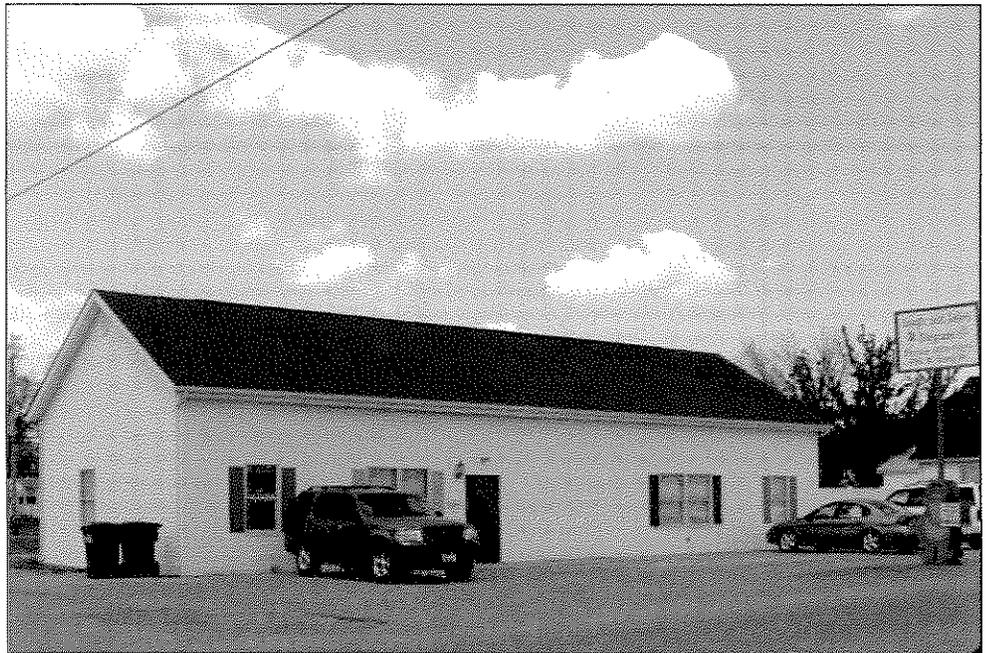




State of Ohio
Environmental Protection Agency

Division of Emergency and Remedial Response

Former Ashville Oil Company Interim Action Completion Report



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Governor Ted Strickland
Director Chris Korleski

OHIO ENVIRONMENTAL PROTECTION AGENCY (OHIO EPA)
DIVISION OF EMERGENCY & REMEDIAL RESPONSE (DERR)

INTERIM ACTION COMPLETION REPORT

Ashville Oil Company
Pickaway County
DERR ID # 165-002354-001

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EXECUTIVE SUMMARY

The former Ashville Oil Company is located at 295 North Long Street in the village of Ashville in Pickaway County. The Ashville Oil Company was last operated as an automotive service station and bulk fuel oil distributor by the late Lewis Berry. The site was operated as a service station from 1928 to 1991 and had five underground storage tanks (USTs) including three gasoline USTs, one diesel UST and one kerosene UST and four fuel oil aboveground storage tanks (ASTs) when it closed.

In December, 1990, a release was reported to the Ohio Department of Commerce, State Fire Marshal, Bureau of Underground Storage Tank Regulation (BUSTR), which has regulatory authority over petroleum USTs. The USTs and ASTs were removed from the site in 1993. Subsurface contamination related to operation of the USTs remained in the subsurface according to the tank closure report submitted to BUSTR. Site investigation and corrective action activities were initiated by the Berry estate but were not completed due to lack of funds.

Following the death of Mr. Berry, the site underwent several property transfers and the service station building was extensively remodeled. The site is currently occupied by a single story slab-on-grade building operating as the Laugh and Learn Daycare.

In 2005, BUSTR, after consultation with the Ohio Department of Job and Family Services (ODJFS), which has regulatory authority over day care centers, requested Ohio EPA's assistance with a field investigation. The Ohio EPA, Division of Emergency and Remedial Response, Site Investigation Field Unit (SIFU) conducted field investigation activities at the site on March 28-29, 2006, May 27-28, 2006 and January 19-20, 2007.

On March 28-29, 2006, 15 soil samples and four ground water samples were collected with Ohio EPA's Geoprobe® drilling rig. Ground water samples were also collected from two existing ground water monitoring wells. Results of the sampling detected the presence of soil and ground water contamination at the site at concentrations indicating the potential for vapor intrusion to indoor air. One existing monitoring well contained approximately 2.8 feet of residual gasoline floating on the ground water surface.

On May 27-28, 2006, two sub-slab soil gas samples, two indoor air samples and two outdoor ambient air samples were collected at the site. Results of the sub-slab sampling indicated substantial concentrations of petroleum-related contaminants in the soil gas beneath the slab. Indoor air sampling results yielded detections of benzene just below acceptable levels and naphthalene above acceptable levels, although the naphthalene detections may have been attributable to use of a consumer product inside the day care center.

A sub-slab vapor mitigation system was installed at the site on June 29, 2006 by the owners of the day care center to provide ventilation beneath the building to prevent the accumulation of sub-slab soil gas that could potentially migrate into the building interior.

On January 19 -20, 2007, soil gas, indoor air and outdoor air sampling were conducted to determine site conditions following the installation of the vapor mitigation system. The samples were collected in the same locations as the May 2006 samples. The indoor air sample results were found to be within acceptable levels. The soil gas sample results displayed a marked reduction in soil gas constituent concentrations beneath the building slab indicating the effectiveness of the vapor mitigation system.

Based on the sub-slab soil gas and indoor air sample results from before and after installation of the vapor mitigation system, Ohio EPA recommends the continued operation of the system with annual evaluations of the mechanical system operation and periodic collection of sub-slab soil gas and indoor air samples every three to five years.

1.0. INTRODUCTION

In 2005, after discussion with ODJFS, BUSTR requested the assistance of Ohio EPA to determine if subsurface contamination from the operation of the former USTs remained on site at concentrations potentially detrimental to human health and the environment and to fulfill requirements to potentially allow BUSTR site closure. The Ohio Department of Health and the Pickaway County General Health District were also notified of the site and participated in meetings regarding the site.

The primary purpose of the field investigation was to evaluate the potential for a complete vapor intrusion pathway from subsurface contamination from the former leaking USTs to indoor air in the day care center. The sampling approach was designed to be consistent with the Ohio EPA Technical Decision Compendium (TDC) document *Methodology for Vapor Intrusion Assessment* and the U.S. EPA OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (*Subsurface Vapor Intrusion Guidance*) referenced therein.

Soil and groundwater samples were collected at the site on March 28-29, 2006 to determine if petroleum compounds remained in the subsurface at concentrations that could potentially migrate to indoor air. Based on the results of the soil and ground water sampling, sub-slab soil gas and indoor air samples were collected on May 27-28, 2006. The owners of the day care center subsequently installed a sub-slab vapor mitigation system on June 29, 2006. Sub-slab soil gas and indoor air samples were collected again on January 19-20, 2007 to determine site conditions following installation and operation of the vapor mitigation system.

This report presents the methods, results and conclusions of the field investigation.

2.0 BACKGROUND

2.1. Site Location

The former Ashville Oil Company (Project ID # 165-002354-001) is located at 295 North Long Street in Cromley's Addition in the village of Ashville, Pickaway County, Ohio (Figure 1). The site latitude and longitude are N 39° 43' 12" and W 82° 57' 11", respectively. The site originally consisted of three lots, 30, 31 and 32, in the Cromley's Addition subdivision. The service station and bulk fuel oil ASTs originally occupied Lots 30 and 31, the southern and central lots, respectively and is the subject of this field investigation. The former service station is an extensively remodeled single story slab-on-grade building currently operating as the Laugh and Learn Daycare. The northern lot, Lot 32, with an address of 305 North Long Street, is occupied by a two-story house and is currently a private residence under separate ownership. The majority of operations related to the former Ashville Oil Company appear to have been located on Lots 30 and 31. The former site features are displayed on Figure 2. The surrounding land use is primarily residential and commercial and is served by municipal water and sewer service.

2.2. Site History

The Ashville Oil Company was a former automotive service station and bulk fuel oil distributor last operated by the late Lewis Berry. According to a Phase I and II site assessment report prepared by GTR Environmental Technologies (GTR) in November 1991, the site was operated as a service station from 1928 until June 1991. The service station burned down and was rebuilt in 1956 at which time four 20,000 gallon fuel oil ASTs were installed on the rear of the site. At the time of the service station's closure in 1991, there were five USTs on the site including two 6000 gallon gasoline USTs, one 10,000 gallon gasoline UST, one 10,000 gallon diesel UST and one 2000 gallon kerosene UST.

Ohio EPA has responded to several complaints related to the site from the 1970s through 2006. According to Ohio EPA emergency response personnel, housekeeping behind the building was poor with used auto parts, batteries, drums, old automobiles and surface oil staining observed. BUSTR has also responded to several complaints at the site and at neighboring residences believed to be related to the site.

According to BUSTR records, BUSTR was contacted by the village of Ashville on December 19, 1990, regarding the presence of fumes in the basements of homes on Station Street south of the site. A field investigation was conducted by BUSTR, which yielded detections of combustible vapor and strong petroleum odors in soils surrounding a fire hydrant in front of the site. The site was entered as a BUSTR reported release on December 20, 1990.

GTR conducted a Phase I and II site assessment of the site for the Berry estate in November 1991. Soil samples collected as part of the investigation detected the presence of petroleum contamination around the UST cavities (GTR, 1991).

In March 1992, BUSTR investigated a complaint regarding the presence of gasoline in a nearby sanitary sewer and fuel oil or diesel fuel in a storm sewer. BUSTR requested the assistance of Ohio EPA in investigating the fuel in the storm sewer. At the request of Ohio EPA, a temporary oil water separator was installed in April 1992 onto a five-inch diameter clay tile that exits at the southwest corner of the site in the vicinity of the ASTs. The source of the fuel appeared to be related to underground sources at the site and not to aboveground spillage, however. Further investigation of the site was referred to BUSTR. The current status of the oil water separator is not known.

In September 1993, the five USTs along with the four fuel oil ASTs were removed from the site. Approximately 500 cubic yards of petroleum-contaminated soil was excavated during the tank removal activities but remained on site until approximately 1998 due to lack of funds in the Berry estate. Confirmation samples collected from a tank cavity indicated soil and ground water contamination remained on site above BUSTR action levels (Catz Enterprises, 1993). According to BUSTR files, BUSTR required a site investigation, which was initiated by the estate but was never completed due to lack of funds.

During 1998, Ohio EPA emergency response personnel responded to a complaint from the village of Ashville that several drums were located at the site. The drums were determined to contain investigation-derived waste and other wastes including containers of paints and lubricants possibly left over from the operation of the service station. The drums were staged inside the service station building prior to their eventual removal.

The site has had several owners since 1999 when it was last owned by the Berry estate. The site was purchased by DB Development in 1999 and was extensively remodeled and occupied in 2000 as an electrical contractor's office. The site was subsequently sold to Timothy and Nancy Cox who remodeled the building into a children's day care facility in October 2002 and began operation in 2003. The site is presently operating as the Laugh and Learn Daycare by Mrs. Cox.

The field investigation described in this report was conducted in 2006 and 2007. On June 29, 2006, a sub-slab vapor mitigation system was installed at the site by the site owners. At this time, the site has not been issued a No Further Action (NFA) determination by BUSTR.

In September 2006, Ohio EPA responded to a complaint at 305 Long Street, the house immediately north of the day care center, regarding gasoline odors in the basement of the residence. The complaint was investigated by Ohio EPA and referred to BUSTR.

On June 18, 2007, the Ohio Department of Health, under a cooperative agreement with the U.S. Agency for Toxic Substances and Disease Registry, issued a Health Consultation report for the site. The report concluded that, following installation and operation of the vapor mitigation system, the site poses no public health hazard and the contamination beneath the building slab has been successfully addressed. The report also concurred with recommendations that annual evaluations of the vapor mitigation system and periodic sampling of indoor air and sub-slab soil gas should be conducted.

2.3. Geology and Hydrogeology

The site is located in the village of Ashville in northeastern Pickaway County in the Till Plains Section of the Central Lowland Physiographic Province (Brockman, 1998). The site is located approximately three miles east of the Scioto River and approximately one half mile north of Walnut Creek, a tributary of the Scioto River.

The site topography is relatively flat with an elevation of approximately 710 feet above mean sea level. Soils mapped in the vicinity of the site are primarily Crosby silt loam with 0-2 percent slopes, a level, somewhat poorly drained soil. (U.S.D.A. 1980)

Surficial deposits mapped in the vicinity of the site include Wisconsinan Age ground moraine deposits in the uplands and outwash in the Scioto River and Walnut Creek valleys. Bedrock underlying the glacial deposits is mapped as the Devonian Age Ohio Shale.

The village of Ashville has a municipal wellfield with three pumping wells located approximately 2200 feet east of the site. A second, future wellfield with three additional wells is being developed approximately 3400 feet southeast of the site along Walnut Creek (Kinder Environmental Services, 2004). Well logs from the village municipal wells record approximately 20 feet of clay and silt overlying sand, gravel and silt with some interbedded clays. The wells were completed to depths of up to 150 feet below ground surface. Bedrock was not encountered in the municipal wells.

3.0. FIELD INVESTIGATION METHODS

3.1 Soil and Ground Water Sampling

Fifteen soil samples and four ground water samples were collected from nine soil boring locations with Ohio EPA's Geoprobe® drilling rig on March 28 and 29, 2006. Additionally, ground water samples and one light non-aqueous phase liquid (free product gasoline) sample were collected from two existing monitoring wells at the site. The Geoprobe® boring (SB-01 through SB-09) and existing monitoring well (MW-01 and MW-02) locations are displayed on Figure 3.

At each Geoprobe® boring location, a dual tube or continuous core sampler with dedicated four feet polyacetate liners was used to collect soil samples to depths up to 32 feet below ground surface (bgs). The soil samples were described and logged on field

log sheets and screened with a photoionization detector (PID). Soil samples were collected from each boring for laboratory analysis based on PID reading, visual observation or stratigraphic position. The soil samples were submitted to Kemron Environmental Services (Kemron) of Marietta, Ohio for analysis for volatile organic compounds (VOCs) using U.S. EPA SW 846 Method 8260B, polycyclic aromatic hydrocarbons (PAHs) using SW846 Method 8270C and total petroleum hydrocarbons (TPH) using SW-846 Method 8015B (Modified).

Ground water samples, designated with a GW prefix, were collected at four Geoprobe® boring locations. At these locations a temporary PVC riser with a screened interval was installed in the borehole. Ground water samples were collected after first purging a volume of ground water to ensure collection of a representative sample.

Ground water samples were also collected from existing monitoring wells, MW-1 and MW-2. Ground water samples were collected from the existing monitoring wells after first measuring the depth to ground water then purging each well to allow collection of a representative sample. In MW-2, a sample of free product gasoline was also collected prior to purging.

The ground water samples were decanted into clean laboratory-supplied glassware, preserved as necessary and placed in a cooler with ice. The ground water samples were submitted to Kemron for analysis for VOCs using SW 846 Method 8260B and PAHs using SW 846 Method 8270C.

Geoprobe® borings were abandoned upon completion by backfilling the boreholes with granular bentonite. Temporary well materials were removed prior to abandonment. In paved areas, the pavement was patched with asphalt at the ground surface.

3.2 Sub-Slab Soil Gas and Indoor Air Sampling

Based on a review of the soil and ground water sample results and comparison to screening level values, additional investigation of the site, including sampling of sub-slab soil gas and indoor air was conducted on May 27-28, 2006. The soil gas and air sampling locations are displayed on Figure 4.

Two sub-slab soil gas samples were collected during May 2006. The samples were collected by drilling through the concrete floors and installing stainless steel fittings and tubing into the subgrade beneath the floor slab. The fittings were grouted into place using a concrete grout. The soil gas samples were collected in stainless steel Summa® canisters after first purging a volume of air to ensure collection of representative samples.

Two indoor air samples and two ambient outdoor air samples were also collected with Summa® canisters. The indoor air samples were collected after first turning off the building's heating and ventilation system and locking up the building for approximately 24

hours to allow for collection of the samples under worst case conditions. Consumer products that may have contained VOCs were removed from the building prior to sampling. The outdoor air samples were collected as background or ambient air samples. Sub-slab soil gas and air samples were analyzed by the Ohio EPA Department of Environmental Services (DES) laboratory using U.S EPA Air Toxic Method TO-14A.

Following review of the sub-slab soil gas and indoor air sample data, a sub-slab vapor mitigation system was installed at the site on June 29, 2006. On January 19-20, 2007, another sampling round consisting of two sub-slab soil gas, two indoor air and two outdoor air samples was collected at the site using the same locations and methods employed during the May 2006 sampling event and were analyzed by the DES laboratory. The samples were collected to determine site conditions after installation and operation of the sub-slab vapor mitigation system.

4.0. FIELD INVESTIGATION RESULTS

4.1 Geologic Characterization

Nine soil borings were completed at depths of 13.5 to 32 feet bgs. The borings encountered clay or gravelly clay with minor sand seams to approximately 21 to 24 feet bgs in all borings except SB-06 and SB-08, which encountered sand from ground surface to 8.5 feet bgs and 12 feet bgs, respectively, and may have been located in backfilled former tank cavities. Below the clay and gravelly clay, gravel and/or sand and gravel were encountered to the completion depth of the borings. Boring logs were prepared by SIFU personnel and are included in Attachment 1.

The borings generally encountered relatively dry dense clay soils with saturated conditions observed only in the minor sand seams. The top of the underlying sand and gravel encountered in the deeper borings was also unsaturated. Accumulated ground water was sampled in temporary wells at four of the soil boring locations, SB-02, SB-04, SB-08 and SB-09. Depth to water and total well depth were measured in the existing monitoring wells, MW-01 and MW-02, prior to sample collection. The measurements were taken from the top of casing inside the flush mount well heads. Monitoring Well MW-01, completed at 29.3 feet, had a measured depth to water of 25.32 feet. Monitoring Well MW-02, located near a former tank cavity, had a measured total depth of 18.72 feet with a depth to free product of 12.91 feet and measured depth to water (uncorrected for product thickness) of 15.75 feet.

4.2 Soil Sampling Results

One or more petroleum VOCs including benzene, toluene, ethylbenzene and xylenes (BTEX) were detected in soil samples from every soil boring except SB-01 and SB-09 located on the northwest side of the property. The highest BTEX concentrations were detected in samples from the borings along the east and northeast sides of the building including SB-04, SB-05 and SB-06, located in the approximate location of a former

gasoline UST cavity and dispenser pumps and from SB-02 at the southeast property corner.

PAHs were detected in all soil borings except SB-09 with the highest concentrations detected in SB-02, SB-03, SB-04 and SB-05 or in relative proximity to the highest BTEX concentrations on the east side of the property.

TPH in light, middle and heavy distillate ranges was detected in all the soil borings, however, the highest detections occurred primarily in SB-04, SB-05 and SB-06 on the east side of the property.

In addition to petroleum related compounds, low concentrations of chlorinated VOCs were also detected in soil samples collected at the site. Tetrachloroethene (PCE) was detected in SB-05 and SB-06 located on the east side of the building. Cis and trans-1, 2-dichloroethene, 1,2-dichloroethane and vinyl chloride were detected in SB-08 on the west side of the building. Chlorobenzene was detected in SB-02 in the southeast corner of the property. The origin of these compounds is not known but may be related to use of solvents and degreasers at the former service station.

Soil sample results are summarized in Table 1. Complete laboratory analytical reports are on file at Ohio EPA.

4.3 Ground Water Sampling Results

Monitoring Well MW-02 contained 2.84 feet of free product gasoline floating on the ground water surface. A sample of the free product was collected as well as a ground water sample from MW-02. The ground water sample from MW-02 contained high concentrations of BTEX exceeding BUSTR's ground water ingestion standards and U.S. EPA's maximum contaminant level (MCL) for drinking water for benzene, toluene, ethylbenzene, and xylenes. Benzene was detected in the ground water sample at a concentration of 1890 ug/l exceeding BUSTR's ground water ingestion standard and the U.S. EPA MCL for drinking water of 5 ug/l. Naphthalene was also detected above BUSTR's ground water ingestion level.

In addition to the petroleum-related compounds, cis-1,2-dichloroethene, a chlorinated VOC, was also detected above its MCL. The origin of this compound, a breakdown product of a solvent or degreaser, is not known but may be related to usage at the former service station.

The gasoline product sample from MW-02 also contained high concentrations of BTEX and naphthalene.

The ground water sample collected from Monitoring Well MW-01 contained low concentrations of BTEX and PAHs. There were no detections of VOCs or PAHs in GW-02, GW-04 and GW-09. GW-08 yielded detections of low concentrations of PAHs.

A review of the VOC concentrations in ground water along with the presence of free product gasoline in close proximity to the building indicated the need for further investigation including sub-slab soil gas sampling at the site.

Ground water sample results are summarized in Table 2. Complete laboratory analytical reports are on file at Ohio EPA.

4.4 Sub-Slab Soil Gas Sampling Results

Several petroleum and non-petroleum related VOCs were detected at high concentrations in the first round of sub-slab samples collected on May 27-28, 2006. The detected VOCs were compared with U.S. EPA's *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* target concentrations in accordance with TDC document *Methodology for Vapor Intrusion Assessment* and Ohio EPA Division of Air Pollution Control (DAPC) procedures.

Benzene was detected at concentrations up to 6200 parts per billion volume (ppbv) exceeding its sub-slab screening value of 9.8 ppbv. Hexane, 1,2,4-trimethylbenzene and n-propylbenzene also exceeded their U.S. EPA target concentration values during the May 2006 sampling event.

Sub-slab samples collected on January 19, 2007, approximately seven months after installation of the sub-slab vapor mitigation system, yielded significantly lower VOC detections with benzene detected at up to 0.43 ppbv and no compounds exceeding their respective U.S. EPA target concentration values.

Sub-slab soil gas results and target concentrations are summarized in Table 3. Complete laboratory analytical reports are on file at Ohio EPA. The TDC and Table 2b of the OSWER guidance are included in Attachment 4. A copy of the complete 2002 OSWER draft guidance is on file at Ohio EPA.

4.5 Indoor and Outdoor Air Sampling Results

Indoor air sampling results were compared to U.S. EPA's OSWER target concentrations for all compounds except benzene, which was compared to the more conservative U.S. EPA Integrated Risk Information System (IRIS) target concentration at the recommendation of Ohio EPA DAPC. Indoor air sample results were also compared to outdoor air sample results, which were collected to determine ambient or background concentrations. Indoor air samples collected during May 27-28, 2006, yielded detections of benzene between 0.23 and 0.38 ppbv, or slightly less than U.S. EPA's IRIS target concentration of 0.40 ppbv. Outdoor air samples detected benzene up to 0.19 ppbv. Naphthalene was detected up to 9.3 ppbv exceeding its target concentration of 0.57 ppbv for indoor air. Naphthalene was detected in the sub-slab gas samples; however, the concentrations were much lower than the air sample results. The naphthalene detections in the indoor air samples may have been related to use of a consumer

product in the day care center. Naphthalene was also detected at 1.2 ppbv in one outdoor air sample during the May 2006 sampling event.

Indoor air samples collected on January 19, 2007 following installation of the vapor mitigation system did not yield any VOC detections above target concentrations. Benzene concentrations ranged from 0.18 to 0.23 ppbv in the indoor air samples compared to 0.19 to 0.28 ppbv for the outdoor ambient air samples. Naphthalene was not detected in any indoor or outdoor air samples during the January 2007 sampling event.

Indoor and outdoor air sample results and target concentrations are summarized in Table 4. Complete laboratory analytical reports are on file at Ohio EPA.

5.0. CONCLUSIONS

Ohio EPA's assistance was requested by BUSTR to conduct a field investigation at the former Ashville Oil site. The results of the field investigation determined that soil and ground water contamination resulting from the operation of the petroleum USTs remain on the site in concentrations exceeding BUSTR's site closure requirements. A sub-slab vapor mitigation system was installed beneath the existing building by the day care center owners to prevent potential vapor intrusion into the building. Results of sub-slab soil gas sampling have shown a marked decrease in soil gas concentrations beneath the building slab indicating the effectiveness of the system.

6.0. RECOMMENDATIONS

Ohio EPA recommends that the system continue in operation, that annual maintenance evaluations are conducted, and that soil gas and indoor air sampling are conducted periodically (every three to five years) to verify the efficacy of the system. Additionally, reassessment may be necessary if site conditions change such as the floor slab cracking or becoming otherwise compromised.

7.0. REFERENCES

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TABLES

Table 1
Ashville Oil Co.
Soil Sample Results

Sample Number	SB-01B			SB-02A			SB-02B								
Date	3/28/2006			3/28/2006			3/28/2006								
Time	13:30			13:50			14:30								
Units	ug/kg			ug/kg			ug/kg								
Parameter (8260)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene				113000	I	50	174000		1000						
1,3,5-Trimethylbenzene				9390		50	9120	J	1000						
Acetone	6.72	J	1							15.4	J	1	21.6	J	1
Benzene				78.3	J	50				0.698	J	1	0.765	J	1
Carbon disulfide										1.21	J	1	1.49	J	1
Chlorobenzene				218	J	50									
Ethylbenzene				31100	I	50	30700		1000						
Isopropylbenzene				7980		50	7160	J	1000						
Methylene chloride										3	J	1	2.59	J	1
Naphthalene				28800	I	50	25900		1000						
Toluene										1.25	E	1	1.59	E	1
m- p-Xylene				20400		50	19300		1000						
n-Butylbenzene				15400		50	12100	J	1000						
n-Propylbenzene				32000	I	50	28900		1000						
p-Isopropyltoluene				2620		50	2040	J	1000						
sec-Butylbenzene				4720		50	3720	J	1000						
tert-Butylbenzene				67.1	J	50									

Parameter (8270C)	Result	Q	Dilution												
1-Methylnaphthalene				372		1	422		10						
2-Methylnaphthalene	4.97	J	1	600	I	1	745		10	19.1		1			
Acenaphthene				12.1		1									
Acenaphthylene				5.14	J	1									
Anthracene				12.7		1									
Benzo(a)anthracene	7.07		1	16.4		1				7.02		1			
Benzo(a)pyrene				13.6		1									
Benzo(b)fluoranthene				17.9		1									
Benzo(g,h,i)perylene	5.85		1	9.22		1				12.5		1			
Benzo(k)fluoranthene				7.13		1									
Chrysene	6.5		1	16.6		1				10.6		1			
Fluoranthene				46		1	49.9	J	10						
Fluorene				17.9		1									
Indeno(1,2,3-cd)pyrene				7.02		1									
Naphthalene	3.54	J	1	931	I	1	2540		10	44.3		1			
Phenanthrene	10.3			53		1	57.5	J	10	12.6		1			
Pyrene	10			41.6		1	45.5	J	10	14.3		1			

Parameter (8015B)	Result	Q	Dilution												
PHC C10-C20	17000		1	32000		1				23000		1			
PHC C20-C34	100000		1	34000		1				120000		1			
Carbon Range (C6-C12)				545000		50									

Parameter (DD2216-90)	Result	Q	Dilution												
Percent Solids	93.3			84						92.7					

Qualifiers (Q)

J = The analyte was positively identified, but the quantation was below the reporting limit.

I = Semiquantative result (out of instrument calibration range)

E = Estimated concentration due to sample matrix interference

Table 1
Ashville Oil Co.
Soil Sample Results

Sample Number	SB-03A						SB-03B					
Date	3/29/2006						3/29/2006					
Time	9:35						10:30					
Units	ug/kg						ug/kg					
Parameter (8260)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene	11000		50									
Acetone							29.6	J	1	29	J	1
Benzene	95.3	J	50									
Ethylbenzene	365	J	50									
Isopropylbenzene	1550		50									
Naphthalene	4380		50									
n-Butylbenzene	3400		50									
n-Propylbenzene	6640		50									
p-Isopropyltoluene	273	J	50									
sec-Butylbenzene	1070		50									

Parameter (8270C)	Result	Q	Dilution									
1-Methylnaphthalene	774	I	1	1040		10	6.07		1			
2-Methylnaphthalene	1110	I	1	2060		10						
Acenaphthene	29.6		1	36.1	J	10						
Benzo(a)anthracene	7.64		1									
Benzo(a)pyrene	5	J	1									
Benzo(b)fluoranthene	7.26		1									
Benzo(g,h,i)perylene	4.93	J	1				8.32		1			
Chrysene	6.7		1				7.42		1			
Fluoranthene	21.5		1									
Fluorene	43.4		1	51.3	J	10						
Naphthalene	902	I	1	2290		10	8.77		1			
Phenanthrene	130		1	140		10	9.93		1			
Pyrene	29.1		1	36.5	J	10	8.73		1			

Parameter (8015B)	Result	Q	Dilution									
PHC C10-C20	190000		1				19000		1			
PHC C20-C34	110000		1				140000		1			
Carbon Range (C6-C12)	335000		50									

Parameter (DD2216-90)	Result	Q	Dilution									
Percent Solids	84.4						94.1					

Qualifiers (Q)

- J = The analyte was positively identified, but the quantation was below the reporting limit.
- I = Semiquantative result (out of instrument calibration range)
- E = Estimated concentration due to sample matrix interference

Table 1
Ashville Oil Co.
Soil Sample Results

Sample Number	SB-04A						SB-04B					
Date	3/29/2006						3/29/2006					
Time	10:53						11:33					
Units	ug/kg						ug/kg					
Parameter (8260)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene	74300	I	50	123000		500						
1,3,5-Trimethylbenzene	28700	I	50	38600		500						
Acetone							25.1	J	1	29.9	J	1
Benzene	64.6	J	50									
Ethylbenzene	25300	I	50	30900		500						
Isopropylbenzene	4300		50	5200	J	500						
Naphthalene	9720		50	12800		500						
Toluene	77.2	J	50									
m- p-Xylene	78500	I	50	117000		500						
n-Butylbenzene	9030		50	11600		500						
n-Propylbenzene	17900		50	22200		500						
o-Xylene	8300		50	10800		500						
p-Isopropyltoluene	803		50	1010	J	500						
sec-Butylbenzene	2090		50	2490	J	500						

Parameter (8270C)	Result	Q	Dilution									
1-Methylnaphthalene	632	I	1	932		10						
2-Methylnaphthalene	942	I	1	1890		10						
Acenaphthene	26.5		1	28.4	J	10						
Anthracene	25.6		1	31.6	J	10						
Benzo(a)anthracene	26.9		1	30	J	10						
Benzo(a)pyrene	21.2		1									
Benzo(b)fluoranthene	22.1		1	29.4	J	10						
Benzo(g,h,i)perylene	13.8		1									
Benzo(k)fluoranthene	13.2		1									
Chrysene	24.6		1	28.4	J	10						
Dibenzo(a,h)anthracene	3.15	J	1									
Fluoranthene	67.2		1	77		10						
Fluorene	33.5		1	39.9	J	10						
Indeno(1,2,3-cd)pyrene	10.7		1									
Naphthalene	769	I	1	2440		10						
Phenanthrene	101		1	113		10						
Pyrene	73		1	80.4		10						

Parameter (8015B)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
PHC C10-C20	110000		5				25000		1			
PHC C20-C34	44000		5				130000		1			
Carbon Range (C6-C12)	2310000	I	50	739000		500						

Parameter (DD2216-90)	Result	Q	Dilution									
Percent Solids	87.5						91					

Qualifiers (Q)

J = The analyte was positively identified, but the quantation was below the reporting limit.
 I = Semiquantative result (out of instrument calibration range)
 E = Estimated concentration due to sample matrix interference

Table 1
Ashville Oil Co.
Soil Sample Results

Sample Number	SB-05A						SB-05A1					
Date	3/29/2006						3/29/2006					
Time	15:45						15:50					
Units	ug/kg						ug/kg					
Parameter	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene	6070		50				3210		50			
1,3,5-Trimethylbenzene	3140		50				1600		50			
Benzene	72.9	J	50									
Ethylbenzene	3090		50				1120		50			
Isopropylbenzene	513	J	50				305	J	50			
Naphthalene	2900		50				2080		50			
m-,p-Xylene	4130		50				1440		50			
n-Butylbenzene	1570		50				973		50			
n-Propylbenzene	1550		50				880		50			
o-Xylene	110	J	50				81.1	J	50			
p-Isopropyltoluene	358	J	50				258	J	50			
sec-Butylbenzene	394	J	50				231	J	50			

Parameter (8270C)	Result	Q	Dilution									
1-Methylnaphthalene	8960	I	10	12100		100	9550	I	10	12600		100
2-Methylnaphthalene	11700	I	10	17800		100	12100	I	10	17600		100
Acenaphthene	1400		10	1580		100	2840		10	3040		100
Anthracene							6690	I	10	10800		100
Benzo(a)anthracene	271		10	330	J	100	8820	I	10	15600		100
Benzo(a)pyrene	215		10				9410	I	10	12300		100
Benzo(b)fluoranthene	300		10	353	J	100	11600	I	10	17100		100
Benzo(g,h,i)perylene	154		10				6300	I	10	7520		100
Benzo(k)fluoranthene	102		10				5010		10	6610		100
Chrysene	257		10				8770	I	10	15100		100
Dibenzo(a,h)anthracene	39.1	J	10				1770		10			
Fluoranthene	787		10	920		100	12000	I	10	40900		100
Fluorene	1790		10	2270		100	3770		10	4670		100
Indeno(1,2,3-cd)pyrene	125		10				5590		10	6640		100
Naphthalene	2820		10	3500		100	2910		10	3550		100
Phenanthrene	4870		10	6460		100	11800	I	10	31600		100
Pyrene	857		10	1020		100	10500	I	10	31000		100

Parameter (8015B)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
PHC C10-C20	1700000		10				1100000		5			
PHC C20-C34	2700000		10				14000000		10			
Carbon Range (C6-C12)	60800	I	1	616000		50	145000		50			

Parameter (DD2216-90)	Result	Q	Dilution									
Percent Solids	77.4						81.9					

Qualifiers (Q)

J = The analyte was positively identified, but the quantation was below the reporting limit.

I = Semiquantative result (out of instrument calibration range)

E = Estimated concentration due to sample matrix interference

Table 1
Ashville Oil Co.
Soil Sample Results

Sample Number	SB-05B						SB-06A					
Date	3/29/2006						3/29/2006					
Time	16:00						19:00					
Units	ug/kg						ug/kg					
Parameter	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene	150000	I	50	178000		2500	108000	I	50	194000		1000
1,3,5-Trimethylbenzene	71100	I	50	52500		2500	51300	I	50	60400		1000
Benzene	9220		50	10500	J	2500	398	J	50			
Ethylbenzene	99800	I	50	110000		2500	60000	I	50	89100		1000
Isopropylbenzene	12700		50	8460	J	2500	8340		50	9850	J	1000
Methyl tert-butyl ether	565		50									
Naphthalene	35600	I	50	23300	J	2500	14300		50	14000	J	1000
Tetrachloroethene	277	J	50				260	J	50			
Toluene	119000	I	50	195000		2500	58100	I	50	88600		1000
m-, p-Xylene	227000	I	50	407000		2500	147000	I	50	322000		1000
n-Butylbenzene	24900	I	50	13400	J	2500	16700		50	18000		1000
n-Propylbenzene	50500	I	50	31200		2500	32900	I	50	37400		1000
o-Xylene	124000	I	50	156000		2500	72100	I	50	113000		1000
p-Isopropyltoluene	2990		50				2000		50	1920	J	1000
sec-Butylbenzene	6790		50	3130	J	2500	4200		50	4090	J	1000
tert-Butylbenzene	95	J	50				61.7	J	50			

Parameter (8270C)	Result	Q	Dilution									
1-Methylnaphthalene	101		10				228		10			
2-Methylnaphthalene	199		10				412		10			
Chrysene	29.4	J	10									
Naphthalene	234		10				505		10			
Phenanthrene	52	J	10				50.2	J	10			

Parameter (8015B)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
PHC C10-C20	100000		1				100000		1			
PHC C20-C34	230000		1				360000		1			
Carbon Range (C6-C12)	1850000		500				4990000		500			

Parameter (DD2216-90)	Result	Q	Dilution									
Percent Solids	91.5						89.6					

Qualifiers (Q)

- J = The analyte was positively identified, but the quantation was below the reporting limit.
- I = Semiquantative result (out of instrument calibration range)
- E = Estimated concentration due to sample matrix interference

Table 1
Ashville Oil Co.
Soil Sample Results

Sample Number	SB-06B						SB-07B					
Date	3/29/2006						3/28/2006					
Time	19:15						15:35					
Units	ug/kg						ug/kg					
Parameter	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene	24.2	E	1	50.7	E	1						
1,3,5-Trimethylbenzene	14.4	E	1	29.4	E	1						
Acetone	38	J	1	43.3	J	1	18.8	J	1	24	J	1
Benzene				0.653	J	1				0.771	J	1
Carbon disulfide	1.3	J	1	1.76	J	1	2.06	J	1	2.29	J	1
Ethylbenzene	4.43	E	1	6.29	E	1						
Isopropylbenzene				0.609	E	1						
Toluene	2.79	E	1	3.81	E	1				1.37	J	1
m-, p-Xylene	20	E	1	30	E	1						
n-Butylbenzene	1.95	E	1	6.06	E	1						
n-Propylbenzene	1.7	E	1	3.73	E	1						
o-Xylene	2.2	E	1	3.34	E	1						
p-Isopropyltoluene				1.88	E	1						

Parameter (8270C)	Result	Q	Dilution									
1-Methylnaphthalene	127		10									
2-Methylnaphthalene	252		10				8.28		1			
Benzo(g,h,i)perylene							10.8		1			
Chrysene	31.2	J	10				8.24		1			
Fluoranthene	56.5		10									
Naphthalene	63.9		10				3.78	J	1			
Phenanthrene	82.5		10				14.4		1			
Pyrene	64.1		10				10.9		1			

Parameter (8015B)	Result	Q	Dilution									
PHC C10-C20	33000		1				31000		1			
PHC C20-C34	150000		1				210000		1			
Carbon Range (C6-C12)	60.8	J	1									

Parameter (DD2216-90)	Result	Q	Dilution									
Percent Solids	90.5						94.2			86.4		

Parameter (Lloyd Kahn)	Result	Q	Dilution									
Total Organic Carbon							36300		1			

Qualifiers (Q)

J = The analyte was positively identified, but the quantation was below the reporting limit.

I = Semiquantative result (out of instrument calibration range)

E = Estimated concentration due to sample matrix interference

Table 1
 Ashville Oil Co.
 Soil Sample Results

Sample Number	SB-08A			SB-08B			SB-09B								
Date	3/28/2006			3/28/2006			3/29/2006								
Time	17:00			17:15			16:40								
Units	ug/kg			ug/kg			ug/kg								
Parameter	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
1,2-Dichloroethane	0.594	J	1												
2-Butanone	3.81	J	1												
Acetone	32.5	J	1	22.7	J	1	25.1	J	1	28.1	J	1	36.9	J	1
Benzene	6.9		1												
Methyl tert-butyl ether	11		1												
Vinyl chloride	1.51	J	1												
cis-1,2-Dichloroethene	28.3		1												
n-Butylbenzene	6.19		1												
sec-Butylbenzene	5.35	J	1												
trans-1,2-Dichloroethene	2.57	J	1												
Parameter (8270C)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
Phenanthrene	30.9	J	10	33.5	J	10									
Parameter (8015B)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
PHC C10-C20	25000		1	23000		1				13000		1			
PHC C20-C34	130000		1	110000		1				79000		1			
Carbon Range (C6-C12)	310		1												
Parameter (DD2216-90)	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution	Result	Q	Dilution
Percent Solids	90.2			91.9						92.3					

Qualifiers (Q)

- J = The analyte was positively identified, but the quantitation was below the reporting limit.
- I = Semiquantative result (out of instrument calibration range)
- E = Estimated concentration due to sample matrix interference

Table 2
Ashville Oil Co.
Ground Water Sample Results

Sample Number	MW-01	MW-01A	MW-02	MW-02 / Free Product		
Date	3/29/2006	3/29/2006	3/29/2006	3/29/2006		
Time	14:45	14:50	14:00	14:00		
Units	ug/L	ug/L	ug/L	ug/kg		
Parameter (8260)	Result	Q	Dilution	Result	Q	Dilution
1,2,4-Trimethylbenzene				14,000,000	I	5000
1,3,5-Trimethylbenzene				4,330,000		5000
Acetone	10.8					
Benzene		5.7	J	474,000	5000	613,000
Ethylbenzene		0.152	J	9,650,000	I	11,000,000
Isopropylbenzene				848,000	5000	752,000
Naphthalene				1,190,000	5000	1,170,000
Toluene	0.388	J	1	17,000	I	19,800,000
cis-1,2-Dichloroethene				112	J	
n-Butylbenzene				83.5	J	1,150,000
sec-Butylbenzene				240,000	5000	
n-Propylbenzene				295	J	2,550,000
o-Xylene	0.261	J	1	12,400,000	I	15,400,000
m,p-Xylene	0.834	J	1	30,500,000	I	40,700,000
p-Isopropyltoluene				133,000	J	5000

Parameter (8270C)	Result	Q	Dilution	Result	Q	Dilution
Chrysene	0.0972	J	1			
Fluoranthene	0.0859	J	1			
Naphthalene				266	10	1,880,000
Phenanthrene	0.054	J	1			
Pyrene	0.0934	J	1			

Sample Number	MW-02	MW-04	
Date	3/29/2006	3/29/2006	
Time	13:30	14:45	
Units	ug/L	ug/L	
Parameter (8260)	Result	Q	Dilution
Acetone			

Sample Number	MW-08	MW-09	
Date	3/29/2006	3/29/2006	
Time	13:30	17:00	
Units	ug/L	ug/L	
Parameter (8260)	Result	Q	Dilution
Acetone	3.61	J	1

Parameter (8270C)	Result	Q	Dilution
Phenanthrene			
Pyrene			

Parameter (8270C)	Result	Q	Dilution
Phenanthrene	0.0513	J	1
Pyrene	0.0643	J	1

Qualifiers (Q)

J = The analyte was positively identified, but the quantitation was below the reporting limit.

I = Semiquantitative result (out of instrument calibration range)

Table 3
Ashville Oil Co.
Sub-Slab Soil Gas Sample Results

Sample Location	Infant Room 1	Infant Room 2	Preschool Room 1	Preschool Room 2	Sub-Slab Soil Gas Screening Target Concentration	Basis of Target Concentration
Date	5/27-5/28 2006	1/19-1/20 2007	5/27-5/28 2006	1/19-1/20 2007		C=Cancer NC=Non-Cancer
Units	ppbv	ppbv	ppbv	ppbv	ppbv	
Compound	Result	Result	Result	Result	Value	
acetone		2.2		3.5	1500	NC
benzene	6200	0.19	290	0.43	9.8	C
n-butane	6200	0.97	1500	1		
cumene	10 E, J		3.3		810	NC
chlorodifluoromethane		0.26		0.23	140000	NC
chloromethane		0.45		0.41	120	C
cyclohexane	7100		580			
decane			1.5			
dichlorodifluoromethane		0.47		0.49	400	NC
ethylbenzene	6.2		6.5	0.41	51	C
4-ethyltoluene			0.75	0.12		
n-heptane	6100	0.11	420			
hexane	11000		2900	0.34	570	NC
naphthalene	0.1		0.1		5.7	NC
n-nonane	2.7		7.7	0.67		
n-octane	2000		43	0.43		
n-pentane	9300	0.24	4000	0.51		
propylene	220	0.6	400 E, J	0.57		
n-propylbenzene	400 E, J		2.7		280	NC
toluene		0.24			1100	NC
trichlorofluoromethane		0.17		0.18	1200	NC
1,2,4-trimethylbenzene	400 E, J		1.5	0.61	12	NC
1,3,5-trimethylbenzene	4.2		0.74	0.24	12	NC
1,1,2-trichloroethane	10			0.84	2.8	C
n-undecane		0.23	0.14			
vinyl chloride			0.12		11	C
o xylene				0.24		
total m&p xylenes	7.3		21	0.8		

Notes:

ppbv = parts per million volume

Detections above target concentration

Only detected compounds are displayed. See laboratory analytical report for complete list of compounds analyzed and individual compound detection limits.

Target Concentration = U.S. EPA OSWER Draft Guidance for Indoor Vapor Intrusion (2002) target shallow soil gas concentration.

Target concentrations based on an excess lifetime cancer risk of 1E-05 or a non-cancer hazard index of 1.

Trip blank 1/19/07 all compounds non-detect.

E, J - Exceeded instrument concentration capabilities, estimated concentration

6200

Table 3
Ashville Oil Co.
Sub-Slab Soil Gas Sample Results

Sample Location	Infant Room 1	Infant Room 2	Preschool Room 1	Preschool Room 2	Sub-Slab Soil Gas Screening Target Concentration	Basis of Target Concentration
Date	5/27-5/28 2006	1/19-1/20 2007	5/27-5/28 2006	1/19-1/20 2007		C=Cancer NC=Non-Cancer
Units	ppbv	ppbv	ppbv	ppbv	ppbv	
Tentatively Identified Compound	Result	Result	Result	Result	Value	
butane, 2,2-dimethyl			900			
butane, 2-methyl	1000					
n-undecane						
cyclobutane, methyl	2000		2000			
pentane, 3-methyl	800		600			
cyclopentane, methyl	1000		1000			
decane, 2,2-dimethyl				100		
ethanol		40				
nonane, 3-methyl-5-propyl				200		
hexane, 2-methyl	1000		2000			
hexane, 3-methyl	900		1000			
cyclohexane, methyl	2000		2000			
heptane, 2-methyl	1000		1000			
pentane, 2,4-dimethyl			900			
pentane, 2,2,4-trimethyl				1000		
pentane, 2,3-trimethyl				200		
pentane, 2,3,4-trimethyl	2000		1000	200		
pentane, 2,3,3-trimethyl	1000		1000	300		
pentane, 2,4-dimethyl						
hexane, 2,2-dimethyl			1000			
hexane, 2,3-dimethyl	700					
octane, 2,6-dimethyl				80		
octane, 4,5-dimethyl			500			
hexane, 2,5-dimethyl	1000		700			
hexane, 2,4-dimethyl	1000					
heptane, 3-methyl			1000			
heptane, 3,4-dimethyl			500			
hexane, 2,2,3-trimethyl				100		
hexane, 2,2,5-trimethyl	600		500			

Notes:

ppbv = parts per million volume
 Only detected compounds are displayed. See laboratory analytical report for complete list of compounds analyzed and individual compound detection Target Concentration = U.S. EPA OSWER Draft Guidance for Indoor Vapor Intrusion (2002) target shallow soil gas concentration.
 Target concentrations based on an excess lifetime cancer risk of 1E-05 or a non-cancer hazard index of 1.
 Trip blank 1/19/07 all compounds non-detect.

Table 4
Ashville Oil Co.
Indoor and Outdoor Air Sample Results

Sample Location	Toddler Room 1		Toddler Room 2		Preschool Room 1		Preschool Room 2 (#90766)		Preschool Room 2 (#90761)		Ambient - Play Yard 1		Ambient - Play Yard 2		Ambient - AC 1		Ambient - AC 2		Indoor Air Target Concentration		Basis of Target Concentration	
	Date	ppbv	Result	ppbv	Result	ppbv	Result	ppbv	Result	ppbv	Result	ppbv	Result	ppbv	Result	ppbv	Result	ppbv	Result	Value		
Units	5/27-5/28 2006	9.3	3.1	10	2.6	2.7	1.7	6.3	3.2	5.2	4.4	150	36	150	36	150	36	150	36	150	36	NC=Non-Cancer
Compound	5/27-5/28 2006	9.3	3.1	10	2.6	2.7	1.7	6.3	3.2	5.2	4.4	150	36	150	36	150	36	150	36	150	36	NC=Non-Cancer
acetone																						
acetonitrile																						
acrylonitrile																						
benzene		0.38	0.23	0.27	0.18	0.21	0.19	0.19	0.28	0.19	0.19	0.17	0.17	0.17	0.19	0.19	0.19	0.19	0.17	0.17	0.17	C
n-butane		1.3	1.2	0.96	1.2	1.2	0.45	1.6	1.6	0.59	1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	C
2-butanone		1.6	2	2	1.1	1.1	0.96	0.6	0.6	0.72	1.1	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	NC
carbon tetrachloride																						
chlorodifluoromethane		0.15					0.1	0.1	0.52	0.52	0.52	14000	14000	14000	14000	14000	14000	14000	14000	14000	14000	C
chloromethane			0.46		0.55	0.44	0.46	0.46	0.47	0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	C
dichlorodifluoromethane			0.47		0.46	0.46	0.46	0.46	0.47	0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	NC
4-ethyltoluene		0.13		0.12																		
n-heptane		0.92	0.12	0.91	0.11	0.12	0.11	0.11	0.11	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	NC
hexane		9.3	0.28	0.5	0.26	0.28	0.26	0.26	0.45	0.37	0.2	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	NC
naphthalene		1.1	0.28	0.94	0.26	0.28	0.26	0.26	0.77	0.2	0.2	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	NC
n-pentane		0.51	0.66	0.23	0.61	0.69	0.61	0.61	0.77	1.2	0.75	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	NC
propylene		0.85	0.31	0.76	0.22	0.27	0.22	0.22	0.53	0.27	0.19	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	NC
toluene		0.38	0.17	0.37	0.17	0.18	0.17	0.17	0.19	0.18	0.17	0.19	0.19	0.19	0.17	0.17	0.17	0.17	0.17	0.17	0.17	NC
trichlorofluoromethane		0.13	0.26	0.37	0.2	0.26	0.2	0.2	0.41	0.26	0.41	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	NC
1,2,4-trimethylbenzene																						
n-undecane																						
vinyl acetate																						

Notes:

Detections above target concentration

ppbv = parts per billion volume

Only detected compounds are displayed. See laboratory analytical report for complete compounds analyzed and individual compound detection limits.

Target Concentration = U.S. EPA OSWER Draft Guidance for Vapor Intrusion (2002) target indoor air concentration except benzene where U.S. EPA IRIS value used per Ohio EPA DAPC guidance.

Target concentration based on an excess lifetime cancer risk of 1E-05 or a non-cancer risk hazard index of 1.

Trip blank 1/19/07 all compounds non-detect

9.3

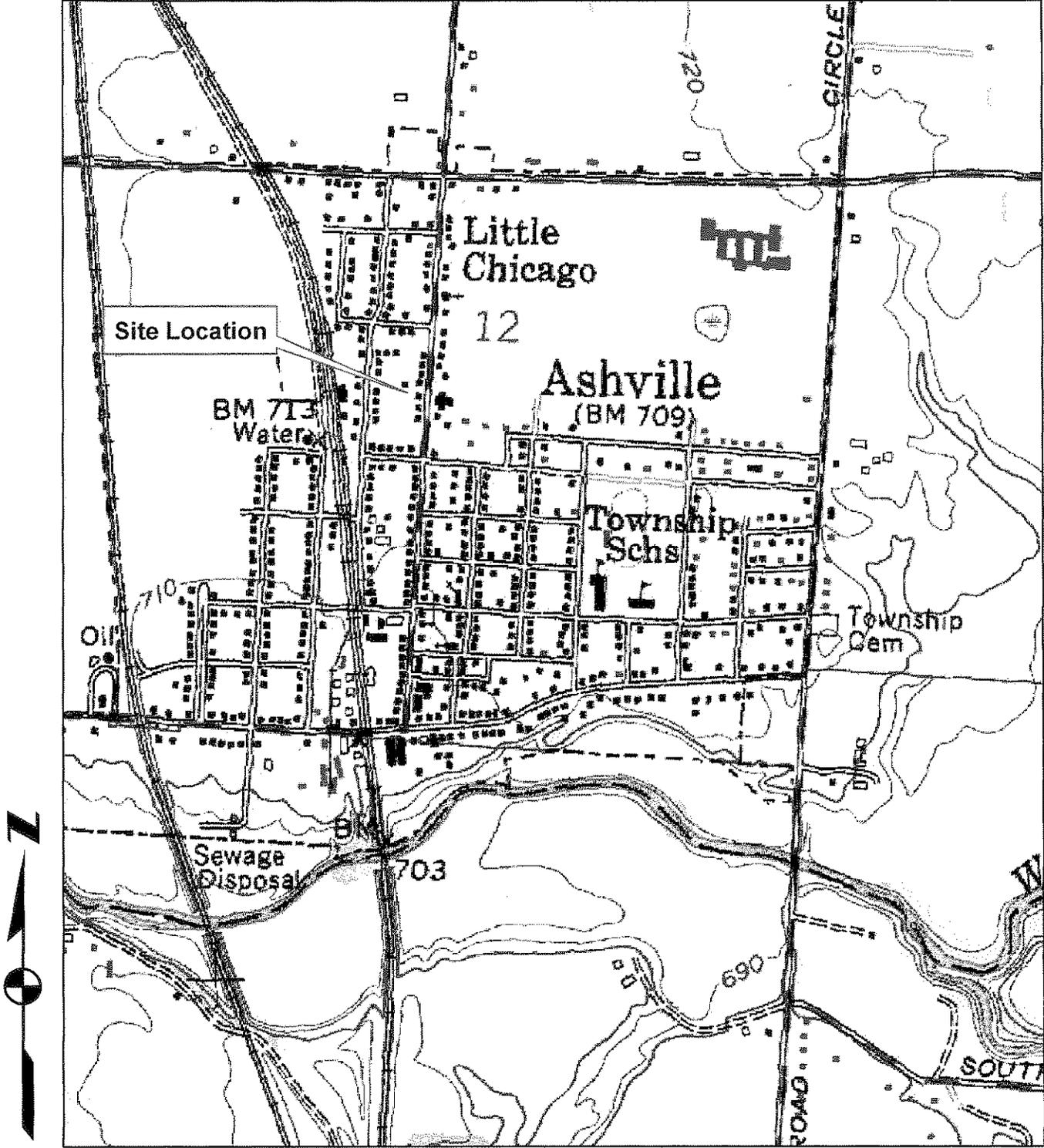
Table 4
Ashville Oil Co.
Indoor and Outdoor Air Sample Results

Sample Location	Toddler Room 1	Toddler Room 2	Preschool Room 1	Preschool Room 2 (#90766)	Preschool Room 2 (#90761)	Ambient - Play Yard 1	Ambient - Play Yard 2	Ambient - AC 1	Ambient - AC 2	Indoor Air Target Concentration	Basis of Target Concentration
Date	5/27-5/28 2006	1/19-1/20 2007	5/27-5/28 2006	1/19-1/20 2007	1/19-1/20 2007	5/27-5/28 2006	1/19-1/20 2007	5/27-5/28 2006	1/19-1/20 2007		C=Cancer NC=Non-Cancer
Units	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	
Tentatively Identified Compound	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	
pentane, 2-methyl	9		10								
pentane, 2,2,4-trimethyl									8		
butane, 2-methyl	6		10								
butane, 2,2,3,3-tetramethyl											
hexane, 2,2-dimethyl	10										
ethanol		40		40			30				
alpha-pinene	20		20								

Notes:

ppbv = parts per billion volume
 Only detected compounds are displayed. See laboratory analytical report for complete compounds analyzed and individual compound detection limits.
 Target Concentration = U.S. EPA OSWER Draft Guidance for Vapor Intrusion (2002) target indoor air concentration except benzene where U.S. EPA IRIS value used per Ohio EPA DAPC guidance.
 Target concentration based on an excess lifetime cancer risk of 1E-05 or a non-cancer risk hazard index of 1.
 Trip blank 1/19/07 all compounds non-detect

FIGURES



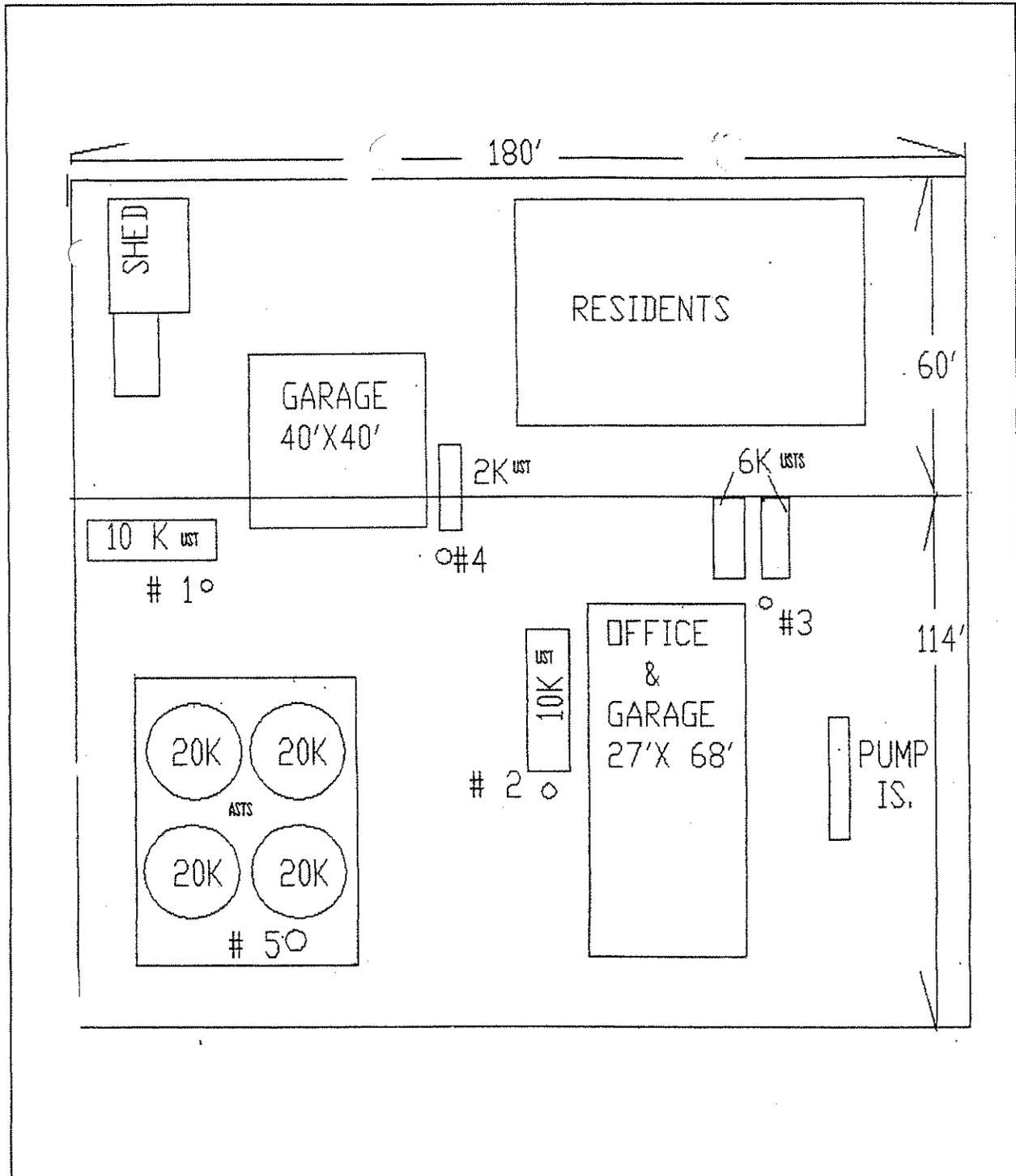
1,000 500 0 1,000 2,000 Feet

Base Map: Ashville, Ohio U.S.G.S. 1:24,000 Quadrangle

Site Location Map

Ashville Oil Company
Field Investigation Report

Figure 1



Not to Scale

Base Map from Phase I & II
Site Assessment for Lewis F. Berry Estate,
GTR Environmental Technologies, 1991

Former Site Features

Ashville Oil Company

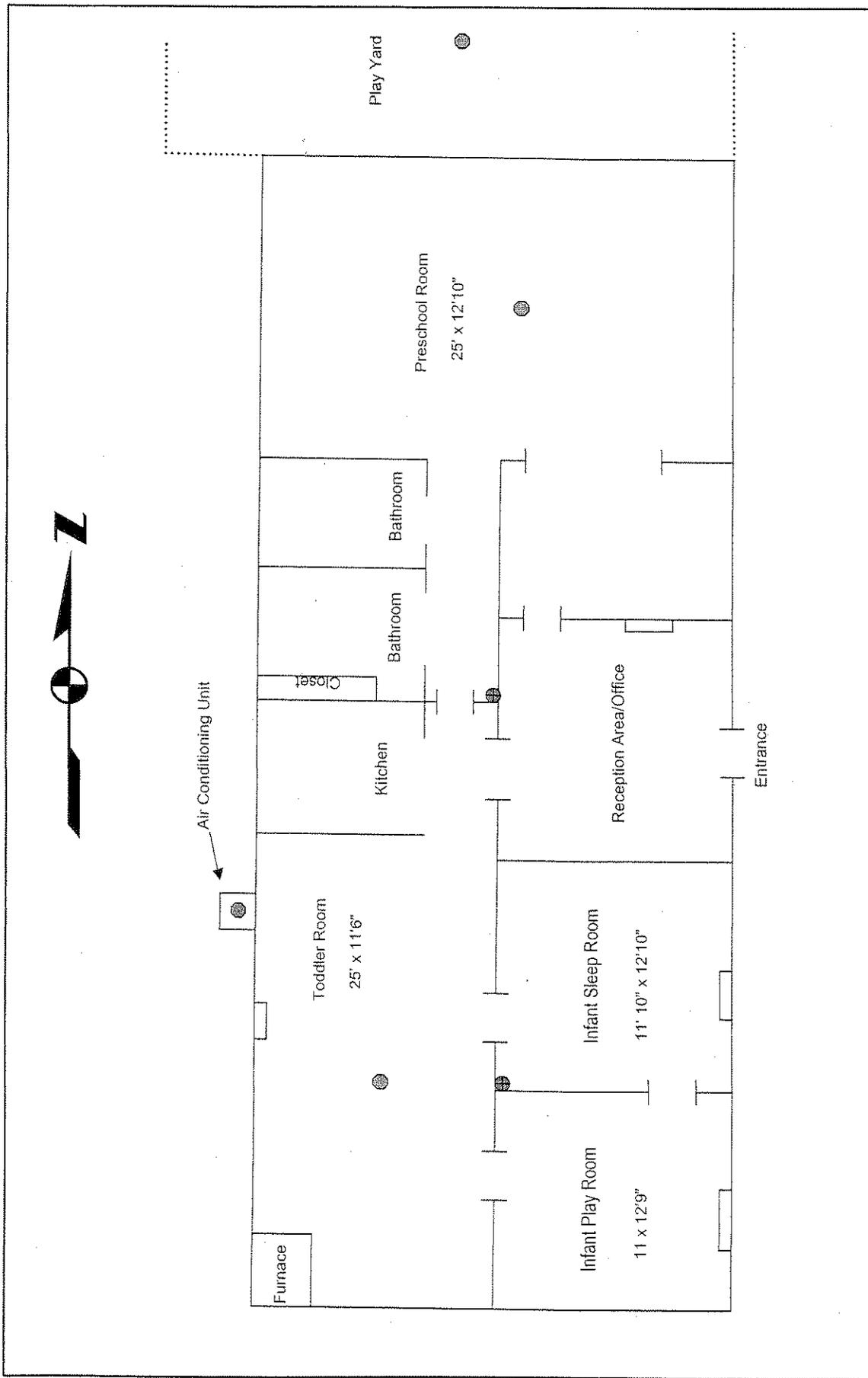
Field Investigation Report

Note: USTs and ASTs removed in September, 1993

Figure 2



Figure 3



Legend

○ Air Sample Location

● Sub-Slab Soil Gas Sample Location

Schematic Figure - Not to Scale
All Sample Locations are Approximate

ATTACHMENT 1
Geoprobe® Core Logs

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/28/06 09:05

Bore Number: SB-01 Location: _____

Logger Name: Wendy Vorwerk Type: Continuous Core

Core A (0-4 ft)		Recovery: 40"			
Depth	Moisture	Color	Description	PIDppm	Sample
19"	Dry	Brown	Sandy gravel fill	0	
19-40"	Dry	Brown	Stiff clay, mottled	0	
Core B (4-8 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PIDppm	Sample
48"	Dry	Brown	Stiff clay, mottled, intermixed with some gravel	0	
Core C (8-12 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PIDppm	Sample
48"	Dry	Brown	Stiff clay, mottled, intermixed with some gravel	0	
Core D (12-16 ft)		Recovery: >48"			
Depth	Moisture	Color	Description	PIDppm	Sample
8"	Dry	Brown	Stiff clay, mottled, intermixed with some gravel	0	
8-48"	Very Dry	Brown	Gravelly clay	0	
Core E (16-20 ft)		Recovery: >48" pushed to 19.5' (3.5')			
Depth	Moisture	Color	Description	PIDppm	Sample
4"	Dry	Brown	Stiff clay	0	
4" - 22"	Dry	Brown	Gravelly stiff clay	0	
22 - 48"	Dry	Brown	Limestone fragments mixed with clay	0	
Core F (20-24 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PIDppm	Sample
7"	Dry	Brown	Clay (slough?)	0	
7-48"	Dry	Brown	Crumbly sand, gravel, clay	0	
Core G (24-28 ft)		Recovery: 48" (pushed 3')			
Depth	Moisture	Color	Description	PIDppm	Sample
12"	Dry	Brown	Slough	0	
12-36"	Dry	Brown	Sandy gravel	0	
36-48"	Moist	Brown	Sandy gravel	0	
Core G (28-32 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PIDppm	Sample
12"	Wet	Brown	Stiff clay	0	
12-48"	Moist	Brown	Sandy gravel	0	SB-01B 30'-32'

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/28/06 13:30

Bore Number: SB-02 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube -

Core A (0-4 ft)		Recovery: 31"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
4"	Dry	Brown	Asphalt, sand/gravel fill	0	
4-31"	Moist	Grey	Clay, some sand	0	
Core B (4-8 ft)		Recovery: 31"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
12"	Moist	Grey	Clay - odor	up	
12-20"	Moist	Brown	Clay, some sand	to	SB-02A 5'8"-6.5'
20-31"	Wet	Brown	Sandy clay	500	
Core C (8-12 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
48"	Wet	Brown	Sandy clay	0	
Core D (12-16 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
21"			Cut for soil porosity	0	
21-48"	Dry	Grey	Hard clay with gravel	0	
Core E (16-20 ft)		Recovery: 38"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
38"	Dry	Grey	Hard clay with gravel	0	
Core F (20-24 ft)		Recovery: 42"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
42"	Dry	Brown	Sandy gravel	0	SB-02B 22-24'

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/29/06 09:00

Bore Number: SB-03 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube

Core A (0-4 ft)		Recovery: 28"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
9"	Dry	Black	Asphalt fill	0	
9-28"	Moist		Black, brown, green mottled clay	0	
Core B (4-8 ft)		Recovery: 37"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
17"	Moist		Black, brown, green mottled clay		
17-33"	Moist		Black, brown, green mottled clay	150	SB-03A 5'-5'6"
33-37"	Moist	Brown	Soft silty clay	9	
Core C (8-12 ft)		Recovery: 39"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
19"	Wet	Brown	Soft silty clay	30	
19-39"	Dry	Brown	Stiff clay mixed with gravel	0	
Core D (12-16 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
48"	Moist	Brown	Stiff clay mixed with gravel	0	
Core E (16-20 ft)		Recovery: 34"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
7"	Moist	Brown	Soft clay	0	
7-20"	Dry	Brown	Clay intermixed with gravel	0	
20-24"	Dry	Brown	Gravel	0	
24-34"	Dry	Brown	Very hard, crumbly clay	0	
Core F (20-24 ft)		Recovery: 28" (pushed 2.5' refusal)			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
17"	Dry	Brown	Very hard, crumbly clay	0	
17-23"	Dry	Brown	Gravelly clay	0	
23-28"	Dry	Brown	Sand with some gravel	0	SB-03B 21'-22'

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/29/06 10:40

Bore Number: SB-04 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube _____

Core A (0-4 ft)		Recovery: 32"			
Depth	Moisture	Color	Description	PIDppm	Sample
11"	Dry	Brown	Asphalt fill	0	
11-32"	Moist	Dk grey	& green clay	0	
Core B (4-8 ft)		Recovery: 36"			
Depth	Moisture	Color	Description	PIDppm	Sample
19"	Moist	Dk grey	& green clay	Up to	SB-04A 5'
19-36"	Moist	Brown	Clay with gravel	1500	
Core C (8-12 ft)		Recovery: 43"			
Depth	Moisture	Color	Description	PIDppm	Sample
5"	Moist	Brown	Clay with gravel	0	
5-20"	Moist	Brown	Gravel mixed with clay	0	
20-43"	Dry	Brown	Clay mixed with gravel	0	
Core D (12-16 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PIDppm	Sample
48"	Dry	Brown	Clay mixed with gravel – very hard	0	
Core E (16-20 ft)		Recovery: 39"			
Depth	Moisture	Color	Description	PIDppm	Sample
15"	Dry	Brown	Clay mixed with gravel – very hard	0	
15-17"	Moist	Brown	Sand	0	
17-20"	Wet	Brown	Sandy gravelly clay – hard	0	
20-39"	Dry	Brown	Hard gravelly clay	0	
Core F (20-24 ft)		Recovery: 39"			
Depth	Moisture	Color	Description	PIDppm	Sample
39"	Dry	Brown	Hard gravelly clay	0	SB-04B 22'-23'
39-44"	Dry	Brown	Sand with some gravel	0	

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/29/06

Bore Number: SB-05 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube

Core A (0-4 ft)		Recovery: 24"			
Depth	Moisture	Color	Description	PIDppm	Sample
12"	Dry	Brown	Sand, gravel	0	
12-16"	Moist	Brown	Silty clay	0	
16-25"	Moist	Grey	& green hard clay	500	SB-05A 2.5'
Core B (4-8 ft)		Recovery: 37"			
Depth	Moisture	Color	Description	PIDppm	Sample
17"	Dry	Brown	Hard clay	100	
17-27"	Moist	Brown	& grey clay	800	
27-37"	Moist	Brown	Hard clay	20	
Core C (8-12 ft)		Recovery: 36"			
Depth	Moisture	Color	Description	PIDppm	Sample
26"	Moist	Brown	Silty clay intermixed with gravel	0	
26-36"	Moist	Brown	Hard clay	0	
Core D (12-16 ft)		Recovery: 19"			
Depth	Moisture	Color	Description	PIDppm	Sample
3"	Moist	Brown	Clay	0	
3-5"	Moist	Brown	Sand seam		
5-19"	Dry	Brown	Hard gravelly clay – refusal	5000	SB-05B 12-13"
Core E (16-20 ft)		Recovery:			
Depth	Moisture	Color	Description	PIDppm	Sample
Core F (20-24 ft)		Recovery:			
Depth	Moisture	Color	Description	PIDppm	Sample

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/29/06 18:30

Bore Number: SB-06 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube -

Core A (0-4 ft)		Recovery: 24"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
7"	Dry	Brown	sand/gravel fill	0	
7-24"	Dry	Brown	coarse sand/fill	0	
Core B (4-8 ft)		Recovery: 22"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
13"	Wet	Brown	Very coarse sand	0	
13-22"	Wet	Dk Brn	Very coarse sand, odor	100	
Core C (8-12 ft)		Recovery: 24"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
6"	Wet	Brown	Very coarse sand, odor	150	
6-24"	Wet	Brown	Clay	150	
Core D (12-16 ft)		Recovery: 43"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
18"	Moist	Brown	Clay	50	
18-43"	Moist	Dk Brn	Clay mixed w/ gravel	3	
Core E (16-20 ft)		Recovery: 32"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
5"	Moist	Brown	Clay		
5-24"	Moist	Brown	Sandy gravel	3000	SB-06A 16.5-18"
24-32"	Moist	Brown	Hard clay with gravel		
Core F (20-24 ft)		Recovery: 40"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
36"	Moist	Brown	Hard clay with gravel	60	
36-40"	Moist	Brown	Sandy gravel, some clay	3	SB-06B 22-23"

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/28/06

Bore Number: SB-07 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube -

Core A (0-4 ft)		Recovery: 24"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
13"	Dry	Brown	Sand/gravel fill	0	
13-24"	Moist	Dk Brn	Stiff clay	0	
Core B (4-8 ft)		Recovery: 36"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
13	Moist	Dk Brn	Stiff clay	0	
13-20"	Moist	Dk Brn	Stiff clay mixed with gravel	0	
20-30	Moist	Brown	& grey mottled clay	0	
30-36"	Dry	Brown	& grey stiff gravelly clay	0	
Core C (8-12 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
48	Dry	Brown	& grey stiff gravelly clay	0	
Core D (12-16 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
26	Dry	Grey	Stiff clay with sand and gravel	0	
26-27	Dry	Brown	Sand seam	0	
27-48	Dry	Grey	Stiff clay with sand and gravel	0	
Core E (16-20 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
48	Dry	Grey	Stiff clay with sand and gravel	0	
Core F (20-24 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
18	Dry	Grey	Stiff clay with sand and gravel	0	
18-48	Dry	Brown	Sand with gravel	0	SB-07B 22-24"

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/28/06 16:00

Bore Number: SB-08 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube

Core A (0-4 ft)		Recovery: 24"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
21"	Dry	Brown	Coarse sand and fine gravel	0	
Core B (4-8 ft)		Recovery: 4"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
4"	Dry	Brown	Coarse sand and fine gravel	0	
			Tank Cavity?		
Core C (8-12 ft)		Recovery: 7"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
7"	Wet	Brown	Clay	0	
			Tank Cavity?		
Core D (12-16 ft)		Recovery: 41"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
5"	Dry	Brown	& grey clay – odor	10	SB-08A 12'
5-41"	Dry	Grey	Tight clay intermixed with gravel		
Core E (16-20 ft)		Recovery: 30"			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
12"	Dry	Brown	Very stiff clay intermixed with gravel	0	
12-14"	Moist	Brown	Sand	0	
14-30"	Dry	Brown	Stiff clay intermixed with gravel	0	
Core F (20-24 ft)		Recovery: 42" (pushed 3.5 feet)			
Depth	Moisture	Color	Description	PID _{ppm}	Sample
42"	Dry	Grey	Stiff clay with sand and gravel	0	SB-08B 22-23.5'

NOTE: water at 25.2' in point well

Geoprobe Core Log

Site: Ashville Oil Date/Time of Bore: 3/29/06 16:00

Bore Number: SB-09 Location: _____

Logger Name: Wendy Vorwerk Type: Dual Tube -

Core A (0-4 ft)		Recovery: 32"			
Depth	Moisture	Color	Description	PIDppm	Sample
12"	Dry	Brown	Sand and gravel mixed with clay	0	
12-17"	Moist	Grey	Clay	0	
17-29"	Moist	Brown	Clay	0	
29-32"	Moist	Brown	Silty clay	0	
Core B (4-8 ft)		Recovery: 34"			
Depth	Moisture	Color	Description	PIDppm	Sample
34"	Moist	Brown	Clay – some gravel	0	
Core C (8-12 ft)		Recovery: 39"			
Depth	Moisture	Color	Description	PIDppm	Sample
8"	Moist	Brown	Silty clay	0	
8-23"	Sat	Brown	Silty sand	0	
23-39"	Dry	Brown	Hard clay, some gravel	0	
Core D (12-16 ft)		Recovery: 48"			
Depth	Moisture	Color	Description	PIDppm	Sample
48"	Dry	Grey	Hard clay, some gravel and sand	0	
Core E (16-20 ft)		Recovery: 4"			
Depth	Moisture	Color	Description	PIDppm	Sample
4"	Dry	Grey	Hard clay, some gravel and sand	0	
Core F (20-24 ft)		Recovery: 28"			
Depth	Moisture	Color	Description	PIDppm	Sample
28"	Dry	Grey	Hard clay, some gravel and sand	0	SB-09B 22'

ATTACHMENT 2

Methodology for Vapor Intrusion Assessment TDC
And
OSWER Indoor Air Guidance Table 2b

Ohio EPA
Division of Emergency and Remedial Response

TECHNICAL DECISION COMPENDIUM

- Title:** **Methodology for Vapor Intrusion Assessment**
- Date:** April 12, 2005
- Key Words:** Vapor intrusion, Johnson and Ettinger, model, volatilization, indoor air, soil gas, ground water, VOCs
- Purpose:** The purpose of this TDC is to provide a methodology, applicable for all remedial response sites, for the evaluation of risk and/or hazards from subsurface contaminants volatilizing into indoor air.
- Background:** Vapor intrusion is the movement of volatile chemicals from subsurface contamination into buildings. Chemicals in contaminated soil or ground water may volatilize and move through soil and into overlying buildings. Transfer of vapors into buildings can occur by simple diffusion through cracks or seams in subsurface walls or floors, or by convection that may be driven by pressure differentials between air inside and outside the buildings. The potential for vapor intrusion may exist for buildings that overlay soil or ground water contaminated with volatile chemicals, regardless of the presence or absence of a basement.
- The purpose of this TDC document is to identify guidance for evaluating the vapor intrusion exposure pathway and to modify such guidance as may be necessary to make it acceptable for use by DERR's Remedial Response Program (RRP). This TDC and the guidance cited below only address exposure to hazardous substances in indoor air resulting from the subsurface vapor intrusion pathway. Other potential pathways of exposure to indoor air contamination, should they exist (*e.g.*, volatilization of hazardous substances from contaminated water, such as during showering), may require additional analysis.
- Decision:** The U.S. EPA Draft Guidance For Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) U.S. EP November 29, 2002 (<http://www.epa.gov/correctiveaction/eis/vapor/complete.pdf>) is to be used as modified by this TDC when evaluating the vapor intrusion pathway at DERR RRP sites.

The modifications to U.S. EPA's draft guidance identified below are to be followed when applying the guidance to DERR Remedial Response sites:

- Occupational settings will default to OSHA standards for acceptable indoor air concentrations when the facility currently uses the same VOCs that are the subject of the vapor intrusion evaluation. Occupational settings that do not currently use the same VOCs that are the subject of the vapor intrusion evaluation shall be evaluated using the screening approach presented in the U.S. EPA draft guidance. The screening values within the guidance may be adjusted based on U.S. EPA default exposure parameters to account for occupational exposures.
- DERR's Remedial Response Program defines unacceptable risk to be in excess of an excess lifetime cancer risk level of $1 \text{ E} - 5$ (See DERR RRP <http://www.epa.state.oh.us/derr/rules/riskgoal.pdf> for additional information on acceptable risk and hazard goals). Screening values in the U.S. EPA's draft vapor intrusion guidance based on an excess lifetime cancer risk level of $1 \text{ E} - 5$ and/or a hazard index of 1, adjusted as necessary to account for multiple compounds (see footnote #2 on page 10 of the Subsurface Vapor Intrusion Guidance), are to be used in determining if the risk of exposure to indoor air via the vapor intrusion pathway warrants further action.
- Ohio EPA has determined that presently, the toxicity values for trichloroethylene (TCE) are those that have been developed by the California Environmental Protection Agency (Cal EPA). Specifically, the TCE slope factors developed by the Office of Environmental Health Hazard Assessment of the California EPA (California Environmental Protection Agency, 2002) are to be used for developing screening or cleanup values as appropriate based on a carcinogenic endpoint. For the values based on non-carcinogenic effects, the chronic criteria developed by the Office of Environmental Health Hazard Assessment of the California-EPA for oral (Cal EPA, 1999) and inhalation exposures (Cal EPA, 2003)(see references for toxicity criteria) are to be used (See DERR RRP <http://www.epa.state.oh.us/derr/rules/notaxtdc.pdf> for additional information on obtaining chemical toxicity information).
- Structures with significant openings to the subsurface (*e.g.*,

sumps, unlined crawlspaces, earthen floors etc.) should not be evaluated using the screening values that employ the 0.1 attenuation factor applied to shallow soil gas concentrations. Screening values for indoor air for structures with significant openings to the subsurface will equal the shallow subsurface soil gas concentration(s) for VOCs.

- Soil gas samples are generally required to verify soil gas concentrations predicted from ground water or soil data.
- Soil gas samples should be to be collected prior to or in conjunction with an indoor air monitoring program/event.
- Ambient or background air samples must be collected simultaneously with indoor air samples.
- Ohio EPA Division of Air Pollution Control (DAPC) Air Toxics Unit is to be consulted prior to and will take the lead on indoor air sampling and data interpretation.

The following points should also be considered when using the U.S. EPA draft guidance:

- Soil gas and indoor sampling are emerging technologies, with associated uncertainties and variability. The U.S. EPA draft guidance cites specific methods and provides guidance for both soil gas and indoor air sampling. Entities planning vapor intrusion evaluations at DERR-RRP sites should refer to these methods and contact Ohio EPA DERR-RRP prior to during the development of a work plan for indoor air or soil gas sampling.
- The guidance includes a series of checklist forms designed to document the evaluation process. Completion of the checklist form is optional for DERR-RRP sites, provided that the assessment is adequately documented.

Rationale:

The U.S. EPA draft subsurface vapor intrusion guidance regarding the evaluation of vapor intrusion to indoor air requires clarification and modification to be acceptable for use at DERR RRP sites.

Contact Person:

Manager, DERR-CO Remedial Response Section, Ohio EPA,
614-644-2924.

Attachment: none

References: Cal/EPA TCE Toxicity Criteria:

Cancer End Point

Oral Slope Factor (SF _o)*	SF _o = 1.3E ⁻² (mg/kg-day) ⁻¹
Inhalation Slope Factor (SF _i)*	SF _i = 7E ⁻³ (mg/kg-day) ⁻¹
Inhalation Unit Risk*	= 2E ⁻⁶ (µg/m ³) ⁻¹

Non-Cancer End Point

Oral Reference Dose (RfD _o)**	RfD _o = 5 E ⁻¹ mg/kg-day
Inhalation Reference Exposure Level (REL)***	REL = 600 µg/m ³ (10ppb)
Inhalation Reference Dose (RfD _i)****	RfD _i = 1.7E ⁻¹ mg/kg-day

* (DHS 1990, Cal/EPA 1994, Cal/EPA 1999, Cal/EPA 2002)

** (Cal/EPA 1999)

*** (Cal/EPA 2003)

**** (Cal/EPA 2003, converted from REL)

Cal/EPA 2003, Table of All Chronic Reference Exposure Levels Adopted by OEHH as of August 2003, http://oehha.ca.gov/air/chronic_rels/pdf/79016.pdf

Cal/EPA 2002, Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors, December 2002, Office of Environmental Health Hazard Assessment, California EPA.

Cal/EPA 1999, Public Health Goal for Trichloroethylene in Drinking Water, Office of Health Hazard Assessment, California Environmental Protection Agency, http://www.oehha.ca.gov/water/phg/pdf/tce_f.pdf

Table 2b- Question 4 Generic Screening Levels and Summary Sheet¹
 Risk = 1 x 10⁻⁵

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C-cancer risk NC=noncancer risk	Target Indoor Air Concentration to Safety Both the Prescribed Risk Level and the Target Hazard Index (R=10 ⁻⁶ , HI=1) C _{indoor} (ppbv)	Measured or Reasonably Estimated Indoor Air Concentration (if available) (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 C _{soil-gas} (ug/m ³)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 C _{soil-gas} (ppbv)	Measured or Reasonably Estimated Shallow Soil Gas Concentration (if available) (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 C _{soil-gas} (ug/m ³)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 C _{soil-gas} (ppbv)	Measured or Reasonably Estimated Deep Soil Gas Concentration (if available) (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.001 and Partitioning Across the Groundwater Table Obeys Henry's Law C _{gw} (ug/L)	Measured or Reasonably Estimated Groundwater Concentration (if available) (specify units)
83329	Acenaphthene	X	NC	2.1E+02	3.3E-01	2.1E+03	3.3E-02	9.0E+01	5.0E+03	9.0E+03	5.0E+03	2.8E+03	
75070	Acetaldehyde		NC	9.0E+00	5.0E+00	9.0E+01	5.0E-01	3.5E+02	1.5E+03	3.5E+03	1.5E+04	2.2E+05	
67641	Acetone	X	NC	3.5E+02	1.5E+02	3.5E+03	1.5E+03	6.0E+02	3.8E+02	6.0E+03	3.8E+03	4.2E+04	
75058	Acetonitrile		NC	5.0E+01	3.8E+01	5.0E+02	3.8E+02	3.5E+03	7.1E+02	3.5E+04	7.1E+03	8.0E+05	
98862	Acetophenone	X	NC	3.5E+02	7.1E+01	2.0E+01	8.7E-02	3.8E+00	1.7E+00	3.8E+01	1.7E+01	4.0E+00	
107028	Acrofen		NC	2.0E+02	8.7E+03	3.8E+02	3.3E+03	5.0E+02	3.3E+03	5.0E+01	3.3E+02	7.1E+01	
197131	Acrylonitrile		C	3.8E+01	1.7E+01	1.4E+01	1.1E-02	3.5E+03	8.1E+02	3.1E+01	9.8E+00	1.4E+01	
309002	Adrin		C	5.0E+03	3.3E+04	1.2E+00	1.1E-01	5.0E+00	9.7E-01	5.0E+01	9.7E+00	3.0E+01	
319346	alpha-HCH (alpha-BHC)		C	1.4E+02	1.1E+03	2.8E+03	4.2E+02	1.8E+03	2.8E+02	1.8E+04	2.8E+03	5.1E+02	
109577	Benzaldehyde	X	NC	3.5E+02	8.1E+01	3.5E+03	8.1E+02	3.1E+01	9.8E+00	3.1E+02	9.8E+01	1.4E+01	
71432	Benzene		C	3.1E+00	9.8E+01	1.2E+00	1.1E-01	5.0E+00	9.7E+00	5.0E+01	9.7E+00	3.0E+01	
205992	Benzobifluoranthene	X	C	1.2E+01	1.1E+02	2.8E+03	4.2E+02	1.8E+03	2.8E+02	1.8E+04	2.8E+03	5.1E+02	
100447	Benzylchloride	X	C	5.0E+01	9.7E+02	3.5E+03	8.1E+02	3.1E+01	9.8E+00	3.1E+02	9.8E+01	1.4E+01	
91587	beta-Chloroanthalene	X	NC	2.8E+02	4.2E+01	1.8E+03	2.8E+02	7.4E+01	1.3E+01	2.4E+01	3.5E+00	2.4E+02	
92524	Biphenyl	X	NC	1.8E+02	2.8E+01	3.9E+03	8.4E+04	2.4E+01	3.5E+00	2.4E+02	3.5E+01	5.1E+02	
11444	Bis(2-chloroethyl)ether		C	7.4E+02	1.3E+02	3.9E+03	8.4E+04	2.4E+01	3.5E+00	2.4E+02	3.5E+01	5.1E+02	
108601	Bis(2-chloroisopropyl)ether		C	2.4E+00	3.5E+01	1.4E+00	2.1E+00	2.2E+02	2.1E+01	1.4E+02	2.1E+01	1.4E+01	
542881	Bis(chloromethyl)ether		C	3.9E+04	8.4E+05	1.4E+00	2.1E+00	2.2E+02	2.1E+01	1.4E+02	2.1E+01	1.4E+01	
75274	Bromodichloromethane	X	C	1.4E+00	2.1E+00	8.7E+01	3.9E+01	7.0E+03	2.2E+03	1.6E+01	2.6E+00	2.4E+01	
75252	Bromoform		C	2.2E+01	3.9E+02	2.4E+00	3.5E+00	2.4E+01	3.5E+00	2.4E+02	3.5E+01	5.1E+02	
106990	1,3-Butadiene		C	8.7E+02	3.9E+02	7.0E+03	2.2E+03	1.6E+01	2.6E+00	2.4E+01	3.5E+01	5.1E+02	
75150	Carbon disulfide		NC	7.0E+02	2.2E+02	1.6E+01	2.6E+00	2.4E+01	3.5E+01	5.1E+02	3.0E+01	3.0E+01	
56235	Carbon tetrachloride		C	1.6E+00	2.6E+01	7.0E+03	2.2E+03	1.6E+01	2.6E+00	2.4E+01	3.5E+01	5.1E+02	
57749	Chloroform		C	2.4E+01	1.5E+02	7.0E+03	2.2E+03	1.6E+01	2.6E+00	2.4E+01	3.5E+01	5.1E+02	
126998	2-Chloro-1,3-butadiene (chloroprene)		NC	7.0E+00	1.9E+01	6.0E+02	1.3E+02	1.4E+04	3.7E+03	1.4E+05	3.7E+04	2.0E+03	
108907	Chlorobenzene		NC	6.0E+01	1.3E+01	1.0E+01	1.2E+00	5.0E+05	1.4E+05	1.0E+06	3.8E+05	2.8E+04	
109693	1-Chlorobutane	X	NC	1.4E+03	3.7E+02	1.0E+01	1.2E+00	1.0E+05	1.4E+05	1.0E+06	3.8E+05	2.8E+04	
124481	Chlorobromomethane	X	C	1.0E+00	1.3E+01	1.0E+05	1.4E+05	1.0E+06	3.8E+05	1.0E+06	3.8E+05	2.8E+04	
75456	Chlorodifluoromethane		NC	5.0E+04	1.4E+04	1.0E+05	1.4E+05	1.0E+06	3.8E+05	1.0E+06	3.8E+05	2.8E+04	
75003	Chloroethane (ethyl chloride)		NC	1.0E+04	3.8E+03	1.0E+05	1.4E+05	1.0E+06	3.8E+05	1.0E+06	3.8E+05	2.8E+04	
67663	Chloroform		C	1.1E+00	2.2E+01	1.8E+02	3.3E+01	1.0E+03	3.2E+02	1.0E+04	3.2E+03	1.7E+02	
95578	2-Chlorophenol	X	NC	1.8E+01	3.3E+00	1.8E+02	3.3E+01	1.0E+03	3.2E+02	1.0E+04	3.2E+03	1.7E+02	
75296	2-Chloropropane		NC	1.0E+02	3.2E+01	1.0E+03	3.2E+02	1.0E+04	3.2E+03	1.0E+05	3.2E+04	2.1E+02	
218019	Chrysene	X	C	1.2E+01	1.2E+00	3.5E+01	8.9E+01	4.5E+01	1.6E+01	4.5E+02	1.6E+01	4.5E+01	
156592	cis-1,2-Dichloroethylene	X	NC	3.5E+01	8.9E+00	3.5E+02	8.9E+01	4.5E+01	1.6E+01	4.5E+02	1.6E+01	4.5E+01	
123739	Cisomalehyde (C-halena)	X	C	4.5E+02	1.6E+02	4.0E+03	8.1E+02	4.0E+03	8.1E+02	4.0E+04	8.1E+03	8.4E+00	
98828	Cumene		NC	4.0E+02	8.1E+01	4.0E+03	8.1E+02	4.0E+04	8.1E+03	4.0E+05	8.1E+04	8.4E+00	

Table 2b: Question 4. Generic Screening Levels and Summary Sheet¹
 Risk = 1 x 10⁻⁵

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C-cancer risk NC=noncancer risk	Target Indoor Air Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index (R=10 ⁻⁵ , HI=1) (µg/m ³ , ppbv)	Measured or Reasonably Estimated Indoor Air Concentration (if available) (specify units)	Target Shallow Soil Gas Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index (R=10 ⁻⁵ , HI=1) (µg/m ³ , ppbv)	Measured or Reasonably Estimated Shallow Soil Gas Concentration (if available) (specify units)	Target Deep Soil Gas Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index (R=10 ⁻⁵ , HI=1) (µg/m ³ , ppbv)	Measured or Reasonably Estimated Deep Soil Gas Concentration (if available) (specify units)	Target Groundwater Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index (R=10 ⁻⁵ , HI=1) (µg/L, C _{gw})	Measured or Reasonably Estimated Groundwater Concentration (if available) (specify units)
72559	DDE	X	C	2.5E-01	1.9E-02	2.5E-02	1.9E-01	1.9E+00	**	**	**
132649	Dibenzofuran	X	NC	1.4E+01	2.0E+00	1.4E+02	2.0E+01	2.0E+02	**	**	**
98128	1,2-Dibromo-3-chloropropane		NC	2.0E-01	2.1E-02	2.0E+00	2.1E-01	2.1E+00	3.3E+01	3.3E+01	3.3E+01
106934	1,2-Dibromoethane (ethylene dichloride)		C	1.1E-01	1.4E-02	1.1E+00	1.4E-01	1.4E+00	3.6E+00	3.6E+00	3.6E+00
541731	1,3-Dichlorobenzene	X	NC	1.1E+02	1.7E+01	1.1E+03	1.7E+02	1.7E+03	8.3E+02	8.3E+02	8.3E+02
95501	1,2-Dichlorobenzene		NC	2.0E+02	3.3E+01	2.0E+03	3.3E+02	3.3E+03	2.6E+03	2.6E+03	2.6E+03
106467	1,4-Dichlorobenzene		NC	8.0E+02	1.3E+02	8.0E+03	1.3E+03	1.3E+04	8.2E+03	8.2E+03	8.2E+03
75719	Dichlorodifluoromethane		NC	2.0E+02	4.0E+01	2.0E+03	4.0E+02	4.0E+03	1.4E+01	1.4E+01	1.4E+01
75343	1,1-Dichloroethane		NC	5.0E+02	1.2E+02	5.0E+03	1.2E+03	1.2E+04	2.2E+03	2.2E+03	2.2E+03
107062	1,2-Dichloroethane		C	9.4E-01	2.3E-01	9.4E+00	2.3E+00	2.3E+01	2.3E+01	2.3E+01	2.3E+01
75554	1,1-Dichloroethylene		NC	2.0E+02	5.0E+01	2.0E+03	5.0E+02	5.0E+03	1.9E+02	1.9E+02	1.9E+02
78875	1,2-Dichloropropane		NC	4.0E+00	8.7E-01	4.0E+01	8.7E+00	8.7E+01	3.5E+01	3.5E+01	3.5E+01
542756	1,3-Dichloropropane		C	6.1E+00	1.3E+00	6.1E+01	1.3E+01	1.3E+02	8.4E+00	8.4E+00	8.4E+00
69571	Dieldrin		C	5.3E-03	3.4E-04	5.3E-02	3.4E-03	3.4E-02	8.6E+00	8.6E+00	8.6E+00
115297	Endosulfan	X	NC	2.1E+01	1.3E+00	2.1E+02	1.3E+01	1.3E+01	**	**	**
106888	Epichlorohydrin		NC	1.0E+00	2.6E-01	1.0E+01	2.6E+00	2.6E+01	8.0E+02	8.0E+02	8.0E+02
60297	Ethyl ether	X	NC	7.0E+02	2.3E+02	7.0E+03	2.3E+03	2.3E+04	7.0E+04	7.0E+04	7.0E+04
141786	Ethylacetate	X	NC	3.2E+03	8.7E+02	3.2E+04	8.7E+03	8.7E+03	3.2E+05	3.2E+05	3.2E+05
100414	Ethylbenzene		C	2.2E+01	5.1E+00	2.2E+02	5.1E+01	5.1E+02	7.0E+02	7.0E+02	7.0E+02
75218	Ethylene oxide		C	2.4E-01	1.4E-01	2.4E+00	1.4E+00	1.4E+01	1.1E+01	1.1E+01	1.1E+01
97632	Ethylmethacrylate	X	NC	3.2E+02	6.8E+01	3.2E+03	6.8E+02	6.8E+03	9.1E+03	9.1E+03	9.1E+03
110909	Fluorene	X	NC	1.4E+02	2.1E+01	1.4E+03	2.1E+02	2.1E+02	**	**	**
58899	Gamma-HCH (Lindane)	X	C	3.5E+00	1.3E+00	3.5E+01	1.3E+01	1.3E+02	1.6E+01	1.6E+01	1.6E+01
76448	Heptachlor		C	6.6E-03	5.5E-03	6.6E-01	5.5E-02	5.5E-01	1.1E+02	1.1E+02	1.1E+02
87683	Hexachlor-1,3-butadiene		C	1.9E-02	1.2E-03	1.9E-01	1.2E-02	1.2E-01	4.0E-01	4.0E-01	4.0E-01
118741	Hexachlorobenzene		C	5.3E-02	4.5E-03	5.3E-01	4.5E-02	4.5E-01	1.0E+00	1.0E+00	1.0E+00
77474	Hexachlorocyclopentadiene		NC	2.0E-01	1.8E-02	2.0E+00	1.8E-01	1.8E+00	5.0E+01	5.0E+01	5.0E+01
67721	Hexachloroethane		C	6.1E+00	6.3E+01	6.1E+01	6.3E+00	6.3E+01	3.8E+01	3.8E+01	3.8E+01
110543	Hexane		NC	2.0E+02	5.7E+01	2.0E+03	5.7E+02	5.7E+03	2.9E+00	2.9E+00	2.9E+00
74608	Hydrogen cyanide		NC	3.0E+00	2.7E+00	3.0E+01	2.7E+01	2.7E+02	3.5E+02	3.5E+02	3.5E+02
78831	Isobutanol	X	NC	1.1E+03	3.5E+02	1.1E+04	3.5E+03	3.5E+04	2.2E+06	2.2E+06	2.2E+06
743976	Mercury (elemental)		NC	3.0E-01	3.7E-02	3.0E+00	3.7E-01	3.7E+00	6.8E-01	6.8E-01	6.8E-01
126987	Methoxychlor		NC	7.0E+01	2.6E+01	7.0E+02	2.6E+00	2.6E+01	**	**	**
72425	Methoxychlor	X	NC	1.8E+01	1.2E+00	1.8E+02	1.2E+00	1.2E+01	**	**	**
79209	Methyl acetate	X	NC	3.5E+03	1.2E+03	3.5E+04	1.2E+04	1.2E+05	7.2E+05	7.2E+05	7.2E+05
96303	Methyl acrylate	X	NC	1.1E+02	3.0E+01	1.1E+03	3.0E+02	3.0E+03	1.1E+04	1.1E+04	1.1E+04

Table 2b: Question 4 Generic Screening Levels and Summary Sheet¹
Risk = 1 x 10⁻⁶

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C-cancer risk NC=noncancer risk	Target Indoor Air Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index [R=10 ⁻⁶ , HI=1] C _{indoor} (ug/m3)	Measured or Reasonably Estimated Indoor Air Concentration (if available) (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 C _{soilgas} (ug/m3)	Measured or Reasonably Estimated Shallow Soil Gas Concentration (if available) (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 C _{soilgas} (ug/m3)	Measured or Reasonably Estimated Deep Soil Gas Concentration (if available) (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.001 and Partitioning Across the Water Table Obys Henry's Law C _{gw} (ug/L)	Measured or Reasonably Estimated Groundwater Concentration (if available) (specify units)
74879	Methyl bromide		NC	5.0E+00	1.3E+01	5.0E+01	1.3E+01	5.0E+02	1.3E+02	2.0E+01	
74873	Methyl chloride (chloromethane)		C	2.4E+01	1.2E+02	2.4E+02	1.2E+02	2.4E+03	1.2E+03	6.7E+01	
108872	Methylcyclohexane		NC	3.0E+03	7.5E+02	3.0E+04	7.5E+03	3.0E+05	7.5E+04	7.1E+02	
74953	Methylene bromide	X	NC	3.5E+01	4.9E+00	3.5E+02	4.9E+01	3.5E+03	4.9E+02	9.9E+02	
75992	Methylene chloride		C	5.2E+01	1.5E+01	5.2E+02	1.5E+02	5.2E+03	1.5E+03	5.8E+02	
78933	Methylcyclohexane (2-butanone)		NC	1.9E+03	3.4E+02	1.9E+04	3.4E+03	1.9E+05	3.4E+04	4.4E+05	
109101	Methylisobutylketone		NC	8.9E+01	2.9E+01	8.9E+02	2.9E+02	8.9E+03	2.9E+03	1.4E+04	
80626	Methylmethacrylate		NC	7.0E+02	1.7E+02	7.0E+03	1.7E+03	7.0E+04	1.7E+04	5.1E+04	
91576	2-Methylnaphthalene	X	NC	7.9E+01	1.2E+01	7.9E+02	1.2E+02	7.9E+03	1.2E+03	3.3E+03	
1634044	MTBE	X	NC	3.0E+03	8.3E+03	3.0E+04	8.3E+03	3.0E+05	8.3E+04	1.2E+05	
103333	m-Xylene	X	NC	7.0E+03	1.6E+03	7.0E+04	1.6E+04	7.0E+05	1.6E+05	2.3E+04	
91203	Naphthalene		NC	3.0E+00	5.7E+01	3.0E+01	5.7E+00	3.0E+02	5.7E+01	1.5E+02	
104516	n-Butylbenzene	X	NC	1.4E+02	2.6E+01	1.4E+03	2.6E+02	1.4E+04	2.6E+03	2.6E+02	
98953	Nitrobenzene		NC	2.0E+00	4.0E+01	2.0E+01	4.0E+00	2.0E+02	4.0E+01	2.0E+03	
79469	2-Nitropropane		C	9.9E+03	2.5E+03	9.9E+02	2.5E+02	9.9E+01	2.5E+01	1.8E+00	
924163	n-Nitroso-6-n-butylamine		C	1.5E+02	2.4E+03	1.5E+01	2.4E+02	1.5E+00	2.4E+01	1.2E+00	
102651	n-Propylbenzene	X	NC	1.4E+02	2.8E+01	1.4E+03	2.8E+02	1.4E+04	2.8E+03	3.2E+02	
88722	n-Nitrofluorant	X	NC	3.5E+01	6.2E+00	3.5E+02	6.2E+01	3.5E+03	6.2E+02	6.8E+04	
96476	p-Xylene	X	NC	7.0E+03	1.6E+03	7.0E+04	1.6E+04	7.0E+05	1.6E+05	3.3E+04	
106473	p-Xylene	X	NC	7.0E+03	1.6E+03	7.0E+04	1.6E+04	7.0E+05	1.6E+05	2.2E+04	
129000	Pyrene	X	NC	1.1E+02	1.3E+01	**	**	**	**	**	
135988	sec-Butylbenzene	X	NC	1.4E+02	2.8E+01	1.4E+03	2.8E+02	1.4E+04	2.8E+03	2.5E+02	
109425	Styrene		NC	1.0E+03	2.3E+02	1.0E+04	2.3E+03	1.0E+05	2.3E+04	8.9E+03	
98006	tert-Butylbenzene	X	NC	1.4E+02	2.8E+01	1.4E+03	2.8E+02	1.4E+04	2.8E+03	2.9E+02	
639206	1,1,2-Tetrachloroethane		C	3.3E+00	4.8E+01	3.3E+01	4.8E+00	3.3E+02	4.8E+01	3.3E+01	
79345	1,1,2,2-Tetrachloroethane		C	4.2E+01	6.1E+02	4.2E+00	6.1E+01	4.2E+01	6.1E+00	3.0E+01	
127184	Tetrachloroethylene		C	8.1E+00	1.2E+00	8.1E+01	1.2E+01	8.1E+02	1.2E+02	1.1E+01	
108883	Toluene		NC	4.0E+02	1.1E+02	4.0E+03	1.1E+03	4.0E+04	1.1E+04	1.5E+03	
156605	trans-1,2-Dichloroethylene	X	NC	7.0E+01	1.6E+01	7.0E+02	1.6E+02	7.0E+03	1.6E+03	1.8E+02	
76331	1,1,2-Trichloro-1,2-difluoroethane		NC	3.0E+04	3.9E+03	3.0E+05	3.9E+04	3.0E+06	3.9E+05	1.5E+03	
120821	1,2,4-Trichlorobenzene		NC	2.0E+02	2.7E+02	2.0E+03	2.7E+02	2.0E+04	2.7E+03	3.4E+03	
78005	1,1,2-Trichloroethane		C	1.5E+00	2.8E+01	1.5E+01	2.8E+00	1.5E+02	2.8E+01	4.1E+01	
715566	1,1,1-Trichloroethane		NC	2.2E+03	4.9E+02	2.2E+04	4.9E+03	2.2E+05	4.9E+04	3.1E+03	
79016	Trichloroethylene ¹⁷	X	C	2.2E+01	4.1E+02	2.2E+00	4.1E+01	2.2E+01	4.1E+00	5.0E+00 ¹	
75994	Trichlorofluoromethane		NC	7.0E+02	1.2E+03	7.0E+03	1.2E+03	7.0E+04	1.2E+04	1.8E+02	
96184	1,2,3-Trichloropropane		NC	4.9E+00	8.1E+01	4.9E+01	8.1E+00	4.9E+02	8.1E+01	2.9E+02	
95636	1,2,4-Trimethylbenzene		NC	6.0E+00	1.2E+00	6.0E+01	1.2E+01	6.0E+02	1.2E+02	2.4E+01	

Table 2b: Question 4 Generic Screening Levels and Summary Sheet¹
Risk = 1 x 10⁻⁵

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration NC=non-cancer risk	Target Indoor Air Concentration to Safety Level and the Target Hazard Index (R=10 ⁻⁵ , H=1) C _{target} (µg/m ³) (ppbv)	Measured or Reasonably Estimated Indoor Air Concentration (if available) (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 C _{soilgas} (µg/m ³) (ppbv)	Measured or Reasonably Estimated Shallow Soil Gas Concentration (if available) (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 C _{soilgas} (µg/m ³) (ppbv)	Measured or Reasonably Estimated Deep Soil Gas Concentration (if available) (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.01 and Partitioning Across the Water Table Obey's Henry's Law C _{gw} (µg/L)	Measured or Reasonably Estimated Groundwater Concentration (if available) (specify units)
108628	1,3,5-Trimethylbenzene		NC	6.0E+00 1.2E+00		6.0E+01 1.2E+01		6.0E+02 1.2E+02		2.5E+01	
108054	Vinyl acetate		NC	2.0E+02 5.7E+01		2.0E+03 5.7E+02		2.0E+04 5.7E+03		9.6E+03	
75014	Vinyl chloride (chloroethene)		C	2.8E+00 1.1E+00		2.8E+01 1.1E+01		2.8E+02 1.1E+02		2.5E+00	

¹ AF = 0.1 for Shallow Soil Gas Target Concentration

AF = 0.01 for Deep Soil Gas Target Concentration

AF = 0.001 for Groundwater Target Concentration

² Health-based target breathing concentration exceeds maximum possible vapor concentration (pathway incomplete)

³ Target soil gas concentration exceeds maximum possible vapor concentration (pathway incomplete)

⁴ The target groundwater concentration is the MCL. (The MCL for chloroform is the MCL for total Trihalomethanes. The MCL listed for m-Xylene, o-Xylene, and p-Xylene is the MCL for total Xylenes.)

⁵ The target concentration for trichloroethylene is based on the upper bound cancer slope factor identified in EPA's draft risk assessment for trichloroethylene (US EPA, 2001). The slope factor is based on a state-of-the-art methodology, however the TCE assessment is still undergoing review. As a result, the slope factor and the target concentration values for TCE may be revised further. (See Appendix D.)