11%	2200
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,2,4-Trimethylbenzene	67%	11 - 200	0%	130000
1,3,5-Trimethylbenzene	56%	8.4 - 190	0%	130000
4-Ethyltoluene	56%	13 - 730	N/A	N/A
Acetone	78%	52 - 350	0%	3400000
CFC-12	100%	5.8 - 4400	0%	29000000
Cumene	44%	7.9 - 330	0%	1700
Cyclohexane	89%	7 - 3200	0%	3500000
Ethanol	56%	14 - 210	N/A	N/A
Ethylbenzene	100%	15 - 12000	0%	59000
Heptane	78%	11 - 2600	0%	2000000
Hexane	89%	3.8 - 380	0%	410000
Naphthalene	56%	42 - 570	0%	1500
Propylbenzene	11%	130	0%	12000
Toluene	100%	16 - 710	0%	2900000
Total Xylenes	100%	49 - 42800	0%	58000
<b>Below <i>de minimus</i> levels</b>				
2,2,4-Trimethylpentane	11%	3.8	0%	2000000
2-Butanone (Methyl Ethyl Ketone)	33%	12 - 76	0%	2900000
2-Propanol	11%	10	N/A	N/A
Carbon Disulfide	22%	47 - 93	0%	410000
CFC-11	22%	5.4 - 6.3	0%	33000000
Styrene	44%	8.5 - 87	0%	32000
Tetrachloroethene (PCE)	56%	21 - 41	0%	23000
Vinyl Chloride	11%	54	0%	4100

N/A = No screening level available

## EVALUATION OF VAPOR INTRUSION

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day before the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 969-2 below shows the analytes detected in each of the three media sampled.



**Table 969-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Benzene	X	•	•
<i>Carbon Disulfide</i>	•	•	•
<i>CFC-11</i>	•	•	•
CFC-12	•	•	•
Ethanol	•	•	•
Ethylbenzene	•	•	•
Heptane	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
1,2,4-Trimethylbenzene	•	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
<i>2-Propanol</i>	•	•	
4-Ethyltoluene	•	•	
Acetone	•	•	
Cyclohexane	•	•	
Hexane	•	•	
<i>Tetrachloroethene</i>	•	•	
1,3,5-Trimethylbenzene	•		
<i>2,2,4-Trimethylpentane</i>	•		
Cumene	•		
Naphthalene	•		
Propylbenzene	•		
<i>Styrene</i>	•		
<i>Vinyl Chloride</i>	•		
Chloroform		•	•
Chloromethane		•	•
1,2-Dichlorobenzene		•	
1,2-Dichloroethane		•	
1,4-Dichlorobenzene		•	
Chloroethane		•	
Methylene Chloride		•	
Trichloroethene		•	
Carbon Tetrachloride			•

• = Detected

= Non-detect

X = Detection exceeds screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further below. Those 38 ND indoor air analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-five analytes were detected in the indoor air in Building 969 and there were no detected concentrations that exceeded screening levels (ethanol and 2-propanol do not have screening levels available). Twelve analytes were detected in the outdoor air sample.

Table 969-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample

results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 969-3. Vapor Intrusion Evaluation for Building 969**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Above nonresidential screening levels (analytes of interest)</b>				
Benzene	100%	0.55 - 1.3	16	0.6
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,2,4-Trimethylbenzene	11%	1.3	960	<0.72
1,3,5-Trimethylbenzene	0%	<0.75 - <0.84	960	<0.72
4-Ethyltoluene	11%	1.4	N/A	<0.72
Acetone	100%	11 - 110	26000	10
CFC-12	100%	2 - 8.7	220000	2
Cumene	0%	<0.75 - <0.84	13	<0.72
Cyclohexane	11%	0.54	26000	<0.5
Ethanol	100%	38 - 240	N/A	4
Ethylbenzene	100%	0.77 - 3.3	440	0.64
Heptane	100%	1.4 - 2.3	15000	1.5
Hexane	44%	0.6 - 2.7	3100	<0.51
Naphthalene	0%	<0.4 - <0.45	11	<0.38
Propylbenzene	0%	<0.75 - <0.84	88	<0.72
Toluene	100%	4.2 - 74	22000	3.2
Total Xylenes	100%	2.78 - 11.7	440	2
<b>Detected in soil gas below <i>de minimus</i> levels</b>				
2,2,4-Trimethylpentane	0%	<3.6 - <4	15000	<3.4
2-Butanone (Methyl Ethyl Ketone)	22%	2.3 - 2.8	22000	<2.2
2-Propanol	100%	3.3 - 27	N/A	<1.8
Carbon Disulfide	0%	<2.4 - <2.7	3100	<2.3
CFC-11	100%	1.1 - 1.3	250000	1.1
Styrene	0%	<0.65 - <0.73	240	<0.62
Tetrachloroethene	11%	0.34	180	<0.2
Vinyl Chloride	0%	<0.04 - <0.044	31	<0.04

N/A = No screening level available

< = Non-detect at the reporting limit provided

None of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

Twelve analytes were detected in the outdoor air sample. Eleven of the analytes were detected in both indoor air and outdoor air and have similar results. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. While all detected concentrations are well below screening levels, three analytes (acetone, toluene, and total xylenes) were detected at slightly higher concentrations in indoor air than outdoor air. Acetone was detected at  $10 \mu\text{g}/\text{m}^3$  in outdoor air and was detected in three samples at similar ranges ( $11 - 14 \mu\text{g}/\text{m}^3$ ). Four more results ranged from  $26 - 98 \mu\text{g}/\text{m}^3$ , and the remaining two sample results occurred at  $100$  and  $110 \mu\text{g}/\text{m}^3$ . These two higher detections likely indicate an indoor source at those locations. Toluene was detected in all nine samples at concentrations ranging from  $4.2 - 74 \mu\text{g}/\text{m}^3$ . Toluene was detected in outdoor air at  $3.2 \mu\text{g}/\text{m}^3$ . Six of

the indoor air detections occur at concentrations similar to the outdoor air value (4.2 - 7.3  $\mu\text{g}/\text{m}^3$ ). The remaining three results for toluene range from 64 - 74  $\mu\text{g}/\text{m}^3$ . These three results occurred in samples 969-IA-01, 969-IA-02, and 969-IA-03 which were collected in the first floor of the warehouse space of the building and it is likely there are other sources in that space. While ethanol does not have a screening level, it was detected in all nine sub-slab soil gas samples at low levels ranging from 14 - 210  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from 38 - 240  $\mu\text{g}/\text{m}^3$ . While ethanol is present in both sub-slab soil gas and indoor air at similar concentrations, ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol: disinfectants, toilet bowl cleaner, Purex, etc.

EDB and HCB were ND in all media; however, all of the ND reporting limits exceed the indoor air screening levels and for EDB, two of nine ND sub-slab soil gas reporting limits exceed the soil gas screening level. HCB was eliminated from further VI evaluation since all sub-slab soil gas ND reporting limits met the screening level. Also, the ND indoor air reporting limits for HCB (8.1 - 9.1  $\mu\text{g}/\text{m}^3$ ) only slightly exceed the screening level (6.2  $\mu\text{g}/\text{m}^3$ ). Similarly, for EDB, one reporting limit met the screening level and the remaining eight ND indoor air reporting limits (0.24 - 0.26  $\mu\text{g}/\text{m}^3$ ) only very slightly exceed the indoor air screening level (0.23  $\mu\text{g}/\text{m}^3$ ). Additionally, seven of the nine ND sub-slab soil gas samples had reporting limits that met the soil gas screening level. Furthermore, throughout the VI evaluation there have been laboratory limitations to achieve low enough reporting limits that consistently met screening levels for these two analytes. Therefore, the ND reporting limit exceedances for EDB and HCB were eliminated from further evaluation for Building 969.

## CONCLUSIONS AND RECOMMENDATIONS

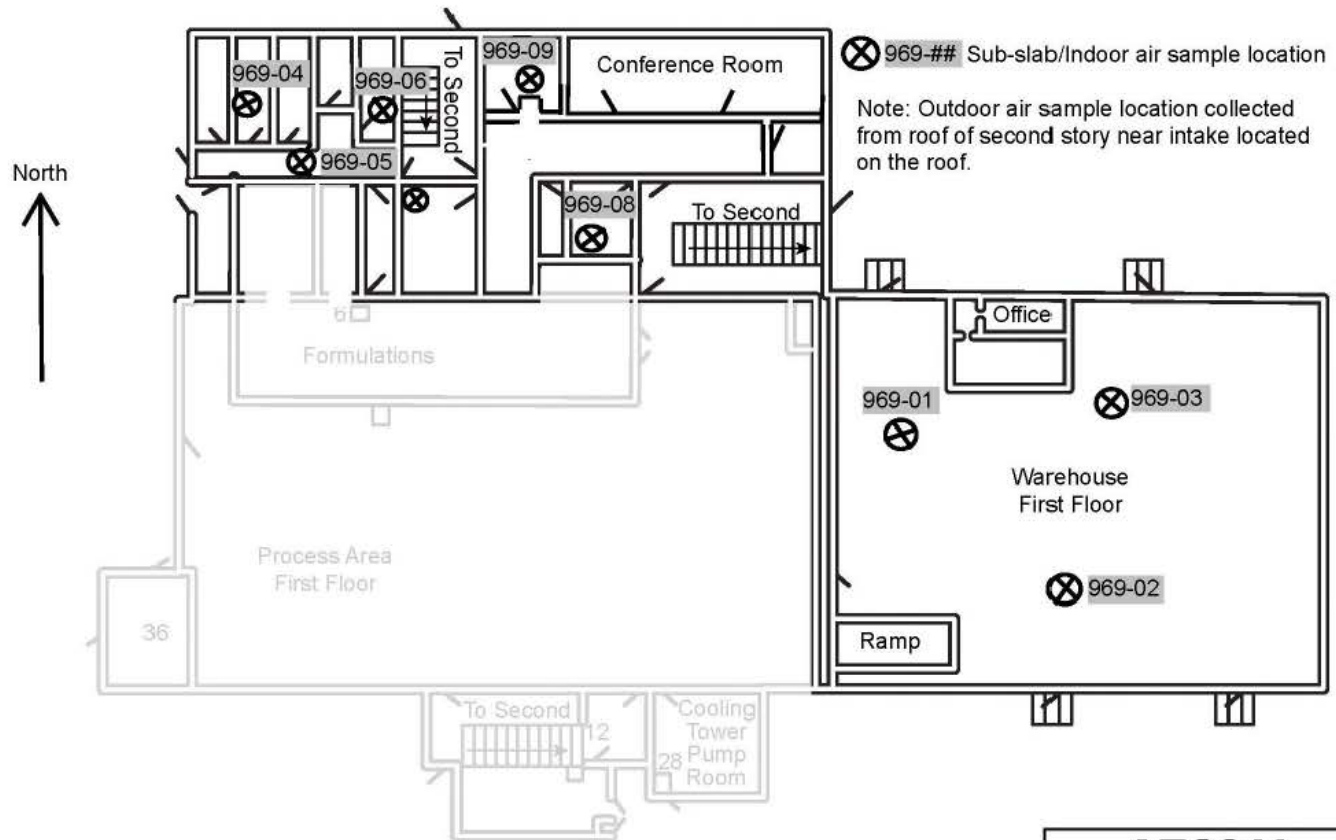
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the indoor air results, the VI pathway at Building 969 is an insignificant exposure pathway based on current use. However, based on the sub-slab soil gas results for benzene and given the potential for future VI, Building 969 was placed in VI Path Forward Building Group 2 (see Figure 5-3), and was recommended for resampling. Additionally, benzene will be added to Industrial Hygiene monitoring for the building.

**Figure 5.4.18-1. Building 969 Location**



**Figure 5.4.18-2. Building 969 Sample Locations**

969 Building



**AECOM**  
 Sample Locations  
 Figure 5.4.18-2  
 The Dow Chemical Company  
 Midland, Michigan

**Table 5.4.18-1. Building 969 Sub-Slab Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	969	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	4.2	89	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	969	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.4	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	969	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.2	89	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	969	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	3.2	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	969	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	3.1	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	969	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	23	490	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	969	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	67%	55.4	70.6	11	200	3.8	4	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	969	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	6	130	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	22%
Category 2	969	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.7	99	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	969	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	3.2	66	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	969	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.6	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	969	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	56%	43.1	61.7	8.4	190	3.8	77	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	969	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.7	36	No Screening Value Available	-	-	-
Category 2	969	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.7	99	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	969	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.7	99	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	969	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	11	240	No Screening Value Available	-	-	-
Category 2	969	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	11%	11.9	14.9	3.8	3.8	3.6	77	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	969	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	33%	39.4	36.5	12	76	9.4	190	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	969	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	13	270	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	969	SS	2-Propanol	67-63-0	UG/M3	9	11%	24.9	30.3	10	10	7.7	160	No Screening Value Available	-	-	-
Category 2	969	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.8	200	No Screening Value Available	-	-	-
Category 2	969	SS	4-Ethyltoluene	622-96-8	UG/M3	9	56%	125	238	13	730	3.8	9.2	No Screening Value Available	-	-	-
Category 2	969	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	3.2	67	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	969	SS	Acetone	67-64-1	UG/M3	9	78%	128	96	52	350	94	370	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	969	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	4	85	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	969	SS	Benzene	71-43-2	UG/M3	9	100%	460	1253	3.6	3800	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	11%	0%
Category 2	969	SS	Bromochloromethane	74-97-5	UG/M3	8	0%	-	-	-	-	16	330	No Screening Value Available	-	-	-
Category 2	969	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	5.2	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	969	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	8.1	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	969	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	30	610	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	969	SS	Carbon Disulfide	75-15-0	UG/M3	9	22%	43.4	42.9	47	93	9.7	200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	969	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	4.9	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	969	SS	CFC-11	75-69-4	UG/M3	9	22%	14.8	17.4	5.4	6.3	4.5	92	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	969	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	6	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	969	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	5.4	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	969	SS	CFC-12	75-71-8	UG/M3	9	100%	1557	1653	5.8	4400	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	969	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.6	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	969	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	8.2	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	969	SS	Chloroform	67-66-3	UG/M3	9	0%	-	-	-	-	3.8	80	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	969	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	16	320	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	969	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	3.1	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	969	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.5	74	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	969	SS	Cumene	98-82-8	UG/M3	9	44%	56.8	107.2	7.9	330	3.8	19	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	969	SS	Cyclohexane	110-82-7	UG/M3	9	89%	372	1061	7	3200	56	56	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	969	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.6	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	969	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	22	470	No Screening Value Available	-	-	-
Category 2	969	SS	Ethanol	64-17-5	UG/M3	9	56%	56.1	63.8	14	210	14	120	No Screening Value Available	-	-	-
Category 2	969	SS	Ethylbenzene	100-41-4	UG/M3	9	100%	1459	3963	15	12000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	969	SS	Heptane	142-82-5	UG/M3	9	78%	310	859	11	2600	3.3	67	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	969	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	33	700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	969	SS	Hexane	110-54-3	UG/M3	9	89%	62.5	119.3	3.8	380	58	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	969	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	3774	10961	32	33000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	969	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	230	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	969	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	27	550	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	969	SS	Naphthalene	91-20-3	UG/M3	9	56%	166	195	42	570	8.2	340	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	969	SS	o-Xylene	95-47-6	UG/M3	9	100%	1172	3238	9	9800	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	969	SS	Propylbenzene	103-65-1	UG/M3	9	11%	22.2	42.0	130	130	3.8	77	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%

**Table 5.4.18-1. Building 969 Sub-Slab Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	969	SS	Styrene	100-42-5	UG/M3	9	44%	21.7	27.7	8.5	87	3.3	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	969	SS	Tetrachloroethene	127-18-4	UG/M3	9	56%	31.6	17.4	21	41	13	110	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	969	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.3	48	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	969	SS	Toluene	108-88-3	UG/M3	9	100%	209	262	16	710	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	969	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	7	148	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	969	SS	Total Xylenes	1330-20-7	UG/M3	9	100%	4945	14198	49	42800	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	969	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3.1	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	969	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.5	74	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	969	SS	Trichloroethene	79-01-6	UG/M3	9	0%	-	-	-	-	4.2	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	969	SS	Vinyl Chloride	75-01-4	UG/M3	9	11%	10.1	17.6	54	54	2	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.18-2. Building 969 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	969	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	0.16	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	969	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	969	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.16	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	969	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	969	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	0.06	0.068	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	969	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.6	6.3	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	969	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	11%	0.502	0.300	1.3	1.3	0.78	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	969	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.23	0.26	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	89%
Category 2	969	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	11%	0.590	0.304	1.4	1.4	0.95	1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	969	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	11%	0.226	0.478	1.5	1.5	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	969	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.7	0.79	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	969	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	0.75	0.84	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	969	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.34	0.38	No Screening Value Available	-	-	-
Category 2	969	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.91	1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	969	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	11%	0.190	0.278	0.93	0.93	0.19	0.2	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	969	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.55	0.62	No Screening Value Available	-	-	-
Category 2	969	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.6	4	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	969	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	22%	1.51	0.61	2.3	2.8	2.3	2.5	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	969	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.1	3.5	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	969	IA	2-Propanol	67-63-0	UG/M3	9	100%	17.2	10.1	3.3	27	-	-	No Screening Value Available	-	-	-
Category 2	969	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.4	2.7	No Screening Value Available	-	-	-
Category 2	969	IA	4-Ethyltoluene	622-96-8	UG/M3	9	11%	0.513	0.333	1.4	1.4	0.78	0.84	No Screening Value Available	-	-	-
Category 2	969	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	0.62	0.7	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	969	IA	Acetone	67-64-1	UG/M3	9	100%	48.4	41.5	11	110	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	969	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.79	0.88	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	969	IA	Benzene	71-43-2	UG/M3	9	100%	0.733	0.270	0.55	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	969	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1	1.1	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	969	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	969	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3	3.3	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	969	IA	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	2.4	2.7	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	969	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	0.376	0.019	0.33	0.4	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	969	IA	CFC-11	75-69-4	UG/M3	9	100%	1.18	0.07	1.1	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	969	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	1.3	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	969	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.21	0.24	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	969	IA	CFC-12	75-71-8	UG/M3	9	100%	5.86	2.96	2	8.7	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	969	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.7	0.79	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	969	IA	Chloroethane	75-00-3	UG/M3	9	33%	0.233	0.189	0.44	0.53	0.21	0.22	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	969	IA	Chloroform	67-66-3	UG/M3	9	78%	0.532	0.577	0.14	1.9	0.16	0.17	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	969	IA	Chloromethane	74-87-3	UG/M3	9	100%	6.21	6.89	1.2	17	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	969	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	969	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.69	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	969	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.75	0.84	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	969	IA	Cyclohexane	110-82-7	UG/M3	9	11%	0.309	0.087	0.54	0.54	0.54	0.59	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	969	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.3	1.4	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	969	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.4	6.1	No Screening Value Available	-	-	-
Category 2	969	IA	Ethanol	64-17-5	UG/M3	9	100%	110	77	38	240	-	-	No Screening Value Available	-	-	-
Category 2	969	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	1.30	0.82	0.77	3.3	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	969	IA	Heptane	142-82-5	UG/M3	9	100%	1.59	0.28	1.4	2.3	-	-	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	969	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.1	9.1	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	969	IA	Hexane	110-54-3	UG/M3	9	44%	0.877	0.945	0.6	2.7	0.56	0.6	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	969	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	3.62	2.34	2.2	9.1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	969	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.55	0.62	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	969	IA	Methylene Chloride	75-09-2	UG/M3	9	44%	0.922	0.451	1.2	1.7	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	969	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	0.4	0.45	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	969	IA	o-Xylene	95-47-6	UG/M3	9	100%	1.00	0.70	0.58	2.6	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	969	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.75	0.84	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	969	IA	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	0.65	0.73	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%



**Table 5.4.18-2. Building 969 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	969	IA	Tetrachloroethene	127-18-4	UG/M3	9	11%	0.136	0.077	0.34	0.34	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	969	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.2	2.5	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	969	IA	Toluene	108-88-3	UG/M3	9	100%	26.9	31.9	4.2	74	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	969	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.38	1.56	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	969	IA	Total Xylenes	1330-20-7	UG/M3	9	100%	4.62	3.04	2.78	11.7	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	969	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.6	0.68	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	969	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.69	0.78	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	969	IA	Trichloroethene	79-01-6	UG/M3	9	33%	0.231	0.215	0.49	0.54	0.17	0.18	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	969	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	0.039	0.044	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	969	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 2	969	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	969	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 2	969	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 2	969	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.058	0.058	-	-	-	-
Category 2	969	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	5.4	5.4	-	-	-	-
Category 2	969	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	969	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	969	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	0.88	0.88	-	-	-	-
Category 2	969	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 2	969	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	969	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	969	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.32	0.32	-	-	-	-
Category 2	969	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	0.88	0.88	-	-	-	-
Category 2	969	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	969	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.53	0.53	-	-	-	-
Category 2	969	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	969	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 2	969	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3	3	-	-	-	-
Category 2	969	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	969	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	969	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	969	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	969	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	10	10	-	-	-	-	-	-
Category 2	969	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	969	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.6	0.6	-	-	-	-	-	-
Category 2	969	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	0.98	0.98	-	-	-	-
Category 2	969	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 2	969	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	2.8	2.8	-	-	-	-
Category 2	969	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.3	2.3	-	-	-	-
Category 2	969	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.37	0.37	-	-	-	-	-	-
Category 2	969	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	969	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	969	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	969	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2	2	-	-	-	-	-	-
Category 2	969	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.67	0.67	-	-	-	-
Category 2	969	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 2	969	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.15	0.15	-	-	-	-	-	-
Category 2	969	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 2	969	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.12	0.12	-	-	-	-
Category 2	969	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	969	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	969	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.5	0.5	-	-	-	-
Category 2	969	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	969	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.2	5.2	-	-	-	-
Category 2	969	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	4	4	-	-	-	-	-	-
Category 2	969	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.64	0.64	-	-	-	-	-	-
Category 2	969	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	1.5	1.5	-	-	-	-	-	-

**Table 5.4.18-2. Building 969 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	969	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	7.8	7.8	-	-	-	-
Category 2	969	OA	Hexane	110-54-3	UG/M3	1	0%	-	-	-	-	0.51	0.51	-	-	-	-
Category 2	969	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	1.6	1.6	-	-	-	-	-	-
Category 2	969	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.53	0.53	-	-	-	-
Category 2	969	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	969	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.38	0.38	-	-	-	-
Category 2	969	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.42	0.42	-	-	-	-	-	-
Category 2	969	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.72	0.72	-	-	-	-
Category 2	969	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 2	969	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	969	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.2	2.2	-	-	-	-
Category 2	969	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	3.2	3.2	-	-	-	-	-	-
Category 2	969	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.32	1.32	-	-	-	-
Category 2	969	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	2.02	2.02	-	-	-	-	-	-
Category 2	969	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.58	0.58	-	-	-	-
Category 2	969	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	969	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.16	0.16	-	-	-	-
Category 2	969	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.037	0.037	-	-	-	-

## 5.4.19 Vapor Intrusion Evaluation for Building 1222

### BACKGROUND

Building 1222 is a Category 2 building in Zone 2. This building is a maintenance shop with office space. It is known as Dursban Maintenance (see Figure 5.4.19-1) and is located within the central portion of the facility designated as Zone 2. The building is only a single story. It is approximately 16,340 ft<sup>2</sup> (1,518 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 1, 2017 and the results can be found in Appendix C. The building has central air conditioning with two units. The air intakes for both units are located on the roof. There are a total of four bay doors in the maintenance shop portion of the building that are opened to move vehicles in and out of the shop and at times, left open during the summer months. The land surrounding the building is a combination of asphalt and gravel.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners, rat poison, adhesive sprays, aqueous cutting fluid, pure nickel special anti-seize compound, and spray paint. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On April 18, 2017, sub-slab soil gas samples were collected from nine locations within the small office space within this warehouse building. Indoor air samples were collected on April 19, 2017 at nine locations, corresponding to the soil gas sample locations, along with a single outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.19-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1222 are presented on Table 5.4.19-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.19-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 51 of the 65 target analytes were ND in each of the 9 samples collected at Building 1222. Twelve ND sub-slab soil gas analytes had at least one reporting limit that exceeded the respective screening level. 1,2-Dichloroethane and TCE each had a single detect; however, each of these analytes also had two ND reporting limits that exceeded the screening level. These 14 reporting limit exceedances are discussed further in the VI evaluation below. The remaining 37 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 14 analytes were detected in one or more of the nine sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone). Each of the 14 detected analytes were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1222-1. Only two detected analytes had detection frequencies of 100% (CFC-11 and CFC-12). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI. Therefore, there are no AOIs in sub-slab soil gas at Building 1222.

**Table 1222-1. Summary of Sub-Slab Soil Gas Detects for Building 1222**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	44%	60 - 1500	0%	3500000
1,1-Dichloroethane	33%	37 - 730	0%	290000
1,2-Dichloroethane	11%	400	0%	700
Acetone	44%	330 - 1200	0%	3400000
CFC-11	100%	10000 - 180000	0%	33000000
CFC-12	100%	400 - 240000	0%	29000000
Cyclohexane	11%	5600	0%	3500000
Ethanol	11%	130	N/A	N/A
Heptane	11%	4700	0%	2000000
Hexane	44%	30 - 18000	0%	410000
Tetrachloroethene (PCE)	22%	120 - 1100	0%	23000
Toluene	56%	41 - 150	0%	2900000
Total Xylenes	22%	175.5 - 290	0%	58000
Trichloroethene (TCE)	11%	180	0%	1200

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes.

Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1222-2 below shows the analytes detected in each of the three media sampled.

**Table 1222-2. Detections Matrix**

Analytes	Sub-slab	Indoor Air	Outdoor Air
Acetone	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
Ethanol	•	•	•
Heptane	•	•	•
Hexane	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
Tetrachloroethene (PCE)	•	•	
1,1,1-Trichloroethane	•		
1,1-Dichloroethane	•		
1,2-Dichloroethane	•		
Cyclohexane	•		
Trichloroethene (TCE)	•		
1,1,2,2-Tetrachloroethane		•	•
2-Butanone (Methyl Ethyl Ketone)		•	•
4-Ethyltoluene		•	•

**Table 1222-2. Detections Matrix (Continued)**

Analytes	Sub-slab	Indoor Air	Outdoor Air
4-Methyl-2-pentanone		•	•
Benzene		•	•
Carbon Tetrachloride		•	•
Chloromethane		•	•
Ethylbenzene		•	•
1,2,4-Trimethylbenzene		•	
2-Propanol		•	
Carbon Disulfide		•	
Chloroform		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Forty-four of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. Those 42 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-one analytes were detected in the indoor air in Building 1222 and there were no detected concentrations that exceeded screening levels (ethanol does not have a screening level available). Sixteen analytes were detected in the outdoor air sample.

Table 1222-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1222-3. Vapor Intrusion Evaluation for Building 1222**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	0%	<0.18 - <0.19	26000	<0.19
1,1-Dichloroethane	0%	<0.13 - <0.14	2200	<0.14
1,2-Dichloroethane	0%	<0.13 - <0.14	5.3	<0.14
Acetone	100%	12 - 30	26000	27
CFC-11	100%	1.1 - 1.3	250000	1.1
CFC-12	100%	2 - 2.1	220000	2
Cyclohexane	0%	0.56 - 0.61	26000	<0.59
Ethanol	100%	4.2 - 63	N/A	8.8
Heptane	44%	0.75 - 1.3	15000	1.1
Hexane	78%	0.88 - 1.3	3100	1.2
Tetrachloroethene (PCE)	11%	0.27	180	<0.23
Toluene	100%	1.3 - 6.2	22000	1.1
Total Xylenes	100%	0.84 - 1.18	440	0.91
Trichloroethene (TCE)	0%	<0.17 - <0.19	8.8	<0.18

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

As with the sub-slab soil gas results, none of the detected concentrations of the indoor air analytes exceeded applicable screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were 16 analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. The majority of the 16 analytes had indoor air results that were very similar to the concentration detected in outdoor air.

Ethanol does not have a screening level. It was detected in only one out of nine sub-slab soil gas samples at 130  $\mu\text{g}/\text{m}^3$ . Ethanol was detected in all nine of the indoor air samples at concentrations ranging from 4.2 - 63  $\mu\text{g}/\text{m}^3$ , and in the outdoor air sample at 9  $\mu\text{g}/\text{m}^3$ . Ethanol is present in numerous consumer products, including disinfectant sprays and wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes. Furthermore, the chemical inventory from the building identified a number of materials likely to contain ethanol, disinfectants, cleaners, etc.

All indoor air ND reporting limits for EDB and HCB exceed the applicable screening level. Neither of these analytes were detected in any media sampled; however, each of these analytes also had two sub-slab soil gas ND reporting limits that exceeded screening levels. Therefore, EDB and HCB were carried forward into the ND evaluation below. The 12 additional ND sub-slab soil gas analytes with at least one reporting limit that exceeded the screening level were also carried forward to the evaluation below (EDB and HCB had ND reporting limit exceedances in both media).

## BUILDING-SPECIFIC ATTENUATION FACTOR EVALUATION

VI evaluations utilize attenuation factors ( $\alpha$ ), which are the ratio of indoor air concentrations to shallow soil gas concentrations, and are used as a measure of the decrease in concentration that occurs during vapor migration. A calculated building-specific attenuation factor can be used to estimate indoor air concentrations for analytes that may be present in indoor air or sub-slab soil gas below the analytical reporting limits or any analytes not included in the TAL.

As shown on Table 1222-1, there were two analytes detected at a 100% frequency in the sub-slab soil gas. The data for those two analytes are given in Table 1222-4. Attenuation factors based on both average and maximum values are shown.

**Table 1222-4. VI Attenuation Factors for Building 1222**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )	
		CFC-11	CFC-12
Indoor Air	1222-IA-01	1.2	2.1
	1222-IA-02	1.2	2.1
	1222-IA-03	1.2	2.1
	1222-IA-04	1.1	2.1
	1222-IA-05	1.1	2
	1222-IA-06	1.1	2
	1222-IA-07	1.2	2.1
	1222-IA-08	1.3	2.1
	1222-IA-09	1.2	2
	Average	1.18	2.07

**Table 1222-4. VI Attenuation Factors for Building 1222 (Continued)**

Data Set	Sample ID	Measured Concentrations ( $\mu\text{g}/\text{m}^3$ )	
		CFC-11	CFC-12
Sub-slab Soil Gas	1222-SS-01	17000	480
	1222-SS-02	18000	1300
	1222-SS-03	150000	160000
	1222-SS-04	23000	1100
	1222-SS-05	92000	1600
	1222-SS-06	180000	3700
	1222-SS-07	30000	570
	1222-SS-08	10000	400
	1222-SS-09	73000	240000
	Average	65,889	45,461
Attenuation Factors	Average	2.0E-05	5.0E-05
	Maximum	7.2E-06	8.8E-06

1. Non-detect values were used to calculate the attenuation factor and the full RL value was used in each case.
2. Average  $\alpha$  value based on average/average. Maximum  $\alpha$  value based on maximum/maximum.

The most conservative attenuation factors calculated were for CFC-12. The average attenuation factor calculated for this analyte was selected as the best estimate of a conservative, building-specific attenuation factor. If the maximum value is used, the attenuation factor is slightly smaller and less conservative. Therefore, the best estimate for a conservative building-specific attenuation factor for Building 1222 is 5.0E-05.

The building-specific attenuation factor was then used to estimate the indoor air concentrations for the 14 analytes with ND reporting limits that exceed either the sub-slab soil gas screening levels or the indoor air screening levels (or both, in the case of EDB and HCB), as shown in Table 1222-5, where:

$$\text{Estimated indoor air concentration} = (\text{Sub-slab soil gas concentration}) \times (\text{Building-specific attenuation factor})$$

The resulting estimated indoor air concentrations were then compared to the applicable indoor air screening levels.

**Table 1222-5. Estimated Indoor Air Concentrations for Non-Detected Analytes with Reporting Limits that Exceed Screening Levels**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas but RLs Exceed Screening Levels</b>					
1,1,2,2-Tetrachloroethane	<2800	5.0E-05	0.14	2.4	No
1,1,2-Trichloroethane	<2200	5.0E-05	0.11	8.5	No
1,2,4-Trichlorobenzene	<12000	5.0E-05	0.60	18	No
1,2-Dibromoethane (EDB)	<3200	5.0E-05	0.16	0.23	No
1,2-Dichloroethane	<1600	5.0E-05	0.08	5.3	No
1,3-Dichlorobenzene	<2500	5.0E-05	0.13	13	No
alpha-Chlorotoluene	<2100	5.0E-05	0.11	2.8	No

**Table 1222-5. Estimated Indoor Air Concentrations for Non-Detected Analytes with Reporting Limits that Exceed Screening Levels (Continued)**

Analyte	Maximum Sub Slab ND RL	Building Specific Attenuation Factor	Estimated Indoor Air Concentration	Indoor Air Screening Level	Exceeds Screening Level?
	$\mu\text{g}/\text{m}^3$	$\alpha$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	
<b>ND in Soil Gas but RLs Exceed Screening Levels</b>					
Bromodichloromethane	<2700	5.0E-05	0.14	7.6	No
Bromomethane	<6400	5.0E-05	0.32	22	No
Cumene	<2000	5.0E-05	0.10	13	No
Dibromochloromethane	<3500	5.0E-05	0.18	5.6	No
Hexachlorobutadiene (HCB)	<17000	5.0E-05	0.85	6.2	No
Naphthalene	<8600	5.0E-05	0.43	11	No
Trichloroethene (TCE)	<2200	5.0E-05	0.11	8.8	No

In order to be conservative, the estimated indoor air concentrations for the analytes listed in Table 1222-5 were based on the maximum ND sub-slab soil gas reporting limit. The estimated indoor air concentrations were below the indoor air screening level for all of the 14 ND analytes. Therefore, all 14 analytes with ND reporting limit exceedances were eliminated from further VI evaluation. However, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for EDB and HCB, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated.

## CONCLUSIONS AND RECOMMENDATIONS

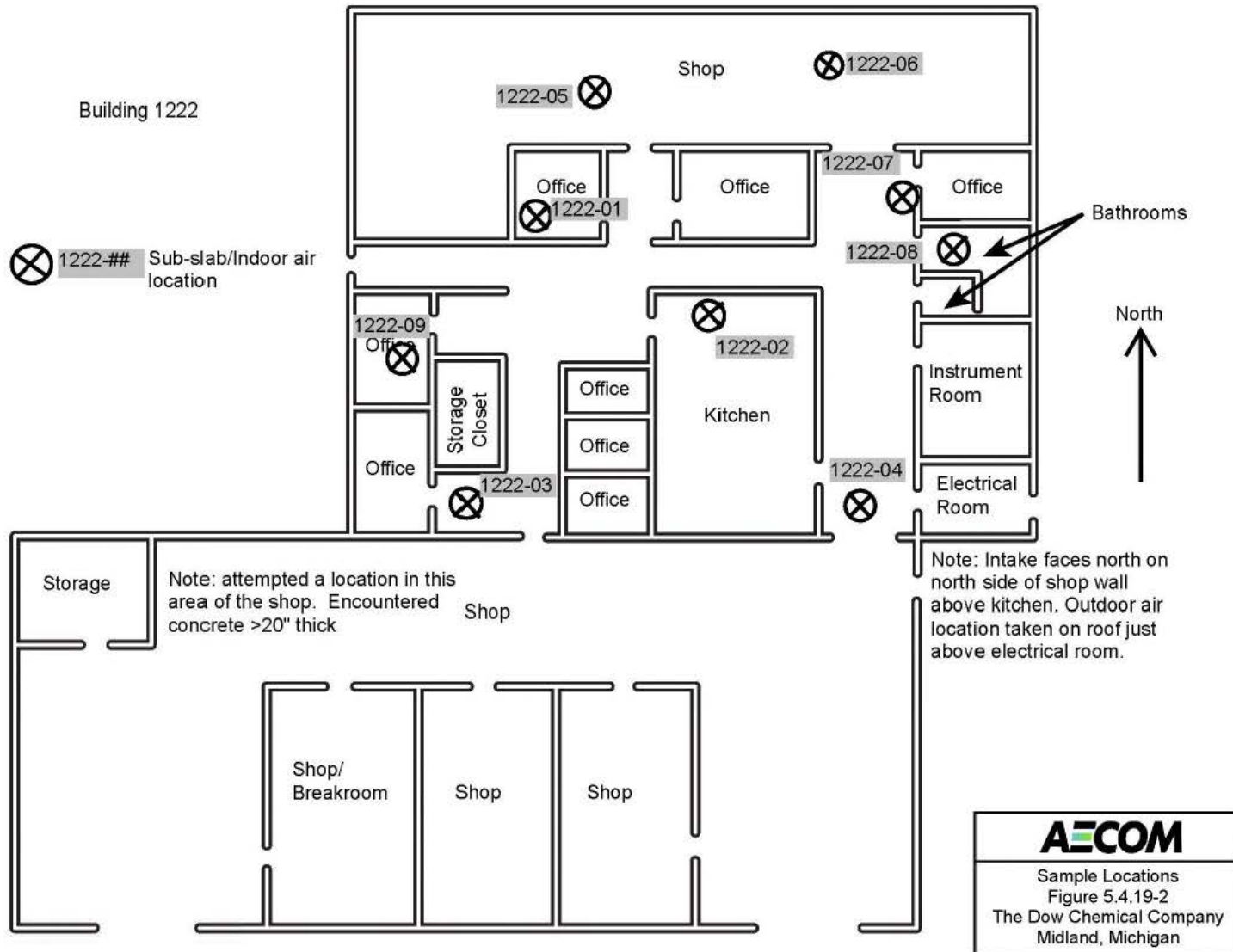
The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. Based on the sub-slab soil gas and indoor air results, the VI pathway at Building 1222 is an insignificant exposure pathway based on current use. Building 1222 was placed into VI Path Forward Building Group 1 (see Figure 5-3) and no further VI evaluation is warranted at this time.



**Figure 5.4.19-1. Building 1222 Location**



**Figure 5.4.19-2. Building 1222 Sample Locations**



**Table 5.4.19-1. Building 1222 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics					Screening Criteria				
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1222	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	44%	478	582	60	1500	29	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1222	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	36	2800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	33%
Category 2	1222	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	29	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	22%
Category 2	1222	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	33%	340	379	37	730	21	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1222	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	21	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	1222	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	160	12000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	33%
Category 2	1222	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	0%	-	-	-	-	26	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1222	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	40	3200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	100%
Category 2	1222	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	32	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	1222	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	11%	236	343	400	400	21	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	22%
Category 2	1222	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	24	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	1222	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	26	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1222	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	12	910	No Screening Value Available	-	-	-
Category 2	1222	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	32	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	22%
Category 2	1222	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	32	2500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	1222	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	76	5900	No Screening Value Available	-	-	-
Category 2	1222	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	24	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1222	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	0%	-	-	-	-	62	4800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1222	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	86	6700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	1222	SS	2-Propanol	67-63-0	UG/M3	9	0%	-	-	-	-	52	4000	No Screening Value Available	-	-	-
Category 2	1222	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	66	5100	No Screening Value Available	-	-	-
Category 2	1222	SS	4-Ethyltoluene	622-96-8	UG/M3	9	0%	-	-	-	-	26	2000	No Screening Value Available	-	-	-
Category 2	1222	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	22	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	1222	SS	Acetone	67-64-1	UG/M3	9	44%	807	712	330	1200	250	3900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	1222	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	27	2100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	33%
Category 2	1222	SS	Benzene	71-43-2	UG/M3	9	0%	-	-	-	-	17	1300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	1222	SS	Bromochloromethane	74-97-5	UG/M3	5	0%	-	-	-	-	110	320	No Screening Value Available	-	-	-
Category 2	1222	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	35	2700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	22%
Category 2	1222	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	54	4200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	1222	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	200	6400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	22%
Category 2	1222	SS	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	65	5100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1222	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	33	2600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	1222	SS	CFC-11	75-69-4	UG/M3	9	100%	65889	63011	10000	180000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	33000000	0%	0%
Category 2	1222	SS	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	40	3100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1222	SS	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	37	2900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1222	SS	CFC-12	75-71-8	UG/M3	9	100%	45461	89875	400	240000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000000	0%	0%
Category 2	1222	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	24	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1222	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	55	4300	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	1222	SS	Chloroform	67-66-3	UG/M3	9	0%	-	-	-	-	26	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	1222	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	110	3400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	1222	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	21	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	1222	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	24	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1222	SS	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	26	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	22%
Category 2	1222	SS	Cyclohexane	110-82-7	UG/M3	9	11%	790	1828	5600	5600	18	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1222	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	45	3500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	22%
Category 2	1222	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	150	12000	No Screening Value Available	-	-	-
Category 2	1222	SS	Ethanol	64-17-5	UG/M3	9	11%	408	640	130	130	40	3100	No Screening Value Available	-	-	-
Category 2	1222	SS	Ethylbenzene	100-41-4	UG/M3	9	0%	-	-	-	-	23	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	1222	SS	Heptane	142-82-5	UG/M3	9	11%	720	1533	4700	4700	22	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1222	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	220	17000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	33%
Category 2	1222	SS	Hexane	110-54-3	UG/M3	9	44%	2177	5941	30	18000	29	1400	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1222	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	22%	254	358	130	140	23	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1222	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	59	1500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	1222	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	180	5700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	1222	SS	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	55	8600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	33%
Category 2	1222	SS	o-Xylene	95-47-6	UG/M3	9	11%	246	362	160	160	23	1800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%

**Table 5.4.19-1. Building 1222 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1222	SS	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	26	2000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	1222	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	22	1700	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	1222	SS	Tetrachloroethene	127-18-4	UG/M3	9	22%	459	624	120	1100	36	2800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	1222	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	15	1200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%
Category 2	1222	SS	Toluene	108-88-3	UG/M3	9	56%	241	291	41	150	62	1500	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1222	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	48	3800	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1222	SS	Total Xylenes	1330-20-7	UG/M3	9	22%	500	719	175.5	290	46	3600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1222	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	21	1600	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1222	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	24	1900	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1222	SS	Trichloroethene	79-01-6	UG/M3	9	11%	297	447	180	180	28	2200	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	22%
Category 2	1222	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	13	1000	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%

**Table 5.4.19-2. Building 1222 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1222	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	0%	-	-	-	-	0.18	0.19	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1222	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	33%	0.378	0.509	0.22	1.5	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	1222	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.18	0.19	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	1222	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	1222	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	0.064	0.07	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	1222	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	6	6.6	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1222	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	33%	0.554	0.207	0.81	0.84	0.8	0.87	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1222	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	0.25	0.27	Vapor Intrusion Indoor Air Screening Levels	0.23	0%	100%
Category 2	1222	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.97	1.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	1222	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	1222	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.75	0.82	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1222	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	0%	-	-	-	-	0.8	0.87	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1222	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.36	0.39	No Screening Value Available	-	-	-
Category 2	1222	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.97	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1222	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	0.19	0.21	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	1222	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.58	0.64	No Screening Value Available	-	-	-
Category 2	1222	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.8	4.1	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1222	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	89%	4.19	2.62	2.6	8.9	2.4	2.4	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1222	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.3	3.6	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	1222	IA	2-Propanol	67-63-0	UG/M3	9	89%	10.4	12.5	3	38	2.1	2.1	No Screening Value Available	-	-	-
Category 2	1222	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.5	2.8	No Screening Value Available	-	-	-
Category 2	1222	IA	4-Ethyltoluene	622-96-8	UG/M3	9	78%	0.821	0.228	0.89	1	0.82	0.87	No Screening Value Available	-	-	-
Category 2	1222	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	22%	0.448	0.205	0.74	0.87	0.66	0.72	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1222	IA	Acetone	67-64-1	UG/M3	9	100%	17.7	6.7	12	30	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1222	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.84	0.92	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	1222	IA	Benzene	71-43-2	UG/M3	9	89%	0.594	0.120	0.6	0.66	0.56	0.56	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	1222	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	1222	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.7	1.8	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	1222	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3.1	3.4	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	1222	IA	Carbon Disulfide	75-15-0	UG/M3	9	11%	1.66	0.99	4.3	4.3	2.5	2.8	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1222	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	0.567	0.016	0.54	0.59	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	1222	IA	CFC-11	75-69-4	UG/M3	9	100%	1.18	0.07	1.1	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	1222	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	1.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1222	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.23	0.25	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1222	IA	CFC-12	75-71-8	UG/M3	9	100%	2.07	0.05	2	2.1	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	1222	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.74	0.81	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1222	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	0.21	0.23	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	1222	IA	Chloroform	67-66-3	UG/M3	9	78%	0.213	0.131	0.18	0.53	0.16	0.17	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	1222	IA	Chloromethane	74-87-3	UG/M3	9	100%	1.23	0.07	1.1	1.3	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	1222	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	0.13	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1222	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.74	0.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1222	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.8	0.87	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1222	IA	Cyclohexane	110-82-7	UG/M3	9	0%	-	-	-	-	0.56	0.61	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1222	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.4	1.5	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	1222	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.8	6.3	No Screening Value Available	-	-	-
Category 2	1222	IA	Ethanol	64-17-5	UG/M3	9	100%	29.1	17.7	4.2	63	-	-	No Screening Value Available	-	-	-
Category 2	1222	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	0.263	0.030	0.2	0.31	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1222	IA	Heptane	142-82-5	UG/M3	9	44%	0.612	0.346	0.75	1.3	0.66	0.72	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1222	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.6	9.4	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	1222	IA	Hexane	110-54-3	UG/M3	9	78%	0.901	0.363	0.88	1.3	0.59	0.62	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1222	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	0.738	0.065	0.59	0.81	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1222	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.58	0.64	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1222	IA	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	1222	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	0.42	0.46	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	1222	IA	o-Xylene	95-47-6	UG/M3	9	100%	0.329	0.037	0.25	0.37	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1222	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.8	0.87	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	1222	IA	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	0.69	0.75	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%

**Table 5.4.19-2. Building 1222 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1222	IA	Tetrachloroethene	127-18-4	UG/M3	9	11%	0.132	0.052	0.27	0.27	0.22	0.24	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	1222	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.4	2.6	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	1222	IA	Toluene	108-88-3	UG/M3	9	100%	4.80	1.92	1.3	6.2	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1222	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.48	1.6	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1222	IA	Total Xylenes	1330-20-7	UG/M3	9	100%	1.07	0.10	0.84	1.18	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1222	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.64	0.7	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1222	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.74	0.8	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1222	IA	Trichloroethene	79-01-6	UG/M3	9	0%	-	-	-	-	0.17	0.19	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	1222	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	0.041	0.045	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1222	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 2	1222	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	100%	-	-	0.67	0.67	-	-	-	-	-	-
Category 2	1222	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.19	0.19	-	-	-	-
Category 2	1222	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	1222	OA	1,1-Dichloroethane	75-35-4	UG/M3	1	0%	-	-	-	-	0.068	0.068	-	-	-	-
Category 2	1222	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.4	6.4	-	-	-	-
Category 2	1222	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.84	0.84	-	-	-	-
Category 2	1222	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 2	1222	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	1222	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	1222	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	1222	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.84	0.84	-	-	-	-
Category 2	1222	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.38	0.38	-	-	-	-
Category 2	1222	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	1222	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.21	0.21	-	-	-	-
Category 2	1222	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 2	1222	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	4	4	-	-	-	-
Category 2	1222	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	100%	-	-	8.7	8.7	-	-	-	-	-	-
Category 2	1222	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.5	3.5	-	-	-	-
Category 2	1222	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2.1	2.1	-	-	-	-
Category 2	1222	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	1222	OA	4-Ethyltoluene	622-96-8	UG/M3	1	100%	-	-	0.87	0.87	-	-	-	-	-	-
Category 2	1222	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	100%	-	-	1	1	-	-	-	-	-	-
Category 2	1222	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	27	27	-	-	-	-	-	-
Category 2	1222	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.89	0.89	-	-	-	-
Category 2	1222	OA	Benzene	71-43-2	UG/M3	1	100%	-	-	0.62	0.62	-	-	-	-	-	-
Category 2	1222	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	1222	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.8	1.8	-	-	-	-
Category 2	1222	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.3	3.3	-	-	-	-
Category 2	1222	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.7	2.7	-	-	-	-
Category 2	1222	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.59	0.59	-	-	-	-	-	-
Category 2	1222	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	1222	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	1222	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.24	0.24	-	-	-	-
Category 2	1222	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2	2	-	-	-	-	-	-
Category 2	1222	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.79	0.79	-	-	-	-
Category 2	1222	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	1222	OA	Chloroform	67-66-3	UG/M3	1	0%	-	-	-	-	0.17	0.17	-	-	-	-
Category 2	1222	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 2	1222	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	1222	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1222	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.84	0.84	-	-	-	-
Category 2	1222	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.59	0.59	-	-	-	-
Category 2	1222	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.5	1.5	-	-	-	-
Category 2	1222	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	6.1	6.1	-	-	-	-
Category 2	1222	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	8.8	8.8	-	-	-	-	-	-
Category 2	1222	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.22	0.22	-	-	-	-	-	-
Category 2	1222	OA	Heptane	142-82-5	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-

**Table 5.4.19-2. Building 1222 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1222	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	9.2	9.2	-	-	-	-
Category 2	1222	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	1.2	1.2	-	-	-	-	-	-
Category 2	1222	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	0.61	0.61	-	-	-	-	-	-
Category 2	1222	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.62	0.62	-	-	-	-
Category 2	1222	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	1222	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.45	0.45	-	-	-	-
Category 2	1222	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.3	0.3	-	-	-	-	-	-
Category 2	1222	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.84	0.84	-	-	-	-
Category 2	1222	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.73	0.73	-	-	-	-
Category 2	1222	OA	Tetrachloroethene	127-18-4	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	1222	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	1222	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	1222	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.56	1.56	-	-	-	-
Category 2	1222	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	0.91	0.91	-	-	-	-	-	-
Category 2	1222	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	1222	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.78	0.78	-	-	-	-
Category 2	1222	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	1222	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.044	0.044	-	-	-	-



## 5.4.20 Vapor Intrusion Evaluation for Building 1377

### BACKGROUND

Building 1377 is a Category 2 building in Zone 2. This building is a warehouse with a small office space and lunchroom. It is known as Division #1 Warehouse (see Figure 5.4.20-1) and is located within the central portion of the facility designated as Zone 2. The building has approximately 90% of its space dedicated to warehouse with a small office space area that is open to the warehouse space, on the eastern side of the building. The building is two-stories tall but the office space is on the first floor. It is approximately 15,260 ft<sup>2</sup> (1,418 m<sup>2</sup>). The depth to groundwater in this area of the facility is approximately 5 ft bgs and the soils are largely fill material. Groundwater flow is towards the south or southwest.

A building survey was performed on March 1, 2017 and the results can be found in Appendix C. The building has one individual air conditioning unit next to the office space. The air intakes are located around the building. There are two bay doors in the warehouse portion of the building that may be left open a little during the summer. The land surrounding the building is a combination of gravel and grass with some asphalt.

Drains and other openings were screened with a PID and no soil gas entry points were identified (no detections indicated). A chemical inventory was completed during the building survey that identified cleaners and insecticide. The full chemical inventory list is presented with the building survey in Appendix C.

### DATA SUMMARY

On May 8, 2017, sub-slab soil gas samples were collected from nine locations within the office and warehouse areas. Indoor air samples were collected on May 9, 2017 at nine locations, corresponding to the sub-slab soil gas sample locations, along with one outdoor air sample from the main air intake. The sampling locations are shown on Figure 5.4.20-2. Summary statistics of the analytical results for sub-slab soil gas for Building 1377 are presented on Table 5.4.20-1 and the summary statistic results for indoor and outdoor air are presented on Table 5.4.20-2. The complete analytical reports for the sub-slab soil gas and the indoor and outdoor air samples are in Appendix F.

### SUB-SLAB SOIL GAS RESULTS EVALUATION

Analytical results were evaluated based on methodologies presented previously in Section 5.1. A total of 45 of the 65 target analytes were ND in each of the 9 samples collected at Building 1377. One ND soil gas analyte had at least one reporting limit that exceeded the respective screening level. The 44 ND analytes with reporting limits that met the respective screening levels were eliminated from further VI evaluation. A total of 20 analytes were detected in one or more of the 9 sub-slab soil gas samples. These analytes include, but are not limited to, chlorinated VOCs, petroleum hydrocarbons, and some common solvents (e.g., ethanol, acetone, and MEK). In terms of measured concentrations, the detected compounds can be divided into two categories:

- Eleven analytes detected below *de minimus* levels (<100 µg/m<sup>3</sup>); and
- Nine were detected above *de minimus* levels but below screening levels and were eliminated from further evaluation.

The sub-slab soil gas results are summarized in Table 1377-1. Of the nine analytes detected above *de minimus* levels but below screening levels, six had detection frequencies of 100% (acetone, CFC-11, CFC-113, heptane, hexane, and toluene). Only the analytes present in the sub-slab soil gas at concentrations above the non-residential screening levels are AOIs for VI; therefore, there are no AOIs in sub-slab soil gas at Building 1377.



**Table 1377-1. Summary of Sub-Slab Soil Gas Detects for Building 1377**

Analyte	Detection Frequency	Measured Range ( $\mu\text{g}/\text{m}^3$ )	% Detections > Screening Level	Screening Level ( $\mu\text{g}/\text{m}^3$ )
<b>Above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	89%	6.3 - 2300	0%	3500000
2,2,4-Trimethylpentane	67%	12 - 380	0%	2000000
Acetone	100%	100 - 240	0%	3400000
CFC-11	100%	11 - 330	0%	33000000
CFC-113	100%	180 - 20000	0%	11000000
Cyclohexane	89%	18 - 320	0%	3500000
Heptane	100%	19 - 100	0%	2000000
Hexane	100%	35 - 150	0%	410000
Toluene	100%	57 - 130	0%	2900000
<b>Below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	33%	8 - 10	0%	130000
1,3,5-Trimethylbenzene	22%	4.4 - 5.8	0%	130000
2-Butanone (Methyl Ethyl Ketone)	33%	15 - 26	0%	2900000
4-Ethyltoluene	22%	5.2 - 6	N/A	N/A
Benzene	89%	13 - 57	0%	2200
CFC-114	11%	14	0%	11000000
CFC-12	11%	5.3	0%	29000000
Ethanol	22%	8.1 - 12	N/A	N/A
Ethylbenzene	44%	12 - 17	0%	59000
Tetrachloroethene (PCE)	33%	8.3 - 61	0%	23000
Total Xylenes	89%	31 - 77	0%	58000

N/A = No screening level available

**EVALUATION OF VAPOR INTRUSION**

By definition, the potential for VI only occurs if an analyte is present in both sub-slab soil gas and indoor air. Analytes only present in indoor air are almost always due to sources other than VI (e.g., storage and/or use of volatiles indoors, air exchange with outdoor air, etc.). Therefore, nine indoor air samples were collected one day after the sub-slab soil gas samples were collected. The indoor air samples were co-located with the sub-slab soil gas sample locations and analyzed for the same 65 analytes. Additionally, one outdoor air sample was collected immediately upwind of the building. Table 1377-2 below shows the analytes detected in each of the three media sampled.

**Table 1377-2. Detections Matrix**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
Acetone	•	•	•
CFC-11	•	•	•
CFC-12	•	•	•
Ethanol	•	•	•
Ethylbenzene	•	•	•
Heptane	•	•	•
Tetrachloroethene(PCE)	•	•	•
Toluene	•	•	•
Total Xylenes	•	•	•
1,1,1-Trichloroethane	•	•	

**Table 1377-2. Detections Matrix (Continued)**

Analytes	Sub-Slab	Indoor Air	Outdoor Air
<i>1,2,4-Trimethylbenzene</i>	•	•	
<i>1,3,5-Trimethylbenzene</i>	•	•	
<i>2-Butanone (Methyl Ethyl Ketone)</i>	•	•	
<i>4-Ethyltoluene</i>	•	•	
<i>Benzene</i>	•	•	
Cyclohexane	•	•	
Hexane	•	•	
2,2,4-Trimethylpentane	•		
CFC-113	•		
<i>CFC-114</i>	•		
4-Methyl-2-pentanone		•	•
Carbon Tetrachloride		•	•
Chloroform		•	•
Chloromethane		•	•
1,2-Dibromoethane (EDB)		X	
1,1-Dichloroethene		•	
2-Propanol		•	
Carbon Disulfide		•	
Methylene Chloride		•	
Styrene		•	
Trichloroethene (TCE)		•	

• = Detected

= Non-detect

X = Detection exceeds non-residential screening level

*Italics* = *de minimus* detections in sub-slab soil gas

Thirty-seven of the 65 indoor air analytes were ND in each of the samples. Two of the ND indoor air analytes had at least one ND reporting limit above the respective screening level (EDB and HCB). These ND reporting limit exceedances are discussed further in the VI evaluation below. The 35 ND analytes with reporting limits that met the respective screening levels were eliminated from further evaluation. Twenty-eight analytes were detected in the indoor air in Building 1377 and only one detection of EDB exceeded a screening level (4-ethyltoluene and ethanol do not have screening levels available). Thirteen analytes were detected in the outdoor air sample.

Table 1377-3 summarizes the indoor air results relative to the sub-slab soil gas detects, since VI only potentially occurs if the analyte is present in both sub-slab soil gas and indoor air. Therefore, the table below provides all analytes detected in sub-slab soil gas, as well as the corresponding indoor air sample results. The outdoor air sample results are also provided to determine if the analytes were present in indoor air due to migration from outdoor air.

**Table 1377-3. Vapor Intrusion Evaluation for Building 1377**

Analyte	Indoor Air Detection Frequency	Indoor Air Measured Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Screening Level ( $\mu\text{g}/\text{m}^3$ )	Outdoor Air Result ( $\mu\text{g}/\text{m}^3$ )
<b>Detected in sub-slab soil gas above <i>de minimus</i> levels but below screening levels</b>				
1,1,1-Trichloroethane	11%	0.2	26000	<0.18
2,2,4-Trimethylpentane	0%	<3.6 - <4.3	15000	<3.9
Acetone	100%	13 - 22	26000	7.3
CFC-11	100%	1.8 - 2.4	250000	1.3
CFC-113	0%	<1.2 - <1.4	85000	<1.3
Cyclohexane	11%	1.2	26000	<0.57
Heptane	78%	0.74 - 1.2	15000	<0.68
Hexane	100%	0.99 - 2.6	3100	0.65
Toluene	100%	3 - 5.6	22000	0.92
<b>Detected in sub-slab soil gas below <i>de minimus</i> levels</b>				
1,2,4-Trimethylbenzene	33%	0.84 - 3.5	960	<0.82
1,3,5-Trimethylbenzene	22%	0.82 - 1.7	960	<0.82
2-Butanone (Methyl Ethyl Ketone)	44%	3.3 - 3.8	22000	<2.5
4-Ethyltoluene	22%	1.1 - 1.8	N/A	<0.82
Benzene	100%	0.77 - 1.2	16	<0.53
CFC-114	0%	<0.21 - <0.26	85000	<0.23
CFC-12	100%	2.1 - 2.3	220000	2.2
Ethanol	100%	43 - 250	N/A	2.3
Ethylbenzene	100%	0.45 - 1.1	440	0.31
Tetrachloroethene (PCE)	100%	2.9 - 3.4	180	1.7
Total Xylenes	100%	1.76 - 6.5	440	1.45

N/A = No screening level available

&lt; = Non-detect at the reporting limit provided

EDB was detected in only one sample and that one detection ( $0.32 \mu\text{g}/\text{m}^3$ ) exceeded the indoor air screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). The results of the remaining eight indoor air samples were ND but the reporting limits very slightly exceeded the indoor air screening levels ( $0.26 - 0.28 \mu\text{g}/\text{m}^3$  compared to  $0.23 \mu\text{g}/\text{m}^3$ ). EDB results and reporting limits will be discussed further below. There were no other analytes with detected results that exceed indoor air screening levels. Where a screening level was available, the detected concentrations were at least one order of magnitude lower than indoor air screening levels.

There were nine analytes detected in both indoor air and outdoor air. Therefore, it is possible that outdoor air may be influencing indoor air concentrations for these analytes. Six of the analytes had indoor air results that were very similar to or ranged slightly higher than concentrations detected in outdoor air (CFC-11, hexane, CFC-12, ethylbenzene, PCE, and total xylenes). The three remaining analytes had indoor air results that were higher in concentration than that detected in outdoor air, indicating that there is a potential for indoor sources (acetone, toluene, and ethanol).

Acetone was detected in the outdoor air sample at  $7.3 \mu\text{g}/\text{m}^3$  and was detected in all nine of the indoor samples (detected results range from  $13 - 22 \mu\text{g}/\text{m}^3$ ). All detections were within the same order of magnitude as other results but an order of magnitude higher than the outdoor air result. Common cleaning items and items utilized commonly in a warehouse can contribute as indoor sources for acetone. However, it is important to point out that all of the results for acetone were well below screening levels.

Toluene was detected in the outdoor sample at  $0.92 \mu\text{g}/\text{m}^3$  and was detected in all nine indoor air samples at concentrations ranging from  $3 - 5.6 \mu\text{g}/\text{m}^3$ . The sample results were similar to each other and only slightly higher than outdoor air result. The indoor air detections of toluene were at least four orders of magnitude below the screening level.

While ethanol does not have a screening level, it was only detected in two of the nine sub-slab soil gas samples at a low level range of  $8.1 - 12 \mu\text{g}/\text{m}^3$ . Ethanol was detected in all of the indoor air samples at concentrations ranging from  $43 - 250 \mu\text{g}/\text{m}^3$ . The fact that indoor air has more ethanol than the sub-slab soil gas samples is indicative of indoor sources for this chemical (i.e., its presence in the indoor air is not due to VI). The two maximum detected concentrations were an order of magnitude higher than any of the other results and occurred in the combined office and lunchroom space of the building. Ethanol is present in numerous consumer products, including disinfectant sprays & wipes, liquid cleaners, hand sanitizer, antiperspirants, air fresheners, toothpaste, cosmetics, and perfumes.

HCB and EDB each had at least one soil gas ND reporting limit, as well as all indoor air ND reporting limits exceed the applicable screening level; however, EDB was already identified as an AOI for Building 1377 since the one detected result of EDB exceeded the indoor air screening level. HCB was not detected in any of the nine sub-slab soil gas samples and the reporting limits met the screening level. The ND reporting limits for HCB in indoor air ( $8.2 - 9.8 \mu\text{g}/\text{m}^3$ ) only slightly exceeded the screening level ( $6.2 \mu\text{g}/\text{m}^3$ ). The ND reporting limits for EDB in indoor air ( $0.26 - 0.28 \mu\text{g}/\text{m}^3$ ) only very slightly exceeded the screening level ( $0.23 \mu\text{g}/\text{m}^3$ ). Furthermore, due to laboratory limitations to achieve low enough reporting limits that consistently meet screening levels for HCB and EDB, further investigation for these analytes will be conducted once the facility-wide priority buildings have been sampled and evaluated; however, based on results from the facility-wide VI evaluation to date, it is unlikely there is a significant VI issue for these two analytes.

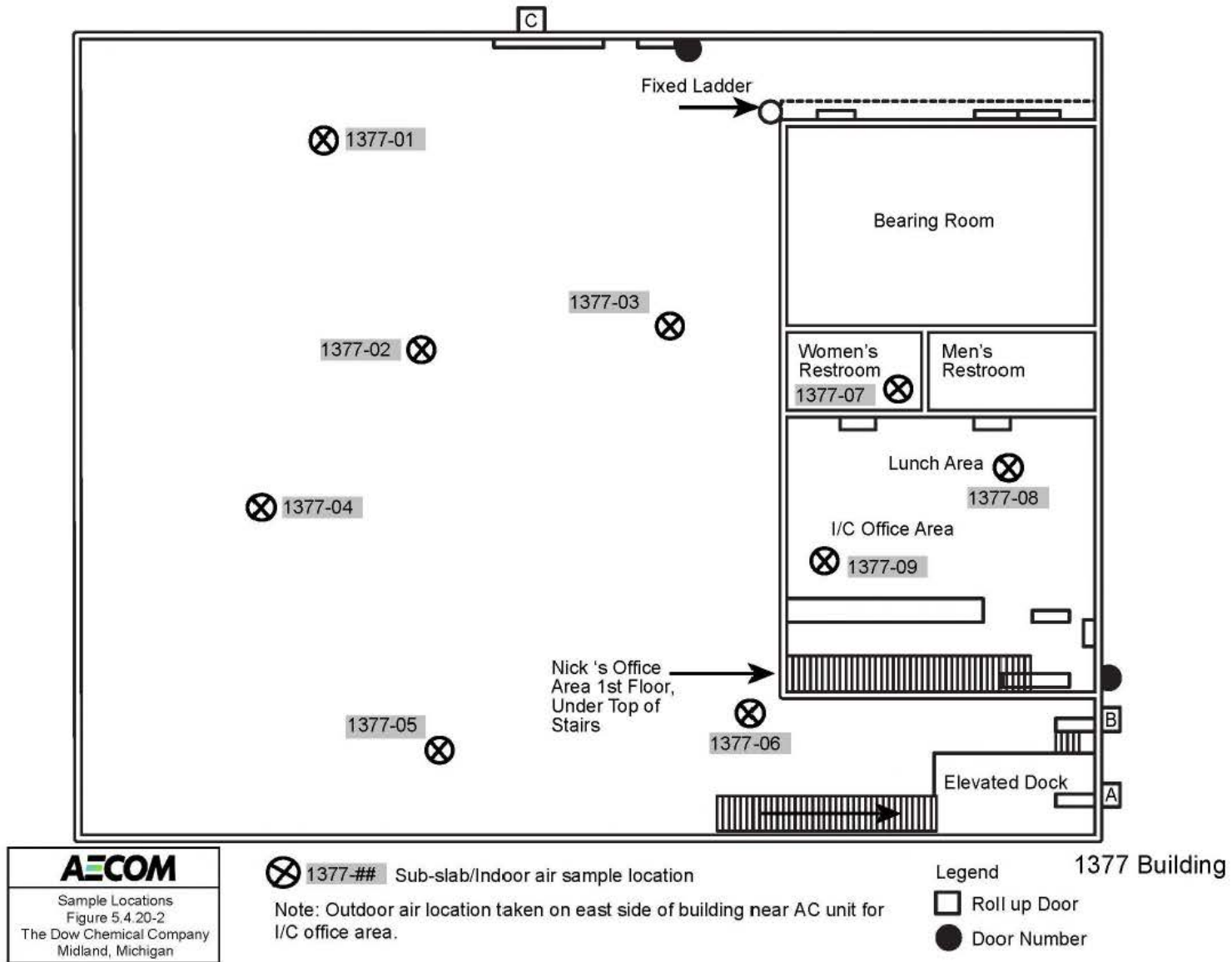
## CONCLUSIONS AND RECOMMENDATIONS

The VI analytical results were provided to the site industrial hygiene staff and the results were presented to the occupants of the building. EDB was identified as an AOI in indoor air. Building 1377 was placed in VI Path Forward Building Group 3 (see Figure 5-3) and further investigation into the EDB result in indoor air will be conducted.

**Figure 5.4.20-1. Building 1377 Location**



**Figure 5.4.20-2. Building 1377 Sample Locations**



**Table 5.4.20-1. Building 1377 Sub-Slab Soil Gas Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1377	SS	1,1,1-Trichloroethane	71-55-6	UG/M3	9	89%	319	746	6.3	2300	44	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1377	SS	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	5.1	58	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	310	0%	0%
Category 2	1377	SS	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	4.1	46	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1100	0%	0%
Category 2	1377	SS	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	290000	0%	0%
Category 2	1377	SS	1,1-Dichloroethene	75-35-4	UG/M3	9	0%	-	-	-	-	3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	120000	0%	0%
Category 2	1377	SS	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	22	250	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	1377	SS	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	33%	12.0	5.4	8	10	9.5	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1377	SS	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	0%	-	-	-	-	5.8	65	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	30	0%	56%
Category 2	1377	SS	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	4.5	51	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	1377	SS	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	700	0%	0%
Category 2	1377	SS	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	3.5	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2300	0%	0%
Category 2	1377	SS	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	22%	10.6	6.6	4.4	5.8	8	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	130000	0%	0%
Category 2	1377	SS	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	1.6	19	No Screening Value Available	-	-	-
Category 2	1377	SS	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	4.5	51	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800	0%	0%
Category 2	1377	SS	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	4.5	51	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2600	0%	0%
Category 2	1377	SS	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	11	120	No Screening Value Available	-	-	-
Category 2	1377	SS	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	67%	77.7	121.5	12	380	19	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1377	SS	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	33%	28.4	13.3	15	26	23	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1377	SS	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	12	140	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	18000	0%	0%
Category 2	1377	SS	2-Propanol	67-63-0	UG/M3	9	0%	-	-	-	-	7.4	83	No Screening Value Available	-	-	-
Category 2	1377	SS	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	9.4	100	No Screening Value Available	-	-	-
Category 2	1377	SS	4-Ethyltoluene	622-96-8	UG/M3	9	22%	10.7	6.4	5.2	6	8	42	No Screening Value Available	-	-	-
Category 2	1377	SS	4-Methyl-2-pentanone	108-10-1	UG/M3	9	0%	-	-	-	-	3.1	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	180000	0%	0%
Category 2	1377	SS	Acetone	67-64-1	UG/M3	9	100%	163	48	100	240	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3400000	0%	0%
Category 2	1377	SS	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	3.9	44	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	370	0%	0%
Category 2	1377	SS	Benzene	71-43-2	UG/M3	9	89%	27.9	13.6	13	57	26	26	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2200	0%	0%
Category 2	1377	SS	Bromochloromethane	74-97-5	UG/M3	9	0%	-	-	-	-	16	180	No Screening Value Available	-	-	-
Category 2	1377	SS	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	5	57	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1000	0%	0%
Category 2	1377	SS	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	7.8	87	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	17000	0%	0%
Category 2	1377	SS	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	29	330	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900	0%	0%
Category 2	1377	SS	Carbon Disulfide	75-15-0	UG/M3	9	0%	-	-	-	-	9.3	100	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1377	SS	Carbon Tetrachloride	56-23-5	UG/M3	9	0%	-	-	-	-	4.7	53	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3000	0%	0%
Category 2	1377	SS	CFC-11	75-69-4	UG/M3	9	100%	145	113	11	330	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3300000	0%	0%
Category 2	1377	SS	CFC-113	76-13-1	UG/M3	9	100%	8997	7337	180	20000	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1377	SS	CFC-114	76-14-2	UG/M3	9	11%	14.8	10.0	14	14	5.2	59	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000000	0%	0%
Category 2	1377	SS	CFC-12	75-71-8	UG/M3	9	11%	10.4	6.9	5.3	5.3	4	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1377	SS	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	3.4	39	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1377	SS	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	7.9	89	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	5800000	0%	0%
Category 2	1377	SS	Chloroform	67-66-3	UG/M3	9	0%	-	-	-	-	3.7	41	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	7600	0%	0%
Category 2	1377	SS	Chloromethane	74-87-3	UG/M3	9	0%	-	-	-	-	15	170	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	29000	0%	0%
Category 2	1377	SS	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%
Category 2	1377	SS	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	3.4	38	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1377	SS	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	3.7	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1700	0%	0%
Category 2	1377	SS	Cyclohexane	110-82-7	UG/M3	9	89%	95.3	97.1	18	320	28	28	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	3500000	0%	0%
Category 2	1377	SS	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	6.4	72	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	740	0%	0%
Category 2	1377	SS	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	21	240	No Screening Value Available	-	-	-
Category 2	1377	SS	Ethanol	64-17-5	UG/M3	9	22%	16.7	9.6	8.1	12	12	64	No Screening Value Available	-	-	-
Category 2	1377	SS	Ethylbenzene	100-41-4	UG/M3	9	44%	13.9	3.3	12	17	18	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	59000	0%	0%
Category 2	1377	SS	Heptane	142-82-5	UG/M3	9	100%	49.8	23.2	19	100	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2000000	0%	0%
Category 2	1377	SS	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	32	360	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	830	0%	0%
Category 2	1377	SS	Hexane	110-54-3	UG/M3	9	100%	85.1	39.5	35	150	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	410000	0%	0%
Category 2	1377	SS	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	89%	36.2	11.0	22	49	35	35	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1377	SS	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	11	120	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1800000	0%	0%
Category 2	1377	SS	Methylene Chloride	75-09-2	UG/M3	9	0%	-	-	-	-	26	290	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	39000	0%	0%
Category 2	1377	SS	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	7.9	88	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1500	0%	0%
Category 2	1377	SS	o-Xylene	95-47-6	UG/M3	9	56%	19.5	7.1	16	32	18	37	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1377	SS	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	3.7	42	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	12000	0%	0%
Category 2	1377	SS	Styrene	100-42-5	UG/M3	9	0%	-	-	-	-	3.2	36	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	32000	0%	0%
Category 2	1377	SS	Tetrachloroethene	127-18-4	UG/M3	9	33%	22.4	17.6	8.3	61	11	57	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	23000	0%	0%
Category 2	1377	SS	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.2	25	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	11000	0%	0%

**Table 5.4.20-1. Building 1377 Sub-Slab Soil Gas Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1377	SS	Toluene	108-88-3	UG/M3	9	100%	96.3	27.8	57	130	-	-	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	2900000	0%	0%
Category 2	1377	SS	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	6.8	76	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1377	SS	Total Xylenes	1330-20-7	UG/M3	9	89%	55.7	16.8	31	77	70	70	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	58000	0%	0%
Category 2	1377	SS	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	3	34	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	41000	0%	0%
Category 2	1377	SS	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	3.4	38	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4600	0%	0%
Category 2	1377	SS	Trichloroethene	79-01-6	UG/M3	9	0%	-	-	-	-	4	45	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	1200	0%	0%
Category 2	1377	SS	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	1.9	22	Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels	4100	0%	0%



**Table 5.4.20-2. Building 1377 Indoor Air and Outdoor Air Summary Results**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1377	IA	1,1,1-Trichloroethane	71-55-6	UG/M3	9	11%	0.106	0.035	0.2	0.2	0.18	0.2	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1377	IA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	9	0%	-	-	-	-	0.21	0.25	Vapor Intrusion Indoor Air Screening Levels	2.4	0%	0%
Category 2	1377	IA	1,1,2-Trichloroethane	79-00-5	UG/M3	9	0%	-	-	-	-	0.17	0.2	Vapor Intrusion Indoor Air Screening Levels	8.5	0%	0%
Category 2	1377	IA	1,1-Dichloroethane	75-34-3	UG/M3	9	0%	-	-	-	-	0.12	0.15	Vapor Intrusion Indoor Air Screening Levels	2200	0%	0%
Category 2	1377	IA	1,1-Dichloroethene	75-35-4	UG/M3	9	100%	0.204	0.018	0.19	0.25	-	-	Vapor Intrusion Indoor Air Screening Levels	880	0%	0%
Category 2	1377	IA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	9	0%	-	-	-	-	5.7	6.8	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1377	IA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	9	33%	0.903	1.011	0.84	3.5	0.82	0.9	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1377	IA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	9	11%	0.154	0.062	0.32	0.32	0.26	0.28	Vapor Intrusion Indoor Air Screening Levels	0.23	11%	89%
Category 2	1377	IA	1,2-Dichlorobenzene	95-50-1	UG/M3	9	0%	-	-	-	-	0.92	1.1	Vapor Intrusion Indoor Air Screening Levels	1300	0%	0%
Category 2	1377	IA	1,2-Dichloroethane	107-06-2	UG/M3	9	0%	-	-	-	-	0.12	0.15	Vapor Intrusion Indoor Air Screening Levels	5.3	0%	0%
Category 2	1377	IA	1,2-Dichloropropane	78-87-5	UG/M3	9	0%	-	-	-	-	0.71	0.84	Vapor Intrusion Indoor Air Screening Levels	18	0%	0%
Category 2	1377	IA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	9	22%	0.613	0.428	0.82	1.7	0.82	0.9	Vapor Intrusion Indoor Air Screening Levels	960	0%	0%
Category 2	1377	IA	1,3-Butadiene	106-99-0	UG/M3	9	0%	-	-	-	-	0.34	0.4	No Screening Value Available	-	-	-
Category 2	1377	IA	1,3-Dichlorobenzene	541-73-1	UG/M3	9	0%	-	-	-	-	0.92	1.1	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1377	IA	1,4-Dichlorobenzene	106-46-7	UG/M3	9	0%	-	-	-	-	0.18	0.22	Vapor Intrusion Indoor Air Screening Levels	20	0%	0%
Category 2	1377	IA	1,4-Dioxane	123-91-1	UG/M3	9	0%	-	-	-	-	0.55	0.66	No Screening Value Available	-	-	-
Category 2	1377	IA	2,2,4-Trimethylpentane	540-84-1	UG/M3	9	0%	-	-	-	-	3.6	4.3	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1377	IA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	9	44%	2.26	1.21	3.3	3.8	2.2	2.7	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%
Category 2	1377	IA	2-Hexanone	591-78-6	UG/M3	9	0%	-	-	-	-	3.1	3.7	Vapor Intrusion Indoor Air Screening Levels	130	0%	0%
Category 2	1377	IA	2-Propanol	67-63-0	UG/M3	9	100%	48.2	44.5	21	160	-	-	No Screening Value Available	-	-	-
Category 2	1377	IA	3-Chloropropene	107-05-1	UG/M3	9	0%	-	-	-	-	2.4	2.9	No Screening Value Available	-	-	-
Category 2	1377	IA	4-Ethyltoluene	622-96-8	UG/M3	9	22%	0.655	0.484	1.1	1.8	0.82	0.9	No Screening Value Available	-	-	-
Category 2	1377	IA	4-Methyl-2-pentanone	108-10-1	UG/M3	9	22%	0.432	0.164	0.72	0.72	0.63	0.75	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1377	IA	Acetone	67-64-1	UG/M3	9	100%	17.9	3.4	13	22	-	-	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1377	IA	alpha-Chlorotoluene	100-44-7	UG/M3	9	0%	-	-	-	-	0.79	0.95	Vapor Intrusion Indoor Air Screening Levels	2.8	0%	0%
Category 2	1377	IA	Benzene	71-43-2	UG/M3	9	100%	1.02	0.17	0.77	1.2	-	-	Vapor Intrusion Indoor Air Screening Levels	16	0%	0%
Category 2	1377	IA	Bromodichloromethane	75-27-4	UG/M3	9	0%	-	-	-	-	1	1.2	Vapor Intrusion Indoor Air Screening Levels	7.6	0%	0%
Category 2	1377	IA	Bromoform	75-25-2	UG/M3	9	0%	-	-	-	-	1.6	1.9	Vapor Intrusion Indoor Air Screening Levels	120	0%	0%
Category 2	1377	IA	Bromomethane	74-83-9	UG/M3	9	0%	-	-	-	-	3	3.6	Vapor Intrusion Indoor Air Screening Levels	22	0%	0%
Category 2	1377	IA	Carbon Disulfide	75-15-0	UG/M3	9	11%	1.61	0.86	3.9	3.9	2.4	2.8	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1377	IA	Carbon Tetrachloride	56-23-5	UG/M3	9	100%	0.631	0.031	0.56	0.66	-	-	Vapor Intrusion Indoor Air Screening Levels	23	0%	0%
Category 2	1377	IA	CFC-11	75-69-4	UG/M3	9	100%	1.93	0.20	1.8	2.4	-	-	Vapor Intrusion Indoor Air Screening Levels	250000	0%	0%
Category 2	1377	IA	CFC-113	76-13-1	UG/M3	9	0%	-	-	-	-	1.2	1.4	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1377	IA	CFC-114	76-14-2	UG/M3	9	0%	-	-	-	-	0.21	0.26	Vapor Intrusion Indoor Air Screening Levels	85000	0%	0%
Category 2	1377	IA	CFC-12	75-71-8	UG/M3	9	100%	2.20	0.05	2.1	2.3	-	-	Vapor Intrusion Indoor Air Screening Levels	220000	0%	0%
Category 2	1377	IA	Chlorobenzene	108-90-7	UG/M3	9	0%	-	-	-	-	0.7	0.84	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1377	IA	Chloroethane	75-00-3	UG/M3	9	0%	-	-	-	-	0.2	0.24	Vapor Intrusion Indoor Air Screening Levels	44000	0%	0%
Category 2	1377	IA	Chloroform	67-66-3	UG/M3	9	89%	0.182	0.070	0.16	0.35	0.17	0.17	Vapor Intrusion Indoor Air Screening Levels	57	0%	0%
Category 2	1377	IA	Chloromethane	74-87-3	UG/M3	9	100%	2.93	0.10	2.8	3.1	-	-	Vapor Intrusion Indoor Air Screening Levels	210	0%	0%
Category 2	1377	IA	cis-1,2-Dichloroethene	156-59-2	UG/M3	9	0%	-	-	-	-	0.12	0.14	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1377	IA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	9	0%	-	-	-	-	0.69	0.83	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1377	IA	Cumene	98-82-8	UG/M3	9	0%	-	-	-	-	0.75	0.9	Vapor Intrusion Indoor Air Screening Levels	13	0%	0%
Category 2	1377	IA	Cyclohexane	110-82-7	UG/M3	9	11%	0.399	0.301	1.2	1.2	0.57	0.63	Vapor Intrusion Indoor Air Screening Levels	26000	0%	0%
Category 2	1377	IA	Dibromochloromethane	124-48-1	UG/M3	9	0%	-	-	-	-	1.3	1.6	Vapor Intrusion Indoor Air Screening Levels	5.6	0%	0%
Category 2	1377	IA	Dibromomethane	74-95-3	UG/M3	9	0%	-	-	-	-	5.4	6.5	No Screening Value Available	-	-	-
Category 2	1377	IA	Ethanol	64-17-5	UG/M3	9	100%	89.7	70.4	43	250	-	-	No Screening Value Available	-	-	-
Category 2	1377	IA	Ethylbenzene	100-41-4	UG/M3	9	100%	0.593	0.205	0.45	1.1	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1377	IA	Heptane	142-82-5	UG/M3	9	78%	0.841	0.304	0.74	1.2	0.72	0.75	Vapor Intrusion Indoor Air Screening Levels	15000	0%	0%
Category 2	1377	IA	Hexachlorobutadiene	87-68-3	UG/M3	9	0%	-	-	-	-	8.2	9.8	Vapor Intrusion Indoor Air Screening Levels	6.2	0%	100%
Category 2	1377	IA	Hexane	110-54-3	UG/M3	9	100%	1.47	0.49	0.99	2.6	-	-	Vapor Intrusion Indoor Air Screening Levels	3100	0%	0%
Category 2	1377	IA	m,p-Xylene	108-38-3/106-42-3	UG/M3	9	100%	1.89	1.11	1.2	4.5	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1377	IA	Methyl tert-butyl ether	1634-04-4	UG/M3	9	0%	-	-	-	-	0.55	0.66	Vapor Intrusion Indoor Air Screening Levels	13000	0%	0%
Category 2	1377	IA	Methylene Chloride	75-09-2	UG/M3	9	22%	0.817	0.469	1.3	1.9	1.1	1.2	Vapor Intrusion Indoor Air Screening Levels	290	0%	0%
Category 2	1377	IA	Naphthalene	91-20-3	UG/M3	9	0%	-	-	-	-	0.4	0.48	Vapor Intrusion Indoor Air Screening Levels	11	0%	0%
Category 2	1377	IA	o-Xylene	95-47-6	UG/M3	9	100%	0.854	0.485	0.56	2	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1377	IA	Propylbenzene	103-65-1	UG/M3	9	0%	-	-	-	-	0.75	0.9	Vapor Intrusion Indoor Air Screening Levels	88	0%	0%
Category 2	1377	IA	Styrene	100-42-5	UG/M3	9	89%	0.828	0.177	0.78	0.96	0.76	0.76	Vapor Intrusion Indoor Air Screening Levels	240	0%	0%
Category 2	1377	IA	Tetrachloroethene	127-18-4	UG/M3	9	100%	3.10	0.16	2.9	3.4	-	-	Vapor Intrusion Indoor Air Screening Levels	180	0%	0%
Category 2	1377	IA	Tetrahydrofuran	109-99-9	UG/M3	9	0%	-	-	-	-	2.2	2.7	Vapor Intrusion Indoor Air Screening Levels	79	0%	0%
Category 2	1377	IA	Toluene	108-88-3	UG/M3	9	100%	4.01	0.84	3	5.6	-	-	Vapor Intrusion Indoor Air Screening Levels	22000	0%	0%

**Table 5.4.20-2. Building 1377 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1377	IA	Total 1,3-Dichloropropene	542-75-6	UG/M3	9	0%	-	-	-	-	1.38	1.66	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1377	IA	Total Xylenes	1330-20-7	UG/M3	9	100%	2.74	1.59	1.76	6.5	-	-	Vapor Intrusion Indoor Air Screening Levels	440	0%	0%
Category 2	1377	IA	trans-1,2-Dichloroethene	156-60-5	UG/M3	9	0%	-	-	-	-	0.61	0.72	Vapor Intrusion Indoor Air Screening Levels	310	0%	0%
Category 2	1377	IA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	9	0%	-	-	-	-	0.69	0.83	Vapor Intrusion Indoor Air Screening Levels	34	0%	0%
Category 2	1377	IA	Trichloroethene	79-01-6	UG/M3	9	11%	0.449	0.657	2.2	2.2	0.41	0.49	Vapor Intrusion Indoor Air Screening Levels	8.8	0%	0%
Category 2	1377	IA	Vinyl Chloride	75-01-4	UG/M3	9	0%	-	-	-	-	0.039	0.047	Vapor Intrusion Indoor Air Screening Levels	31	0%	0%
Category 2	1377	OA	1,1,1-Trichloroethane	71-55-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	1377	OA	1,1,2,2-Tetrachloroethane	79-34-5	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	1377	OA	1,1,2-Trichloroethane	79-00-5	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	1377	OA	1,1-Dichloroethane	75-34-3	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	1377	OA	1,1-Dichloroethene	75-35-4	UG/M3	1	0%	-	-	-	-	0.066	0.066	-	-	-	-
Category 2	1377	OA	1,2,4-Trichlorobenzene	120-82-1	UG/M3	1	0%	-	-	-	-	6.2	6.2	-	-	-	-
Category 2	1377	OA	1,2,4-Trimethylbenzene	95-63-6	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	1377	OA	1,2-Dibromoethane (EDB)	106-93-4	UG/M3	1	0%	-	-	-	-	0.26	0.26	-	-	-	-
Category 2	1377	OA	1,2-Dichlorobenzene	95-50-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	1377	OA	1,2-Dichloroethane	107-06-2	UG/M3	1	0%	-	-	-	-	0.14	0.14	-	-	-	-
Category 2	1377	OA	1,2-Dichloropropane	78-87-5	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	1377	OA	1,3,5-Trimethylbenzene	108-67-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	1377	OA	1,3-Butadiene	106-99-0	UG/M3	1	0%	-	-	-	-	0.37	0.37	-	-	-	-
Category 2	1377	OA	1,3-Dichlorobenzene	541-73-1	UG/M3	1	0%	-	-	-	-	1	1	-	-	-	-
Category 2	1377	OA	1,4-Dichlorobenzene	106-46-7	UG/M3	1	0%	-	-	-	-	0.2	0.2	-	-	-	-
Category 2	1377	OA	1,4-Dioxane	123-91-1	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	1377	OA	2,2,4-Trimethylpentane	540-84-1	UG/M3	1	0%	-	-	-	-	3.9	3.9	-	-	-	-
Category 2	1377	OA	2-Butanone (Methyl Ethyl Ketone)	78-93-3	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	1377	OA	2-Hexanone	591-78-6	UG/M3	1	0%	-	-	-	-	3.4	3.4	-	-	-	-
Category 2	1377	OA	2-Propanol	67-63-0	UG/M3	1	0%	-	-	-	-	2	2	-	-	-	-
Category 2	1377	OA	3-Chloropropene	107-05-1	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	1377	OA	4-Ethyltoluene	622-96-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	1377	OA	4-Methyl-2-pentanone	108-10-1	UG/M3	1	100%	-	-	0.83	0.83	-	-	-	-	-	-
Category 2	1377	OA	Acetone	67-64-1	UG/M3	1	100%	-	-	7.3	7.3	-	-	-	-	-	-
Category 2	1377	OA	alpha-Chlorotoluene	100-44-7	UG/M3	1	0%	-	-	-	-	0.86	0.86	-	-	-	-
Category 2	1377	OA	Benzene	71-43-2	UG/M3	1	0%	-	-	-	-	0.53	0.53	-	-	-	-
Category 2	1377	OA	Bromodichloromethane	75-27-4	UG/M3	1	0%	-	-	-	-	1.1	1.1	-	-	-	-
Category 2	1377	OA	Bromoform	75-25-2	UG/M3	1	0%	-	-	-	-	1.7	1.7	-	-	-	-
Category 2	1377	OA	Bromomethane	74-83-9	UG/M3	1	0%	-	-	-	-	3.2	3.2	-	-	-	-
Category 2	1377	OA	Carbon Disulfide	75-15-0	UG/M3	1	0%	-	-	-	-	2.6	2.6	-	-	-	-
Category 2	1377	OA	Carbon Tetrachloride	56-23-5	UG/M3	1	100%	-	-	0.62	0.62	-	-	-	-	-	-
Category 2	1377	OA	CFC-11	75-69-4	UG/M3	1	100%	-	-	1.3	1.3	-	-	-	-	-	-
Category 2	1377	OA	CFC-113	76-13-1	UG/M3	1	0%	-	-	-	-	1.3	1.3	-	-	-	-
Category 2	1377	OA	CFC-114	76-14-2	UG/M3	1	0%	-	-	-	-	0.23	0.23	-	-	-	-
Category 2	1377	OA	CFC-12	75-71-8	UG/M3	1	100%	-	-	2.2	2.2	-	-	-	-	-	-
Category 2	1377	OA	Chlorobenzene	108-90-7	UG/M3	1	0%	-	-	-	-	0.77	0.77	-	-	-	-
Category 2	1377	OA	Chloroethane	75-00-3	UG/M3	1	0%	-	-	-	-	0.22	0.22	-	-	-	-
Category 2	1377	OA	Chloroform	67-66-3	UG/M3	1	100%	-	-	0.18	0.18	-	-	-	-	-	-
Category 2	1377	OA	Chloromethane	74-87-3	UG/M3	1	100%	-	-	1.4	1.4	-	-	-	-	-	-
Category 2	1377	OA	cis-1,2-Dichloroethene	156-59-2	UG/M3	1	0%	-	-	-	-	0.13	0.13	-	-	-	-
Category 2	1377	OA	cis-1,3-Dichloropropene	10061-01-5	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	1377	OA	Cumene	98-82-8	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	1377	OA	Cyclohexane	110-82-7	UG/M3	1	0%	-	-	-	-	0.57	0.57	-	-	-	-
Category 2	1377	OA	Dibromochloromethane	124-48-1	UG/M3	1	0%	-	-	-	-	1.4	1.4	-	-	-	-
Category 2	1377	OA	Dibromomethane	74-95-3	UG/M3	1	0%	-	-	-	-	5.9	5.9	-	-	-	-
Category 2	1377	OA	Ethanol	64-17-5	UG/M3	1	100%	-	-	2.3	2.3	-	-	-	-	-	-
Category 2	1377	OA	Ethylbenzene	100-41-4	UG/M3	1	100%	-	-	0.31	0.31	-	-	-	-	-	-
Category 2	1377	OA	Heptane	142-82-5	UG/M3	1	0%	-	-	-	-	0.68	0.68	-	-	-	-
Category 2	1377	OA	Hexachlorobutadiene	87-68-3	UG/M3	1	0%	-	-	-	-	8.9	8.9	-	-	-	-
Category 2	1377	OA	Hexane	110-54-3	UG/M3	1	100%	-	-	0.65	0.65	-	-	-	-	-	-
Category 2	1377	OA	m,p-Xylene	108-38-3/106-42-3	UG/M3	1	100%	-	-	1.1	1.1	-	-	-	-	-	-
Category 2	1377	OA	Methyl tert-butyl ether	1634-04-4	UG/M3	1	0%	-	-	-	-	0.6	0.6	-	-	-	-
Category 2	1377	OA	Methylene Chloride	75-09-2	UG/M3	1	0%	-	-	-	-	1.2	1.2	-	-	-	-
Category 2	1377	OA	Naphthalene	91-20-3	UG/M3	1	0%	-	-	-	-	0.44	0.44	-	-	-	-

**Table 5.4.20-2. Building 1377 Indoor Air and Outdoor Air Summary Results (Continued)**

Category	Building	Sample Type	Analyte	CAS Number	Unit	Number of Samples	Detection Rate	Summary Statistics						Screening Criteria			
								Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	Screening Type	Screening Value	Percent Exceed (Detect)	Percent Exceed (Non-detect RL)
Category 2	1377	OA	o-Xylene	95-47-6	UG/M3	1	100%	-	-	0.35	0.35	-	-	-	-	-	-
Category 2	1377	OA	Propylbenzene	103-65-1	UG/M3	1	0%	-	-	-	-	0.82	0.82	-	-	-	-
Category 2	1377	OA	Styrene	100-42-5	UG/M3	1	0%	-	-	-	-	0.71	0.71	-	-	-	-
Category 2	1377	OA	Tetrachloroethene	127-18-4	UG/M3	1	100%	-	-	1.7	1.7	-	-	-	-	-	-
Category 2	1377	OA	Tetrahydrofuran	109-99-9	UG/M3	1	0%	-	-	-	-	2.5	2.5	-	-	-	-
Category 2	1377	OA	Toluene	108-88-3	UG/M3	1	100%	-	-	0.92	0.92	-	-	-	-	-	-
Category 2	1377	OA	Total 1,3-Dichloropropene	542-75-6	UG/M3	1	0%	-	-	-	-	1.52	1.52	-	-	-	-
Category 2	1377	OA	Total Xylenes	1330-20-7	UG/M3	1	100%	-	-	1.45	1.45	-	-	-	-	-	-
Category 2	1377	OA	trans-1,2-Dichloroethene	156-60-5	UG/M3	1	0%	-	-	-	-	0.66	0.66	-	-	-	-
Category 2	1377	OA	trans-1,3-Dichloropropene	10061-02-6	UG/M3	1	0%	-	-	-	-	0.76	0.76	-	-	-	-
Category 2	1377	OA	Trichloroethene	79-01-6	UG/M3	1	0%	-	-	-	-	0.18	0.18	-	-	-	-
Category 2	1377	OA	Vinyl Chloride	75-01-4	UG/M3	1	0%	-	-	-	-	0.043	0.043	-	-	-	-

### **5.4.21 Zone 2 Phase 1 Sampling Results and Evaluation Summary**

The results of the 18 buildings sampled in Zone 2 Phase 1 are summarized in the table below.

Table 5.4.21-1. Zone 2 Phase 1 Sampling Results and Evaluation Summary

Zone 2 Bldg	Category	Section No.	Sub-Slab Soil Gas AOI(s)	Indoor Air AOI(s)	Path Forward Bldg Group	
					Bldg Grouping	Conclusions
833	1	5.4.3	--	--	1	No AOI identified. No further VI work at this time.
941	1	5.4.4	1,1,2-Trichloroethane, 1,2-Dichloroethane, Carbon Tetrachloride, Chloroform, cis-1,2-Dichloroethene, Tetrachloroethene (PCE) and Trichloroethene (TCE)	TCE	4	Sub-slab soil gas AOIs and indoor air AOI identified (evidence of potential VI based on results). Further sampling will be conducted. AOIs will be added to Industrial Hygiene monitoring.
948	1	5.4.5	Benzene, cis-1,2-Dichloroethene, Cumene, Tetrachloroethene (PCE) and Trichloroethene (TCE)	Tetrachloroethene (PCE)	4	Sub-slab soil gas AOIs and indoor air AOI identified (evidence of potential VI based on results). Further sampling will be conducted. AOIs will be added to Industrial Hygiene monitoring.
972	1	5.4.6	--	--	1	No AOI identified. No further VI work at this time.
1025	1	5.4.7	--	--	1	No AOI identified. No further VI work at this time.
1028	1	5.4.8	--	--	1	No AOI identified. No further VI work at this time.
1233	1	5.4.9	1,2-Dichloroethane, 1,2-Dichloropropane, Hexachlorobutadiene (HCB), Trichloroethene (TCE)	--	2	Sub-slab soil gas AOIs identified; however, indoor air results were below screening levels. Additional sampling recommended. AOIs will be added to Industrial Hygiene monitoring.
1	2	5.4.10	--	--	1	No AOI identified. No further VI work at this time.
477	2	5.4.11	--	--	1	No AOI identified. No further VI work at this time.
489	2	5.4.12	--	Tetrahydrofuran	3	Indoor air AOI identified; however, no evidence of VI. Further investigation into indoor air result will be conducted.
768	2	5.4.13	--	--	1	No AOI identified. No further VI work at this time.
827	2	5.4.14	Tetrachloroethene (PCE)	TCE	2, 3	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring. Indoor air AOI identified (TCE); however, no evidence of VI. Further investigation into indoor air result will be conducted.
849	2	5.4.15	--	--	1	No AOI identified. No further VI work at this time.
858	2	5.4.16	Benzene	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
934	2	5.4.17	--	--	1	No AOI identified. No further VI work at this time.
969	2	5.4.18	Benzene	--	2	Sub-slab soil gas AOI identified; however, indoor air results were below screening levels. Additional sampling recommended. AOI will be added to Industrial Hygiene monitoring.
1222	2	5.4.19	--	--	1	No AOI identified. No further VI work at this time.
1377	2	5.4.20	--	1,2-Dibromoethane (EDB)	3	Indoor air AOI identified; however, no evidence of VI. Further investigation into indoor air result will be conducted.

## **5.5 Zone 2 Phase 2 VI Pathway Building Categorization**

Zone 2, shown on Figures 4.3-1, 4.3-2, and 4.3-3, is approximately 283 acres in size and contains 151 total buildings and structures that were visited and evaluated for the potential for exposure via VI. Due to the amount of buildings, Zone 2 was split into Phase 1 and Phase 2. The buildings in Zone 2 Phase 1 were discussed in Section 5.4. The 71 buildings in Zone 2 Phase 2 were visited in September 2017 and their categorization is discussed in this section.

### 5.5.1 Identification of Zone 2 Phase 2 Priority Buildings (Category 1 and 2)

Zone 2 Phase 2 contains 71 buildings and structures that were visited and evaluated for the potential for exposure via VI. Table 5-8 lists the buildings identified by building number and provides information regarding occupancy and use. Following the VI Categorization Flowchart (Figure 5-2), 14 out of the 71 buildings in Zone 2 Phase 2 were categorized as priority buildings (Category 1 and 2 buildings). Figure 5-7 presents the 14 priority buildings in Zone 2 Phase 2 identified for further evaluation.

The 14 priority buildings in Zone 2 Phase 1 are as follows:

#### Category 1:

- Building 1130 – Styrene Mono Offices and Control Room includes offices, laboratory, control room, instrument shop, locker rooms, and a kitchen;
- Building 1215 – #52 Gate is the Saginaw Road Gatehouse;
- Building 1255 – DPF Offices is an EH&S building; and
- Building 1314 – TTCC (6-5457) includes one office and a truck center.

#### Category 2:

- Building 304 – Dow Automotive – Brake Fluids Building includes an office and warehouse;
- Building 388 – Fabrication Shop includes one office and a shop;
- Building 499 – Demineralized Water Plant includes offices, laboratory, process shop, and warehouse;
- Building 593 – Fabrication Shop includes offices, shop, and warehouse;
- Building 779 – Miscellaneous Shipping includes offices, locker rooms, kitchen, and a warehouse;
- Building 826 – Maintenance Shop includes offices, conference rooms, locker rooms, kitchen, shop, and a warehouse;
- Building 921 – RD & Yard Maintenance includes offices, locker rooms, kitchen, conference room, and shop;
- Building 922 – Garage/General Trucking Building includes offices, kitchen, locker room, shop, and warehouse;
- Building 923 – Hydrochem (6-1641) includes offices, locker rooms, kitchen, conference room, and shop; and
- Building 935 – Riggers Building includes offices and warehouse.

In October and November 2017, the Zone 2 Phase 2 priority buildings were sampled. In preparation for VI sampling, a building survey was conducted for each of these buildings, which included a PID screening that focused on potential migration pathways. Building maps or blue prints were used to develop building sampling plans. Table 5-9 presents the priority buildings, square footage, and number of samples collected. For each building, an equal number of co-located indoor air and sub-slab soil gas samples were collected. In addition, at least one outdoor air sample was collected at each building.

**Zone 2 Phase 2 Path Forward**

Results for the Zone 2 Phase 2 Category 1 and 2 buildings that were sampled in October and November 2017 will be presented and discussed with MDEQ in a meeting in early 2018. The evaluation of results and recommendations of Zone 2 Phase 2 will be submitted in the December 2018 Corrective Action Summary Report.



## **5.6 Year 3 Vapor Intrusion Goals**

The results and evaluation of Zone 2 Phase 2 priority buildings will be included in the 2018 Corrective Action Summary Report, as well as the results and evaluations of any additional rounds of sampling for Zone 1 and Zone 2. The buildings in Zone 3, shown on Figure 4.7-1, will be categorized and the priority buildings will be sampled. The results and evaluations will be provided in the 2018 Corrective Action Summary Report.

## 6.0 Ambient Air Pathway

To achieve “under control” status for the EI, Dow will maintain current ambient air and fugitive dust monitoring programs until further evaluation is completed and it is determined that further action is warranted. The soil volatilization to ambient air and particulate soil inhalation pathways will be considered as relevant data is collected to support the indoor air and direct contact pathways during this license period (2015-2025). Dow will maintain current ambient air and fugitive dust monitoring programs until further evaluation is completed and it is determined that further action is warranted. The soil volatilization to ambient air and particular soil inhalation pathways will be considered as relevant data is collected to support the indoor air and direct contact pathways. The MDEQ Part 201 non-residential criteria, specifically the VSIC and Particulate Soil Inhalation Criteria, will be used for the screening evaluation of any relevant soil and groundwater data. If screening criteria are exceeded for the particulate soil inhalation pathway, it is anticipated that any remedy designed to address the soil direct contact pathway would also address this pathway. Any exceedances of the VSIC pathway will be managed on a case-by-case basis.

### 6.1 Soil Volatilization to Ambient Air

The soil volatilization to ambient air exposure pathway applies to all land uses where hazardous substance vapors may emit from soils to ambient air. The outdoor air at the facility is monitored in the Ambient Air Monitoring Program (Attachment 16 of the License) which has not identified significant impacts from the facility. Soil direct contact sample results from Zone 1 and 2 have been screened against the soil volatilization to ambient air exposure pathway by comparison to the MDEQ Part 201 non-residential criteria, specifically the VSIC, and no results have exceeded the Cleanup Criteria.

Construction workers can potentially encounter vapors when working with subsurface soils or in a trench scenario; however, exposure is not reasonably expected to be significant since the exposure routes are managed by the required use of PPE and air monitoring specified in the Worker Exposure Control Plan, Appendix C of Attachment 19 of the License.

### 6.2 Particulate Soil Inhalation

The particulate soil inhalation exposure pathway addresses the emission and dispersion of contaminated soil particles into the ambient air (inhalation of fugitive dust particles). Exhaust constituents from process vents, power generation, and thermal incineration processes may have deposited onto plant soils. During dry periods, these soils may have been disturbed by equipment or vehicles and blown by the wind, resulting in fugitive dust emissions.

Fugitive dust control has been in progress at the Midland Plant since 1986. Dow is currently required by the 2015 Operating License and its Renewable Operating Permit (Section 1, IX.5) to provide and regularly update an operating program to control fugitive dust sources or emissions. The current fugitive dust control program requires semi-annual review and updates. In addition, fugitive dust emissions from the facility are monitored for dioxin emissions on an ongoing basis along the plant perimeter pursuant to the “Soil Box Data Evaluation Plan,” approved by MDEQ on September 25, 2015. Monitoring began in 2002 and continues to show the fugitive dust control program for the facility is effective. Soil direct contact sample results from Zone 1 and 2 have been screened against the soil volatilization to ambient air exposure pathway by comparison to the MDEQ Part 201 non-residential criteria, specifically the Particulate Soil Inhalation Criteria, and no results have exceeded the Cleanup Criteria.

Dow has placed surface cover to prevent exposure to surface soil. The covers include clean top soil and vegetation, gravel, and/or asphalt. Existing covers are managed and maintained. Figure 2-1 presents the current surface cover map for the Midland Plant. These surface covers limit the generation of fugitive dust and particulates. Based on current conditions this pathway is likely to be adequately controlled.

### **6.3 Current Status**

The soil volatilization to ambient air and particulate soil inhalation exposure pathways were evaluated using the surface soil direct contact sample results from Zones 1 and 2. Based on this evaluation, none of the samples screened exceed the criteria. To achieve “under control” status for the EI, Dow will review ambient air specific to the available data in Zones 1 and 2 and work collaboratively with MDEQ to lay out a comprehensive evaluation of current potential exposures from the outdoor air pathway.

## 7.0 Fuel Oil Tank Farm (7th Street Purge Wells Area)

The former fuel tank farm AOC is located in an upland area on the west bank of the Tittabawassee River, approximately 520 feet upstream of the Dow Dam. Historically, two above-ground fuel oil storage tanks were located in the area. The tanks provided fuel oil to a backup boiler located in Building 879. Historic release(s) from the operation of this above-ground storage tank system and associated piping have impacted the soil and groundwater. The area has been extensively backfilled with ash, sand, gravel, bricks, crushed concrete, asphalt, coal, and various other man made materials. The shallow perched groundwater exhibits an easterly hydraulic gradient towards the Tittabawassee River. The fill material is underlain by thin silts and clays. The silts and clays form a thin aquitard over the large sand inclusion in the till that is in hydraulic communication with the Tittabawassee River channel.

### 7.1 Overview of Site Characterization and Interim Measures

During a preliminary hydrogeologic investigation as part of the H-3 Compliance schedule identified in the 2003 Operating License, Dow identified a shallow perched groundwater zone in the area located on the west bank of the Tittabawassee River within the Midland Plant (see Figure 7-1). The initial evaluation indicated that the reversal of the natural gradient provided by the seven purge wells in the area wells did not extend to the shallow perched groundwater zone.

An IRA Work Plan was submitted December 13, 2005, and a Completion Summary Report provided September 28, 2007. The IRA investigation included the installation of a number of groundwater monitoring wells in the shallow zone (see Figure 7-2). Groundwater sampling identified chromium, lead, and various volatile organic hydrocarbons including naphthalene. The highest groundwater concentrations of the constituents of concern were detected in MW-4 and MW-7. The groundwater concentrations in MW-4 and MW-7 occasionally exceeded the Groundwater Surface Water Interface (GSI) criteria.

Measureable free product was identified in monitoring wells MW-9, MW-10, MW-11, and MW-13. An intermittent heavy sheen of free product has been noted in MW-7. The free product is dark brown to black in color and highly viscous (e.g., not mobile). Analytical data confirms the oil is viscous and lighter than water. A map indicating the estimated extent of the area impacted by free product is attached as Figure 7-3.

The silt and clay aquitard undulates across the site, is generally at a higher elevation along the riverbank and is restricting or retarding the movement of groundwater towards the river. The aquitard is present at the highest level along the riverbank near MW-17 and MW-18 and lowest along the riverbank near MW-1 and MW-6.

During routine monitoring, seven compounds were detected at concentrations above their GSI Cleanup criterion, following the April 2, 2013 sampling of corrective action wells MW-15S, MW-14S, MW-18, and MW-17. The MDEQ was verbally notified on June 10, 2013, and the wells were re-sampled on June 13 and 17, 2013. Detected concentrations of 1,2,4-trimethylbenzene, ethylbenzene and naphthalene were confirmed to be at concentrations exceeding their GSI Cleanup Criterion. 1,2,4-Trimethylbenzene was identified in one sample at concentrations that also exceed the Michigan Rule 57 Final Acute Value. MDEQ was notified of the confirmation on July 8, 2013.

In response to the chemical detections in the corrective action monitoring wells that exceeded generic MDEQ Cleanup Criterion, an IRA Work Plan was submitted August 2, 2013, summarizing the IMs that included targeted removal of 'source' material in the area. The interim response was designed in order to improve the groundwater quality sufficiently enough that generic Cleanup Criterion will not be exceeded. During the Fall of 2013, soil was excavated to the top of the aquitard and impacted soil was removed from the area. Approximately 5,000 cubic yards of 'source' material was removed (see Figure 7-4). The area was backfilled with excess soils re-located from other areas on-site. Immediately following the source removal detections of arsenic, 1,2,4-trimethylbenzene, ethylbenzene, isopropylbenzene, o-xylene,

naphthalene, and cyanide were detected above the generic GSI cleanup criteria, but have either not been confirmed in follow-up sampling or the wells have remained dry.

## 7.2 Current Status

A number of upgradient and source wells were removed during utility work and the soil remediation during 2013. Existing monitoring wells 14S, 15S, 17, and 18 are also routinely dry or they go dry during sample collection; which presents a significant challenge to routinely and effectively evaluate the shallow groundwater against Performance Criteria. For example, in the Second Quarter of 2017, 1,2,4-trimethylbenzene was detected during routine monitoring at MW-18 with a result of 19 micrograms per liter ( $\mu\text{g/L}$ ), the performance criteria is 17  $\mu\text{g/L}$ ; however, subsequent efforts to obtain groundwater samples have been unsuccessful due to dry conditions. Dow will install shallow monitoring wells to measure upgradient groundwater concentrations as well as groundwater within the former remedy area to evaluate current groundwater quality. Dow will also attempt to establish routine groundwater monitoring locations upgradient of the wells that are frequently dry.

Inspection of existing wells in the area during 2017 identified evidence of light non-aqueous phase liquid (LNAPL) at MW-11, MW-10, MW-13, PZ-4177, and PZ-4178. During 2018, routine product recovery will begin at MW-13, with additional efforts at wells MW-10, MW-11, PZ-4177, and PZ-4178 to determine if sufficient product is present for routine recovery.

Dow anticipates work will proceed beginning in 2018, as outlined in the Corrective Action Implementation Plan High Level Overview (Attachment 2).

## 8.0 Poseyville Landfill

PLF is within the contiguous property boundary of Dow, located west of the Dow industrial complex and southwest of the City of Midland in Midland Township (Figure 8-1). The landfill is bordered on the east by the Dow complex, and by Dow property to the north. The landfill was operated as a municipal landfill by the City of Midland, beginning in 1940. Dow purchased the landfill and began operations in 1955. Landfill operations were discontinued on January 5, 1981 (The Dow Chemical Company, 1989).

### 8.1 Overview of Site Characterization and Interim Measures

A draft compliance and final closure schedule for PLF, was submitted to MDNR by Dow on August 18, 1981. The proposed schedule for closure included details regarding the installation of additional monitoring wells to be sampled and analyzed for specific parameters. Dow also committed to defining the hydrogeological conditions in the northeast corner of the site including the flow direction, aquifer thickness, and water quality. In addition, Dow committed to further defining the flow direction in the upper aquifer in the southeast corner of the site, which included a groundwater contour map for the eastern portion of the landfill.

The Michigan Division was issued a hazardous and solid waste amendment (HSWA) permit on October 12, 1988, and has since been involved in the required submittal of corrective action requirements including closure packages and Corrective Action Monitoring Plans for the SWMUs. Dow was required to submit a RCRA Facility Investigation (RFI) Phase I Environmental Monitoring Report (Phase I) for the PLF SWMU within 365 days of the effective date of the permit. This report was submitted October 12, 1989 and details past monitoring requirements, an apparent leakage in the northeast corner of the facility, and corrective action measures taken.

In 1996, Dow submitted the final two sections of the PLF RFI Phase II Release Assessment (Phase II). The report focused on chemical and hydraulic monitoring data of the isolated plume on the northeast corner of the facility, and analysis of the chemical data from groundwater within the plume to evaluate the possibility of a continuing release from the landfill. The data was evaluated in order to provide a comprehensive hydraulic picture of the effectiveness of the purge wells employed to contain and remediate the groundwater in the plume.

Routine sampling at PLF is currently conducted in accordance with the Operating License SAP. Hydraulic information, as well as groundwater and leachate samples are collected and analyzed. Samples are regularly collected for Leak Detection Chemical Monitoring, Corrective Action Chemical Monitoring, and Corrective Action Hydraulic Monitoring. Four purge wells in the northeast corner of the landfill (2690A, 2917, 2960, and 2961), were installed to mitigate the plume in the northeast corner, are part of the Corrective Action Chemical Monitoring program, and are sampled quarterly for benzene, chlorobenzene, chloroform, and ethylbenzene.

The four historical purge wells are screened at the base of the Eastern Till Sand Body which lies beneath the northeast corner of the PLF and extends beyond the landfill boundaries (Figure 8-2). A slurry wall, keyed into clay till beneath the Till Sand, is present to isolate that portion of the Till Sand present beneath the landfill. The well pumps are controlled by water level probes in the well casings in order to maintain a consistent drawdown profile into the well. The volume of water pumped from each of the four purge wells is recorded.

Hydraulic monitoring is conducted for the Eastern Till Sand outside of the landfill perimeter slurry wall using an array of piezometers as shown in Figure 9-1. The hydraulic monitoring is utilized to observe groundwater drawdown into the four purge wells, and ensure that existing contaminants do not migrate away from the landfill perimeter.

## 8.2 Planned Work for 2017

In 2016, Dow contracted with EarthCon to perform groundwater plume analytical services to further assess the groundwater plume in the northeast corner of the PLF. EarthCon performed the plume analytics to help provide a better understanding of the overall behavior of the plume dynamics by conducting a stability analysis looking at the center of the mass over time, the areal extent of the plume, and the overall spatial difference of the plume from 1995 to August 2016.

Earthcon found that in the earlier period of the analysis, the dissolved plume in the northeast corner was centered near well 2917 and extended to the east near purge well 2961 and west near purge well 2960. Sustained pumping from peripheral purge wells 2960 and 2961 appears to have resulted in cleanup of the dissolved plume in the eastern and western portions by about 2010 and sustained until the end of the period of analysis (Figure 8-3). Also during this period, the dissolved plume exhibited patterns of continued attenuation in the eastern portions of the plume area, including the vicinity of 2917.

The evaluation also demonstrated that the release of constituents was likely not a one-time release. It appears that there may be an on-going sourcing of constituents into the study area. However, with the recent pumping regime at the site and the recent site data, it appeared that the plume was at or near a point of hydrodynamic equilibrium (e.g., the rate of pumping is such that the plume is stable).

The data analysis also suggested that there might be an apparent dynamic between purge wells 2960A and 2917, whereby the plume behaves differently depending on the ratio of flow rates between these two wells. For example, based on observation of site data from 1995 through 2016, plume attenuation rates were better when the flow rate from 2960A far exceeded the flow rate from 2917 and were sub-optimal when flow rates from 2917 exceeded those from 2960A.

Based on evaluation and other analysis conducted in 2016, priority actions were planned for 2017, including the following:

- A. Development of a Pilot Purge Well Optimization Study - Since purge wells 2960 and 2961 exhibited generally non-detect or below maximum contaminant level (MCL) concentrations, and their continued pumping may be serving to expand (or retard the collapse of) the present dissolved plume, work for 2017 included the development of a pilot optimization study to include a trial period during of one to two years, depending on observable trends, during which wells 2960 and 2961 would be shut down.
- B. Investigation of Continued Potential Sourcing of Plume Area – The 2016 evaluations suggested the continued release of COCs in the northeast corner of the landfill. Additional investigation into the sourcing occurring in the northeast corner would be planned and implemented and was anticipated to include direct push drilling and MIP around the perimeter of the slurry wall and additional environmental samples collected for laboratory analysis to confirm the nature and extent of the modeled plume.

## 8.3 Purge Well Optimization

In March 2017, details of the Purge Well Optimization pilot study were shared with MDEQ at the regular monthly coordination meeting. The implementation of the optimization study began November 13, 2017. The following sections describe the analysis that took place and the study scope of work.

### 8.3.1 Summary of Purge Well Analysis

Analytical data for the period of analysis for benzene, chlorobenzene, and ethylbenzene for each purge well was examined (Tables 8-1 thru 8-3). Chloroform is also one of the four constituents that has been monitored routinely since 1995; however, since that time, there have only been 14 isolated low level detections in all the purge wells and there has been no detection in any well since 2004. As such, there

was not enough data to conduct an analysis on this parameter, and it likely should be eliminated from further monitoring as it is not a good indicator of the plume.

Since benzene is the primary constituent at the site, and both the chlorobenzene and ethylbenzene exhibit similar patterns to benzene, data for benzene will be discussed and considered representative of the three detected constituents.

### **8.3.1.1 Purge Wells 2690A and 2917**

As shown on Figure 8-3, the plume has been centered on purge wells 2690A and 2917 in recent years. As such these wells were evaluated together. Figure 8-4 shows the annual recovery rates compared to benzene concentrations for both purge wells 2690A and 2917. For the period 1995-1998 purge well 2690A pumped approximately one million gallons per year while 2917 pumped at a much lower rate. During this time the benzene concentrations remained at relatively low levels and stable in 2690A and displayed a downward trend in 2917.

In 1999, the flow in 2690A was increased to approximately two million gallons per year and far exceeds the flow from 2917 and at the same time benzene significantly increases in 2960A while it continues to decline in 2917. This may be explained by the possibility that increased pumping in 2690A "pulled" benzene from 2917 to 2690A.

For the period 2000-2004 the pumping rate of 2690A was increased to 2.5 to 3 million gallons per year. In 2000-2001 the pumping rate of 2917 was increased to approximately 2 million gallons per year and during this time benzene concentrations continued to decline in 2917 while staying stable in 2690A. In 2003-2004, the pumping rate in 2917 was reduced to less than 1 million gallons per year at which time we notice a decrease in benzene in 2690A while concentrations in 2917 appear to be relatively stable.

For the period 2005-2012, the pumping rate in 2690A was increased above 3 million gallons per year while there were variances in the pumping rate in 2917 during this period. We see that starting in 2005, coinciding with the increased pumping rate, benzene concentrations in 2690A significantly increased and stayed steady through 2008 while the pumping rate varied in 2917. During this time, we see a general decline in benzene concentrations in 2917. In 2009, the pumping rate in 2690A was increased to approximately 6 million gallons per year at which time benzene concentrations started to decrease in 2690A. This may be due to reduction in contaminant mass, the drawing in (influx) of clean water into the pumping zone due to a larger pumping radius of influence, or a combination of both. A steady decline in benzene concentrations in both wells and mass reduction is observed from 2009-2010. In 2011 and 2012, the pumping rate of 2917 was increased to approximately 3 million gallons per year or higher. The effect observed is that the benzene concentration trends reversed in both 2690A and 2917 and started to increase.

While no pumping data is available for the time period 2013-2014, during the time period of 2015-2016 we observe that the pumping rate of 2690A had been reduced significantly to below 1 million gallons per year in 2015 to and extrapolated annual pace of less than 500,000 gallons per year in 2016. For this same period the pumping rate of 2917 was maintained at approximately 1 million gallons per year. Under this pumping scenario, we observe that the concentration of benzene in both wells and the benzene mass in the plume is beginning an increasing trend.

This data analysis suggests that there may be a significant dynamic between wells 2960A and 2917, whereby the plume behaves differently depending on the ratio of flow rates between these two wells. For example, based on observation of site data from 1995 through 2016, plume attenuation rates were better when the flow rate from 2960A far exceeded the flow rate from 2917 and were sub-optimal when flow rates from 2017 exceeded those from 2960A.



### 8.3.1.2 Purge Wells 2960 and 2961

As shown on the Figure 8-5, since the initial monitoring of purge well 2960 in 2003 there have been very few low level detections of benzene, concentrated primarily around 2008. It is further noted that both purge wells 2960 and 2961 exhibited non-detect levels of benzene from 2011 through 2016 (Table 8-1).

As observed in Figure 8-5, purge well 2960 was recovering less than one million gallons of water a year for the 1995 to 2008 time period. Constituent concentrations were generally low or non-detect during that time until 2007 when benzene concentrations started to increase. The benzene concentrations show a noticeable "spike" in 2008-2009 followed by a decrease to non-detect or low concentrations in 2011. The pumping rate of this well was increased to approximately two million gallons per year from 2009 to 2016 (where data is available). We note that this rate has been maintained despite constituent concentrations being mostly non-detect since approximately 2011.

Purge well 2961 has pumped consistently since at least 1995 with annual recovery rates between approximately one-half to one million gallons per year, except for increased recovery rates between two and three million gallons per year during the period of 2003 through 2005 (Figure 8-6). Over the study period of 1995 through 2016, concentrations have steadily declined in well 2961 with chlorobenzene being the only constituent detected since 2012 (Figure 8-7). Further, the chlorobenzene concentrations have remained below the chlorobenzene federal MCL of 100 µg/L since 2009.

### 8.3.1.3 Rate Changes

Purge wells 2690A and 2917 were inspected and refurbished so that flow rates for these two wells can be easily modified as needed. Based on concentration patterns in the past, the initial flow rates will be optimized over the time, but expected to stabilize at a ratio similar to the past optimal conditions observed where 2917 will pump much less than 2690A. It is expected that this may be approximately one fourth to one fifth of the 2690A flow rate. Depending on plume behavior and resulting trends, the 2690A/2917 flow ratio is expected to be modified over time, but it is the intent that the rate of 2917 will be kept well below 2690A so as not to "pull" the plume from 2690A toward 2917.

Since purge wells 2960 and 2691 have exhibited generally non-detect or below MCL concentrations and their continued pumping appears to be serving to expand (or retard the collapse of) the present dissolved plume, these two wells will be turned off during a test period of two years, dependent upon observable trends. During this time, the purge wells will continue to be monitored and sampled in accordance with the SAP. Additional monitoring may be conducted to confirm that plume behavior.

## 8.4 Slurry Wall Investigation Scope of Work

The conceptual plan for the membrane interface hydraulic profiling tool (MiHPT) work at PLF can be found on Figure 8-8. This plan was meant to be a conceptual plan to begin boring work and anticipated to be modified during the investigation in response to MiHPT information that becomes available.

MiHPT work was anticipated to be conducted at approximately 25 locations within the primary AOC identified and likely another 8-10 locations along the slurry wall outside of the AOC identified in Figure 8-8. Secondary areas have been identified should the area of investigation need to be expanded in order to achieve the project objectives. Each MiHPT borings was planned to include the use of multiple detectors (e.g. PID, FID, EC, HPT, XSD, stratigraphy, etc.).

The primary target constituents outside the slurry wall include benzene, chlorobenzene, ethylbenzene, chloroform, and 1,2 Dichlorobenzene.

- Benzene - Historically benzene detections in the plume area have been as high as 8600 µg/L; however, in recent years the highest detected concentration has been 1600 µg/L.

- Chlorobenzene – Chlorobenzene concentrations have been lower than benzene concentrations with a historical maximum concentration of 920 µg/L and in recent years a maximum concentration of 430 µg/L.
- Ethylbenzene – The highest historical detection of ethylbenzene from the purge wells has been 215 µg/L. During recent years, highest concentration has been 140 µg/L.
- Chloroform – Chloroform is also one of the four constituents that has been monitored routinely since 1995; however, since that time there have only been 14 isolated low level detections in all the purge wells and there has been no detection in these wells since 2004.
- 1,2 Dichlorobenzene – This compound has recently been detected in two of the shallow temporary wells outside the slurry wall and may be proposed to be tracked instead of chloroform through the routine groundwater monitoring program. Detections were 34 µg/L and 98 µg/L.

#### 8.4.1 MiHPT Technology

In order to determine the source of contamination that suspected to be coming from the landfill through a breach in the slurry wall and landfill impoundment area, AECOM contracted GeoServ, Inc. and Columbia Technologies, Inc. to conduct a direct push investigation of subsurface impacts utilizing Direct Image MIP technology developed by Geoprobe. Direct sensing tooling used included the MIP technology to map the dissolved phase, vapor phase, and sorbed phase of VOCs. The MIP membrane is semi-permeable and is comprised of a thin film polymer impregnated into a stainless steel screen for support. The membrane is placed in a heated block attached to the probe. This block is heated to approximately 100-120 degrees Celsius (°C), as the probe is advanced into the soil. The MIP can be used in saturated or unsaturated soils, as water does not pass through the membrane. Heating the block accelerates membrane diffusion while at the same time minimizing membrane absorption. Diffusion across the membrane is driven by the concentration gradient between the contaminated soil and the clean carrier gas behind the membrane. A constant nitrogen gas flow behind the membrane carries the contaminants to the gas phase detectors at the surface. The detectors included a photoionization detector (PID), flame ionization detector (FID), and halogen specific detector (XSD). These detectors are employed in series with each detector providing sensitivity to a particular group or type of contaminant. The output signal from the detectors is recorded by the MIP data logging system.

The PID detector consists of a specialized ultraviolet (UV) lamp mounted on a thermostatically controlled, low volume, flow-through cell. The 10.6 electron volt (eV) UV lamp emits energy at a wavelength of 120 nanometers, which is sufficient to ionize most aromatics VOCs such as benzene, toluene, xylene, etc., and many other molecules such as hydrogen sulfide (H<sub>2</sub>S), hexane, and ethanol whose ionization potential is below 10.2 eV. The PID also emits a response for chlorinated compounds containing double-bonded carbons (halogenated ethylenes), such as PCE and TCE. Methanol, methane, and water, which have ionization potentials greater than 10.6 eV, do not respond on the PID.

The FID utilizes a hydrogen flame to combust compounds in the carrier gas. The carrier gas effluent from the GC column is mixed with hydrogen and burned. This combustion ionizes the analyte molecules. The hydrogen flame can ionize any organic material with an ionization potential of 15.4 eV or less. This detector responds to any molecule with a carbon-hydrogen bond (TCE, cis-1,2-DCE, and VC), but poorly to compounds such as hydrogen sulfide, or ammonia. The FID responds poorly to PCE and carbon tetrachloride due to the lack of the carbon-hydrogen bond.

The XSD detector consists of a ceramic probe, platinum wire (anode) and platinum bead (cathode) mounted inside a high temperature reactor. The XSD is sensitive to halogen atoms including bromine, chlorine, and fluorine. The detector reactor combusts the incoming sample into a stream of air and converts halogenated organic compounds into free halogen atoms. The free halogen atoms will then react with alkali atoms on the surface of the electrically charged platinum bead, which functions as an electron emitter. When this reaction takes place, the current is measured and transmitted to the data

system. The XSD detects compounds that contain elements in the halogen group, specifically chlorine and tends to respond higher to compounds with more chlorine such as PCE and TCE, or CFCs.

In addition to the chemical profiling tools, the MIP Probe also has an Electrical Conductivity (EC) sensor and hydraulic profiling tool (HPT) installed. The EC technology is used to characterize soil stratigraphy with different grain sizes generally reporting a range of EC values. The HPT is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. This injection pressure log is an indicator of formation permeability. In addition to measurement of injection pressure, the HPT can also be used to measure hydrostatic pressure under the zero flow condition. This allows the profiling of the subsurface permeability with depth identifying permeable zones and the determination of hydraulic conductivity.

## **8.4.2 Field Methodology**

### **8.4.2.1 MiHPT Borings**

Prior to advancing tooling, each selected location was cleared utilizing air knife soil vacuum technology. This method uses high-pressure air to loosen subsurface material coupled with a vacuum to remove the material from the borehole. Each location was excavated to 5 feet below grade to an approximate diameter of twice the tooling being used (e.g. 4 inches clearance). Underground utility maps were also re-reviewed to confirm the location of utilities near each proposed boring. Boring locations were adjusted based the site conditions encountered to avoid obstructions, underground, and overhead utilities.

The MiHPT tooling was advanced using a 7822DT Direct Push Technology (DPT) drilling rig. The profiling depth of the sensors was measured and recorded using a precision string potentiometer with a 100-inch linear range. The potentiometer is mounted onto the mast of the DPT rig and a counter-weight anchored to the ground. Measurements are recorded on the down stroke of the mast, as the tooling string is pushed into the subsurface. The reference elevation (depth) reported for each individual boring is established by setting the data logger to zero feet with the membrane on the MIP probe aligned with the ground surface permitting depth-specific MIP data at each investigation location. The ground surface was surveyed following the MiHPT investigation to calculate elevation to correlate the investigative borings to each other and to other existing monitoring well network.

The profiling depth of the sensors was measured and recorded using a precision string potentiometer with a 100-inch linear range. The potentiometer is mounted onto the mast of the DPT rig and a counter-weight anchored to the ground. Measurements are recorded on the down stroke of the mast, as the tooling string is pushed into the subsurface. The reference elevation (depth) reported for each individual boring is established by setting the data logger to zero feet with the membrane on the MIP probe aligned with the ground surface permitting depth-specific MIP data at each investigation location.

### **8.4.2.2 Groundwater Sampling**

The MiHPT investigation was supplemented through the collection of groundwater samples at both the existing monitoring wells and samples collected from select MiHPT locations. Collected water samples were analyzed utilizing the temporary on-site laboratory (Pace Analytical Services).

Groundwater samples were collected at select MiHPT locations. The groundwater was collected by installing temporary PVC screen/casing in close proximity to the MiHPT location using the 7822DT DPT drilling rig. The temporary well locations were cleared if utilities using the same methodology as the MiHPT borings. Following review of the MiHPT response profiles, the depth of the well screen was selected based on elevated detector response zones. The temporary wells were sampled utilizing a peristaltic pump with disposable single-use tubing. Water samples were collected following a short well purge to obtain a representative sample of the groundwater. Groundwater samples were collected from 15 of the 27 MiHPT locations.

Identified monitoring wells in the investigation areas were also sampled during the investigation utilizing a peristaltic pump. Water samples were collected following a short well purge to obtain a representative sample of the groundwater. Disposable single-use tubing was used to prevent cross contamination.

### **8.4.3 Results and Analyses**

#### **8.4.3.1 MiHPT**

A total of 27 MiHPT borings were advanced throughout the northeast corner of the PLF during the investigation. The termination depth of the MiHPT probe was based on refusal of the MiHPT probe due to core competent subsurface layers. The depth of the MiHPT boring ranged from 11 to 31 feet. The MiHPT boring locations were based on the planned locations and were advanced in a sequence to aid in the delineation of observed detections and provide for boundary of the elevated responses. Not all planned locations were probed due to obstacles, such as utilities, or were deemed not necessary based on the gathered MiHPT responses and distribution of the investigation network.

Figure 8-9 presents the location of the advanced MiHPT borings. The logs of the MiHPT profiles at each location are provided as Attachment G.

The vertical profiling depths of the individual detectors of the MiHPT borings (PID, FID, and XSD) were correlated to ground surface elevation. This data was used to map the MiHPT responses at select horizons. The MiHPT detector responses at elevations of 590 feet, 595 feet, 600 feet, and 605 feet were evaluated in order to assess response magnitudes with depth. Figures 8-10 through 8-21 present the isoconcentration of the PID (Figures 8-10 thru 8-13), FID (Figures 8-14 thru 8-17), and XSD (Figures 8-18 thru 8-21) responses.

As noted on the Figures 8-12, 8-13, 8-20, and 8-21, all the PID and XSD MiHPT detectors reported elevated responses in the vicinity of MIHTP borings PLF-09 and PLF-16 in the 590 to 595 foot elevation. It should be noted that the base of the elevated MIHTP responses was not delineated due to MiHPT probe refusal. The extent of the deeper PID responses north of PLF-09 were also not delineated. The FID detector reported elevated responses for borings located at the northeastern landfill perimeter at the 605-foot elevation, but attenuated rapidly with depth and downgradient extent.

#### **8.4.3.2 Groundwater Characterization**

The MiHPT investigations was supplemented through the collection of groundwater samples at existing piezometers, monitoring wells, and purge wells as well as grab water samples collected at MiHPT locations. Collected water samples were analyzed utilizing the temporary on-site laboratory (Pace Analytical Services).

Water samples were collected following a short well purge to obtain a representative sample of the groundwater. Disposable single-use tubing was utilized to prevent cross contamination. The existing well network sampled included: 2917, 2960, 2961, 2690A, 6174, PLFT02S, PLFT08S, PLFT09S, PLFT10S, PLFT11S, PLFT12S, and PLFT13S. Groundwater samples were also collected at select MiHPT locations (Figure 8-22). All confirmation water data is included in Appendix H.

Figures 8-23 through 8-26 present the contoured distributions of 1,2-Dichlorobenzene, chlorobenzene, benzene, and ethylbenzene, respectively. The distributions for each constituent of interest (COI) are generally similar and depict migration through the slurry wall consistent with the MiHPT results. Detections of chloroform were limited in the 2017 dataset, therefore the COIs assessed were limited to 1,2-Dichlorobenzene, chlorobenzene, benzene and ethylbenzene.

In order to further characterize the distributions of COIs emanating from the PLF, concentration profiles were established in a northeasterly direction, along the apparent centerline of the distributions; recent data from internal landfill monitoring wells including P-15 through P-18. Figures 8-27 through 8-30

present the axial concentration profiles for 1,2-Dichlorobenzene, chlorobenzene, benzene, and ethylbenzene, respectively. With the exception of 1,2-Dichlorobenzene (Figure 8-27), each COI profile reflects an increase in concentration at or north of monitoring well PLT-3, which is located north of the slurry wall.

Additional profiles were generated along a west to east direction along the northern portion of the landfill, north of the reported slurry wall location (Figures 8-23 thru 8-26). Based upon these profiles, COI impacts were observed between well location PLFT-9 (west) and MiHPT boring PLF-11 (east). These findings were consistent with both the MiHPT detector responses and the contoured COI distributions.

## 8.5 Summary of Findings

Based upon the MiHPT boring responses, the apparent breach in the slurry wall appears to be between MiHPT boring locations PLF-14 and PLF-16, centered approximately on MiHPT boring PLF-15. Impacts were observed to extend to the north of the slurry wall.

The executed groundwater sampling portion of the investigation was generally consistent with the findings of the MiHPT boring program. Specifically, four primary COIs are migrating out of the landfill in the vicinity of existing well PLFT-3 and that the downgradient migration of the COIs appears to be controlled by the operation of the purge wells.

From a corrective action standpoint, the apparent slurry wall breach or area of poor integrity is situated between well location PLFT-9 (west) and MiHPT boring PLF-11 (east). Potential remedial measures should be focused on repair of the slurry wall and optimization of the purge wells northeast of the landfill.

## 8.6 Path Forward

Work in 2018 will focus on continued optimization of the purge well network and addressing the continued sourcing in the northeast corner.

### 8.6.1 Purge Well Optimization

- Continue routine monitoring in purge wells;
- Continue to examine trends in purge wells and in sentinel wells;
- Take appropriate actions if the plume is not behaving as expected; and
- Adjust flow rates as appropriate to optimize performance.

### 8.6.2 Slurry Wall

- Conduct a preliminary remedial technology screening to assess the feasibility of management strategies to address the continued sourcing in the northeast corner of the landfill; and
- Collect additional pre-design data and complete design for selected management strategies.

## 9.0 Northeast Perimeter

The NEP is located along the north and east of the Midland Plant (Figure 9-1). Shallow groundwater in this area has been identified as having the potential for seasonal off-site migration and possible venting to storm sewers located along Washington Street, Bay City and South Saginaw Roads. Historic releases of organic contaminants have been identified by detection in groundwater monitoring wells, including benzene, trichlorofluoromethane (CFC-11), dichlorofluoromethane (CFC-21) and the organic daughter products and inorganic byproducts from natural attenuation of chlorinated ethenes.

### 9.1 Overview of Site Characterization and Interim Measures

A federal HSWA permit was originally issued to the Midland Plant on October 12, 1988. Included in the conditions of the permit were provisions that Dow was required to contain all contaminated groundwater on-site, and properly treat it through the wastewater treatment plant. In addition, the corrective action plan for the facility at that time included maintaining old closed WMUs in-place, intercepting and treating shallow groundwater flowing underneath the Midland Plant, and continuing to study the hydrogeology as needed to develop a full understanding of groundwater flow relationships and potential environmental impacts of the Midland Plant and contiguous properties.

As part of the on-going study, EDI Engineering and Science completed a hydrogeologic study of the Midland Plant in March of 1989. Groundwater modelling performed as a part of this study identified areas where shallow groundwater could flow off-site from the Midland Plant, including the NEP of the Midland Plant along Saginaw Road and Bay City Road. A groundwater collection system was presumptively proposed for the area in May of 1990. Study of the area continued into 1993 to fill data gaps identified by MDEQ. Groundwater samples collected from the area were found to be free of contamination, so the plans to construct the groundwater collection system were withdrawn.

Development of a groundwater monitoring program for the NEP was outlined in the Operating License. Dow proposed to conduct additional investigation needed to finalize and implement a routine groundwater monitoring program. A groundwater monitoring program was developed and submitted to MDEQ on July 22, 2005. Based on MDEQ comments to the proposal, an addendum to the Monitoring Program was submitted on October 14, 2005. The groundwater monitoring program for the NEP was added to the RCRA Facility SAP in April 2006 and received MDEQ approval on September 27, 2007.

During implementation of the approved groundwater monitoring program at the NEP, vinyl chloride was detected in two monitoring wells (MW-6178 and MW-6175). Additional groundwater investigations were developed and implemented to determine the extent of the groundwater impacts. Summary reports for both the 6175 and 6178 Area studies were submitted to the MDEQ on September 14, 2007. Corrective Action Plans were submitted for these two areas (Area 6178 and Area 6175) on January 18, 2008.

Results of the 2007 study of the 6178 Area indicate that the vinyl chloride is a daughter product of higher chlorinated ethenes that are being naturally dechlorinated. At the downgradient boundary of the plume, the concentrations of the constituents of concern were below the generic GSI criterion. Results of the 6175 Area study also indicate that the vinyl chloride is a daughter product of higher chlorinated ethenes that are being naturally dechlorinated; however, observations indicated that the dechlorination process may not progress to ethenes and ethanes, as observed in the 6178 Area, prior to entering the backfill of an existing storm sewer. This storm sewer eventually discharges to the Tittabawassee River, so corrective action was proposed and included a GSI criterion mixing zone determination.

In both areas, the initial source was determined to likely be a relatively small, historic release of higher chlorinated ethenes that have naturally dechlorinated in the groundwater and diffused into the lower clay soils. Monitoring wells from both areas were added to the existing bi-annual NEP groundwater monitoring program in the area. The purpose of the monitoring programs is to demonstrate on-going natural attenuation, and ensure that concentrations of constituents of concern are not increasing over time.

Dow also completed a voluntary investigation in 2008 near monitoring wells 3540A and 4358 (CFC Area) in the NEP due to detectable concentrations of trichlorofluoromethane (CFC-11) and dichlorofluoromethane (CFC-21). A GSI criterion has not formally been developed for CFC-11 or -21; however, the available toxicity data suggested that the criterion, if developed, may be lower than the concentrations detected in this area (URS, 2011).

Further voluntary investigation was proposed in the *Work Plan for CFC-11 and -21 Evaluation Near Wells 3450-A and 4358* submitted September 30, 2010 and the *Work Plan Addendum for the Northeast Perimeter Groundwater Monitoring Program* submitted for MDEQ review and approval on December 21, 2011.

## 9.2 Planned Work for 2017

Dow has continued to assess results from the on-going groundwater monitoring program for the NEP since its implementation. To assist with the assessment of the historical data, in 2016 Dow contracted with EarthCon Consultants, Inc. (EarthCon) to perform groundwater plume analytical services to help characterize the conditions in the NEP. Findings of their analyses conducted coupled with additional analyses of the monitoring data further defined additional investigation for the NEP to address the groundwater detections measured above generic MDEQ GSI and the concentrations of CFC-11 and CFC-21.

The *2016 MiOps Corrective Action Summary and 2017 Work Plan* described the planned work activities for 2017, including the primary objectives of the work in each area. The planned activities included additional drilling work using a MIP and follow-up laboratory analyses to assess each area.

- Area 6178 - Additional analyses conducted in 2016 seemed to validate that the 6178 plume does not appear to be sourcing and overall, the source seems to be disappearing. As the plume appears to continue to be naturally attenuating, the additional work in 2017 was focused on assessing the plume fate and verifying that the vinyl chloride plume is being adequately tracked and measured.
- Area 6175 – Planned work for 2017 included the additional characterization necessary to build a more complete CSM for the 6175 Area. The 2016 assessment of the existing groundwater data for this area was inconclusive in regard to a potential continued localized source. Supplemental characterization in 2017 was planned upgradient of the plume area to characterize the source area and downgradient to the west of the monitoring well network to verify the plume delineation.
- CFC Area – Work in the CFC area was planned to proceed in conjunction with the Area 6175 work, to further characterize the distribution, fate, and transport of elevated concentrations of CFC-11 and CFC-21.

## 9.3 Investigation Scope of Work

The MiHPT Study was planned to achieve the objectives of each the AOCs identified for the NEP of the facility (Figure 9-2). The initial plan included the potential completion of MiHPT at regular intervals along investigative tracks, dependent upon the MiHPT and analytical results (Figure 9-3). Additionally, MiHPT borings were planned to be advanced at locations to the north of the facility to delineate the extent of the plume areas.

During the planning for the work, it was not anticipated that every location shown on Figure 9-3 would be utilized for the purposes of the investigation; however, potential locations were identified and cleared so that they would be readily accessible if the MiHPT data obtained should indicate the need to collect data at that location. Each of these potential locations was located by a surveyor at a minimum distance of 20 feet away from mapped utilities.

Each MiHPT boring included the use of multiple detectors (e.g. PID, FID, EC, HPT, XSD, stratigraphy, etc.). Further, groundwater samples were planned to be collected from selected MiHPT borings in order to determine the relative distribution of target constituents based upon the MiHPT technology responses. A mobile laboratory was on-site to provide analytical services.

The target constituents for the 6175 and 6178 Areas included:

- Vinyl chloride
- Cis-1,2-DCE
- Trans-1,2-DCE
- 1,1-DCE
- TCE
- PCE

The target constituents for the CFC Area were:

- Trichlorofluoromethane (CFC-11)
- Dichlorofluoromethane (CFC-21)

As the plume areas were hypothesized to perhaps overlap or intersect, all analytes were analyzed in each groundwater sample.

### 9.3.1 MiHPT Technology

To delineate the known impacts associated with the 6175 Area, the 6178 Area, and the CFC Area of the NEP, the investigation objective was to understand the vertical and horizontal extent of subsurface chlorinated hydrocarbon contamination.

AECOM contracted GeoServ, Inc. and Columbia Technologies, Inc. to conduct a direct push investigation of subsurface impacts utilizing Direct Image MIP technology developed by Geoprobe. Direct sensing tooling used included the MIP technology to map the dissolved phase, vapor phase, and sorbed phase of VOCs.

The MIP membrane is semi-permeable and is comprised of a thin film polymer impregnated into a stainless steel screen for support. The membrane is placed in a heated block attached to the probe. This block is heated to approximately 100-120 degrees Celsius (°C), as the probe is advanced into the soil. The MIP can be used in saturated or unsaturated soils, as water does not pass through the membrane. Heating the block accelerates membrane diffusion while at the same time minimizing membrane absorption. Diffusion across the membrane is driven by the concentration gradient between the contaminated soil and the clean carrier gas behind the membrane. A constant nitrogen gas flow behind the membrane carries the contaminants to the gas phase detectors at the surface. The detectors included a photoionization detector (PID), flame ionization detector (FID), and halogen specific detector (XSD). These detectors are employed in series with each detector providing sensitivity to a particular group or type of contaminant. The output signal from the detectors is recorded by the MIP data logging system.

The PID detector consists of a specialized ultraviolet (UV) lamp mounted on a thermostatically controlled, low volume, flow-through cell. The 10.6 electron volt (eV) UV lamp emits energy at a wavelength of 120 nanometers, which is sufficient to ionize most aromatics VOCs such as benzene, toluene, xylene, etc., and many other molecules such as hydrogen sulfide (H<sub>2</sub>S), hexane, and ethanol whose ionization potential is below 10.2 eV. The PID also emits a response for chlorinated compounds containing double-bonded carbons (halogenated ethylenes), such as PCE and TCE. Methanol, methane, and water, which have ionization potentials greater than 10.6 eV, do not respond on the PID.



The FID utilizes a hydrogen flame to combust compounds in the carrier gas. The hydrogen flame can ionize any organic material with an ionization potential of 15.4 eV or less. This detector responds to any molecule with a carbon-hydrogen bond (TCE, cis-1,2-DCE, and VC), but poorly to compounds such as hydrogen sulfide, or ammonia. The FID responds poorly to PCE and carbon tetrachloride due to the lack of the carbon-hydrogen bond.

The XSD detector consists of a ceramic probe, platinum wire (anode) and platinum bead (cathode) mounted inside a high temperature reactor. The XSD is sensitive to halogen atoms including bromine, chlorine, and fluorine. The detector reactor combusts the incoming sample into a stream of air and converts halogenated organic compounds into free halogen atoms. The free halogen atoms will then react with alkali atoms on the surface of the electrically charged platinum bead, which functions as an electron emitter. When this reaction takes place, the current is measured and transmitted to the data system. The XSD detects compounds that contain elements in the halogen group, specifically chlorine and tends to respond higher to compounds with more chlorine such as PCE and TCE, or CFCs.

In addition to the chemical profiling tools, the MIP Probe also has an Electrical Conductivity (EC) sensor and hydraulic profiling tool (HPT) installed. The EC technology is used to characterize soil stratigraphy with different grain sizes generally reporting a range of EC values. The HPT is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. This injection pressure log is an indicator of formation permeability. In addition to measurement of injection pressure, the HPT can also be used to measure hydrostatic pressure under the zero flow condition. This allows the profiling of the subsurface permeability with depth identifying permeable zones and the determination of hydraulic conductivity.

Groundwater samples would then be used to confirm that the readings on the MIP were from the COCs and be used to correlate the results on the probes to concentrations of the analytes confirmed in the groundwater samples.

## **9.4 Field Methodology**

### **9.4.1 MiHPT Borings**

Prior to advancing tooling, each selected location was cleared utilizing air knife soil vacuum technology. This method uses high-pressure air to loosen subsurface material coupled with a vacuum to remove the material from the borehole. Each location was excavated to five feet below grade to an approximate diameter of twice the tooling being used (e.g. four inches clearance). Underground utility maps were also re-reviewed to confirm the location of utilities near each proposed boring. Boring locations were adjusted based the site conditions encountered to avoid obstructions, underground, and overhead utilities.

The MiHPT tooling was advanced using a 7822DT DPT drilling rig. The profiling depth of the sensors was measured and recorded using a precision string potentiometer with a 100-inch linear range. The potentiometer is mounted onto the mast of the DPT rig and a counter-weight anchored to the ground. Measurements are recorded on the down stroke of the mast, as the tooling string is pushed into the subsurface. The reference elevation (depth) reported for each individual boring is established by setting the data logger to zero feet with the membrane on the MIP probe aligned with the ground surface permitting depth-specific MIP data at each investigation location. The ground surface was surveyed following the MiHPT investigation to calculate elevation to correlate the investigative borings to each other and to other existing monitoring well network.

### **9.4.2 Groundwater Sampling**

The MiHPT investigation was supplemented through the collection of groundwater samples at both the existing monitoring wells and samples collected from select MiHPT locations. Collected water samples were analyzed utilizing the temporary on-site laboratory (Pace Analytical Services) or an off-site laboratory (TestAmerica at the end of the work period).

Groundwater samples were collected at select MiHPT locations. The groundwater was collected by installing temporary PVC screen/casing in close proximity to the MiHPT location using the 7822DT DPT drilling rig. The temporary well locations were cleared of utilities using the same methodology as the MiHPT borings. Following review of the MiHPT response profiles, the depth of the well screen was selected based on elevated detector response zones. The temporary wells were sampled utilizing a peristaltic pump with disposable single-use tubing. Water samples were collected following a short well purge to obtain a representative sample of the groundwater. Groundwater samples were collected from 41 of the 67 MiHPT locations.

Identified monitoring wells in the investigation areas were also sampled during the investigation utilizing a peristaltic pump. Water samples were collected following a short well purge to obtain a representative sample of the groundwater. Disposable single-use tubing was used to prevent cross contamination.

## 9.5 Results and Analyses

### 9.5.1 MiHPT

At the NEP Area, the three AOIs were investigated collectively as it was anticipated that overlapping contaminant plumes may exist, particularly the 6175 and CFC Areas. A total of 67 MiHPT borings were advanced throughout the NEP Area during the investigation. The MiHPT logs for each of the borings completed can be found in Appendix G.

The termination depth of the MiHPT probe was approximately 31 feet for all borings with the exception of borings NEP-154, NEP 155, NEP-158, NEP-159, and NEP 160, which were advanced up to 40 feet. The MiHPT boring locations were based on the planned locations and were advanced in a sequence to aid in the delineation of observed detections and provide for boundary of the elevated responses. Figure 9-4 presents the location and identifiers of the advanced MiHPT borings.

The vertical profiling depths of the XSD were correlated to ground surface elevation. This data was used to map the MiHPT responses at select horizons. The XSD responses at elevations of 605 feet, 610 feet, 615 feet, 620 feet, 625 feet, and 630 feet were evaluated in order to assess response magnitudes with depth. Figures 9-5 through 9-9 present the elevation specific isoconcentration maps of the XSD responses.

As noted, the XSD is particularly sensitive to chlorinated solvents with higher amounts of chlorine such as PCE and TCE, and CFCs. The 6175 and 6178 Areas reported minor increases in XSD response which is typical of lower concentration contaminant distribution. Elevations 625 ft. and 630 ft. reported limited XSD response above the observed background response levels. At 620 feet, elevated XSD responses were noted for the known CFC Area in the east portion of the NEP. The elevated XSD responses decreased with depth returning to assumed background levels between 615 and 610 feet.

During the investigation to identify the source of the impacts at 6175 and 6178 Areas, an elevated response area was identified between the Building 433 and Building 542. The elevated XSD responses begin at an elevation of 618 feet and continued to depth at some MiHPT boring locations, due to presumed carry over or contaminant drag from the probe. Based on observations during groundwater sampling activities of the temporary piezometers installed at select MiHPT locations, free-phase non-aqueous phase liquid (NAPL) was observed at NEP-69 and NEP-151. Based on the contaminant suite, it is presumed that this is a DNAPL. The trunk line that delivers the vapor stream to the sensors can become impacted in DNAPL areas and cause lingering detections within the transport gas. Therefore, a level of uncertainty was posed by the select locations suggesting carry over. However, MiHPT boring NEP-69, which also reported a visual observation of DNAPL, suggests a bottom elevation of approximately 610-612 feet elevation for the DNAPL source area.

The elevated responses, indicating emplaced DNAPL, were compared to the elevation of the bottom of the sand layer, which all of the existing monitoring wells target. As noted, DNAPL impacts were not

encountered until an elevation of 618 feet. However, the elevation of the base of the upper sand unit in the DNAPL area ranges from 622 feet to 620 feet. This indicates that the DNAPL may have penetrated into or be diffusing from the clay layer and is sourcing to the sand unit and potentially migrating toward the 6175 and 6178 Areas based on the position and contour of the upper sand/clay interface.

Alternatively, the presence of discrete permeable lenses or unit(s) below the reported stiff clay unit may be suggested as this interface serves as the base for the uppermost sand unit monitoring network.

Figure 9-10 presents the isoconcentrations of the XSD response at 618 feet elevation with the upper sand/clay interface superimposed indicating elevated XSD responses below the uppermost sand unit (e.g. within the clay unit).

## 9.5.2 Analytical Data

Results for all water quality samples collected through the investigation can be found in Appendix H.

### 9.5.2.1 6178 Area

The 6178 Area existing monitoring network consists of monitoring wells A through K and monitoring well 6178. Monitoring well 6177 is located approximately 400-ft NNE of the 6178 Area and was utilized in the assessment. MiHPT borings also included in the 6178 Area assessment included NEP-5, -6, -11, -18, -19, -28, and -29. During the August 2017 investigation, groundwater samples were collected from each of the monitoring wells comprising the 6178 Area monitoring network as well as MiHPT location NEP-5. Positive detections of COIs within the 6178 Area were limited to cis-1,2-DCE and VC.

Based upon the observed potentiometric surface for the shallow sand unit, groundwater flow direction within the 6178 Area is observed to be NNW (Figure 9-11). In order to assess the apparent distribution of detected constituents with respect to the observed groundwater flow direction, a transect (#1) was generated to graphically present the upgradient to downgradient detection pattern (Figures 9-12 and 9-13). As shown in Figure 9-13, the detections of both cis-1,2-DCE and VC decrease in a downgradient direction.

In order to further assess the 6178 Area monitoring network, a review of the individual boring logs for each available monitoring well in the NEP Area was completed in order to generate a top of the stiff clay (till) unit/bottom of the uppermost sand unit. Therefore, the isopleth map source data includes both the 6175 and 6178 Area monitoring well networks, as well as monitoring wells 6177, 4355, 3660, 4358, 4359, 3540A, 6176, 4363, and 3654.

The generated isopleth map for the base of the uppermost sand unit (e.g. top of the stiff clay) reveals that the 6178 Area appears to be separated from the 6175 Area to the east by a ridge-like feature at the top of the stiff clay unit. The isopleth map also suggests a thickening of the uppermost sand unit in the southern portions of the 6178 Area monitoring network to the west (e.g. a valley-like feature in the top of the stiff clay unit). The overlaid groundwater flow vectors (April 2017 gauging event) suggest that the orientation of the surface of the stiff clay unit is a factor in groundwater flow direction within the uppermost sand unit (Figure 9-14).

With respect to the ID of the source of the impacts in the 6178 Area, the identified DNAPL area located to the east and south of the 6178 Area is suggested, based upon the observed groundwater flow directions, the orientation of the surface of the stiff clay unit, and the detection of reductive dechlorination by-products. Adding an isoconcentration map for PCE suggests that the elevated concentration (source) area that included DNAPL observation is emplaced near the ridge-like feature on the surface of the stiff clay unit, potentially serving as the source area for the 6178 Area impacts (Figure 9-15).

With respect to fate of the existing impacts in the 6178 Area, an evaluation of the time-series concentration trends (Appendix K) were also completed as well as limited fate and transport modeling (Section 9.6.3). An evaluation of time-series concentration trends for the 6178 Area monitoring network suggest decreasing trends for monitoring wells MW-A and 6178 while MW-B has not reported a positive

detection since 2011 and MW-H since May 2016. Increasing time-series concentration trends are evident for MW-G and MW-J and monitoring wells MW-D, MW-I, and MW-K report increasing detection magnitudes over the last several monitoring events. It is noted that that apparent valley-like feature at the surface of the stiff clay unit is nearest the southern-most and upgradient monitoring locations in the 6178 Area network inclusive of monitoring wells MW-I, MW-J, and MW-K.

### 9.5.2.2 6175 Area

The 6175 Area monitoring network consists of monitoring wells MW-1 through MW-10 and monitoring well 6175. Nearby monitoring wells 3660 and 4355 were also utilized in the 2017 assessment. Additionally, based upon the ID of the DNAPL area south of the 6175 Area, the MiHPT borings included in the 6175 Area assessment was expanded to include NEP-9, -10, -12 through -16, -30 through -34, -42, -43, -48, -49, -56, -57, -68 through -73, -151 through -153, and -156 through -160. During the August 2017 assessment, groundwater samples were collected from each of the monitoring wells comprising the 6175 Area monitoring network as well as select MiHPT locations including NEP-10, -16, -33, -34, -42, -43, -48, -49, -56, -68 through -70, -72, -73, -151 through -153, and -156 through -160.

Positive detections of PCE were limited to MiHPT borings and primarily reported for those locations near the identified DNAPL (source) area, including locations NEP-69, -151, -153, -157, and -160. MiHPT boring NEP-157 reported the highest PCE detection at 85 milligrams per liter (mg/L). A single PCE detection was reported north of D-Street at NEP-158. TCE detections were limited to the presumed source area (NEP-69, -151, and -160) as well as a single detection within NEP-50 to the south and east of the 6175 Area. Distributions of cis-1,2-DCE and VC were reported for both the presumed source area and the downgradient area north of D Street. The highest cis-1,2-DCE detections were reported for boring NEP-43 (4.1 mg/L) located just south of D Street and downgradient of the highest PCE detection at NEP-157 and downslope with respect to the surface of the stiff clay unit. Similarly, the highest VC detections were reported for NEP-43 and NEP-158, which are located south and north of D Street (Figure 9-15).

Based upon the observed potentiometric surface for the shallow sand unit, groundwater flow direction within the 6175 Area is observed to be NNE towards the MW-10 and retention pond location (Figure 9-16).

In order to assess the apparent distribution of detected constituents with respect to the observed groundwater flow direction, two (2) transects were generated to graphically present the upgradient to downgradient detection pattern in the 6175 Area (Transects #2 and 3) (Figure 9-12). The first transect was oriented from upgradient of the DNAPL (source) area at well 3660 north-northeast to MW-10. As illustrated in this transect, the detections of chlorinated organics (PCE-TCE- cis-1,2-DCE and VC) decrease in the downgradient direction, however, both cis-1,2-DCE and VC are observed to increase in concentrations north of D Street before reaching non-detect levels (Figure 9-18).

As completed for the 6178 Area, an interpretation of the individual logs was completed for the 6175 Area in order to generate a top of the stiff clay (till) unit/bottom of the uppermost sand unit. The generated isopleth map for the base of the uppermost sand unit (e.g. top of the stiff clay) reveals that the 6175 Area appears to include a valley-like feature extending from monitoring well MW-8 in the west to monitoring well MW-1 in the east oriented south to north (Figure 9-19). Therefore, the second transect was oriented in a south to north pattern in order to evaluate the chlorinated organic concentration trends in the apparent sloping direction of the surface of the stiff clay unit (Figure 9-20).

With respect to the 6175 Area monitoring well network, an assessment of the screened interval range and the MiHPT boring sampling intervals was completed for the area north of D Street (Figure 9-21). The 6175 Area monitoring well network screened interval, which also targets the uppermost sand unit, ranges between 623.2 to 618.8 ft-elevation while the MiHPT boring sampling interval ranges between 621 to 616 ft-elevation. Graphically, this assessment suggests that the deeper the sampling interval the higher concentrations observed; and the deeper the sampling interval the presence of source area constituents

(e.g. PCE) are reported. The source of the impacts in the 6175 Area also appears to be the identified DNAPL area located to the south, based upon the observed groundwater flow directions, the orientation of the surface of the stiff clay unit, and the distribution of detected constituents.

As with the 6178 area, an evaluation of time series trends (Appendix G) and molar concentrations (Appendix H) was completed as well as limited fate and transport modeling (Section 9.6.3). An evaluation of time-series concentration trends for the 6175 Area monitoring network suggest decreasing trends for monitoring wells 6175 and MW-4 for cis-1,2-DCE, MW-2 and MW-6 for cis-1,2-DCE and vinyl chloride. MW-8 indicates an overall decreasing trend with noted fluctuations. Generally stable time-series concentration trends were observed for MW-2 and MW-5 for cis-1,2-DCE, and vinyl chloride while well 6175 and MW-4 indicated stability for vinyl chloride only. The variability in detections at MW-7 precluded assessment of overall trends concentration trends.

With respect to molar concentrations, similar results to the time-series concentration trend assessment were indicated. Specifically, monitoring wells 6175, MW-6 and MW-8 indicated decreasing molar concentration over time. Monitoring wells MW-4 and MW-5 indicated overall stable molar concentration trends with a recent decreasing tendency. As with the time-series concentration trends, MW-7 variability renders an assessment of the molar concentration trends prohibitive.

### 9.5.2.3 CFC Area

The CFC Area is located in the northeastern portion of the NEP Area (Figure 9-2). The CFC Area monitoring network is limited and consists of monitoring wells 3539A, 3540A, 3540B, 3654, 4358, 4359, 4363, and 6176. Additionally, MiHPT borings NEP-24 through -27, -35 through -38, -41, -51, -53, -54, -58, -64 through -67, -75 through -77, -83, -93, -95, -149, -150, -154, and -155. During the August 2017 assessment, groundwater samples were collected from each of the monitoring wells comprising the CFC Area monitoring network as well as select MiHPT locations.

The reductive dechlorination by-product of trichlorofluoromethane (CFC-11) is dichlorofluoromethane (CFC-21), therefore, these COIs comprised the CFC Area assessment with respect to constituents evaluated. Detections of CFC-11 were reported pervasively across the CFC Area ranging between 4.2 µg/L and 180 mg/L with the highest reported concentrations located in the vicinity of monitoring well 3540A and MiHPT boring NEP-51. Detections of CFC-21 were generally consistent with the observed distribution of CFC-11 and concentrations ranged from 1.2 µg/L and 21 mg/L. For all CFC-11 detections, a commensurate CFC-21 detection was reported. The sole location reporting a detection of CFC-21 without a detection of CFC-11 was boring NEP-83 located at the southwestern extent of the CFC Area.

In order to evaluate the distribution pattern for CFC-11 and CFC-21, the evaluation of the contact surface of the uppermost sand unit with the stiff clay unit was extended to the CFC Area. The generated isopleth map for the base of the uppermost sand unit (e.g. top of the stiff clay) reveals a ridge-like feature or elevation high in the northeastern portion of the CFC Area, extending from well 3540A to the east-northeast and a depression to the south-southeast near monitoring well 6176 and boring NEP-77. The ridge-like feature in the northeastern portion of the CFC Area extends downward to the formerly identified valley-like feature located in the northeastern portion of the 6175 Area, in the vicinity of monitoring well MW-10 (Figure 9-15).

Figures 9-22 and 9-23 present the distribution of dissolved phase concentrations of CFC-11 and CFC-21, respectively. The distribution of detected CFC-11 and CFC-21 appears to reflect the orientation of the surface of the stiff clay unit, with contaminant lobes extending from the clay high to the lower elevation areas, as well as the observed groundwater flow directions.

Based upon the MiHPT boring and groundwater sampling results, the source area of the CFC area appears to be present in the area north and /or the northern portions of the 819 and 792 Buildings, potentially inclusive of the rail line. The impacts are also observed to be present within and beneath the uppermost sand unit.

In order to assess the apparent distribution of detected constituents with respect to the observed groundwater flow direction, two (2) transects (#4 and 5, Figure 9-12) were generated to graphically present the upgradient to downgradient detection pattern in the CFC Area. The first transect was oriented southwest to northeast from upgradient of the high concentration (source) area observed at boring NEP-51 beginning at NEP-83 and extending to NEP-38 (Figure 9-24). This transect indicates elevated CFC-11 concentrations with a transition to greater concentrations of CFC-21 in a downgradient direction.

In order to evaluate the apparent northwesterly groundwater flow direction from the high concentration area near NEP-51, a second transect was established and extended from the apparent source area northwest to boring NEP-16 (Figure 9-25). Similarly, the detection pattern indicates a reduction in CFC-11 and an accumulation of CFC-21 along this apparent groundwater flow pathway.

### **9.5.3 Fate and Transport Modeling**

#### **9.5.3.1 6178 Area**

This section presents the results of the fate and transport modeling performed to assess the potential exposure pathways downgradient of the site. In order to estimate the migration potential of the constituents detected within shallow groundwater in the 6178 Area, a fate and transport evaluation was performed employing the Quick Domenico (QD) analytical model. Input parameters for the model were derived from the 6175 and 6178 Area Corrective Action Plan and supplemented with data collected in the 2017 investigation.

The QD model conservatively assumes a continuing source and steady, uniform, one-dimensional groundwater flow. Further, the QD model does not simulate the transformation of parent compounds into daughter compounds, nor does it consider volatilization of constituents. QD also considers each compound individually with no reaction between compounds. Therefore, the application of the QD model is considered to constitute a conservative and qualitative simulation of constituent fate.

The QD model was calibrated using the 2017 analytical data set and an applied 15-year modeling period. The calibrated model provided for a reasonable approximation of current conditions in the 6178 Area for both cis-1,2-DCE and VC. The QD model was then utilized to estimate the required source area concentration of both cis-1,2-DCE and VC that would result in the off-site migration of these constituents at levels above their respective GSI criteria. For VC, the required source area concentration was determined to be 32 mg/L and for cis-1,2-DCE an extremely high concentration (0.67%) would be required. Appendix I presents the QD model simulation output for the 6178 Area.

#### **9.5.3.2 6175 Area**

Similar to the 6178 area, the QD analytical model was employed for fate and transport evaluation with the input parameters derived from the 6175 and 6178 Area Corrective Action Plan and supplemented with data collected in the 2017 investigation (Appendix I).

The QD model was calibrated using the 2017 analytical data set and an applied 15-year modeling period. The calibrated model was used to reproduce the current conditions in the 6175 Area for PCE, cis-1,2-DCE, and VC. PCE and cis-1,2-DCE reasonable approximations of the current conditions, however the VC attenuation in the model could not be reproduced with an adequate level of efficacy. This may be due to a combination of hanging wells, well network layout, and focused pre-design delineation needs. Regardless, the QD model was utilized to estimate the required source area concentration of PCE, cis-1,2-DCE, and VC that would result in the off-site migration of these constituents at levels above their respective GSI criteria. For PCE and cis-1,2-DCE, the required source area concentration (at approximately D Street) was determined to be in excess of the respective solubility's for each constituent and vinyl chloride would require a source concentration of 132 mg/L. The required concentrations are all well above the maximum concentrations observed across the monitoring well network for the 6175 Area.

### **9.5.3.3 CFC Area**

Due to limited CFC database, the fate and transport modeling could not be sufficiently completed; therefore, no assessment was completed.

## **9.6 Conclusions and Path Forward**

### **9.6.1 Summary of Evaluation**

The NEP Investigation findings defined the limits of impacts of site COIs for each of the investigative areas; 6178 Area; 6175 Area; and CFC Area. The impacts in each of the NEP investigative areas were delineated through the implementation of MiHPT borings and focused groundwater sampling.

The MiHPT investigative program identified a DNAPL source area south of the 6175 Area in the vicinity of Buildings 433 to the northwest and Building 1268 to the southeast. Based upon the limited TAL, the DNAPL appeared to be predominantly comprised of PCE. Based upon review of the available hydrogeologic data for this portion of the NEP, this identified DNAPL area is likely the source of the impacts in the 6175 Area and could possibly also be the source of the impacts to the 6178 Area. The primary COIs identified for the 6175 Area included PCE, TCE, cis-1,2-DCE and VC while the 6178 Area COIs were limited to cis-1,2-DCE and VC. For DCE detections, cis-1,2-DCE comprises a significant percentage of the total DCE, therefore, it is inferred to represent a reductive dechlorination by-product of a PCE or TCE source.

For the CFC Area, the MiHPT investigative program and associated focused groundwater sampling program successfully delineated the impacts of the target CFCs. Both the sampling and MiHPT results identified the source of the primary CFC-11 impacts to be located in the area between and north of Buildings 719 and 872, with lower level impacts in the area north of Building 564, which may be due to migration from the apparent source area based upon variable groundwater flow conditions in this portion of the NEP. The distribution of CFC-11 and its reductive dechlorination by-product CFC-21 are nearly coincident and appear to be bounded by hydrogeologic conditions in this portion of the NEP.

### **9.6.2 Conceptual Site Models**

#### **9.6.2.1 6178 Area**

For the 6178 Area, the developed CSM (Figure 9-26) depicts the coincidence of the impacts of COIs with an area of depressed elevation in the surface of the stiff clay unit, which serves as the base of the uppermost sand unit monitoring well network. Based upon the orientation of the clay surface, the monitoring network screened intervals, the observed localized groundwater flow conditions, and the proximity of the identified DNAPL source area to the southeast of the 6178 Area, the potential for impacts emanating from the DNAPL area to the 6178 Area exists. Further evidenced by the developed CSM is the likely presence of impacts within the clay unit, based upon the detections of COIs within monitoring wells screened predominantly below the uppermost sand unit (e.g. within the stiff clay unit).

With respect to data gaps for the 6178 Area, an area of limited data points exists between Building 433 and the existing monitoring network. Additionally, several of the existing monitoring network well locations (MW-I, MW-J) possess screened intervals above the clay unit while others (MW-A, MW-B, MW-C) have a majority of the screened interval within the clay unit. Further, no monitoring wells are located to the west of monitoring wells MW-J and MW-K, an area suggested to coincide with depression in the surface of the clay unit (e.g. uppermost sand thickening).

### 9.6.2.2 6175 Area

The developed CSM (Figure 9-27) for the 6175 Area also depicts the influence of hydrogeologic conditions on the distribution of COI impacts. The identified DNAPL source area was found to be present between elevation 612-616 feet, three to 5 feet below the uppermost sand and stiff clay unit contact. Downgradient (northerly) migration of dissolved phase impacts and potentially DNAPL appears to be controlled by several factors, including the slope of the clay unit, the thickening of the uppermost sand unit, and the resulting northerly groundwater flow pattern between the source area and the 6175 Area. Based upon these observations, the DNAPL area likely constitutes a continuing source area for the impacts to the 6175 Area.

With respect to COI fate, the MiHPT investigation identified a localized area near monitoring well MW-3 in which current VC concentrations in excess of the GSI criteria (15 µg/L) likely extends beyond the northern property line of the Facility. However, based upon further downgradient groundwater sampling, the migration appears to attenuate to non-detect levels within 200-300 feet. Further delineation of the northernmost extent of the COIs may be warranted. Additional data gaps include optimization of the monitoring well network as several monitoring wells (MW-2, MW-5, MW-7, MW-8, and MW-9) possess screened intervals above the clay unit.

### 9.6.2.3 CFC Area

The CSM prepared for the CFC Area (Figure 9-28) was developed based upon the results of the MiHPT investigation and limited to CFC-11 and CFC-21 COIs. The CFC impacts were also determined to be largely controlled by the hydrogeologic conditions in this portion of the Facility. Specifically, the migration of CFCs is northeast, consistent with the observed groundwater flow direction before forming two distinct dissolved phase lobes to the northwest and east-southeast in the vicinity of monitoring well MW-3540A where the uppermost sand unit thins due to an apparent ridge-like feature in the stiff clay unit in this portion of the Facility. This assessment can be confirmed as monitoring well MW-4359, installed within the ridge-like feature, is periodically noted to be dry.

The results of the MiHPT investigation successfully delineated the CFC impacts and noted that impacts were observed within both the uppermost sand unit as well as the stiff clay unit, suggestive of a surface source.

Therefore, identified data gaps for the CFC Area are limited to optimization of the CFC Area monitoring network and the collection of pre-design sampling data in order to facilitate remedial technology screening and selection, if warranted.

### 9.6.3 Path Forward

Work in 2018 will focus on achieving the following objectives for the AOIs in the NEP:

- Assess and prioritize identified data gaps that need to be filled in order to develop management strategies; gather additional data as necessary
- Conduct a preliminary remedial technology screening to assess the feasibility of presumptive remedial technologies such as enhanced in-situ bioremediation, bio-stimulation, and oxidation
- Collect additional pre-design data and begin implementation of selected remedial strategies
- Develop monitoring well network optimization plan



## 10.0 Schedule

The project as a whole is anticipated to proceed according to the updated Corrective Action Implementation Plan High Level Overview, provided as Attachment 2. Work on this project during 2018 is anticipated to progress consistent with the timelines provided below. MDEQ and Dow have tentatively scheduled monthly Corrective Action working meetings to facilitate discussions on the topics outlined in this Work Plan, review relevant data or findings and revisit the schedule on an on-going basis throughout the year. A Microsoft SharePoint® website, or equivalent, was launched in 2016 to track progress, provide data and other electronic deliverables to MDEQ, as needed for decision-making and to help MDEQ fulfill their oversight function. As additional information becomes available, other corrective action goals may be identified in cooperation with MDEQ.

The anticipated timelines provided below are guidelines to be used for planning purposes only. They are highly dependent on weather, and other issues which may necessitate changes. Work scheduling and the planning process, described in Appendix G of Attachment 19 to the current Operating License, will be an iterative process that will incorporate changes, as warranted, through adaptive management.

Unless otherwise necessary or requested, results or findings will be provided to MDEQ during routine quarterly reporting or during periodic progress meetings, which are scheduled to occur on an approximately monthly basis. Presentations and notes from those meetings will be posted to the Microsoft SharePoint® website 2 weeks after the meeting.

Milestones	Anticipated 2018 Timeline
Present and provide a Summary of 2017 sub-slab and outdoor air sampling to MDEQ	Q1
Submit construction drawings for Interim Measures Plan for direct contact to surface soils for areas in Zone 1 and Zone 2 IM Areas	Q1
Submit Former Ash Pond Corrective Measures Implementation Plan	Q1
Begin initial shutdown and monitoring for PW #5, #6 and #7, in Seventh Street Purge Well Area to demonstrate horizontal well performance	Q1
Provide Soil Sampling and Laboratory Testing Protocol Memorandum for DEQ review for testing of former fire training area (Zone 1 DU 1D-1)	Q1
Prepare soil sampling plans (maps of each DU and increment locations) for Direct Contact to Surface Soil for Zone 3 to share with MDEQ	Q1 and Q2
Collection of Soil Samples for Direct Contact to Surface Soil for Zone 2	Q2 and Q3
Begin Construction for Zone 1 and 2 IM Areas	Q3
Review Zone 3 Building Categorization and Prioritization for Vapor Intrusion with MDEQ	Q3
Review results of Direct Contact Soil Sampling with MDEQ	Q4
Collect sub-slab, indoor and outdoor air samples for Vapor Intrusion to Indoor Air	Q4
Submittal of 2017 Corrective Action Summary Report and 2018 Corrective Action Implementation Work Plan	Q4

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