

SOIL VAPOR INTRUSION ASSESSMENT  
FEBRUARY 2011 SUB-SLAB SAMPLING  
Darigold Rainier Avenue Facility

Prepared for: Darigold, Inc.

Project No. 090066-003 • March 8, 2011 •



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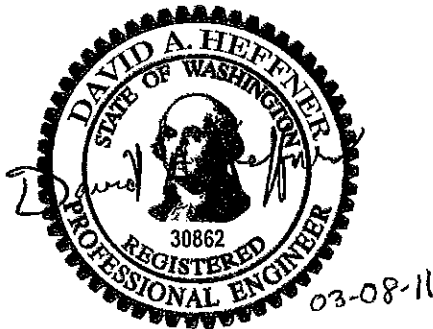


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Aspect Consulting, LLC



**Dave Heffner, PE**  
Associate Engineer  
dheffner@aspectconsulting.com

V:\090066 Darigold\Rainier Avenue Facility\Deliverables\Soil VI Assessment\Feb 2011 Sampling Report\VI Assessment Rpt\_Mar 2011.doc



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# 1 Introduction

This report documents the results of sub-slab soil vapor sampling conducted in the basement of the large Darigold building located at 4058 Rainier Avenue South in Seattle. Releases from former underground storage tank (UST) systems have impacted the North Yard of the facility with petroleum hydrocarbons in the gasoline and diesel ranges, as well as the gasoline additive methyl tertiary-butyl ether (MTBE). Environmental investigations have detected contaminants adsorbed to soil, dissolved in groundwater, and floating on the groundwater table as separate-phase hydrocarbon (SPH) near the northwest corner of the building (see Figure 1). In addition, a soil vapor survey conducted in 1990 detected elevated concentrations of total petroleum hydrocarbon (TPH) between the building's northwest corner and the former UST location.

Volatile organic compounds (VOCs), including MTBE and gasoline-range petroleum hydrocarbons, can migrate through the subsurface in the vapor phase and enter buildings through joints/cracks in the floor slab, utility penetrations, and other openings. Soil vapor samples were collected from beneath the basement's floor slab to evaluate the potential for unacceptable impacts to indoor air via vapor intrusion (VI).

## 2 Sub-Slab Vapor Sampling

Vapor probe installation and sampling was conducted in general conformance with the site-specific *Soil Vapor Intrusion Assessment Work Plan (Work Plan; Aspect, 2011)*. The three probes (SSV-1 through SSV-3) were installed in the basement floor slab on February 11, 2011, at the locations shown on Figure 1. Sub-slab vapor samples were collected between approximately 10:00 am and 11:30 am on February 17, 2011. Laboratory-supplied evacuated 6-liter Summa canisters were used to collect 1-hour time-integrated samples. The gages on the canisters showed vacuum readings of approximately 29 inches of mercury (in. Hg) at the start of the sampling period, and approximately 8 in. Hg at its conclusion. Upon completion of sampling, the canisters were packed in their original shipping container and returned to Air Toxics, Limited (ATL), in Folsom, California. Refer to the *Work Plan* (Section 3 and Appendix B) for additional detail regarding vapor probe installation and sampling procedures.

VI occurs when air pressure inside the building is lower than the pressure of the soil vapor beneath the floor slab, and the rate of VI increases as that pressure difference increases. Since both operation of the building's HVAC system and ambient weather conditions can impact the pressure gradient across the floor slab, they must be considered in assessing whether the sampling event is representative of typical VI conditions.

Darigold personnel reported that the HVAC system serving this portion of the building's basement runs continuously, and normal operation was maintained during the sampling event.

Weather conditions recorded at the Boeing Field station in Seattle during the week of the sampling event are provided in Appendix A. A period of decreasing barometric pressure (e.g., when a storm-generated low moves into the area) is generally expected to yield worst-case VI conditions, since soil vapor is “exhaled” from the subsurface to maintain pressure equilibrium. As shown on the plot in Appendix A, barometric pressure exhibited a decreasing trend for the 10-hour period immediately prior to start of sampling. Since the groundwater table was only about 1-foot below the base of the floor slab at the time of sampling, the soil vapor “reservoir” beneath the building is extremely limited. Therefore, small changes in barometric pressure are not expected to significantly impact VI at the Darigold building.

### 3 Laboratory Analysis and Evaluation of Results

ATL analyzed the canister samples for the ten VOCs identified in the *Work Plan* as potential contaminants of concern (PCOCs) using modified EPA Method TO-15-LL (Sp). Analytical results are summarized in Table 1, and the complete laboratory report is provided as Appendix B. The screening levels against which the sampling results were evaluated are also listed in the table. As discussed in the *Work Plan*, the screening levels are 10 times the most stringent corresponding Washington State Model Toxics Control Act (MTCA) Method B air cleanup levels. Thus, the screening levels conservatively account for soil vapor attenuation across the basement’s floor slab in accordance with the Tier I methodology specified in Ecology’s *Guidance for Evaluating Soil Vapor Intrusion in Washington State* (Ecology, 2009).

As shown in Table 1, many of the PCOCs were detected at low concentrations in the sub-slab soil vapor. However, none of the PCOC detections exceed the corresponding screening levels. In addition, the detection limits for those PCOCs that were not detected are below the corresponding screening levels.

### 4 Conclusion

Vapor probes were installed at three basement locations and sub-slab vapor sampling was successfully completed in accordance with the *Work Plan*. Sampling results indicate that PCOC concentrations in the soil vapor beneath the building are below conservative screening levels established by Ecology for protection of indoor air. Furthermore, the sampling event appears to have been conducted under “typical” conditions with respect to VI potential. The HVAC system reportedly runs continuously, and was operating normally during sampling. Barometric pressure showed a decreasing trend immediately prior to sampling, although this parameter likely has little impact on VI potential at this site. Therefore, we conclude that the results of this sampling event adequately demonstrate that VI of PCOCs associated with soil and groundwater contamination in the

North Yard is not a concern, and there is no need for follow-up vapor-phase (sub-slab or indoor air) sampling.

## 5 References

Aspect Consulting, 2011, Soil Vapor Intrusion Assessment Work Plan, Rainier Avenue Facility, Seattle, Washington, January 18, 2011.

Ecology, 2009, Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Washington State Department of Ecology, Toxics Cleanup Program, Review DRAFT, October 2009.

## 6 Limitations

Work for this project was performed and this report prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of Darigold, Inc., for specific application to the referenced property. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

## Table 1 - Screening Levels and Sub-Slab Sampling Results February 2011 Sampling Event

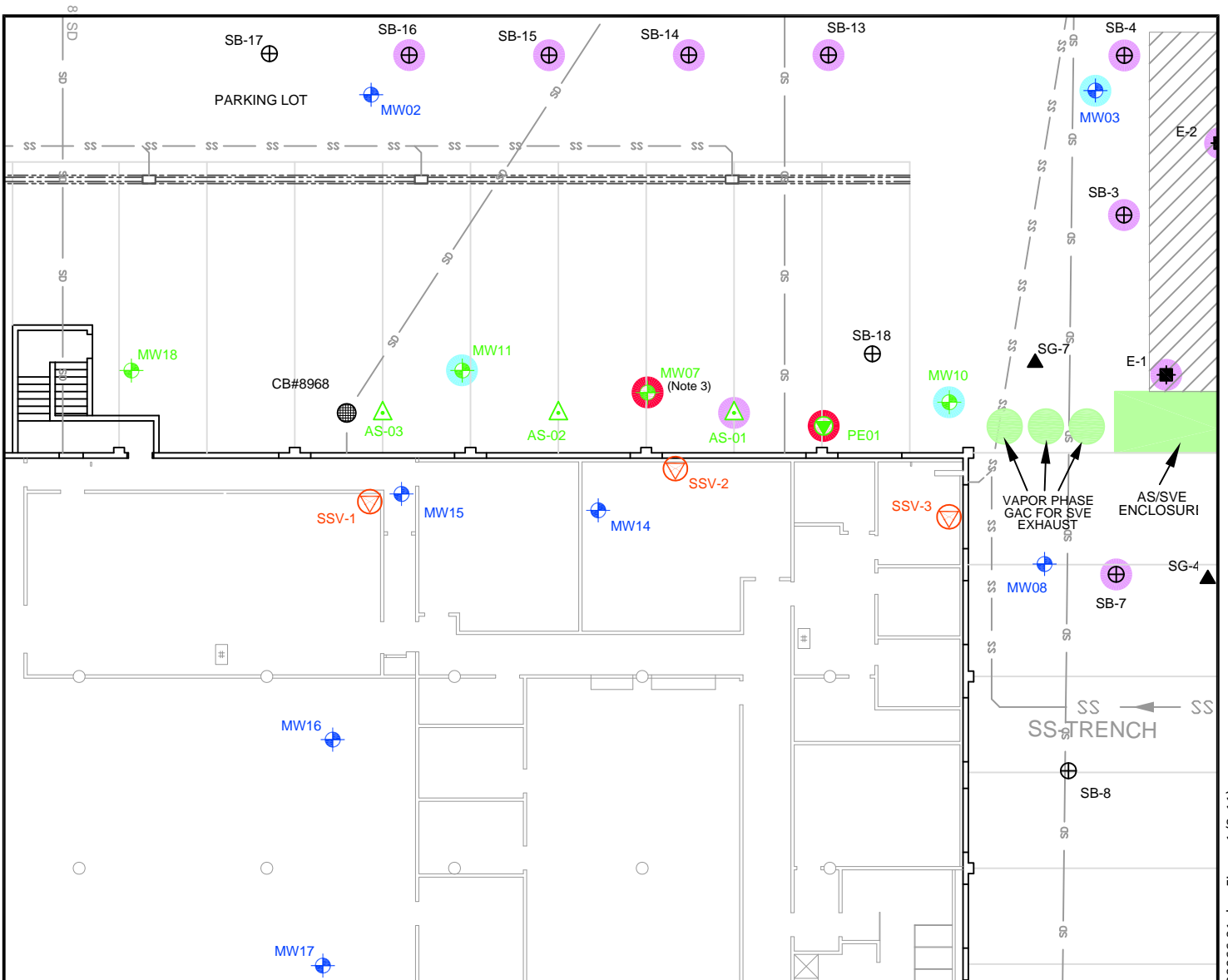
Soil Vapor Intrusion Assessment, Darigold Rainier Avenue Facility

Potential Compound of Concern (PCOC)	Screening Level <sup>(2)</sup>	Sub-Slab Soil Vapor Samples Collected on February 17, 2011		
		SSV-1	SSV-2	SSV-3
Methyl tertiary-butyl ether	96	0.66 U	0.62 U	0.64 U
n-Hexane	3,200	0.64 U	0.86	0.87
Benzene	3.2	0.70	1.0	2.0
Toluene	22,000	9.9	12	10
Ethylbenzene	4,600	2.3	3.5	2.8
Xylenes (total)	460	16	21	16
Cumene	1,800	1.4	2.8	1.5
1,3,5-Trimethylbenzene	27	0.90 U	0.84 U	0.88 U
1,2,4-Trimethylbenzene	27	3.4	5.7	4.6
Naphthalene	14	4.8 U	4.5 U	4.7 U

U Analyte was not detected at the indicated detection limit.

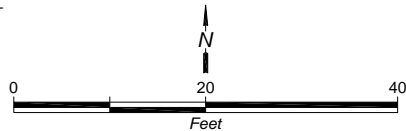
**Notes:**

- 1) All concentrations are in units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).
- 2) Values in this column were obtained by multiplying the most stringent MTCA Method B air cleanup level by 10, to conservatively account for soil vapor attenuation across the floor slab in accordance with Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State*.



**NOTE:** COMPONENTS OF THE AIR SPARGE/SOIL VAPOR EXTRACTION (AS/SVE) SYSTEM INSTALLED IN AUGUST 2008 ARE COLORED GREEN ON THIS FIGURE

**REFERENCES:** SES, FIELD MEASUREMENTS, 2004-2009 DARIGOLD, INC, FACILITY DRAWINGS, 2005. CITY OF SEATTLE, SEWER CARD NOS. 1442, 1443, AND 5412, 2001. SD&C, UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT, 1998.



**LEGEND**

- |  |   |
|--|---|
| SSV-1 VAPOR PROBE LOCATION (SUB-SLAB)  | CATCH BASIN OR CURB INLET                     |
| B-1 SOIL BORING  | MANHOLE                                       |
| E-1 SOIL EXCAVATION BASE OR SIDEWALL SAMPLE  | SS SANITARY SEWER                             |
| SG-1 SOIL VAPOR SAMPLE (ENVIROS, 1990)   | SD STORM SEWER                                |
| MW01 GROUNDWATER MONITORING WELL   | ZIPPER DRAIN                                  |
| PE01 PILOT TEST WELL   | APPROXIMATE FORMER UST EXCAVATION (SES, 2004) |
| <p>NOTE: Green wells have been incorporated into the soil vapor extraction (SVE) system.</p> | UST UNDERGROUND STORAGE TANK                  |
| AS-01 AIR SPARGING WELL  |   |

**DETECTION OF MTCA METHOD A CLEANUP LEVEL EXCEEDENCES**

- SOIL ONLY
- GROUNDWATER ONLY
- SOIL AND GROUNDWATER

**NOTES:**

1. Among the explorations, only the monitoring wells (MWs) and Well PE01 have groundwater sampling results.
2. Groundwater cleanup level exceedences are based on the four monitoring rounds between August 2009 and May 2010.
3. Separate-phase hydrocarbon (SPH) is typically observed in Well MW07.



Site Plan Showing Cleanup Level Exceedances and Vapor Probe Locations  
 Darigold - Rainier Avenue Facility  
 Seattle, Washington

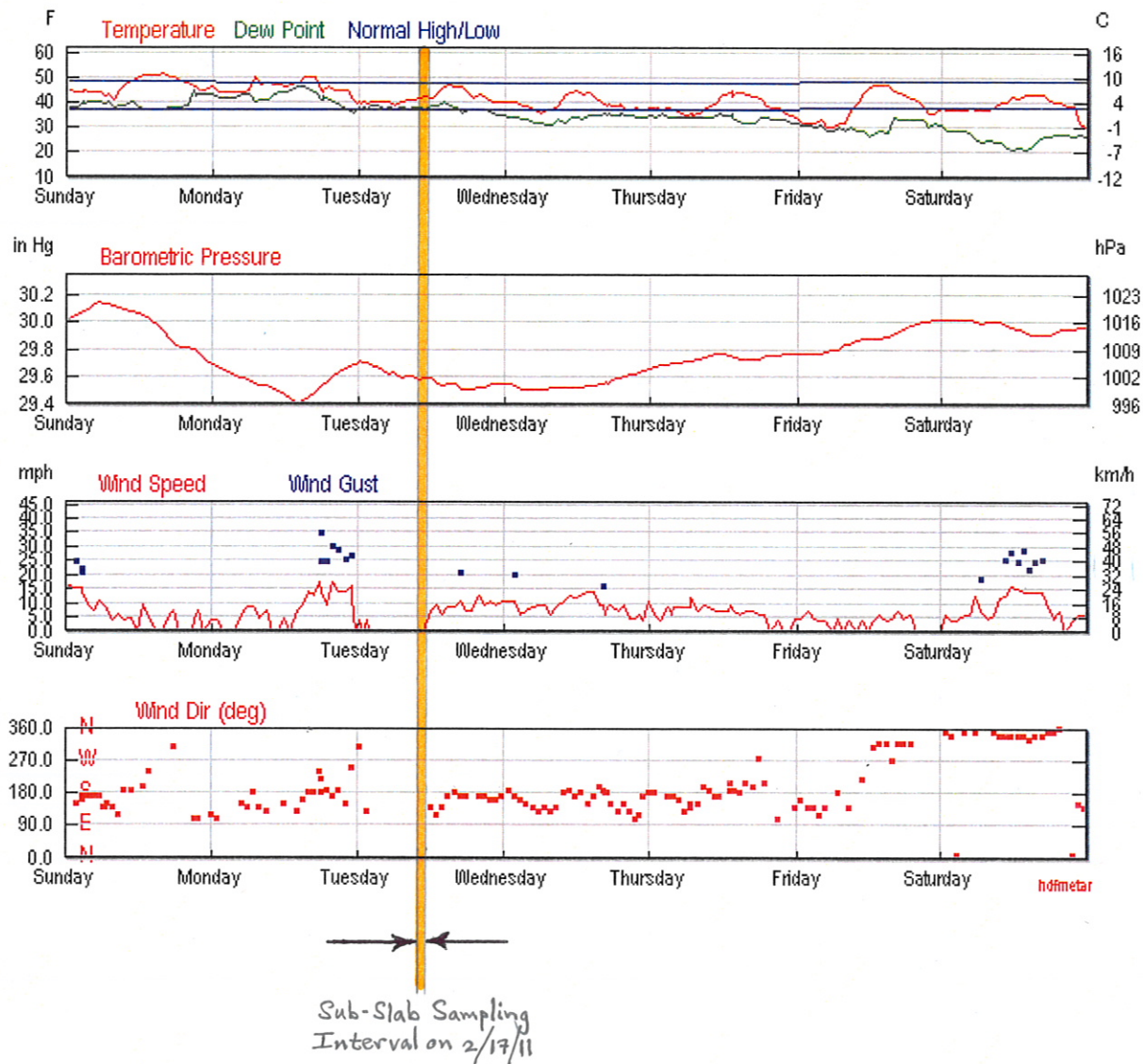
DATE:	March 2011
DESIGNED BY:	DAH
DRAWN BY:	SCC
REVISED BY:	SCC

PROJECT NO.	090066
FIGURE NO.	1

## **APPENDIX A**

### **Weather Conditions during Sub-Slab Sampling**

# Weather Conditions during Sub-Slab Sampling Boeing Field Station, Seattle



## **APPENDIX B**

**Laboratory Report  
Air Toxics, Limited**

2/28/2011

Mr. Dave Heffner  
Aspect Consulting LLC  
401 Second Avenue South  
Suite 201  
Seattle WA 98104

Project Name: Darigold  
Project #: 090066-003-05  
Workorder #: 1102396

Dear Mr. Dave Heffner

The following report includes the data for the above referenced project for sample(s) received on 2/21/2011 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner  
Project Manager

**WORK ORDER #: 1102396**

Work Order Summary

<b>CLIENT:</b>	Mr. Dave Heffner Aspect Consulting LLC 401 Second Avenue South Suite 201 Seattle, WA 98104	<b>BILL TO:</b>	Accounts Payable Aspect Consulting LLC 179 Madrone Lane North Bainbridge Island, WA 98110
<b>PHONE:</b>	206-328-7443	<b>P.O. #</b>	090066-003-05
<b>FAX:</b>	206-838-5853	<b>PROJECT #</b>	090066-003-05 Darigold
<b>DATE RECEIVED:</b>	02/21/2011	<b>CONTACT:</b>	Kelly Buettner
<b>DATE COMPLETED:</b>	02/28/2011		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SSV-1-021711	Modified TO-15	8.0 "Hg	5 psi
02A	SSV-2-021711	Modified TO-15	6.5 "Hg	5 psi
03A	SSV-3-021711	Modified TO-15	7.5 "Hg	5 psi
04A	Lab Blank	Modified TO-15	NA	NA
05A	CCV	Modified TO-15	NA	NA
06A	LCS	Modified TO-15	NA	NA
06AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: 

DATE: 02/28/11

Laboratory Director

Certification numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763,  
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719

Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,  
Accreditation number: E87680, Effective date: 07/01/09, Expiration date: 06/30/11

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Air Toxics Ltd.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630  
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

**LABORATORY NARRATIVE  
Modified TO-15  
Aspect Consulting LLC  
Workorder# 1102396**

Three 6 Liter Summa Canister (100% Certified) samples were received on February 21, 2011. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

<i>Requirement</i>	<i>TO-15</i>	<i>ATL Modifications</i>
ICAL %RSD acceptance criteria	+/- 30% RSD with 2 compounds allowed out to < 40% RSD	30% RSD with 4 compounds allowed out to < 40% RSD
Daily Calibration	+/- 30% Difference	<= 30% Difference with four allowed out up to <=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

There were no analytical discrepancies.

**Definition of Data Qualifying Flags**

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

- U - Compound analyzed for but not detected above the reporting limit.
- UJ- Non-detected compound associated with low bias in the CCV and/or LCS.
- N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

- a-File was requantified
- b-File was quantified by a second column and detector
- r1-File was requantified for the purpose of reissue

**Summary of Detected Compounds**  
**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

**Client Sample ID: SSV-1-021711**

**Lab ID#: 1102396-01A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Benzene	0.18	0.22	0.58	0.70
Toluene	0.18	2.6	0.69	9.9
Ethyl Benzene	0.18	0.53	0.79	2.3
m,p-Xylene	0.18	2.7	0.79	12
o-Xylene	0.18	0.80	0.79	3.5
Cumene	0.18	0.29	0.90	1.4
1,2,4-Trimethylbenzene	0.18	0.69	0.90	3.4

**Client Sample ID: SSV-2-021711**

**Lab ID#: 1102396-02A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Hexane	0.17	0.24	0.60	0.86
Benzene	0.17	0.31	0.55	1.0
Toluene	0.17	3.2	0.64	12
Ethyl Benzene	0.17	0.80	0.74	3.5
m,p-Xylene	0.17	3.6	0.74	16
o-Xylene	0.17	1.1	0.74	5.0
Cumene	0.17	0.57	0.84	2.8
1,2,4-Trimethylbenzene	0.17	1.2	0.84	5.7

**Client Sample ID: SSV-3-021711**

**Lab ID#: 1102396-03A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Hexane	0.18	0.25	0.63	0.87
Benzene	0.18	0.62	0.57	2.0
Toluene	0.18	2.8	0.67	10
Ethyl Benzene	0.18	0.64	0.78	2.8
m,p-Xylene	0.18	2.8	0.78	12
o-Xylene	0.18	0.86	0.78	3.8

**Summary of Detected Compounds**  
**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

**Client Sample ID: SSV-3-021711**

**Lab ID#: 1102396-03A**

Cumene	0.18	0.30	0.88	1.5
1,2,4-Trimethylbenzene	0.18	0.93	0.88	4.6

Client Sample ID: SSV-1-021711

Lab ID#: 1102396-01A

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

<b>File Name:</b>	<b>e022416</b>	<b>Date of Collection:</b> 2/17/11 10:00:00 AM
<b>Dil. Factor:</b>	<b>1.83</b>	<b>Date of Analysis:</b> 2/24/11 08:04 PM

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Methyl tert-butyl ether	0.18	Not Detected	0.66	Not Detected
Hexane	0.18	Not Detected	0.64	Not Detected
Benzene	0.18	0.22	0.58	0.70
Toluene	0.18	2.6	0.69	9.9
Ethyl Benzene	0.18	0.53	0.79	2.3
m,p-Xylene	0.18	2.7	0.79	12
o-Xylene	0.18	0.80	0.79	3.5
Cumene	0.18	0.29	0.90	1.4
1,3,5-Trimethylbenzene	0.18	Not Detected	0.90	Not Detected
1,2,4-Trimethylbenzene	0.18	0.69	0.90	3.4
Naphthalene	0.92	Not Detected	4.8	Not Detected

**Container Type: 6 Liter Summa Canister (100% Certified)**

<b>Surrogates</b>	<b>%Recovery</b>	<b>Method Limits</b>
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: SSV-2-021711

Lab ID#: 1102396-02A

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

<b>File Name:</b>	<b>e022417</b>	<b>Date of Collection:</b> 2/17/11 10:10:00 AM
<b>Dil. Factor:</b>	<b>1.71</b>	<b>Date of Analysis:</b> 2/24/11 08:44 PM

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Methyl tert-butyl ether	0.17	Not Detected	0.62	Not Detected
Hexane	0.17	0.24	0.60	0.86
Benzene	0.17	0.31	0.55	1.0
Toluene	0.17	3.2	0.64	12
Ethyl Benzene	0.17	0.80	0.74	3.5
m,p-Xylene	0.17	3.6	0.74	16
o-Xylene	0.17	1.1	0.74	5.0
Cumene	0.17	0.57	0.84	2.8
1,3,5-Trimethylbenzene	0.17	Not Detected	0.84	Not Detected
1,2,4-Trimethylbenzene	0.17	1.2	0.84	5.7
Naphthalene	0.86	Not Detected	4.5	Not Detected

**Container Type: 6 Liter Summa Canister (100% Certified)**

<b>Surrogates</b>	<b>%Recovery</b>	<b>Method Limits</b>
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	106	70-130

Client Sample ID: SSV-3-021711

Lab ID#: 1102396-03A

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

<b>File Name:</b>	<b>e022418</b>	<b>Date of Collection:</b> 2/17/11 10:20:00 AM
<b>Dil. Factor:</b>	<b>1.79</b>	<b>Date of Analysis:</b> 2/24/11 09:26 PM

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Methyl tert-butyl ether	0.18	Not Detected	0.64	Not Detected
Hexane	0.18	0.25	0.63	0.87
Benzene	0.18	0.62	0.57	2.0
Toluene	0.18	2.8	0.67	10
Ethyl Benzene	0.18	0.64	0.78	2.8
m,p-Xylene	0.18	2.8	0.78	12
o-Xylene	0.18	0.86	0.78	3.8
Cumene	0.18	0.30	0.88	1.5
1,3,5-Trimethylbenzene	0.18	Not Detected	0.88	Not Detected
1,2,4-Trimethylbenzene	0.18	0.93	0.88	4.6
Naphthalene	0.90	Not Detected	4.7	Not Detected

**Container Type: 6 Liter Summa Canister (100% Certified)**

<b>Surrogates</b>	<b>%Recovery</b>	<b>Method Limits</b>
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

Client Sample ID: Lab Blank

Lab ID#: 1102396-04A

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

<b>File Name:</b>	<b>e022408</b>	<b>Date of Collection:</b> NA
<b>Dil. Factor:</b>	<b>1.00</b>	<b>Date of Analysis:</b> 2/24/11 02:23 PM

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected
Hexane	0.10	Not Detected	0.35	Not Detected
Benzene	0.10	Not Detected	0.32	Not Detected
Toluene	0.10	Not Detected	0.38	Not Detected
Ethyl Benzene	0.10	Not Detected	0.43	Not Detected
m,p-Xylene	0.10	Not Detected	0.43	Not Detected
o-Xylene	0.10	Not Detected	0.43	Not Detected
Cumene	0.10	Not Detected	0.49	Not Detected
1,3,5-Trimethylbenzene	0.10	Not Detected	0.49	Not Detected
1,2,4-Trimethylbenzene	0.10	Not Detected	0.49	Not Detected
Naphthalene	0.50	Not Detected	2.6	Not Detected

Container Type: NA - Not Applicable

<b>Surrogates</b>	<b>%Recovery</b>	<b>Method Limits</b>
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	102	70-130

Client Sample ID: CCV

Lab ID#: 1102396-05A

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

<b>File Name:</b>	<b>e022402</b>	<b>Date of Collection:</b> NA
<b>Dil. Factor:</b>	<b>1.00</b>	<b>Date of Analysis:</b> 2/24/11 08:38 AM

<b>Compound</b>	<b>%Recovery</b>
Methyl tert-butyl ether	94
Hexane	84
Benzene	79
Toluene	84
Ethyl Benzene	88
m,p-Xylene	91
o-Xylene	90
Cumene	90
1,3,5-Trimethylbenzene	88
1,2,4-Trimethylbenzene	93
Naphthalene	110

**Container Type: NA - Not Applicable**

<b>Surrogates</b>	<b>%Recovery</b>	<b>Method Limits</b>
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	101	70-130

Client Sample ID: LCS

Lab ID#: 1102396-06A

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

File Name:	e022403	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 2/24/11 09:21 AM

Compound	%Recovery
Methyl tert-butyl ether	94
Hexane	82
Benzene	75
Toluene	80
Ethyl Benzene	85
m,p-Xylene	91
o-Xylene	86
Cumene	88
1,3,5-Trimethylbenzene	87
1,2,4-Trimethylbenzene	86
Naphthalene	93

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

Client Sample ID: LCSD

Lab ID#: 1102396-06AA

**MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN**

File Name:	e022405	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 2/24/11 11:10 AM

Compound	%Recovery
Methyl tert-butyl ether	94
Hexane	84
Benzene	75
Toluene	78
Ethyl Benzene	82
m,p-Xylene	87
o-Xylene	87
Cumene	85
1,3,5-Trimethylbenzene	83
1,2,4-Trimethylbenzene	82
Naphthalene	87

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	113	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	103	70-130

