

# ***SOIL VAPOR WELL INSTALLATION AND MONITORING REPORT***

*Miller's Market*

*VCP# SW1380*

*Antea<sup>®</sup> Group Project No. STCG-047-2*

*May 31, 2016*

*Prepared for:*

***Miller's Market***

3152 Washington Way  
Longview, WA 98632

*Prepared by:*

***Antea Group***

4006 148<sup>th</sup> Avenue NE  
Redmond, WA 98052  
800 477 7411

May 31, 2016

Mr. Mike Bauman  
Miller's Market  
3152 Washington Way  
Longview, WA 98632

Subject: Soil Vapor Well Installation and Monitoring Report  
Miller's Market  
3152 Washington Way  
Longview, Washington  
Antea Project No. STCG-047-2  
Colony Claim No. 21164

Dear Mr. Bauman:

Antea®Group (Antea Group) has prepared this report for additional investigation at the gasoline fueling station located at 3152 Washington Way in Longview, Washington (Figure 1). Antea Group issued a Remedial Investigation (RI) report to the Department of Ecology (Ecology) on July 28, 2015 and requested an opinion on whether the site complied with Model Toxics Control Act (MTCA) standards. Ecology responded with a request to further evaluate the vapor exposure pathway at the Site before they will approve the RI report and issue an opinion on further action. The scope of work detailed below was developed to complete the soil vapor sampling and evaluation of potential vapor exposure pathways at the Site.

## EXECUTIVE SUMMARY

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On December 29, 2016, Antea Group personnel installed one soil vapor monitoring point. The following is a summary of the installation activities and the subsequent soil vapor sampling event:

- Antea Group updated the Health & Safety Plan (HASP) prior to initiation of field activities.
- Antea Group notified One Call (Public Underground Utility Notification) prior to initiation of field activities and had public utilities in the area of the site clearly marked.
- Antea Group contracted a private utility locating firm to clear the proposed boring location for the presence of subsurface utilities.
- On December 29, 2015, one sub-slab soil gas monitoring point was installed inside the station building north of groundwater monitoring well MW-3.

- On January 6, 2015, a shut-in leak detection test was performed on the sampling train from the vapor probe tubing termination to the sample container (Summa Canister) to verify that the sampling system would hold a vacuum.
- Following a successful shut-in leak detection test, a second leak detection test was performed using a tracer gas (helium) to confirm the integrity of the sampling train and well seal.
- Following successful leak detection testing, Antea Group personnel collected a soil gas sample in a laboratory supplied Summa Canister fitted with a vacuum gauge and a flow regulator and submitted it for laboratory analysis.

## **SITE DESCRIPTION**

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The Site is currently an active gasoline fueling station with above ground structures that include a station building in the central portion of the property and one dispenser-island located south of the station building. Five underground storage tanks (USTs) were decommissioned and removed from the Site in 1991. The USTs were replaced by one 12,000-gallon, one 8,000-gallon, and one 6,000-gallon UST in the southeastern portion of the property. The locations of the decommissioned and operational USTs on the property are shown on Figure 2. Remediation activities have been performed at the site and documented in other reports and the RI document. None of the groundwater monitoring wells on Site have exceeded the MTCA Method A cleanup levels for total petroleum hydrocarbons as gasoline (TPH-G) or benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds for four consecutive quarters. Most of the wells on Site have been below laboratory reporting limits and the MTCA Method A cleanup levels since installation.

## **SCOPE OF WORK**

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The scope of work performed by Antea Group included the following tasks:

- Develop a site-specific Health and Safety Plan;
- Notify the One-Call underground utility locator and contract a private utility location firm to delineate the location and marking of underground utilities and other potential subsurface obstructions in the vicinity of the proposed monitoring point;
- Install one sub-slab soil gas monitoring point;
- Perform shut-in leak detection testing to ensure that the sampling train holds vacuum;
- Perform leak detection testing utilizing a tracer gas to ensure the integrity of the sampling train and well seal;
- Conduct a sub-slab soil vapor monitoring event;

- Submit soil vapor samples for quantitative chemical analysis;
- Interpret the data obtained; and
- Prepare this report summarizing the findings of the sub-slab soil gas monitoring point installation and the subsequent soil vapor monitoring event.

## **SOIL VAPOR MONITORING WELL INSTALLATION**

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On December 29, 2015, Antea Group personnel drilled and installed one sub-slab soil gas point north of groundwater monitoring well MW-3 inside the station building to evaluate the potential vapor intrusion pathway into the station building (Figure 2). Prior to drilling activities, Antea Group notified One Call (Public Underground Utility Notification) and contracted a private locator from Applied Professional Services Inc. (APS) to delineate and mark the location of underground utilities and other potential subsurface obstructions in the vicinity of the proposed soil vapor point.

Antea Group used a mobile coring rig to drill a 4 inch bore hole through the concrete floor and extend the hole beneath the slab. The semi-permanent soil gas probe was initially to be installed to a depth of approximately 1.5 feet below ground surface (bgs), or approximately ten inches beneath the bottom of the concrete slab. Due to the presence of additional concrete blocks approximately 6 inches bgs, the soil gas probe was installed to approximately 8 inches beneath the building concrete slab. Depth to groundwater on site ranges from 3.13 to 7.51 feet bgs. The soil gas probe was constructed in accordance with the provisions set forth in the Petroleum Vapor Intrusion Guidance Document prepared by The Interstate Technology & Regulatory Council (ITRC) Petroleum Vapor Intrusion Team, dated October 2014. The vapor point well was constructed of a 6-inch vapor implant screen fitted with ¼ inch Teflon tubing to grade. Clean silica sand was used to fill the annular space to a height of approximately 2-inches above the top of the screened interval, and two inches below the screened interval. A seal of hydrated bentonite was installed above the silica sand to the bottom of the concrete slab. The bore hole was sealed with cement grout to the floor surface and was allowed to dry for more than 48 hours.

On January 6, 2015, leak detection testing was performed on the well seal and sampling system. A shut-in test was first performed on the sampling train from the vapor probe tubing termination to the sample container (Summa Canister). The system consisted of a two way valve at the vapor probe termination, a vacuum gauge, and a three-way valve with a gastight syringe. The two-way valve was closed, and a vacuum was applied by drawing back the syringe plunger. The three-way valve was then closed and the vacuum was to be monitored for 30 seconds. The sampling train did not hold the vacuum for more than a couple of seconds. The connections were rechecked, select fittings were replaced and the shut-in test was repeated. The second shut-in test was successfully conducted.

After a successful shut-in test, the second leak detection test utilized a tracer gas to confirm the integrity of the sampling train. A shroud was placed around the vapor probe surface completion and a vacuum was applied to the

sampling train. The soil gas probe was purged of ten pore space volumes with a peristaltic pump. The tracer element (helium) was deployed around the wellhead to ensure that there were no leaks in the well seal or valve assembly. Antea Group utilized a dielectric M6D-202 Helium Leak Detector to measure the helium concentration under the shroud and inside the sampling train. The effluent sample from the sampling train was 0.0 ppm, less than 15% of the concentration under the shroud (the recommended limit) throughout the entire test. A soil gas sample was then collected in a laboratory-supplied 6-Liter Summa Canister fitted with a vacuum gauge and submitted to a state-accredited laboratory for analysis. The Summa Canister was fitted with a flow regulator set at approximately 150 milliliters per minute (ml/min). The start time and vacuum gauge reading were noted when the sampling was initiated. The soil gas sample was analyzed for benzene, toluene, ethylbenzene and xylenes by EPA Method TO-15. Sampling methods are consistent with the ITRC Guidance Document and The State of Washington Department of Ecology's "Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" (Ecology's Vapor Guidance), Publication no. 09-09-047. Ecology's draft indoor air cleanup levels, groundwater screening levels and soil gas screening levels are presented in Table B-1 as Appendix A. Table B-1 was updated on April 6, 2015 and is presented in Ecology's Vapor Guidance documents.

Three images showing the vapor sampling train assembly, the probe and summa canister, and the soil vapor sampling train in the shroud are shown on Figures 3-5, respectively.

## SOIL VAPOR SAMPLE COLLECTION AND ANALYSIS

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Antea Group collected a soil vapor sample from the newly installed soil vapor monitoring point on January 6, 2016. The sample collection took approximately 45 minutes to complete. The initial vacuum gauge reading was approximately 29 inches mercury at the starting time of 14:40 hours. Upon completion, the vacuum gauge reading was 3 inches mercury at 15:25 hours. One soil vapor sample was submitted to ALS Laboratory Group for laboratory analysis. The sample collected was individually labeled, registered on a Chain-of-Custody form, and placed in a cooler pending delivery to a certified analytical laboratory. The soil vapor sample was analyzed for benzene, toluene, ethylbenzene and xylenes by EPA Method TO-15.

## ANALYTICAL RESULTS

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Analytical results indicate that a concentration of benzene was detected above the Ecology Vapor Guidance, sub-slab soil gas screening level at 12 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). All other compounds analyzed were detected at low concentrations and do not have any associated screening levels. The soil vapor analytical data is presented in Table 1. The laboratory analytical report for soil vapor results is included as Appendix B.

## **CONCLUSIONS AND RECOMMENDATIONS**

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Antea Group personnel drilled and installed one sub-slab soil gas point north of groundwater monitoring well MW-3 inside the station building on December 29, 2015. The soil vapor monitoring point installation was designed to evaluate the potential vapor intrusion pathway into the station building. Laboratory analytical results for the soil vapor sample indicated that a concentration of benzene was detected above the Ecology Vapor Guidance, sub-slab soil gas screening level.

Due to the elevated benzene concentrations detected in the sub-slab vapor sample during this project, Antea Group has scheduled another vapor sampling event at the Site. The next soil vapor sampling event is currently planned during the second quarter of 2016. Antea Group will collect another sub-slab vapor sample from the vapor monitoring point in the station building. This sample will be repeated to verify previous concentrations and to measure current conditions. As before, the sample will be collected in a laboratory-supplied Summa Canister with a flow regulator set at approximately 150 ml/min.

In addition, Antea Group proposes to collect one indoor air sample, and two outdoor air samples from the Site. The indoor air sample will be collected from the office located inside the building to determine the air quality in an area where employees are typically working over an 8-hour period. One outdoor air sample will be collected behind the station building to determine background conditions at the Site. The second outdoor air sample will be collected near the dispenser islands to establish background air quality levels typical of an operating fueling station. These three samples will be collected in laboratory-supplied Summa Canisters with the flow regulators set to collect the samples over an 8-hour period.

## **REMARKS**

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The recommendations contained in this report represent Antea USA, Inc.'s professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Antea USA, Inc. and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Antea USA, Inc.'s client and anyone else specifically identified in writing by Antea USA, Inc. as a user of this report. Antea USA, Inc. will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Antea USA, Inc. makes no express or implied warranty as to the contents of this report.

Antea Group appreciates the opportunity to provide environmental services to you. Please call Matthew Miller, Senior Project Manager, at 425-498-7722 if you have any questions regarding the contents of this letter.

Prepared by:



Date: May 31, 2016


For Lauren Hamilton  
Staff Professional

Reviewed by:



Date: May 31, 2016

Jaime Sasse  
Project Professional



Matthew R. Miller, LG  
Senior Project Manager



Date: May 31, 2016

Matthew Miller

cc: Toxics Cleanup Program, Washington State Department of Ecology, Olympia, Washington (Hard Copy)  
Mr. Mark Newman, The Vertex Companies, Inc., Seattle, Washington (Electronic Copy)  
Argo Pro /Colony Insurance, San Antonio, Texas (Electronic copy issued by Vertex)  
Ms. Carrie Pederson, PLIA, Olympia, Washington (Electronic copy issued by Vertex)  
File, Antea Group

## Enclosures

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Table 1            Soil Vapor Analytical Results

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Figure 1            Site Location Map  
Figure 2            Site Map with Soil Vapor Point  
Figure 3            Soil Vapor Sampling Train Assembly  
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Figure 5            Soil Vapor Sampling Train in Shroud

### Appendices

Appendix A        WA Department of Ecology Vapor Guidance Screening Levels  
Appendix B        Analytical Lab Reports and Chain-of-Custody Documentation

## ***Table***

Table 1      Soil Vapor Analytical Results

TABLE 1  
 SOIL VAPOR ANALYTICAL RESULTS  
 Miller's Market  
 3152 Washington Way  
 Longview, Washington

Well I.D. (TOC)	Sample Date	Benzene ( $\mu\text{g}/\text{m}^3$ )	Toluene ( $\mu\text{g}/\text{m}^3$ )	Ethyl- benzene ( $\mu\text{g}/\text{m}^3$ )	Xylenes ( $\mu\text{g}/\text{m}^3$ )
Soil Vapor Sample	01/06/16	12	5.7	0.76	4.1
<b>DOE Screening Levels</b>		<b>10.7</b>	--	--	--

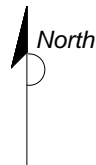
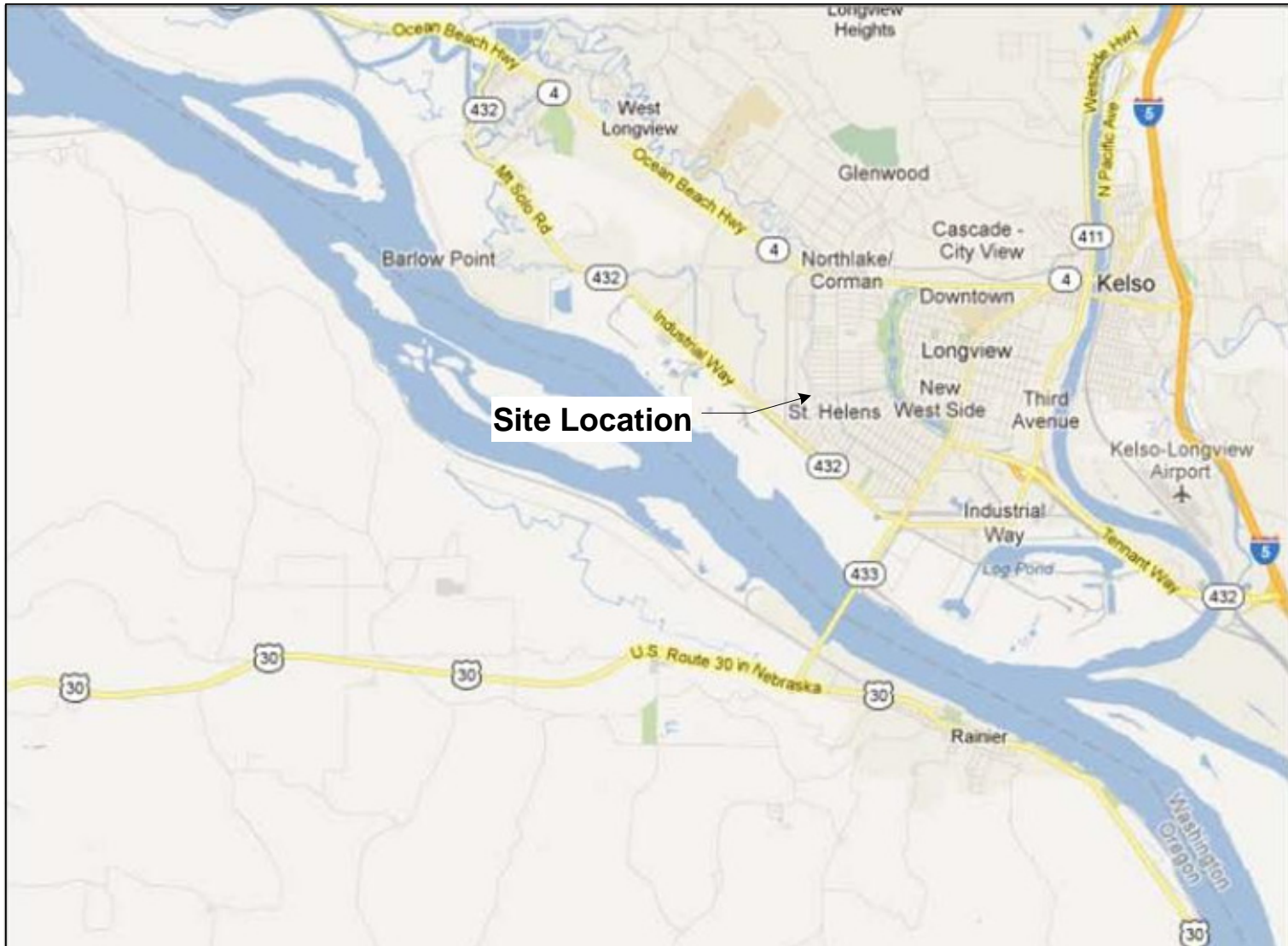
**Notes:**

( $\mu\text{g}/\text{m}^3$ ) = micrograms per cubic meter

BTEX Compounds - Analysis by EPA Method TO-15

## ***Figures***

- Figure 1      Site Location Map
- Figure 2      Site Map with Soil Vapor Point
- Figure 3      Soil Vapor Sampling Train Assembly
- Figure 4      Probe and Summa
- Figure 5      Soil Vapor Sampling Train in Shroud

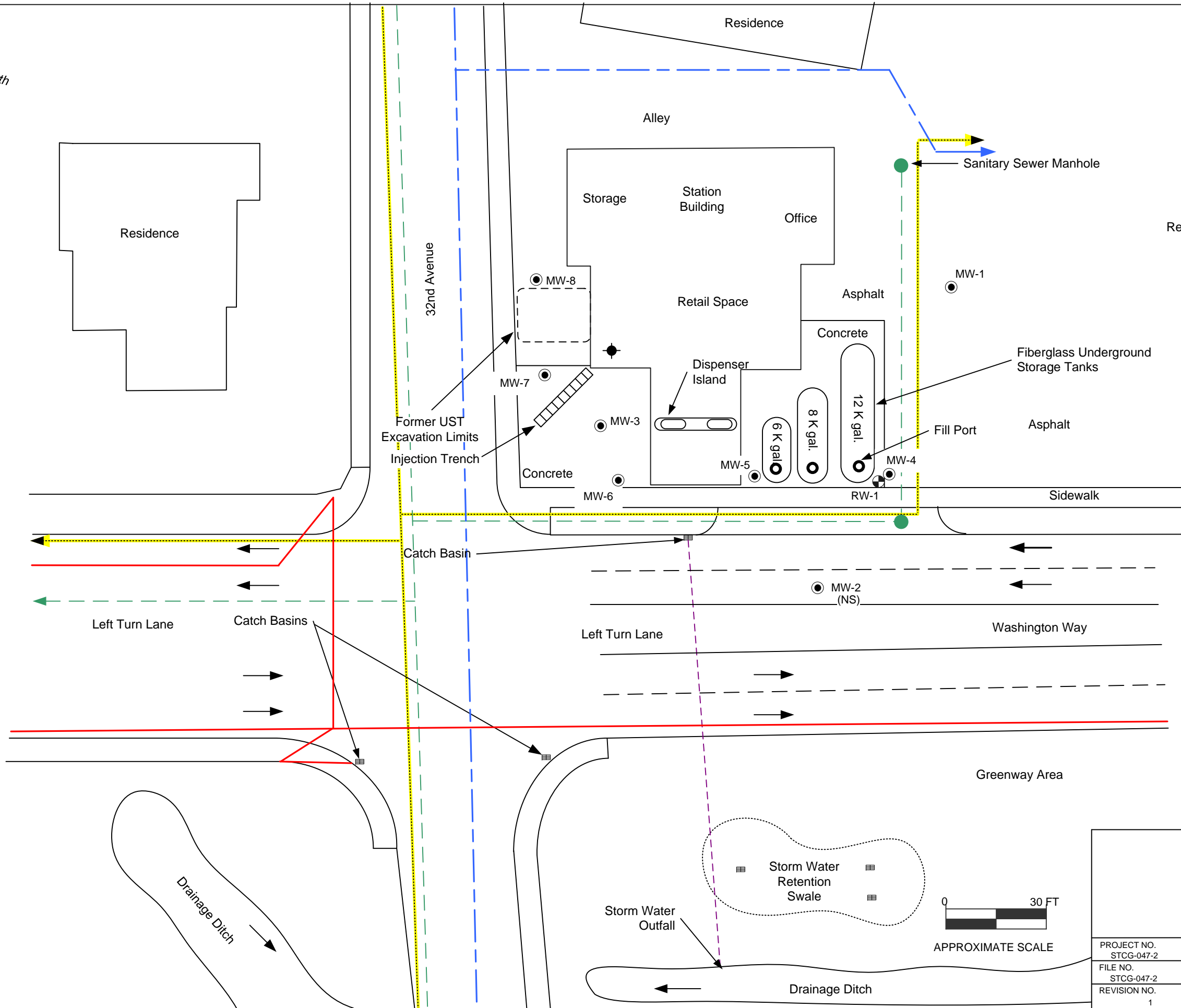
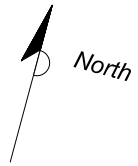


**FIGURE 1**  
**SITE LOCATION MAP**

MILLER'S MARKET  
3152 WASHINGTON WAY  
LONGVIEW, WASHINGTON

PROJECT NO. STCG-047-2	DRAWN BY JK 5-12-12
FILE NO. STCG-047-2	PREPARED BY JK
REVISION NO.	REVIEWED BY MM





**LEGEND**

- Soil Vapor Point
- MW-2 ● Groundwater Monitoring Well Location and Designation (MW-1 to MW-3 November 2003) (MW-4 to MW-8 November 2005)
- RW-1 ● Recovery Well Location and Designation (November 2003)
- Existing Groundwater Monitoring Well
- G Gasoline  $\mu\text{g/L}$
- B Benzene  $\mu\text{g/L}$
- T Toluene  $\mu\text{g/L}$
- E Ethylbenzene  $\mu\text{g/L}$
- X Xylenes  $\mu\text{g/L}$
- MTBE Methyl T-Butyl Ether  $\mu\text{g/L}$
- <N Non Detect
- $\mu\text{g/L}$  Micrograms per Liter
- NS Not Sampled
- 4" Water Line (3' to 4' Deep)
- 8" Sewer Line and Associated Manholes (7' to 9' Deep)
- Storm Water Line
- 2" Natural Gas Line
- Electrical Line (2' to 3' Deep)

**FIGURE 2**  
**SITE MAP WITH SOIL VAPOR POINT**

**Miller's Market**  
3152 Washington Way  
Longview, Washington



PROJECT NO. STCG-047-2	DRAWN BY N.H. 9/31/03
FILE NO. STCG-047-2	PREPARED BY JK 9/14/15
REVISION NO. 1	REVIEWED BY JK





**FIGURE 3**  
**SOIL VAPOR SAMPLING TRAIN ASSEMBLY**

MILLER'S MARKET  
 3152 WASHINGTON WAY  
 LONGVIEW, WASHINGTON

PROJECT NO. STCG-047-2	DRAWN BY LH 04/15/16
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REVISION NO.	REVIEWED BY MM





**FIGURE 4**

**PROBE and SUMMA**

MILLER'S MARKET  
3152 WASHINGTON WAY  
LONGVIEW, WASHINGTON

PROJECT NO. STCG-047-2	DRAWN BY LH 04/15/16
FILE NO. STCG-047-2	PREPARED BY LH
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**FIGURE 5**  
**SOIL VAPOR SAMPLING TRAIN IN SHROUD**

MILLER'S MARKET  
3152 WASHINGTON WAY  
LONGVIEW, WASHINGTON

PROJECT NO. STCG-047-2	DRAWN BY LH 04/15/16
FILE NO. STCG-047-2	PREPARED BY LH
REVISION NO.	REVIEWED BY MM



## ***Appendix A***

WA Department of Ecology Vapor Guidance Screening Levels

Updated Table B-1 from Ecology "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" Publication no. 09-09-047

Chemical Name	CAS #	Risk Driver for Individual Chemicals	2015	2015	2015	2015	2015	2015	2015	2015
			Indoor Air	Indoor Air	Groundwater	Groundwater	Sub-Slab	Sub-Slab	Deep Soil Gas	Deep Soil Gas
			Cleanup Level Method B Noncancer	Cleanup Level Method B Cancer	Screening Level Method B Noncancer	Screening Level Method B Cancer	Soil Gas Screening Level Method B Noncancer	Soil Gas Screening Level Method B Cancer	Screening Level Method B Noncancer	Screening Level Method B Cancer
		(µg/m³)	(µg/m³)	(µg/L)	(µg/L)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	
acetaldehyde	75-07-0	Cancer	4.11E+00	1.14E+00	1.92E+03	5.30E+02	1.37E+02	3.79E+01	4.11E+02	1.14E+02
acetonitrile	75-05-8	Noncancer	2.74E+01		3.30E+04		9.14E+02		2.74E+03	
acrolein	107-02-8	Noncancer	9.14E-03		2.90E+00		3.05E-01		9.14E-01	
acrylonitrile	107-13-1	Cancer	9.14E-01	3.68E-02	3.98E+02	1.60E+01	3.05E+01	1.23E+00	9.14E+01	3.68E+00
aldrin	309-00-2	Cancer		5.10E-04		3.20E-01		1.70E-02		5.10E-02
benzene	71-43-2	Cancer	1.37E+01	3.21E-01	1.03E+02	2.40E+00	4.57E+02	1.07E+01	1.37E+03	3.21E+01
benzyl chloride	100-44-7	Cancer	4.57E-01	5.10E-02	5.56E+01	6.20E+00	1.52E+01	1.70E+00	4.57E+01	5.10E+00
bis(2-chloroethyl)ether	111-44-4	Cancer		7.58E-03		2.60E+01		2.53E-01		7.58E-01
bromodichloromethane	75-27-4	Cancer		6.76E-02		1.84E+00		2.25E+00		6.76E+00
bromoform	75-25-2	Cancer		2.27E+00		2.00E+02		7.58E+01		2.27E+02
bromomethane	74-83-9	Noncancer	2.29E+00		1.30E+01		7.62E+01		2.29E+02	
butadiene;1,3-	106-99-0	Cancer	9.14E-01	8.33E-02	4.06E-01	3.70E-02	3.05E+01	2.78E+00	9.14E+01	8.33E+00
carbon disulfide	75-15-0	Noncancer	3.20E+02		4.00E+02		1.07E+04		3.20E+04	
carbon tetrachloride	56-23-5	Cancer	4.57E+01	4.17E-01	5.92E+01	5.39E-01	1.52E+03	1.39E+01	4.57E+03	4.17E+01
chloro-1,3-butadiene;2-	126-99-8	Cancer	9.14E+00	8.33E-03	3.43E+01	3.13E-02	3.05E+02	2.78E-01	9.14E+02	8.33E-01
chlorobenzene	108-90-7	Noncancer	2.29E+01		2.86E+02		7.62E+02		2.29E+03	
chlorodifluoromethane	75-45-6	Noncancer	2.29E+04		2.70E+04		7.62E+05		2.29E+06	
chloroform	67-66-3	Cancer	4.48E+01	1.09E-01	4.95E+02	1.20E+00	1.49E+03	3.62E+00	4.48E+03	1.09E+01
chloromethane	74-87-3	Noncancer	4.11E+01		1.53E+02		4.11E+03		4.11E+03	
cumene	98-82-8	Noncancer	1.83E+02		7.20E+02		6.10E+03		1.83E+04	
dibromochloromethane	124-48-1	Cancer		9.26E-02		4.53E+00		3.09E+00		9.26E+00
dichlorobenzene;1,2-	95-50-1	Noncancer	9.14E+01		2.57E+03		3.05E+03		9.14E+03	
dichlorobenzene;1,4-	106-46-7	Cancer	3.66E+02	2.27E-01	7.81E+03	4.85E+00	1.22E+04	7.58E+00	3.66E+04	2.27E+01
dichlorodifluoromethane	75-71-8	Noncancer	4.57E+01		5.66E+00		1.52E+03		4.57E+03	
dichloroethane;1,1-	75-34-3	Cancer		1.56E+00		1.12E+01		5.21E+01		1.56E+02
dichloroethane;1,2-	107-06-2	Cancer	3.20E+00	9.62E-02	1.40E+02	4.20E+00	1.07E+02	3.21E+00	3.20E+02	9.62E-02
dichloroethylene;1,1-	75-35-4	Noncancer	9.14E+01		1.30E+02		3.05E+03		9.14E+03	
dichloropropane;1,2-	78-87-5	Cancer	1.83E+00	2.50E-01	2.84E+01	3.89E+00	6.10E+01	8.33E+00	1.83E+02	2.50E+01
dichloropropene;1,3-	542-75-6	Cancer	9.14E+00	6.25E-01	2.34E+01	1.60E+00	3.05E+02	2.08E+01	9.14E+02	6.25E+01
ethyl chloride	75-00-3	Noncancer	4.57E+03		1.83E+04		1.52E+05		4.57E+05	
ethylbenzene	100-41-4	Noncancer	4.57E+02		2.78E+03		1.52E+04		4.57E+04	
ethylene dibromide (EDB)	106-93-4	Cancer	4.11E+00	4.17E-03	2.77E+02	2.80E-01	1.37E+02	1.39E-01	4.11E+02	4.17E-01
ethylene oxide	75-21-8	Cancer	1.37E+01	2.84E-02	8.78E+02	1.82E+00	4.57E+02	9.47E-01	1.37E+03	2.84E+00
hexachlorobutadiene	87-68-3	Cancer		1.14E-01		8.10E-01		3.79E+00		1.14E+01
hexachloroethane	67-72-1	Cancer	1.37E+01	2.27E-01	1.87E+02	3.10E+00	4.57E+02	7.58E+00	1.37E+03	2.27E+01
hexane;n-	110-54-3	Noncancer	3.20E+02		7.80E+00		1.07E+04		3.20E+04	
hydrogen cyanide	74-90-8	Noncancer	3.66E-01		1.02E+02		1.22E+01		3.66E+01	
mercury	7439-97-6	Noncancer	1.37E-01		8.90E-01		4.57E+00		1.37E+01	
methacrylonitrile	126-98-7	Noncancer	1.37E+01		2.40E+03		4.57E+02		1.37E+03	
methyl ethyl ketone	78-93-3	Noncancer	2.29E+03		1.74E+06		7.62E+04		2.29E+05	
methyl isobutyl ketone	108-10-1	Noncancer	1.37E+03		4.71E+05		4.57E+04		1.37E+05	
methyl methacrylate	80-62-6	Noncancer	3.20E+02		4.60E+04		1.07E+04		3.20E+04	
methyl tert-butyl ether	1634-04-4	Cancer	1.37E+03	9.62E+00	8.70E+04	6.10E+02	4.57E+04	3.21E+02	1.37E+05	9.62E+02
methylene chloride	75-09-2	Cancer	2.74E+02	2.50E+02	4.86E+03	4.43E+03	9.14E+03	8.33E+03	2.74E+04	2.50E+04
naphthalene	91-20-3	Cancer	1.37E+00	7.35E-02	1.67E+02	8.93E+00	4.57E+01	2.45E+00	1.37E+02	7.35E+00
nitrobenzene	98-95-3	Cancer	4.11E+00	6.25E-02	1.05E+04	1.60E+02	1.37E+02	2.08E+00	4.11E+02	6.25E+00
nitropropane;2-	79-46-9	Cancer	9.14E+00	9.26E-04	3.55E+03	3.60E-01	3.05E+02	3.09E-02	9.14E+02	9.26E-02
styrene	100-42-5	Noncancer	4.57E+02		8.10E+03		1.52E+04		4.57E+04	
tetrachloroethane;1,1,1,2-	630-20-6	Cancer		3.38E-01		7.40E+00		1.13E+01		3.38E+01
tetrachloroethane;1,1,2,2-	79-34-5	Cancer		4.31E-02		6.20E+00		1.44E+00		4.31E+00
tetrachloroethylene	127-18-4	Cancer	1.83E+01	9.62E+00	4.35E+01	2.29E+01	6.10E+02	3.21E+02	1.83E+03	9.62E+02
toluene	108-88-3	Noncancer	2.29E+03		1.56E+04		7.62E+04		2.29E+05	
trichloro-1,2,2-trifluoroethane;1,1,2-	76-13-1	Noncancer	1.37E+04		1.10E+03		4.57E+05		1.37E+06	
trichlorobenzene;1,2,4-	120-82-1	Noncancer	9.14E-01		3.92E+01		3.05E+01		9.14E+01	
trichloroethane;1,1,1-	71-55-6	Noncancer	2.29E+03		5.24E+03		7.62E+04		2.29E+05	
trichloroethane;1,1,2-	79-00-5	Noncancer	9.14E-02	1.56E-01	4.51E+00	7.71E+00	3.05E+00	5.21E+00	9.14E+00	1.56E+01
trichloroethylene	79-01-6	Cancer	9.14E-01	3.70E-01	3.84E+00	1.55E+00	3.05E+01	1.23E+01	9.14E+01	3.70E+01

trichlorofluoromethane	75-69-4	Noncancer	3.20E+02		1.20E+02		1.07E+04		3.20E+04
trimethylbenzene;1,2,4-	95-63-6	Noncancer	3.20E+00		2.84E+01		1.07E+02		3.20E+02
vinyl acetate	108-05-4	Noncancer	9.14E+01		7.80E+03		3.05E+03		9.14E+03
vinyl chloride	75-01-4	Cancer	4.57E+01	2.80E-01	5.67E+01	3.47E-01	1.52E+03	9.33E+00	4.57E+03
xylene;m-	108-38-3	Noncancer	4.57E+01		3.10E+02		1.52E+03		4.57E+03
xylene;o-	95-47-6	Noncancer	4.57E+01		4.40E+02		1.52E+03		4.57E+03
VPH [EC5-6 aliphatics + EC6-8 aliphatics] fraction	NONE	Noncancer	2.70E+03		1.40E+02				
VPH [EC8-10 aliphatics + EC 10-12 aliphatics] fraction	NONE	Noncancer	1.40E+02		2.90E+00				
VPH [EC8-10 aromatics + EC10-12 aromatics] fraction minus [naphthalene]	NONE	Noncancer	1.80E+02		1.30E+03				
APH [EC5-8 aliphatics] fraction	NONE	Noncancer	2.70E+03				9.00E+04		2.70E+05
APH [EC9-12 aliphatics] fraction	NONE	Noncancer	1.40E+02				4.70E+03		1.40E+04
APH [EC9-10 aromatics] fraction	NONE	Noncancer	1.80E+02				6.00E+03		1.80E+04

## ***Appendix B***

Analytical Lab Reports and Chain-of-Custody Documentation



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2655 Park Center Dr., Suite A  
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## LABORATORY REPORT

January 25, 2016

Matthew Miller  
Antea USA Inc  
4006 148th Avenue NE  
Redmond, WA 98052

**RE: Millers Market Soil Vapor / STCG 0472**

Dear Matthew:

Your report number P1600116 has been amended for the samples submitted to our laboratory on January 11, 2016. The report has been revised to report BTEX only as indicated on the chain of custody. The entire report has been revised due to fewer pages and indicated by the "Revised Page" footer located at the bottom right of each page.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

By Kate Aguilera at 2:35 pm, Jan 25, 2016

Kate Aguilera  
Project Manager



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[www.alsglobal.com](http://www.alsglobal.com)

Client: Antea USA Inc  
Project: Millers Market Soil Vapor / STCG 0472

Service Request No: P1600116

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## CASE NARRATIVE

The sample was received intact under chain of custody on January 11, 2016 and was stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the sample at the time of sample receipt.

### Volatile Organic Compound Analysis

The sample was analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation, however it is not part of the AIHA-LAP accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The container was cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

---

*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>	101661
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0694
DoD ELAP	<a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>	L15-398
Florida DOH (NELAP)	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E871020
Maine DHHS	<a href="http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm">http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm</a>	2014025
Minnesota DOH (NELAP)	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	977273
New Jersey DEP (NELAP)	<a href="http://www.nj.gov/dep/oqa/">http://www.nj.gov/dep/oqa/</a>	CA009
New York DOH (NELAP)	<a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>	11221
Oregon PHD (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	4068-001
Pennsylvania DEP	<a href="http://www.depweb.state.pa.us/labs">http://www.depweb.state.pa.us/labs</a>	68-03307 (Registration)
Texas CEQ (NELAP)	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704413-15-6
Utah DOH (NELAP)	<a href="http://www.health.utah.gov/lab/labimp/certification/index.html">http://www.health.utah.gov/lab/labimp/certification/index.html</a>	CA01627201 5-5
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at [www.alsglobal.com](http://www.alsglobal.com), or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

**ALS ENVIRONMENTAL**

**DETAIL SUMMARY REPORT**

Client: Antea USA Inc  
Project ID: Millers Market Soil Vapor / STCG 0472

Service Request: P1600116

Date Received: 1/11/2016  
Time Received: 09:40

TO-15 - VOC Cans

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	
Soil Vapor Sample 1	P1600116-001	Air	1/6/2016	14:40	SSC00158	-0.41	3.53	X





# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Antea USA Inc  
**Client Sample ID:** Soil Vapor Sample  
**Client Project ID:** Millers Market Soil Vapor / STCG 0472

ALS Project ID: P1600116  
 ALS Sample ID: P1600116-001

Test Code: EPA TO-15  
 Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13  
 Analyst: Evelyn Alvarez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes:  
 Container ID: SSC00158

Date Collected: 1/6/16  
 Date Received: 1/11/16  
 Date Analyzed: 1/16/16  
 Volume(s) Analyzed: 1.00 Liter(s)

Initial Pressure (psig): -0.41      Final Pressure (psig): 3.53

Canister Dilution Factor: 1.28

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
71-43-2	Benzene	<b>12</b>	0.64	<b>3.8</b>	0.20	
108-88-3	Toluene	<b>5.7</b>	0.64	<b>1.5</b>	0.17	
100-41-4	Ethylbenzene	<b>0.76</b>	0.64	<b>0.18</b>	0.15	
179601-23-1	m,p-Xylenes	<b>3.0</b>	1.3	<b>0.69</b>	0.29	
95-47-6	o-Xylene	<b>1.1</b>	0.64	<b>0.26</b>	0.15	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Antea USA Inc

**Client Sample ID:** Method Blank

**Client Project ID:** Millers Market Soil Vapor / STCG 0472

ALS Project ID: P1600116

ALS Sample ID: P160116-MB

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Analyst: Evelyn Alvarez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 1/16/16

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

CAS #	Compound	Result	MRL	Result	MRL	Data Qualifier
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbV	ppbV	
71-43-2	Benzene	ND	0.50	ND	0.16	
108-88-3	Toluene	ND	0.50	ND	0.13	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
95-47-6	o-Xylene	ND	0.50	ND	0.12	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Antea USA Inc  
**Client Project ID:** Millers Market Soil Vapor / STCG 0472

ALS Project ID: P1600116

Test Code: EPA TO-15  
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13  
Analyst: Evelyn Alvarez  
Sample Type: 6.0 L Silonite Canister(s)  
Test Notes:

Date(s) Collected: 1/6/16  
Date(s) Received: 1/11/16  
Date(s) Analyzed: 1/16/16

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4	Toluene-d8	Bromofluorobenzene	Acceptance Limits	Data Qualifier
		Percent Recovered	Percent Recovered	Percent Recovered		
Method Blank	P160116-MB	87	102	116	70-130	
Lab Control Sample	P160116-LCS	86	103	117	70-130	
Soil Vapor Sample	P1600116-001	88	103	115	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

<b>Client:</b>	<b>Antea USA Inc</b>	ALS Project ID: P1600116
<b>Client Sample ID:</b>	<b>Lab Control Sample</b>	ALS Sample ID: P160116-LCS
<b>Client Project ID:</b>	<b>Millers Market Soil Vapor / STCG 0472</b>	
Test Code:	EPA TO-15	Date Collected: NA
Instrument ID:	Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13	Date Received: NA
Analyst:	Evelyn Alvarez	Date Analyzed: 1/16/16
Sample Type:	6.0 L Silonite Canister	Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:		

CAS #	Compound	Spike Amount <small>µg/m<sup>3</sup></small>	Result <small>µg/m<sup>3</sup></small>	% Recovery	ALS Acceptance Limits	Data Qualifier
71-43-2	Benzene	226	<b>197</b>	<b>87</b>	61-110	
108-88-3	Toluene	218	<b>207</b>	<b>95</b>	67-117	
100-41-4	Ethylbenzene	218	<b>225</b>	<b>103</b>	69-123	
179601-23-1	m,p-Xylenes	428	<b>443</b>	<b>104</b>	67-125	
95-47-6	o-Xylene	210	<b>217</b>	<b>103</b>	67-124	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.  
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.