SANBORN HEAD ENGINEERING

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REPORT OF HVAC ADJUSTMENT AND INDOOR AIR QUALITY TESTING

BUILDING 330D

Former IBM East Fishkill Facility
Hopewell Junction, New York

Prepared for IBM Corporation
File No. 2999.06
March 2016

8976 Wellington Road
Manassas, VA 20109

March 2, 2016

Alex G. Czuhanich
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Re: Report of HVAC Adjustment and Indoor Air Quality Testing – B330D
Former IBM East Fishkill Facility
Hopewell Junction, New York
EPA ID No. NYD000707901

Dear Mr. Czuhanich:

The enclosed report presents the results of heating, ventilating, and air conditioning (HVAC) adjustment and indoor air quality (IAQ) testing that was conducted in Building 330D of the Former IBM East Fishkill Facility in Hopewell Junction, New York, which is currently owned by Global Foundries (GF). IAQ testing was conducted in accordance with IBM's Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan, dated June 15, 2009.

If you have any questions or wish to discuss the report, please contact me at (703) 257-2583.

Sincerely yours,

Dean W. Chartrand

Dean W. Chartrand
Program Manager
Corporate Environmental Affairs

Encl: Report of HVAC Adjustment and Indoor Air Quality Testing – B330D

Cc:	Brad Green	Sanborn Head	(via email/cover letter only)
	Gary Marone	Global Foundries	(via email/cover letter only)
	Jayne Ulrich	Global Foundries	(via email/cover letter only)
	Scarlett McLaughlin	NYSDOH	(via email and hard copy)

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IBM Corporate Environmental Affairs
8976 Wellington Road
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Re: Report of HVAC Adjustment and Indoor Air Quality Testing – B330D
Former IBM East Fishkill Facility
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Dear Mr. Chartrand:

The enclosed report presents the results of heating, ventilating, and air conditioning (HVAC) adjustment and indoor air quality (IAQ) testing that was conducted in Building 330D at the former IBM East Fishkill facility. Please contact us if you have any questions.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea

David Shea, P.E.
President
20 Foundry St
Concord, NH 03301

JHS/DS: ds

Encl. Report of HVAC Adjustment and Indoor Air Quality Testing – B330D

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SANBORN HEAD ENGINEERING
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REPORT OF HVAC ADJUSTMENT AND INDOOR AIR QUALITY TESTING
BUILDING 330D

Former IBM East Fishkill Facility
Hopewell Junction, New York

Prepared for
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Prepared by
Sanborn, Head Engineering, P.C.

File 2999.06
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1.0 INTRODUCTION

This report summarizes the results of indoor air quality (IAQ) testing that was conducted in Building 330D (B330D) in December 2015 at the former IBM East Fishkill Facility (the site), currently owned by Global Foundries (GF). A site location plan is provided as Figure 1, and the location of B330D on the site is shown on Figure 2. The work described herein was conducted by Sanborn, Head Engineering, PC (SHPC), on behalf of IBM, in general accordance with IBM's Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan dated June 15, 2009 (RFI Work Plan), which was approved by the New York State Department of Environmental Conservation and Department of Health (the Agencies).

IBM sold its former East Fishkill facility to GF in July 2015, and IBM maintains responsibility for execution of the RFI Work Plan. IBM is working cooperatively with GF to maintain the heating, ventilating, and air conditioning (HVAC) operating conditions in routinely occupied portions of the buildings that were the focus of the RFI Work Plan. In August 2015, GF requested to change HVAC operating conditions on the first floor of B330D due to decreased occupancy. IAQ screening and sampling was subsequently conducted to assess concentrations of certain volatile organic compounds (VOCs) under the HVAC system operating conditions requested by GF.

The services conducted and this report are subject to the standard limitations for this type of work, as described in Appendix A.

2.0 BACKGROUND INFORMATION

This section provides a summary of prior IAQ testing and remedial measures in the building, as well as a summary of the original and adjusted HVAC conditions.

2.1 Previous Sampling and Remedial Measures

B330D was designated for source investigation in the RFI Work Plan based on anomalous levels of tetrachloroethene (PCE) detected in first floor indoor air samples collected in 2007. In addition, B330D overlies confirmed vadose zone contamination due to historical solvent releases. PCE was detected in first floor indoor air at concentrations of up to 530 $\mu g/m^3$ during the 2007 sampling events. The highest PCE concentrations were detected at the northwestern end of the building in the former 80K Manufacturing Area (referred to as the 80K area), which is presently unoccupied. The results of the 2007 sampling were included in the RFI Work Plan.

IBM initiated source investigation and mitigation measures in the 80K area in 2008. During the 2008 work, elevated PCE concentrations were detected in subslab vapor in the 80K area at concentrations indicative of residual solvent presence. Mitigation measures to reduce PCE migration from the subslab source included grouting and sealing the floor at the base of return air chases, and modifying the HVAC system configuration and operations in the 80K area. The mitigation measures resulted in a greater than ten-fold reduction in

indoor air PCE concentrations as compared to pre-mitigation levels. The results of the source investigation were provided in a December 2008 report[1].

IBM subsequently installed a subslab vapor extraction system for the 80K area to supplement the 2008 mitigation measures and as a means of VOC source reduction. The system was put into operation on October 6, 2010. IBM conducted a performance assessment of the system following start-up, which included building-wide confirmatory indoor air sampling of the first floor in July 2011. The results of the performance assessment and confirmatory sampling were presented in a December 2011 report[2]. The results indicated that the subslab vapor extraction system was successfully meeting its design objectives of reducing PCE source mass below the floor slab and decreasing PCE vapor intrusion. The building-wide indoor air sampling indicated that the operation of the subslab vapor extraction system improved air quality throughout the first floor of the building. The data from the July 2011 sampling round are included on Figure 6 of the December 2011 report; for reference, this figure is also provided in Appendix B. In a March 13, 2013 letter to IBM, the Agencies concurred with IBM that no further assessment was required for B330D per the Work Plan.

2.2 Occupancy and HVAC Status

The B330D first floor HVAC zone layout in 2011 is shown on the figure provided in Appendix B. IBM made mechanical changes to the HVAC zones at the southern end of the building in December 2014, which included eliminating the use of certain HVAC systems and combining zones. These changes reduced the outside air supply to zones AC-8-2 and AC-5B2/AC-6B1.

Decommissioning work and equipment removal of the former MLC manufacturing areas within B330D have been completed, with much of the building currently unoccupied. However, certain areas of the first floor remain routinely occupied. The areas that will be routinely occupied once GF makes their requested changes are depicted with a blue hatch pattern on Figures 3 through 5.

Because of the decreased occupancy of the first floor, GF requested air handling unit (AHU) operational changes to certain HVAC zones. The original HVAC settings (i.e., before the December 2015 testing was conducted) and the adjusted HVAC settings (i.e., conditions under which the December 2015 testing was conducted) are provided in Table 1. Zones in which HVAC operations were adjusted are represented by shaded rows. The locations of the HVAC zones and a depiction of their operating status are provided on Figure 3.

3.0 HVAC ADJUSTMENTS AND INDOOR AIR QUALITY TESTING

The following sections provide a summary of the HVAC adjustments, IAQ screening, and sampling results in B330D.

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1 "Report of Findings, Building 330D VOC Source Investigation and Mitigation, IBM East Fishkill Facility, Hopewell Junction, New York," Sanborn, Head Engineering, P.C., December 24, 2008.

2 "Performance Monitoring and Confirmatory Sampling Results, Building 330D, VOC Source Assessment, Hopewell Junction, NY, IBM East Fishkill Facility," Sanborn, Head Engineering, P.C., December 2011.

3.1 Scope of B330D Assessment

IAQ screening was conducted throughout the first floor of B330D on December 16, 2015, using a HAPSITE® portable gas chromatograph/mass spectrometer (GC/MS). The purpose of IAQ screening and sampling was to assess potential changes in PCE and trichloroethene (TCE) indoor air concentrations as a result of GF's requested HVAC adjustments. Following screening, indoor air sampling in occupied areas was conducted on December 17, 2015 using SUMMA® canisters.

3.1.1 Summary of HVAC Adjustments

GF turned off the AHUs in the HVAC zones shaded in red on Figure 3 prior to IAQ screening to allow conditions to stabilize prior to testing. The HVAC zones where AHUs were turned off for IAQ testing are shaded on Table 1.

Four HVAC zones have outside air (OA) economizers that automatically adjust the OA damper position based on changing weather conditions (e.g., temperature and humidity). For the purposes of testing under conservative conditions, the OA dampers were set to their minimum positions and switched to manual mode so that they would not automatically adjust to let in more OA during the testing period.

3.1.2 Summary of B330D IAQ Screening and Sampling Procedures

IAQ screening was conducted using the portable GC/MS under the adjusted HVAC conditions shown on Table 1 and depicted on Figure 3. The portable GC/MS was calibrated to analyze for PCE and TCE to a reporting limit of approximately 0.68 and 0.54 micrograms per cubic meter ($\mu g/m^3$), respectively. The 80K area subslab vapor extraction system was running during the testing period.

Following screening, confirmatory sampling was conducted on December 17, 2015 in occupied areas of the first floor in conformance with the procedures described in the RFI Work Plan. Indoor air samples were collected as 8-hour time-weighted-average samples into SUMMA® canisters under the adjusted HVAC conditions shown in Table 1. The samples were submitted to Eurofins/Air Toxics of Folsom, California for analysis of 22 project-specific analytes using USEPA Method TO-15, which was modified as specified in the RFI Work Plan to achieve lower reporting limits via selective ion monitoring (SIM) for TCE, vinyl chloride, and carbon tetrachloride.

A field duplicate sample, ambient outdoor air sample, and nitrogen blank were also collected for quality assurance/quality control (QA/QC) purposes. A photographic log of sampling locations is provided as Appendix C, and a summary of field sampling information is provided in Table 2.

3.2 B330D Results

This discussion of results represents conditions within the first floor of B330D that reflect the adjusted AHU settings indicated on Table 1 and Figure 3. These are the AHU operations that IBM understands GF will maintain until there are occupancy or other changes that warrant consideration of new adjustments.

3.2.1 B330D Portable GC/MS Screening Results

PCE and TCE screening results from December 16, 2015 are provided in Table 3 and depicted on Figure 4. TCE was not detected above the reporting limit of the portable GC/MS at any of the 35 screening locations. PCE was detected at levels at or below 22 µg/m^3 at 34 of the 35 screening locations. One screening location in an unoccupied area exhibited a PCE concentration of 39 µg/m^3. PCE concentrations were generally highest in the central portion of the building, and were the lowest in the northeast area (B330D Annex) and southwest portion of the building.

3.2.2 B330D Confirmatory Sample Results

Confirmatory indoor air samples were collected in nine occupied areas of the first floor under GF's adjusted HVAC conditions documented in Table 1 and on Figure 3. Indoor air confirmatory sampling results are provided in Table 4, and the PCE and TCE results are depicted on Figure 5.

PCE was detected at all 9 sample locations, with concentrations ranging from 3.5 to 19 µg/m^3. The highest concentration of PCE was detected in the southeastern portion of the building in HVAC zone AC-8-2. The general pattern of PCE detections was similar to that of the screening results; concentrations were the lowest in the northeast and southwest portions of the building, and increased toward the central portions of the building. TCE was detected in 6 of the 9 sample locations. Where detected, TCE was typically less than 0.3 µg/m^3, with the exception of the IA4019 field duplicate sample where TCE was detected at 1.3 µg/m^3.

A comparison of the December 2015 PCE and TCE confirmatory sample results to the July 2011 confirmatory sample results is provided on Figure 5. Sampling locations with paired historical and recent confirmatory data are primarily located in the southern portion of the building. With one exception (sample location IA BH-40), the December 2015 PCE concentrations are higher than the July 2011 results at the same locations. This may be a result of the mechanical changes that were made to the HVAC systems in the southern portion of the building in December 2014 and the associated reduction in outside air flow rates (described in Section 2.2 above).

Low levels of nine additional analytes were detected in indoor air, including: acetone (6.1 to 39 µg/m^3); benzene (0.59 to 0.67 µg/m^3); carbon tetrachloride (0.37 to 0.49 µg/m^3); dichlorodifluoromethane (CFC12; [2.3 to 2.8 µg/m^3]); methylene chloride (1.5 to 5.4 µg/m^3); toluene (0.62 to 5.6 µg/m^3); trichlorofluoromethane (CFC11; [1.3 to 2.7 µg/m^3]); o-xylene (0.66 µg/m^3); and m,p-xylene (0.89 to 2.1 µg/m^3). With the exception of xylene, these compounds were also detected at similar concentrations in the ambient outside air sample, indicating that the concentrations detected at interior locations are likely attributable to the presence of these analytes in ambient outdoor air.

The analytical laboratory report for the indoor air samples is provided in Appendix D.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The analytical data for the December 2015 confirmatory indoor air samples were provided to New Environmental Horizons, Inc. (NEH) of Arlington, MA and Skillman, NJ for an independent In-Depth data usability review. The data validation report is provided in Appendix E. The review found that all results were considered usable for project objectives/decisions, with the following qualifications:

- Precision was acceptable for all VOCs except for TCE in the field duplicate (FD) pair IA4019 and IA4019 Duplicate. The TCE results in IA4019 (<0.17 µg/m^3) and IA4019 Duplicate (1.3 µg/m^3) were estimated with indeterminate bias due to FD imprecision. These results are an indication of acceptable precision and representativeness of the samples for all the project-specific VOCs except for TCE. Laboratory QA/QC results for TCE were acceptable for accuracy and precision; therefore, in our opinion the imprecision noted in the field duplicate pair does not impact the reliability of the remaining TCE data from B330D.

- VOC concentrations in the nitrogen blank sample were similar to those observed in the ambient air blank, which was collected outside the building next to the nitrogen blank. Based on the results, we believe that a leak was present in the connections between the nitrogen canister and the Summa® canister into which the nitrogen was being transferred. The data from the nitrogen blank was not used in the data usability assessment due to the uncertainty of the results.

5.0 CONCLUSIONS

Under GF's adjusted HVAC operating conditions for the first floor of B330D, the December 2015 indoor air sample results indicate a general slight increase in PCE levels as compared to the results of the last indoor air sampling conducted in July 2011. IBM understands GF will maintain the adjusted HVAC operating conditions shown in Table 1 and depicted on Figure 3 until there are occupancy or other changes that warrant consideration of new adjustments and IAQ testing.

Consistent with the requirements in the RFI Work Plan, IBM understands that GF will communicate the results of the 8-hr, time weighted average SUMMA® samples in B330D to building occupants within 45 days of IBM's receipt of validated data.

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TABLES

Table 1
Original and Adjusted AHU Settings
Building 330D First Floor
Former IBM East Fishkill Facility
Hopewell Junction, New York

AC Unit	Area Use	Original HVAC Settings Prior to Nov/Dec 2015 Adjustments (Note 2)							Adjusted HVAC Settings Based on Nov/Dec 2015 Testing (Notes 3 and 4)						
		Current Occupancy (Note 7)	Operating Schedule (Note 9)	Outside Air (OA) Flow Rate	Return Air (RA) Flow Rate	Total Supply Air Flow Rate	OA Economizer (Note 9)	OA Damper Position (Note 9)	Future Occupancy (Note 7)	Operating Schedule (Note 9)	OA Flow Rate (Note 8)	RA Flow Rate	Total Supply Air Flow Rate	OA Economizer (Note 9)	OA Damper Position (Note 9)
AC-5B2,6B1	Labs/Unoccupied Lab	Occ	24/7	27,744	0	27,744	No	100% open	Occ	24/7	26,370	0	26,370	No	100% open
AC-6A2	Offices	30	24/7	360	7,040	7,400	No	0% open	30	24/7	360	7,040	7,400	No	0% open
AC-8-2	Labs and Offices	27	24/7	14,975	18,905	33,880	Yes	85% open (min)	27	24/7	14,975	18,905	33,880	Yes	85% open (min)
AC-12	Offices/Unoccupied Labs	Occ	24/7	11,440	7,497	18,937	No	45% open	0	Off					
AC-13	Offices/Unoccupied Labs	32	24/7	12,664	15,224	27,888	No	40% open	32	24/7	11,871	15,595	27,466	No	75% open
AC-15	Labs and Offices	11	24/7	10,368	15,328	25,696	Yes	30% open (min)	11	24/7	10,368	15,328	25,696	Yes	30% open (min)
AC-25	Executive Offices/Lobbies	Occ	6am-630pm 7days	34,397	3,823	38,220	Yes	30% open (min)	Occ	6am-630pm 7days	34,397	3,823	38,220	Yes	30% open (min)
AC-60	Cleaning Personnel/ Unoccupied Area	0	6 AM - 6 PM On	35,470	3,002	38,472	No	50% open	0	Off					
AC-61 (Note 5)	Off	0	Off						0	Off					
AC-71	Tool Shop	Occ	5 AM - 5 PM On	7,683	3,806	11,489	Yes	20% open (min)	0	5 AM - 5 PM On	8,211	3,125	11,336	Yes	20% open (min)
AC-72,82	Unoccupied Lab/Refeed Corridor	Occ	24/7	8,803	0	8,803	No	NA	0	Off					
AC-79	Unoccupied Lab	0	24/7	7,080	0	7,080	No	100% open	0	24/7	7,585	0	7,585	No	100% open
AC-83	Lab and Unoccupied Lab	2	6AM - 4:30 PM On	17,859	3,741	21,600	No	28% open	2	6AM - 4:30 PM On	18,165	7,435	25,600	No	40% open

Notes
1. The information in this table was provided to IBM and Sanborn, Head Engineering, PC (SHPC) by Global Foundries (GF). Flow rates are based on reports prepared by GF's contractor, US Test.
2. Original HVAC flow rates are based on an Excel file titled, "AC Shutdown - Master ListR1.xls" that GF sent to IBM and SHPC on August 14, 2015.
3. With the exception of AC-83, the flow rates and OA damper positions for the adjusted HVAC settings are based on a US Test Report dated 11/18/2015.
4. The flow rates and OA damper position for the AC-83 adjusted HVAC settings are based on an email from GF dated 11/20/2015.
5. The area formerly served by AC-61 was being supplied by AC-60 under the original conditions.
6. Flow rates are provided in cubic feet per minute (cfm).
7. "Occ" = occupied; specific number of occupants not provided by GF.
8. Shaded rows indicate the HVAC zones that were adjusted prior to testing. Zones that were marginally adjusted to within 10% of their original settings are not shaded.
9. Operating schedule and economizer information/minimum OA damper positions were updated based on a call with GF on 12/7/2015 and an email from GF dated 12/15/2015.

Table 2
Summary of Confirmatory Indoor Air Sample Information
Building 330D
Former IBM East Fishkill Facility
Hopewell Junction, NY

Sample Location	Building Floor	Sample Matrix	Canister Number	Sample Height (ft above floor)	Start Time (hours)	Start Pressure (mm Hg)	Stop Time (hours)	Stop Pressure (mm Hg)	PID (ppbv)	Temperature (°F)	Location Description	Notes
IA AY-43	Ground	Indoor Air	13673	3	10:25	-30	18:25	-6.5	215	72.1	JDA Lab	
IA BB-39	Ground	Indoor Air	33890	4	9:40	-30	17:40	-5.5	177	72.6	Semiconductor Cooling Technology Lab	
IA BG-38	Ground	Indoor Air	61264	3.5	10:10	-30	18:10	-6	237	71.4	JDA Lift Station	
IA BG-45	Ground	Indoor Air	14872	4	11:10	-30	19:10	-7	167	73.7	Reliability Lab	
IA BH-40	Ground	Indoor Air	11029	3.5	10:49	-30	17:22	-5	189	71	Hallway tables/break area	
IA4014	Ground	Indoor Air	33573	5	9:15	-30	17:15	-7	207	67.9	Near restrooms off building foyer	
IA4016	Ground	Indoor Air	645	3.5	9:55	-30	17:55	-6	400	72.1	Machine shop	Grease and oil odors noted
IA4017	Ground	Indoor Air	11027	4	9:30	-29.5	17:30	-7	247	72.4	Lunch/break room	
IA4019	Ground	Indoor Air	34407	3.5	10:38	-30	18:38	-7	163	71	Conference room	
IA4019 DUP	Ground	Indoor Air	9546	3.5	10:38	-30	18:38	-6	163	71	Conference room	Duplicate sample
Ambient Air	Ground	Ambient Air	34347	6	8:45	-29.5	16:45	-10	127	61.4	AC-83 intake (outside building)	
Nitrogen Blank	Ground	Nitrogen	32116	6	8:45	-29.5	16:45	-7	127	61.4	AC-83 intake - adjacent to ambient air	

Notes:

1. Samples were on December 17, 2015 into 6-liter, stainless steel, pre-evacuated SUMMA® canisters using 8-hour metering regulators. Canisters and regulators were laboratory-certified clean (100% certification).
2. PID screening was conducted using a ppbRAE, calibrated to a 10 parts per million by volume (ppmv) isobutylene-in-air standard.

Table 3
Summary of Portable GC/MS Indoor Air Screening Results
Building 330D
Former IBM East Fishkill Facility
Hopewell Junction, New York

Location	Date	HVAC Zone	µg/m³	
			PCE	TCE
IA AP-30	12/16/15	AC-60	9.4	<0.54
IA AR-28	12/16/15	AC-60	9.7	<0.54
IA AY-35	12/16/15	AC-13	1.6	<0.54
IA AY-43	12/16/15	AC-8-2	20	<0.54
IA BA-28	12/16/15	AC-12	12	<0.54
IA BA-39	12/16/15	AC-5B2	39	<0.54
IA BA-44	12/16/15	AC-8-2	13	<0.54
IA BB-24	12/16/15	AC-72/82	10	<0.54
IA BB-37	12/16/15	AC-79	3.0	<0.54
IA BB-39	12/16/15	AC-83	13	<0.54
IA BC-32	12/16/15	AC-71	6.7	<0.54
IA BD-25	12/16/15	AC-72/82	17	<0.54
IA BE-28	12/16/15	AC-6B1	13	<0.54
IA BF-24	12/16/15	AC-72/82	17	<0.54
IA BG-38	12/16/15	AC-5B2	7.6	<0.54
IA BG-45	12/16/15	AC-15	2.9	<0.54
IA BH-40	12/16/15	AC-6A2	6.4	<0.54
IA4001	12/16/15	See Note 3	3.9	<0.54
IA4002	12/16/15	AC-60	8.3	<0.54
IA4003	12/16/15	AC-61	11	<0.54
IA4004	12/16/15	AC-25	9.1	<0.54
IA4005	12/16/15	AC-6B1	20	<0.54
IA4006	12/16/15	AC-13	9.1	<0.54
IA4007	12/16/15	AC-6B1	22	<0.54
IA4008	12/16/15	AC-79	13	<0.54
IA4009	12/16/15	AC-13	4.3	<0.54
IA4010	12/16/15	AC-5B2	2.5	<0.54
IA4011	12/16/15	AC-8-2	4.8	<0.54
IA4012	12/16/15	AC-15	2.4	<0.54
IA4014	12/16/15	AC-25	3.4	<0.54
IA4015	12/16/15	AC-72/82	11	<0.54
IA4016	12/16/15	AC-71	12	<0.54
IA4017	12/16/15	AC-13	9.8	<0.54
IA4018	12/16/15	AC-8-2	8.2	<0.54
IA4019	12/16/15	AC-13	7.2	<0.54

Notes:

1. This table summarizes data recorded during field screening of grab indoor air screening samples using a HAPSITE Smart ® portable gas chromatograph/mass spectrometer (GC/MS), manufactured by Inficon. The instrument was calibrated to manufacturer prepared standards ranging from 0.1 part per billion on a volumetric basis (ppbv) to 50 ppbv, for tetrachloroethene (PCE) and trichloroethene (TCE). The field samples were collected directly into the portable GC/MS sampling probe from the location and on the dates noted in the table. The samples were screened using the portable GC/MS in selective ion monitoring (SIM) mode. Results were converted to micrograms per cubic meter (µg/m^3) assuming standard temperature (25 °C) and pressure (1 atmosphere) for the conversion. Results were rounded to two significant figures.

2. < - The analyte was not detected above the indicated reporting limit.

3. Screening location not within an HVAC zone.

Table 4
Summary of 8-Hour Confirmatory Sampling Results
Building 330D
Former IBM East Fishkill Facility
Hopewell Junction, NY

	Field Sample Name	AA (Note 3)			Nitrogen Blank (Note 3)			IA AY-43			IA BB-39			IA BG-38			IA BG-45			IA BH-40			IA4014			IA4016			IA4017		
	Collection Date	12/17/2015			12/17/2015			12/17/2015			12/17/2015			12/17/2015			12/17/2015			12/17/2015			12/17/2015			12/17/2015			12/17/2015		
	Units	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias
Acetone	µg/m^3	30			27			13			7.2			7.5			18			9.2			9.6			17			39		
Benzene	µg/m^3	0.58			0.52	U		0.53	U		0.52	U		0.54	U		0.59			0.55	U		0.51	U		0.53	U		0.67		
Carbon tetrachloride	µg/m^3	0.53			0.52			0.46			0.46			0.46			0.48			0.37			0.49			0.48			0.48		
Chlorobenzene (Monochlorobenzene)	µg/m^3	0.84	U		0.74	U		0.76	U		0.74	U		0.78	U		0.74	U		0.79	U		0.74	U		0.76	U		0.72	U	
Dichlorobenzene (1,2-)	µg/m^3	1.1	U		0.97	U		1	U		0.97	U		1	U		0.97	U		1	U		0.97	U		1	U		0.94	U	
Dichlorobenzene (1,3-)	µg/m^3	1.1	U		0.97	U		1	U		0.97	U		1	U		0.97	U		1	U		0.97	U		1	U		0.94	U	
Dichlorobenzene (1,4-)	µg/m^3	1.1	U		0.97	U		1	U		0.97	U		1	U		0.97	U		1	U		0.97	U		1	U		0.94	U	
Dichlorodifluoromethane (CFC12)	µg/m^3	2.9			2.7			2.4			2.4			2.3			2.5			2.4			2.4			2.4			2.4		
Dichloroethene (1,1-)	µg/m^3	0.72	U		0.64	U		0.66	U		0.64	U		0.67	U		0.64	U		0.68	U		0.64	U		0.66	U		0.62	U	
Dichloroethene (cis-1,2-)	µg/m^3	0.72	U		0.64	U		0.66	U		0.64	U		0.67	U		0.64	U		0.68	U		0.64	U		0.66	U		0.62	U	
Ethane, 1,1,2-trichloro-1,2,2-trifluoro- (CFC113)	µg/m^3	1.4	U		1.2	U		1.3	U		1.2	U		1.3	U		1.2	U		1.3	U		1.2	U		1.3	U		1.2	U	
Ethylbenzene	µg/m^3	0.79	U		0.7	U		0.72	U		0.7	U		0.73	U		0.7	U		0.74	U		0.7	U		0.72	U		0.68	U	
Methylene Chloride (Dichloromethane)	µg/m^3	1.3			1.1			1.2	U		1.5			1.2	U		1.1	U		5.4			1.1	U		1.2	U		2.2		
Tetrachloroethene (PCE)	µg/m^3	1.2	U		1.1	U		19			7.9			11			4.2			3.5			4.4			13			13		
Toluene	µg/m^3	0.67	J	I	0.64			0.62	J	I	0.61	U		0.64	U		3.3			0.64	U		0.61	U		0.62	U		5.6		
Trichlorobenzene (1,2,4-)	µg/m^3	6.8	U		6	U		6.2	U		6	U		6.3	U		6	U		6.3	U		6	U		6.2	U		5.8	U	
Trichloroethane (1,1,1-)	µg/m^3	0.99	U		0.88	U		0.9	U		0.88	U		0.92	U		0.88	U		0.93	U		0.88	U		0.9	U		0.86	U	
Trichloroethene (TCE)	µg/m^3	0.2	U		0.17	U		0.22			0.17	U		0.3			0.17	U		0.33			0.17	U		0.18			0.19		
Trichlorofluoromethane	µg/m^3	1.4			1.5			2.2			1.3			1.5			1.7			1.5			2.4			2.7			2.3		
Vinyl chloride	µg/m^3	0.046	U		0.041	U		0.042	U		0.041	U		0.043	U		0.041	U		0.044	U		0.041	U		0.042	U		0.04	U	
Xylene (o-)	µg/m^3	0.79	U		0.7	U		0.72	U		0.7	U		0.73	U		0.7	U		0.74	U		0.7	U		0.72	U		0.66	J	I
Xylene-m,p (Sum of Isomers)	µg/m^3	0.79	U		0.7	U		0.72	U		0.7	U		0.73	U		0.89			0.74	U		0.7	U		0.72	U		2.1		

Notes:

1. Samples were collected on the dates indicated over an 8-hour sampling interval. The samples were analyzed by Eurofins Air Toxics, Inc. (EATI) of Folsom, California for the project-specific list of volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Method TO-15 in the full scan and selective ion monitoring (SIM) modes.

2. An In-Depth data usability review (DUR) was performed on the data by New Environmental Horizons, Inc. (NEH) . All results were considered acceptable, with the understanding of the potential uncertainty (bias) in the qualified results. In some cases, NEH assigned the following qualifiers and biases to the data. Refer to the DUR report for further details.
"U" indicates the analyte is non-detect at or above the indicated sample specific practical quantification limit (PQL).
"J" indicates the result is an estimated value.
"UJ" indicates the non-detect is estimated at the indicated PQL.
"I" indicates an indeterminate bias.

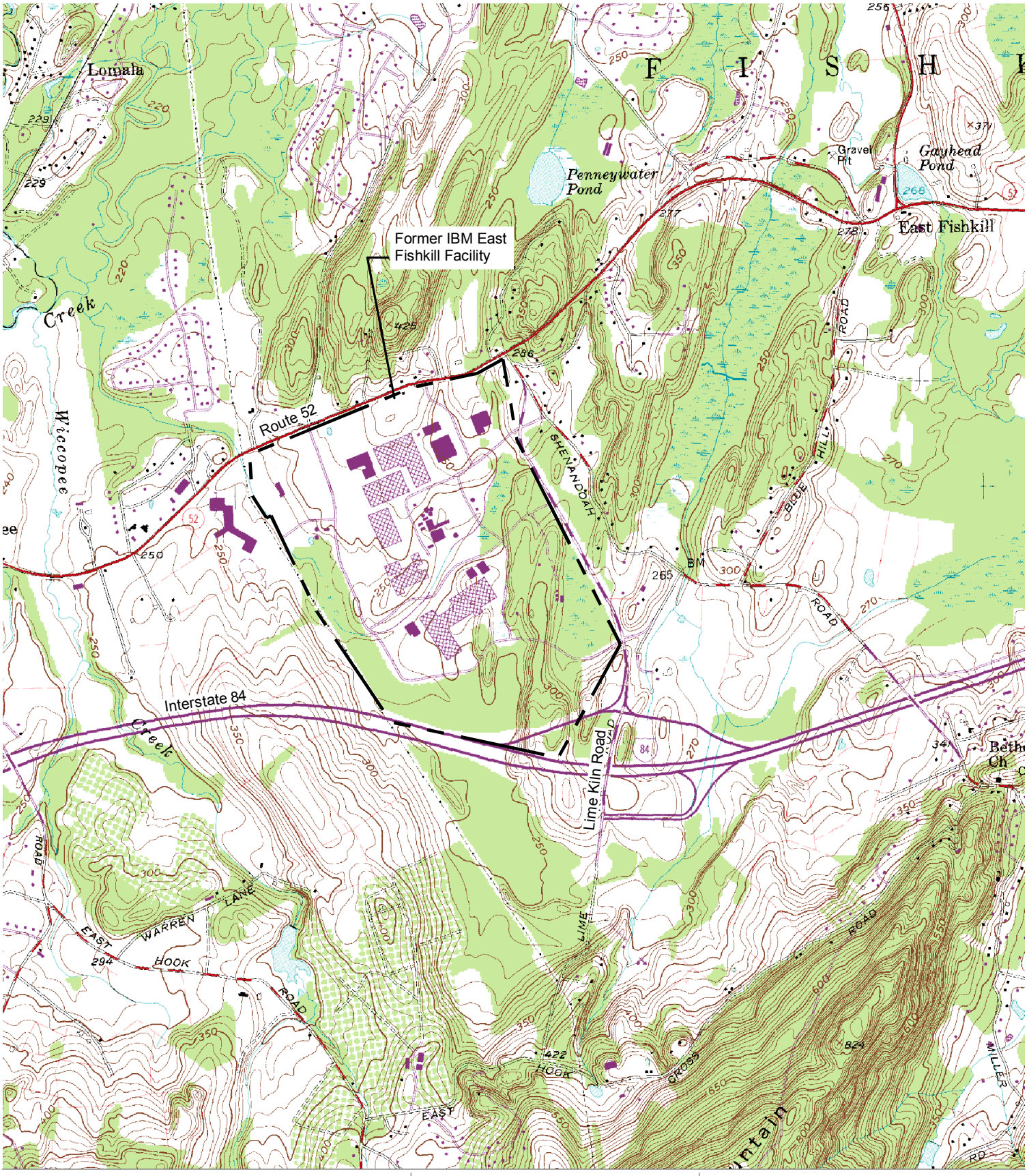
3. The "AA" designation indicates that the sample consists of ambient air collected from outside the building. The ambient air and nitrogen blank samples were collected from beneath the outside air intake to air handling unit AC-83. Based on the nitrogen blank results, we believe that a leak was present in the connections between the nitrogen canister and the Summa® canister into which the nitrogen was being transferred. The data from the nitrogen blank were not used in the data usability assessment due to the uncertainty of the results.

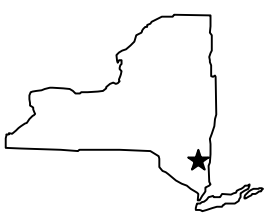
4. Results were rounded to two significant figures.

Table 4
Summary of 8-Hour Confirmatory Sampling Results
Building 330D
Former IBM East Fishkill Facility
Hopewell Junction, NY

	Field Sample Name	IA4019			IA4019 Duplicate		
	Collection Date	12/17/2015			12/17/2015		
	Units	Result	Qualifier	Bias	Result	Qualifier	Bias
Acetone	µg/m^3	6.2			6.1		
Benzene	µg/m^3	0.52	U		0.51	U	
Carbon tetrachloride	µg/m^3	0.48			0.45		
Chlorobenzene (Monochlorobenzene)	µg/m^3	0.74	U		0.74	U	
Dichlorobenzene (1,2-)	µg/m^3	0.97	U		0.96	U	
Dichlorobenzene (1,3-)	µg/m^3	0.97	U		0.96	U	
Dichlorobenzene (1,4-)	µg/m^3	0.97	U		0.96	U	
Dichlorodifluoromethane (CFC12)	µg/m^3	2.8			2.4		
Dichloroethene (1,1-)	µg/m^3	0.64	U		0.63	U	
Dichloroethene (cis-1,2-)	µg/m^3	0.64	U		0.63	U	
Ethane, 1,1,2-trichloro-1,2,2-trifluoro- (CFC113)	µg/m^3	1.2	U		1.2	U	
Ethylbenzene	µg/m^3	0.7	U		0.69	U	
Methylene Chloride (Dichloromethane)	µg/m^3	1.1	U		1.1	U	
Tetrachloroethene (PCE)	µg/m^3	11			9.9		
Toluene	µg/m^3	0.61	U		0.6	U	
Trichlorobenzene (1,2,4-)	µg/m^3	6	U		5.9	U	
Trichloroethane (1,1,1-)	µg/m^3	0.88	U		0.87	U	
Trichloroethene (TCE)	µg/m^3	0.17	UJ	I	1.3		
Trichlorofluoromethane	µg/m^3	1.4			1.4		
Vinyl chloride	µg/m^3	0.041	U		0.041	U	
Xylene (o-)	µg/m^3	0.7	U		0.69	U	
Xylene-m,p (Sum of Isomers)	µg/m^3	0.7	U		0.69	U	

FIGURES





N
W E
S

Notes:
Base map taken from 7.5 minute USGS Quadrangle Maps: Hopewell Junction, New York, Dated 1957, Photorevised in 1981.

Drawn By: E. Wright
Designed By: J. Corsello
Reviewed By: S. Soos / D. Shea
Project No: 2999.06
Date: March 2016

1,000' 0 2,000' Feet

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Figure 1

Site Location Plan

Former IBM East Fishkill Facility
Hopewell Junction, New York

Figure 2

B330D Location Plan

Former IBM East Fishkill Facility
Hopewell Junction, New York

Drawn By: E. Wright
Designed By: J. Corsello
Reviewed By: S. Soos / D. Shea
Project No: 2999.06
Date: March 2016

Figure Narrative

This figure shows the buildings at the former IBM East Fishkill facility. Building B330D is highlighted.

Legend

— - - — Property Line

Unlabeled features include wastewater treatment tanks, pump houses, trailers, and other structures and features not intended for human occupancy

B320B Indicates building number

Indicates the location of B330D

N
W E
S

200' 100' 0 200' 400' Feet

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File P:\2900s\2999.00\Graphics Files\CAD\B330D\B330D_LocationPlan.dwg Plot Date: 2-18-16

Figure 3

B330D First Floor HVAC Status

Former IBM East Fishkill Facility

Hopewell Junction, New York

Drawn By:	C. LaVack
Designed By:	J. Sanborn
Reviewed By:	B. Green / D. Shea
Project No:	2999.06
Date:	March 2016

Figure Narrative

This figure shows the HVAC zones and operating status in December 2015 at the time of indoor air screening and sampling reported in the text. Additional information is provided in the legend.

Legend

- AC-13 — HVAC Zone and Associated Air Handling Unit ID
- HVAC off as requested by owner (Global Foundries)
- HVAC on. No changes from original settings. The term "original settings" refers to the HVAC settings in-place prior to the December 2015 HVAC adjustment and indoor air testing.
- Areas that will be routinely occupied when Global Foundries makes their requested HVAC changes

Unshaded areas represent routinely unocccupied areas without direct HVAC service

37.5 18.75 0 37.5 75 Feet

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Last Edited By: clavack
Path: P:\2900s\2999.00\Graphics Files\GIS\Figures\B330D\HVAC\B330D_Summary_Portable_GCMS_Results.mxd

Figure 4

Summary of Portable GC/MS Screening Results - Adjusted HVAC Operating Conditions

Building 330D

Former IBM East Fishkill Facility

Hopewell Junction, New York

Drawn By:	C. LaVack
Designed By:	J. Sanborn
Reviewed By:	B. Green / D. Shea
Project No:	2999.06
Date:	March 2016

Figure Narrative

This figure shows tetrachloroethene (PCE) and trichloroethene (TCE) screening results for indoor air conducted using a portable gas chromatograph/mass spectrometer (GC/MS) under adjusted heating, ventilation, and air conditioning (HVAC) operating conditions. Results are shown in micrograms per cubic meter (µg/m^3). Refer to Table 1 of this report for further details on the HVAC operating conditions in B330D.

Legend

- Indoor Air Location
- AC-83 — HVAC Zone and Designation
- HVAC Zones Off During Screening
- IA4009 4.3 / <0.54 — Control Point Name PCE result / TCE Result (µg/m^3) (December 16th, 2015)
- Areas that will be routinely occupied when Global Foundries makes their requested HVAC changes

Feet
37.5 18.75 0 37.5 75

SANBORN HEAD ENGINEERING

Last Edited By: clavack
Path: P:\2900s\2999.00\Graphics Files\GIS\Figures\B330D\HVAC\B330D_Summary_SUMMA_Results.mxd

Figure 5

Summary of 8-Hour Confirmatory Sampling Results (PCE and TCE)

Building 330D

Former IBM East Fishkill Facility

Hopewell Junction, New York

Drawn By:	C. LaVack
Designed By:	J. Sanborn
Reviewed By:	B. Green / D. Shea
Project No:	2999.06
Date:	March 2016

Figure Narrative

This figure shows tetrachloroethene (PCE) and trichloroethene (TCE) results for indoor air sampling of occupied portions of the first floor of B330D on December 17, 2015. The results of the last historical sampling event are also shown for comparison at each location where a December 2015 sample was collected. "NS" indicates that the location has not been sampled previously. The samples were collected as 8-hour time-weighted-average samples using 6-L SUMMA canisters. Results are shown in micrograms per cubic meter ($\mu g/m^3$). Refer to Table 1 of this report for further details on the HVAC operating conditions in B330D.

Legend

- Indoor Air Location
- Ambient Air Location
- AC-83 — HVAC Zone and Designation
- IA AY-43 — Control Point Name
- 4.7 / <0.17 — PCE/TCE (Historical Confirmatory Sample-Date Varies)
- 19 / 0.22 — PCE/TCE (December 17, 2015 Confirmatory Sample)
- NS — Not Sampled
- HVAC Zones Off During Testing
- Areas that will be routinely occupied when Global Foundries makes their requested HVAC changes

37.5 18.75 0 37.5 75 Feet

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APPENDIX A

LIMITATIONS

APPENDIX A
SHPC LIMITATIONS

1. The findings and conclusions described in this report are based in part on the data obtained from a finite number of samples from widely spaced locations. The figures are intended to depict inferred conditions during a given period of time, consistent with available information. The actual conditions will vary from that shown, both spatially and temporally. Other interpretations are possible. The nature and extent of variations between sampling locations may not become evident until further investigation is initiated. If variations or other latent conditions then appear evident, it may be necessary to re-evaluate the conclusions of this report.

2. Quantitative laboratory testing was performed by others as part of the investigation as noted within the report. Where such analyses have been conducted by an outside laboratory, unless otherwise stated in the report, SHPC has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data. It must be noted that additional compounds not searched for during the current study may be present in vapor and indoor air at the site. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their distribution within the vapor and indoor air may occur due to the passage of time, seasonal water table fluctuations, recharge events, and other factors.

3. This report has been prepared for the exclusive use of the IBM Corporation for specific application to the former IBM East Fishkill facility in accordance with generally accepted hydrogeologic and engineering practices. No warranty, expressed or implied, is made. The contents of this report should not be relied on by any other party without the express written consent of SHPC.

4. In preparing this report, SHPC has endeavored to conform to generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. SHPC has attempted to observe a degree of care and skill generally exercised by the technical community under similar circumstances and conditions.

APPENDIX B

RESULTS OF B330D HISTORICAL CONFIRMATORY SAMPLES (JULY 2011)

Figure 6

Building 330D

Performance Monitoring and Confirmatory Sampling Results
Building 330D VOC Source Assessment
IBM East Fishkill Facility
Hopewell Junction, New York

Drawn By: E. Wright
Designed By: L. Atwell
Reviewed By: B. Green
Project No: 2999.00
Date: December 2011

Figure Narrative

This figure shows the results of indoor and ambient air sampling conducted at Building 330D on July 26, 2011. Air samples were collected into 6-liter Summa Canisters equipped with 8-hour flow controllers. The samples were analyzed for a site specific list of volatile organic compounds (VOCs) by Air Toxics Ltd. of Folsom, CA using USEPA Method TO-15 Hi/Lo. The data are presented in units of micrograms per cubic meter ($\mu g/m^3$).

Legend

- Indoor Air Sampling Location and Designation
- Ambient Air Sampling Location and Designation
- Groundwater Monitoring Well Location and Designation
- HVAC Zone (Approximate)
- 80k Area Perimeter
- 334 Solid Waste Management Unit with ID number
- IW Industrial Waste Unit
- SO Solvent Waste Unit
- CW Container Waste
- L/UL Tank Truck Loading/Unloading Area
- LS Lift Station
- PE Perchloroethylene Recycle Unit

IA AR-28	7/26/11
PCE	1.2
Carbon Tet	0.39
Acetone	9.6
Toluene	1.0
Freon 11	4.0
Freon 12	3.7

IA AR-27	7/26/11
PCE	1.2
Carbon Tet	0.38
Acetone	5.4
Toluene	0.61
Freon 11	3.4
Freon 12	3.5

AA MAU 72	7/26/11
Carbon Tet	0.43
Acetone	6.0
Freon 11	1.2
Freon 12	2.5

IA BB-24	7/26/11
Carbon Tet	0.33
Acetone	10
Freon 11	1.8
Freon 12	2.6

IA BD-25	7/26/11
Acetone	7.5
Freon 11	1.2
Freon 12	2.5

IA AP-30	7/26/11
PCE	1.2
Carbon Tet	0.40
Acetone	10
Toluene	1.0
Freon 11	4.1
Freon 12	3.8

IA BB-37	7/26/11
PCE	30
TCE	0.43
Carbon Tet	0.34
Acetone	14
Toluene	0.60 J
Freon 11	3.4
Freon 12	3.1

IA BA-39	7/26/11
PCE	4.4
Carbon Tet	0.36
Acetone	11
Freon 11	1.4
Freon 12	2.6

IA BA-28	7/26/11
Acetone	8.5
Freon 11	2.6
Freon 12	2.6

IA BC-32	7/26/11
PCE	4.5
Carbon Tet	0.53
Acetone	9.8
Freon 11	5.0
Freon 12	3.2

IA AY-35	7/26/11
PCE	2.6
Carbon Tet	0.41
Acetone	8.8
Freon 11	3.0
Freon 12	5.3

IA BB-39	7/26/11
PCE	4.2
Carbon Tet	0.46
Acetone	8.2
Toluene	0.64
Freon 11	1.4
Freon 12	3.0

IA BB-40	7/26/11
PCE	2.1
Carbon Tet	0.52
Acetone	11
Freon 11	1.6
Freon 12	2.9

IA AY-43	7/26/11
PCE	4.7
Carbon Tet	0.36
Acetone	11
Toluene	0.70
Freon 11	2.4
Freon 12	3.0

IA BA-44	7/26/11
PCE	4.0
Carbon Tet	0.38
Acetone	13
Toluene	0.81
Freon 11	2.4
Freon 12	3.0

IA BE-23	7/26/11
Carbon Tet	0.43
Acetone	7.4
Freon 11	1.5
Freon 12	2.3

IA BG-23	7/26/11
Carbon Tet	0.36
Acetone	11
m,p-Xylene	0.70
Toluene	1.7
Freon 11	1.6
Freon 12	2.5

IA BF-24	7/26/11
Carbon Tet	0.48
Acetone	7.3
Freon 11	1.5
Freon 12	2.4

IA BG-24	7/26/11
Carbon Tet	0.34
Acetone	7.1
Freon 11	1.4
Freon 12	2.3

IA BE-28	7/26/11
PCE	3.3
Carbon Tet	0.45
Acetone	7.7
Freon 11	2.1
Freon 12	2.6

IA BF-34	7/26/11
PCE	12
Carbon Tet	0.47
Acetone	8.8
Freon 11	3.9
Freon 12	3.0

IA BG-38	7/26/11
PCE	6.2
Carbon Tet	0.36
MeCl	1.1
Acetone	9.6
Freon 11	2.3
Freon 12	2.4

IA BH-40	7/26/11
PCE	8.4
Carbon Tet	0.32
Acetone	11
Freon 11	2.4
Freon 12	2.8

IA BG-45	7/26/11
PCE	1.3
Carbon Tet	0.35
Acetone	12
m,p-Xylene	0.76
Toluene	0.86
Freon 11	1.8
Freon 12	2.6

AA AC-15	7/26/11
VC	0.83
Carbon Tet	0.53
MeCl	1.2
Acetone	7.9
Benzene	0.78
Toluene	0.65
Freon 11	1.8
Freon 12	2.7
Collected at BF-49 (Not Shown)	

IA BG-22	7/26/11
Carbon Tet	0.20
MeCl	1.40
Acetone	7.1
Freon 11	1.0
Freon 12	1.5

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APPENDIX C

PHOTOGRAPH LOG

B330D HVAC Shutdown Testing
8-HR Summa Sampling
Photograph Log

Photo 1: Samples AA-1 and Nitrogen Blank. Outside air intake for AC-83.

Photo 2: Sample IA AY-43

Photo 3: Sample IA BB-39

Photo 4: Sample IA BG-38

Photo 5: Sample IA BG-45

Photo 6: Sample IA BH-40, tables in hallway

Photo 7: Sample IA4014

Photo 8: Sample IA 4016, machine shop

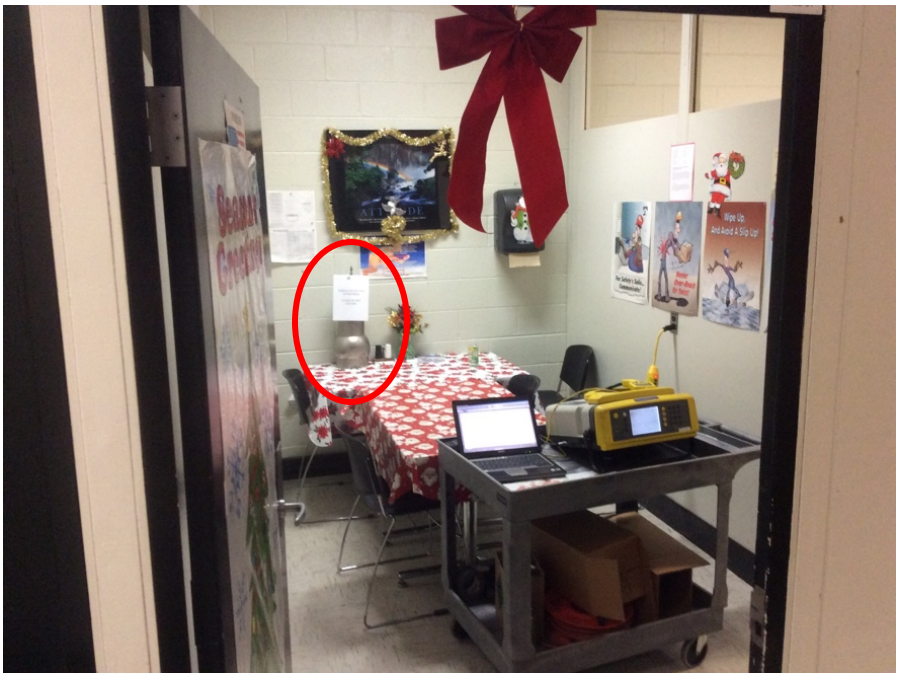

Photo 9: Sample IA 4017, breakroom

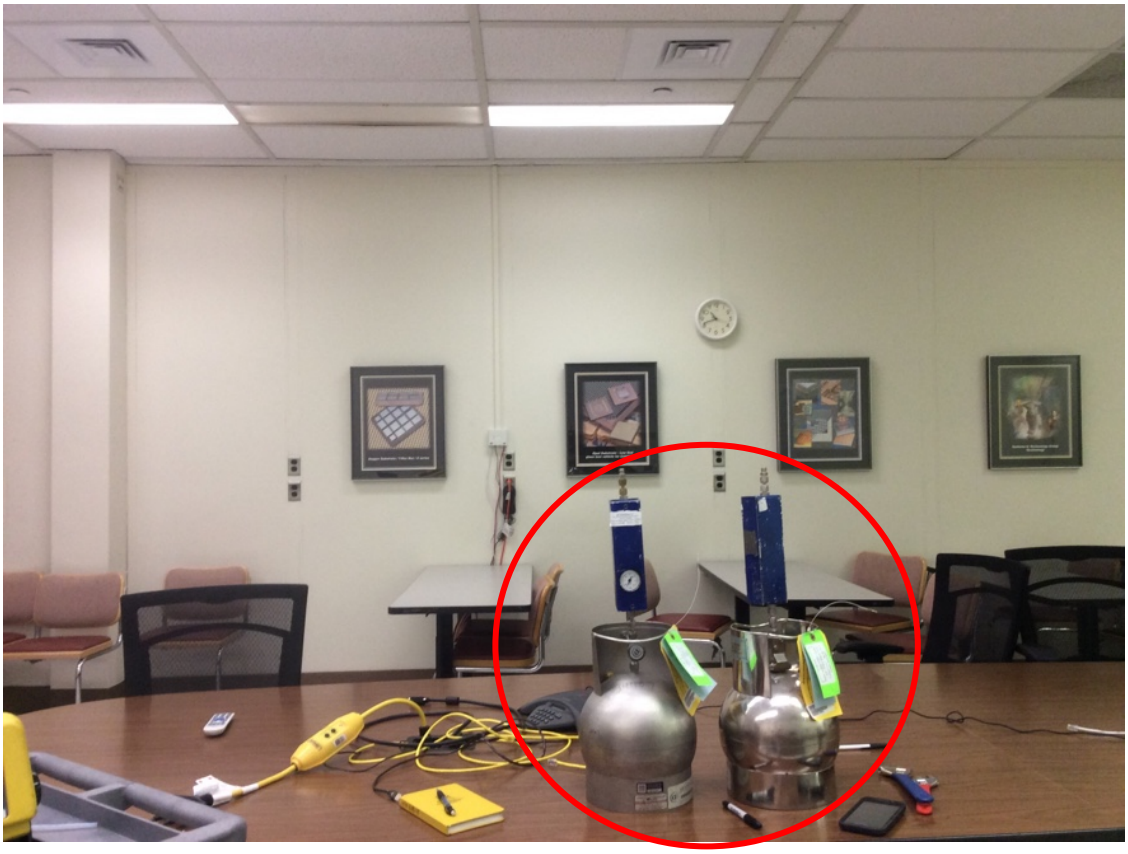

Photo 10: Sample IA4019 and IA4019 duplicate. Center of conference room

APPENDIX D

ANALYTICAL LABORATORY REPORT

(ON CD)

eurofins | Air Toxics

1/6/2016
Ms. Erica Bosse
Sanborn, Head & Associates
24 Wade Road

Latham NY

Project Name:
Project #:
Workorder #: 1512401

Dear Ms. Erica Bosse

The following report includes the data for the above referenced project for sample(s) received on 12/21/2015 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 Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1512401

Work Order Summary

CLIENT:	Ms. Erica Bosse Sanborn, Head & Associates 24 Wade Road Latham, NY	**BILL TO:**	Accounts Payable Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301
PHONE:	518-207-0769	**P.O. #**	2999.06
FAX:		**PROJECT #**	
DATE RECEIVED:	12/21/2015	**CONTACT:**	Ausha Scott
DATE COMPLETED:	01/06/2016		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	IA4014	Modified TO-15	4.9 "Hg	5.1 psi
01B	IA4014	Modified TO-15	4.9 "Hg	5.1 psi
02A	IA4017	Modified TO-15	4.7 "Hg	4.8 psi
02B	IA4017	Modified TO-15	4.7 "Hg	4.8 psi
03A	IA4016	Modified TO-15	5.7 "Hg	5.1 psi
03B	IA4016	Modified TO-15	5.7 "Hg	5.1 psi
04A	IABB-39	Modified TO-15	5.1 "Hg	5.1 psi
04B	IABB-39	Modified TO-15	5.1 "Hg	5.1 psi
05A	IABG-38	Modified TO-15	6.1 "Hg	5.1 psi
05B	IABG-38	Modified TO-15	6.1 "Hg	5.1 psi
06A	IABH-40	Modified TO-15	6.5 "Hg	5 psi
06B	IABH-40	Modified TO-15	6.5 "Hg	5 psi
07A	Ambient Air	Modified TO-15	7.6 "Hg	5.3 psi
07B	Ambient Air	Modified TO-15	7.6 "Hg	5.3 psi
08A	Nitrogen Blank	Modified TO-15	5.3 "Hg	4.9 psi
08B	Nitrogen Blank	Modified TO-15	5.3 "Hg	4.9 psi
09A	IAAy-43	Modified TO-15	5.9 "Hg	4.9 psi
09B	IAAy-43	Modified TO-15	5.9 "Hg	4.9 psi
10A	IABG-45	Modified TO-15	5.1 "Hg	5.1 psi
10B	IABG-45	Modified TO-15	5.1 "Hg	5.1 psi
11A	IA4019	Modified TO-15	5.5 "Hg	4.7 psi
11B	IA4019	Modified TO-15	5.5 "Hg	4.7 psi
12A	IA4019 Duplicate	Modified TO-15	5.5 "Hg	4.5 psi

Continued on next page

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WORK ORDER #: 1512401

Work Order Summary

CLIENT:	Ms. Erica Bosse Sanborn, Head & Associates 24 Wade Road Latham, NY	**BILL TO:**	Accounts Payable Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301
PHONE:	518-207-0769	**P.O. #**	2999.06
FAX:		**PROJECT #**	
DATE RECEIVED:	12/21/2015	**CONTACT:**	Ausha Scott
DATE COMPLETED:	01/06/2016		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
12B	IA4019 Duplicate	Modified TO-15	5.5 "Hg	4.5 psi
13A	Lab Blank	Modified TO-15	NA	NA
13B	Lab Blank	Modified TO-15	NA	NA
14A	CCV	Modified TO-15	NA	NA
14B	CCV	Modified TO-15	NA	NA
15A	LCS	Modified TO-15	NA	NA
15AA	LCSD	Modified TO-15	NA	NA
15B	LCS	Modified TO-15	NA	NA
15BB	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 01/06/16

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15 Std Full Scan/SIM
Sanborn, Head & Associates
Workorder# 1512401

Twelve 6 Liter Summa Canister (SIM Certified) samples were received on December 21, 2015. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the Full Scan and SIM acquisition modes. The method involves concentrating up to 1.0 liter of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

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.

Requirement	***TO-15***	***ATL Modifications***
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to </= 40% RSD	For SIM only: Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to </= 40% RSD
Daily Calibration	+- 30% Difference	For Std. Full Scan: </= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers For SIM: Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	For SIM only: 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

Receiving Notes

The Chain of Custody (COC) information for sample IA4019 did not match the entry on the sample tag with regard to sample identification. The information on the COC was used to process and report the sample.

Analytical Notes

The results for each sample in this report were acquired from two separate data files originating from the same analytical run. The two data files have the same base file name and are differentiated with a "sim" extension on the SIM data file.

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

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

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

Client Sample ID: IA4014

Lab ID#: 1512401-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.80	2.4
Freon 11	0.16	0.42	0.90	2.4
Acetone	0.80	4.0	1.9	9.6
Tetrachloroethene	0.16	0.64	1.1	4.4

Client Sample ID: IA4014

Lab ID#: 1512401-01B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.078	0.20	0.49

Client Sample ID: IA4017

Lab ID#: 1512401-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.78	2.4
Freon 11	0.16	0.42	0.88	2.3
Acetone	0.78	16	1.9	39
Methylene Chloride	0.31	0.64	1.1	2.2
Benzene	0.16	0.21	0.50	0.67
Toluene	0.16	1.5	0.59	5.6
Tetrachloroethene	0.16	1.9	1.1	13
m,p-Xylene	0.16	0.48	0.68	2.1
o-Xylene	0.16	0.15 J	0.68	0.66 J

Client Sample ID: IA4017

Lab ID#: 1512401-02B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.031	0.076	0.20	0.48
Trichloroethene	0.031	0.035	0.17	0.19

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

Client Sample ID: IA4016

Lab ID#: 1512401-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.48	0.82	2.4
Freon 11	0.17	0.48	0.93	2.7
Acetone	0.83	7.4	2.0	17
Tetrachloroethene	0.17	2.0	1.1	13

Client Sample ID: IA4016

Lab ID#: 1512401-03B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.033	0.076	0.21	0.48
Trichloroethene	0.033	0.033	0.18	0.18

Client Sample ID: IABB-39

Lab ID#: 1512401-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.49	0.80	2.4
Freon 11	0.16	0.23	0.91	1.3
Acetone	0.81	3.0	1.9	7.2
Methylene Chloride	0.32	0.44	1.1	1.5
Tetrachloroethene	0.16	1.2	1.1	7.9

Client Sample ID: IABB-39

Lab ID#: 1512401-04B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.074	0.20	0.46

Client Sample ID: IABG-38

Lab ID#: 1512401-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)

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

Client Sample ID: IABG-38

Lab ID#: 1512401-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.47	0.84	2.3
Freon 11	0.17	0.26	0.95	1.5
Acetone	0.84	3.2	2.0	7.5
Tetrachloroethene	0.17	1.7	1.1	11

Client Sample ID: IABG-38

Lab ID#: 1512401-05B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.034	0.074	0.21	0.46
Trichloroethene	0.034	0.056	0.18	0.30

Client Sample ID: IABH-40

Lab ID#: 1512401-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.48	0.84	2.4
Freon 11	0.17	0.26	0.96	1.5
Acetone	0.86	3.9	2.0	9.2
Methylene Chloride	0.34	1.6	1.2	5.4
Tetrachloroethene	0.17	0.52	1.2	3.5

Client Sample ID: IABH-40

Lab ID#: 1512401-06B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.034	0.059	0.22	0.37
Trichloroethene	0.034	0.061	0.18	0.33

Client Sample ID: Ambient Air

Lab ID#: 1512401-07A

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

Client Sample ID: Ambient Air

Lab ID#: 1512401-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.18	0.58	0.90	2.9
Freon 11	0.18	0.26	1.0	1.4
Acetone	0.91	13	2.2	30
Methylene Chloride	0.36	0.36	1.3	1.3
Benzene	0.18	0.18	0.58	0.58
Toluene	0.18	0.18 J	0.68	0.67 J

Client Sample ID: Ambient Air

Lab ID#: 1512401-07B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.036	0.084	0.23	0.53

Client Sample ID: Nitrogen Blank

Lab ID#: 1512401-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.54	0.80	2.7
Freon 11	0.16	0.26	0.91	1.5
Acetone	0.81	11	1.9	27
Methylene Chloride	0.32	0.32	1.1	1.1
Toluene	0.16	0.17	0.61	0.64

Client Sample ID: Nitrogen Blank

Lab ID#: 1512401-08B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.082	0.20	0.52

Client Sample ID: IAAy-43

Lab ID#: 1512401-09A

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

Client Sample ID: IAAy-43

Lab ID#: 1512401-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.48	0.82	2.4
Freon 11	0.17	0.40	0.93	2.2
Acetone	0.83	5.4	2.0	13
Toluene	0.17	0.16 J	0.62	0.62 J
Tetrachloroethene	0.17	2.8	1.1	19

Client Sample ID: IAAy-43

Lab ID#: 1512401-09B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.033	0.073	0.21	0.46
Trichloroethene	0.033	0.041	0.18	0.22

Client Sample ID: IABG-45

Lab ID#: 1512401-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.51	0.80	2.5
Freon 11	0.16	0.30	0.91	1.7
Acetone	0.81	7.8	1.9	18
Benzene	0.16	0.18	0.52	0.59
Toluene	0.16	0.87	0.61	3.3
Tetrachloroethene	0.16	0.62	1.1	4.2
m,p-Xylene	0.16	0.20	0.70	0.89

Client Sample ID: IABG-45

Lab ID#: 1512401-10B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.076	0.20	0.48

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

Client Sample ID: IA4019

Lab ID#: 1512401-11A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.56	0.80	2.8
Freon 11	0.16	0.25	0.91	1.4
Acetone	0.81	2.6	1.9	6.2
Tetrachloroethene	0.16	1.7	1.1	11

Client Sample ID: IA4019

Lab ID#: 1512401-11B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.076	0.20	0.48

Client Sample ID: IA4019 Duplicate

Lab ID#: 1512401-12A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.79	2.4
Freon 11	0.16	0.24	0.90	1.4
Acetone	0.80	2.6	1.9	6.1
Tetrachloroethene	0.16	1.5	1.1	9.9

Client Sample ID: IA4019 Duplicate

Lab ID#: 1512401-12B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.072	0.20	0.45
Trichloroethene	0.032	0.25	0.17	1.3

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Client Sample ID: IA4014

Lab ID#: 1512401-01A

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

File Name:	**v122306**	**Date of Collection: 12/17/15 5:15:00 PM**	
Dil. Factor:	**1.61**	**Date of Analysis: 12/23/15 12:15 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.80	2.4
Freon 11	0.16	0.42	0.90	2.4
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Acetone	0.80	4.0	1.9	9.6
Methylene Chloride	0.32	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	Not Detected	0.51	Not Detected
Toluene	0.16	Not Detected	0.61	Not Detected
Tetrachloroethene	0.16	0.64	1.1	4.4
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	Not Detected	0.70	Not Detected
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.80	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: IA4014

Lab ID#: 1512401-01B

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

File Name:	**v122306sim**	**Date of Collection: 12/17/15 5:15:00 PM**	
Dil. Factor:	**1.61**	**Date of Analysis: 12/23/15 12:15 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Carbon Tetrachloride	0.032	0.078	0.20	0.49
Trichloroethene	0.032	Not Detected	0.17	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: IA4017

Lab ID#: 1512401-02A

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

File Name:	**v122307**	**Date of Collection: 12/17/15 5:30:00 PM**	
Dil. Factor:	**1.57**	**Date of Analysis: 12/23/15 12:51 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.78	2.4
Freon 11	0.16	0.42	0.88	2.3
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.62	Not Detected
Acetone	0.78	16	1.9	39
Methylene Chloride	0.31	0.64	1.1	2.2
cis-1,2-Dichloroethene	0.16	Not Detected	0.62	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.86	Not Detected
Benzene	0.16	0.21	0.50	0.67
Toluene	0.16	1.5	0.59	5.6
Tetrachloroethene	0.16	1.9	1.1	13
Chlorobenzene	0.16	Not Detected	0.72	Not Detected
Ethyl Benzene	0.16	Not Detected	0.68	Not Detected
m,p-Xylene	0.16	0.48	0.68	2.1
o-Xylene	0.16	0.15 J	0.68	0.66 J
1,3-Dichlorobenzene	0.16	Not Detected	0.94	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.94	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.94	Not Detected
1,2,4-Trichlorobenzene	0.78	Not Detected	5.8	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA4017

Lab ID#: 1512401-02B

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

File Name:	**v122307sim**	**Date of Collection: 12/17/15 5:30:00 PM**	
Dil. Factor:	**1.57**	**Date of Analysis: 12/23/15 12:51 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
Carbon Tetrachloride	0.031	0.076	0.20	0.48
Trichloroethene	0.031	0.035	0.17	0.19

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA4016

Lab ID#: 1512401-03A

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

File Name:	**v122308**	**Date of Collection:**	**12/17/15 5:55:00 PM**
Dil. Factor:	**1.66**	**Date of Analysis:**	**12/23/15 01:26 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.48	0.82	2.4
Freon 11	0.17	0.48	0.93	2.7
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.66	Not Detected
Acetone	0.83	7.4	2.0	17
Methylene Chloride	0.33	Not Detected	1.2	Not Detected
cis-1,2-Dichloroethene	0.17	Not Detected	0.66	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.90	Not Detected
Benzene	0.17	Not Detected	0.53	Not Detected
Toluene	0.17	Not Detected	0.62	Not Detected
Tetrachloroethene	0.17	2.0	1.1	13
Chlorobenzene	0.17	Not Detected	0.76	Not Detected
Ethyl Benzene	0.17	Not Detected	0.72	Not Detected
m,p-Xylene	0.17	Not Detected	0.72	Not Detected
o-Xylene	0.17	Not Detected	0.72	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.83	Not Detected	6.2	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	95	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: IA4016

Lab ID#: 1512401-03B

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

File Name:	**v122308sim**	**Date of Collection: 12/17/15 5:55:00 PM**	
Dil. Factor:	**1.66**	**Date of Analysis: 12/23/15 01:26 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.042	Not Detected
Carbon Tetrachloride	0.033	0.076	0.21	0.48
Trichloroethene	0.033	0.033	0.18	0.18

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: IABB-39

Lab ID#: 1512401-04A

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

File Name:	**v122309**	**Date of Collection: 12/17/15 5:40:00 PM**	
Dil. Factor:	**1.62**	**Date of Analysis: 12/23/15 02:01 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.49	0.80	2.4
Freon 11	0.16	0.23	0.91	1.3
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Acetone	0.81	3.0	1.9	7.2
Methylene Chloride	0.32	0.44	1.1	1.5
cis-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
Toluene	0.16	Not Detected	0.61	Not Detected
Tetrachloroethene	0.16	1.2	1.1	7.9
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	Not Detected	0.70	Not Detected
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.81	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: IABB-39

Lab ID#: 1512401-04B

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

File Name:	**v122309sim**	**Date of Collection: 12/17/15 5:40:00 PM**	
Dil. Factor:	**1.62**	**Date of Analysis: 12/23/15 02:01 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Carbon Tetrachloride	0.032	0.074	0.20	0.46
Trichloroethene	0.032	Not Detected	0.17	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: IABG-38

Lab ID#: 1512401-05A

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

File Name:	**v122310**	**Date of Collection: 12/17/15 6:10:00 PM**	
Dil. Factor:	**1.69**	**Date of Analysis: 12/23/15 02:37 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.47	0.84	2.3
Freon 11	0.17	0.26	0.95	1.5
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Acetone	0.84	3.2	2.0	7.5
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
cis-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Benzene	0.17	Not Detected	0.54	Not Detected
Toluene	0.17	Not Detected	0.64	Not Detected
Tetrachloroethene	0.17	1.7	1.1	11
Chlorobenzene	0.17	Not Detected	0.78	Not Detected
Ethyl Benzene	0.17	Not Detected	0.73	Not Detected
m,p-Xylene	0.17	Not Detected	0.73	Not Detected
o-Xylene	0.17	Not Detected	0.73	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.84	Not Detected	6.3	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IABG-38

Lab ID#: 1512401-05B

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

File Name:	**v122310sim**	**Date of Collection: 12/17/15 6:10:00 PM**	
Dil. Factor:	**1.69**	**Date of Analysis: 12/23/15 02:37 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
Carbon Tetrachloride	0.034	0.074	0.21	0.46
Trichloroethene	0.034	0.056	0.18	0.30

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IABH-40

Lab ID#: 1512401-06A

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

File Name:	**v122311**	**Date of Collection:**	**12/17/15 5:22:00 PM**
Dil. Factor:	**1.71**	**Date of Analysis:**	**12/23/15 03:12 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.48	0.84	2.4
Freon 11	0.17	0.26	0.96	1.5
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.68	Not Detected
Acetone	0.86	3.9	2.0	9.2
Methylene Chloride	0.34	1.6	1.2	5.4
cis-1,2-Dichloroethene	0.17	Not Detected	0.68	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.93	Not Detected
Benzene	0.17	Not Detected	0.55	Not Detected
Toluene	0.17	Not Detected	0.64	Not Detected
Tetrachloroethene	0.17	0.52	1.2	3.5
Chlorobenzene	0.17	Not Detected	0.79	Not Detected
Ethyl Benzene	0.17	Not Detected	0.74	Not Detected
m,p-Xylene	0.17	Not Detected	0.74	Not Detected
o-Xylene	0.17	Not Detected	0.74	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.86	Not Detected	6.3	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IABH-40

Lab ID#: 1512401-06B

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

File Name:	**v122311sim**	**Date of Collection: 12/17/15 5:22:00 PM**	
Dil. Factor:	**1.71**	**Date of Analysis: 12/23/15 03:12 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.044	Not Detected
Carbon Tetrachloride	0.034	0.059	0.22	0.37
Trichloroethene	0.034	0.061	0.18	0.33

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: Ambient Air

Lab ID#: 1512401-07A

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

File Name:	**v122312**	**Date of Collection: 12/17/15 4:45:00 PM**	
Dil. Factor:	**1.82**	**Date of Analysis: 12/23/15 03:48 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.18	0.58	0.90	2.9
Freon 11	0.18	0.26	1.0	1.4
Freon 113	0.18	Not Detected	1.4	Not Detected
1,1-Dichloroethene	0.18	Not Detected	0.72	Not Detected
Acetone	0.91	13	2.2	30
Methylene Chloride	0.36	0.36	1.3	1.3
cis-1,2-Dichloroethene	0.18	Not Detected	0.72	Not Detected
1,1,1-Trichloroethane	0.18	Not Detected	0.99	Not Detected
Benzene	0.18	0.18	0.58	0.58
Toluene	0.18	0.18 J	0.68	0.67 J
Tetrachloroethene	0.18	Not Detected	1.2	Not Detected
Chlorobenzene	0.18	Not Detected	0.84	Not Detected
Ethyl Benzene	0.18	Not Detected	0.79	Not Detected
m,p-Xylene	0.18	Not Detected	0.79	Not Detected
o-Xylene	0.18	Not Detected	0.79	Not Detected
1,3-Dichlorobenzene	0.18	Not Detected	1.1	Not Detected
1,4-Dichlorobenzene	0.18	Not Detected	1.1	Not Detected
1,2-Dichlorobenzene	0.18	Not Detected	1.1	Not Detected
1,2,4-Trichlorobenzene	0.91	Not Detected	6.8	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	115	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: Ambient Air

Lab ID#: 1512401-07B

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

File Name:	**v122312sim**	**Date of Collection: 12/17/15 4:45:00 PM**	
Dil. Factor:	**1.82**	**Date of Analysis: 12/23/15 03:48 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.018	Not Detected	0.046	Not Detected
Carbon Tetrachloride	0.036	0.084	0.23	0.53
Trichloroethene	0.036	Not Detected	0.20	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	119	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: Nitrogen Blank

Lab ID#: 1512401-08A

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

File Name:	**v122313**	**Date of Collection:**	**12/17/15 4:45:00 PM**
Dil. Factor:	**1.62**	**Date of Analysis:**	**12/23/15 04:23 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.54	0.80	2.7
Freon 11	0.16	0.26	0.91	1.5
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Acetone	0.81	11	1.9	27
Methylene Chloride	0.32	0.32	1.1	1.1
cis-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
Toluene	0.16	0.17	0.61	0.64
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	Not Detected	0.70	Not Detected
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.81	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	115	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	104	70-130

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Client Sample ID: Nitrogen Blank

Lab ID#: 1512401-08B

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

File Name:	**v122313sim**	**Date of Collection: 12/17/15 4:45:00 PM**	
Dil. Factor:	**1.62**	**Date of Analysis: 12/23/15 04:23 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Carbon Tetrachloride	0.032	0.082	0.20	0.52
Trichloroethene	0.032	Not Detected	0.17	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	117	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	105	70-130

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Client Sample ID: IAAy-43

Lab ID#: 1512401-09A

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

File Name:	**v122314**	**Date of Collection: 12/17/15 6:25:00 PM**	
Dil. Factor:	**1.66**	**Date of Analysis: 12/23/15 05:00 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.17	0.48	0.82	2.4
Freon 11	0.17	0.40	0.93	2.2
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.66	Not Detected
Acetone	0.83	5.4	2.0	13
Methylene Chloride	0.33	Not Detected	1.2	Not Detected
cis-1,2-Dichloroethene	0.17	Not Detected	0.66	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.90	Not Detected
Benzene	0.17	Not Detected	0.53	Not Detected
Toluene	0.17	0.16 J	0.62	0.62 J
Tetrachloroethene	0.17	2.8	1.1	19
Chlorobenzene	0.17	Not Detected	0.76	Not Detected
Ethyl Benzene	0.17	Not Detected	0.72	Not Detected
m,p-Xylene	0.17	Not Detected	0.72	Not Detected
o-Xylene	0.17	Not Detected	0.72	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.83	Not Detected	6.2	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: IAAy-43

Lab ID#: 1512401-09B

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

File Name:	**v122314sim**	**Date of Collection: 12/17/15 6:25:00 PM**	
Dil. Factor:	**1.66**	**Date of Analysis: 12/23/15 05:00 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.042	Not Detected
Carbon Tetrachloride	0.033	0.073	0.21	0.46
Trichloroethene	0.033	0.041	0.18	0.22

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: IABG-45

Lab ID#: 1512401-10A

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

File Name:	**v122315**	**Date of Collection:**	**12/17/15 7:10:00 PM**
Dil. Factor:	**1.62**	**Date of Analysis:**	**12/23/15 05:44 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.51	0.80	2.5
Freon 11	0.16	0.30	0.91	1.7
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Acetone	0.81	7.8	1.9	18
Methylene Chloride	0.32	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	0.18	0.52	0.59
Toluene	0.16	0.87	0.61	3.3
Tetrachloroethene	0.16	0.62	1.1	4.2
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	0.20	0.70	0.89
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.81	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: IABG-45

Lab ID#: 1512401-10B

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

File Name:	**v122315sim**	**Date of Collection: 12/17/15 7:10:00 PM**	
Dil. Factor:	**1.62**	**Date of Analysis: 12/23/15 05:44 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Carbon Tetrachloride	0.032	0.076	0.20	0.48
Trichloroethene	0.032	Not Detected	0.17	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	102	70-130

eurofins | Air Toxics

Client Sample ID: IA4019

Lab ID#: 1512401-11A

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

File Name:	**v122316**	**Date of Collection: 12/17/15 6:38:00 PM**	
Dil. Factor:	**1.62**	**Date of Analysis: 12/23/15 06:21 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.56	0.80	2.8
Freon 11	0.16	0.25	0.91	1.4
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Acetone	0.81	2.6	1.9	6.2
Methylene Chloride	0.32	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
Toluene	0.16	Not Detected	0.61	Not Detected
Tetrachloroethene	0.16	1.7	1.1	11
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	Not Detected	0.70	Not Detected
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.81	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA4019

Lab ID#: 1512401-11B

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

File Name:	**v122316sim**	**Date of Collection: 12/17/15 6:38:00 PM**	
Dil. Factor:	**1.62**	**Date of Analysis: 12/23/15 06:21 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Carbon Tetrachloride	0.032	0.076	0.20	0.48
Trichloroethene	0.032	Not Detected	0.17	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	102	70-130

eurofins | Air Toxics

Client Sample ID: IA4019 Duplicate

Lab ID#: 1512401-12A

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

File Name:	**v122317**	**Date of Collection:**	**12/17/15 6:38:00 PM**
Dil. Factor:	**1.60**	**Date of Analysis:**	**12/23/15 07:00 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.79	2.4
Freon 11	0.16	0.24	0.90	1.4
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Acetone	0.80	2.6	1.9	6.1
Methylene Chloride	0.32	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.87	Not Detected
Benzene	0.16	Not Detected	0.51	Not Detected
Toluene	0.16	Not Detected	0.60	Not Detected
Tetrachloroethene	0.16	1.5	1.1	9.9
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.69	Not Detected
m,p-Xylene	0.16	Not Detected	0.69	Not Detected
o-Xylene	0.16	Not Detected	0.69	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.96	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.96	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.96	Not Detected
1,2,4-Trichlorobenzene	0.80	Not Detected	5.9	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: IA4019 Duplicate

Lab ID#: 1512401-12B

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

File Name:	**v122317sim**	**Date of Collection: 12/17/15 6:38:00 PM**	
Dil. Factor:	**1.60**	**Date of Analysis: 12/23/15 07:00 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Carbon Tetrachloride	0.032	0.072	0.20	0.45
Trichloroethene	0.032	0.25	0.17	1.3

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1512401-13A

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

File Name:	**v122305**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 11:21 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.10	Not Detected	0.49	Not Detected
Freon 11	0.10	Not Detected	0.56	Not Detected
Freon 113	0.10	Not Detected	0.77	Not Detected
1,1-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Acetone	0.50	Not Detected	1.2	Not Detected
Methylene Chloride	0.20	Not Detected	0.69	Not Detected
cis-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
1,1,1-Trichloroethane	0.10	Not Detected	0.54	Not Detected
Benzene	0.10	Not Detected	0.32	Not Detected
Toluene	0.10	Not Detected	0.38	Not Detected
Tetrachloroethene	0.10	Not Detected	0.68	Not Detected
Chlorobenzene	0.10	Not Detected	0.46	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
1,3-Dichlorobenzene	0.10	Not Detected	0.60	Not Detected
1,4-Dichlorobenzene	0.10	Not Detected	0.60	Not Detected
1,2-Dichlorobenzene	0.10	Not Detected	0.60	Not Detected
1,2,4-Trichlorobenzene	0.50	Not Detected	3.7	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	94	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1512401-13B

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

File Name:	**v122305sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 11:21 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
Carbon Tetrachloride	0.020	Not Detected	0.12	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1512401-14A

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

File Name:	**v122302**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 08:57 AM**	

Compound	%Recovery
Freon 12	111
Freon 11	100
Freon 113	102
1,1-Dichloroethene	102
Acetone	106
Methylene Chloride	101
cis-1,2-Dichloroethene	106
1,1,1-Trichloroethane	100
Benzene	105
Toluene	104
Tetrachloroethene	100
Chlorobenzene	104
Ethyl Benzene	106
m,p-Xylene	101
o-Xylene	105
1,3-Dichlorobenzene	90
1,4-Dichlorobenzene	89
1,2-Dichlorobenzene	94
1,2,4-Trichlorobenzene	97

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	95	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1512401-14B

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

File Name:	**v122302sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 08:57 AM**	

Compound	%Recovery
Vinyl Chloride	94
Carbon Tetrachloride	123
Trichloroethene	98

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1512401-15A

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

File Name:	**v122303**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 09:47 AM**	

Compound	%Recovery	Method Limits
Freon 12	108	70-130
Freon 11	101	70-130
Freon 113	95	70-130
1,1-Dichloroethene	96	70-130
Acetone	102	70-130
Methylene Chloride	94	70-130
cis-1,2-Dichloroethene	98	70-130
1,1,1-Trichloroethane	93	70-130
Benzene	103	70-130
Toluene	101	70-130
Tetrachloroethene	99	70-130
Chlorobenzene	105	70-130
Ethyl Benzene	101	70-130
m,p-Xylene	99	70-130
o-Xylene	100	70-130
1,3-Dichlorobenzene	91	70-130
1,4-Dichlorobenzene	88	70-130
1,2-Dichlorobenzene	93	70-130
1,2,4-Trichlorobenzene	103	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	91	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	95	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1512401-15AA

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

File Name:	**v122304**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 10:31 AM**	

Compound	%Recovery	Method Limits
Freon 12	104	70-130
Freon 11	98	70-130
Freon 113	94	70-130
1,1-Dichloroethene	94	70-130
Acetone	100	70-130
Methylene Chloride	92	70-130
cis-1,2-Dichloroethene	97	70-130
1,1,1-Trichloroethane	92	70-130
Benzene	102	70-130
Toluene	100	70-130
Tetrachloroethene	102	70-130
Chlorobenzene	103	70-130
Ethyl Benzene	103	70-130
m,p-Xylene	96	70-130
o-Xylene	101	70-130
1,3-Dichlorobenzene	85	70-130
1,4-Dichlorobenzene	85	70-130
1,2-Dichlorobenzene	89	70-130
1,2,4-Trichlorobenzene	96	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	89	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	95	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1512401-15B

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

File Name:	**v122303sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 09:47 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	96	70-130
Carbon Tetrachloride	97	60-140
Trichloroethene	96	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1512401-15BB

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

File Name:	**v122304sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/23/15 10:31 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	93	70-130
Carbon Tetrachloride	96	60-140
Trichloroethene	96	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

APPENDIX E

DATA VALIDATION REPORT

Data Usability Review
Method TO-15 Hi/Lo Analysis

Client:	Sanborn, Head & Associates, Inc., Concord, New Hampshire (SHA)
Site:	IBM East Fishkills Facility, Hopewell Junction, New York Building B330D
Laboratory:	Eurofins Air Toxics, Inc. (EATL), Folsom, California
SDG / Work Order:	1512401
Date(s) of Collection:	December 17, 2015
Number and type Samples & analyses:	10 Indoor Air, 1 Ambient Air, and 1 Equipment Blank sample for twenty-two project-specific VOCs by Method TO-15 Hi/Lo
Senior Data Reviewers:	Dr. Nancy C. Rothman, New Environmental Horizons, Inc. Susan D. Chapnick, New Environmental Horizons, Inc.
Date Completed:	January 26, 2016

This Data Usability Report was performed on the Work Order identified with the following intentions: 1) to determine if the data were generated and reported in accordance with the *Work Plan, RCRA Facility Investigation (RFI), VOC Source Assessment IBM East Fishkill Facility, Hopewell Junction, New York*, prepared by Sanborn, Head & Associates, June 2009; NYSDEC Analytical Services Protocol, June 2005 with NYSDEC Modifications to the EPA Region 9 TO-15 QA/QC Criteria, February 2008; USEPA Region 9, *Volatile Organic Compounds (VOCs) in Air (Ambient Air/Soil Vapor/Stack Gas) Samples Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS), EPA Method TO-15* (January 1999), 01/21/2000 revision; USEPA Region II SOP HW-31, *Validating Air Samples, Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15*, Rev. 4, August 2009; and Method TO-15, *Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*, Publication EPA/625/R-96/010b, January 1999; 2) to determine if the data met project data quality objectives for acceptable accuracy, precision, sensitivity; and technical usability; and 3) to update the project database with appropriate data quality qualifiers.

I. Sample Descriptions and Analytical Parameters

The sample IDs, date of sampling, identification of quality control (QC) samples, if applicable, and the analytical parameters reviewed in this In-Depth data usability review are listed in Table 1. Any deviations noted for sample collection and receipt (*e.g.*, temperature or preservation issues) are included in Section III, below.

Table 1. Sample Descriptions and Analytical Parameters

Sample ID	Lab Sample ID	Collection Date	Matrix	Analytical Parameters	Sample Type
IA4014	1512401-01	12/17/15	Indoor Air	VOCs	Field Sample
IA4017	1512401-02	12/17/15	Indoor Air	VOCs	Field Sample
IA4016	1512401-03	12/17/15	Indoor Air	VOCs	Field Sample
IA BB-39	1512401-04	12/17/15	Indoor Air	VOCs	Field Sample
IA BG-38	1512401-05	12/17/15	Indoor Air	VOCs	Field Sample
IA BH-40	1512401-06	12/17/15	Indoor Air	VOCs	Field Sample
Ambient Air	1512401-07	12/17/15	Ambient Air	VOCs	Field Sample
Nitrogen Blank	1512401-08	12/17/15	Nitrogen	VOCs	Equipment Blank
IA AY-43	1512401-09	12/17/15	Indoor Air	VOCs	Field Sample
IA BG-45	1512401-10	12/17/15	Indoor Air	VOCs	Field Sample
IA4019	1512401-11	12/17/15	Indoor Air	VOCs	Field Sample
IA4019 Duplicate	1512401-12	12/17/15	Indoor Air	VOCs	Field Duplicate of IA4019

Analytical method reference:

VOC: TO-15 Hi/Lo – Method TO-15 with simultaneous Full Scan and Selected Ion Monitoring (SIM) analysis for twenty-two project-specific VOCs

II. Data Deficiencies, Analytical Protocol Deviations, and Quality Control Problems

The following QC elements, as applicable to the analytical methods, were reviewed during this validation:

- Data package completeness and reporting protocols
- Sample receipt, holding times, and canister condition
- Calibration criteria (instrument tuning, initial and continuing calibration verifications)
- Method and field blank results
- Laboratory Control Sample (LCS) recoveries
- Internal Standard (IS) Recoveries
- Sample/Laboratory Duplicate (LD) or sample/Field Duplicate (FD) Relative Percent Differences (RPDs)
- Sample result reporting (including reporting limits and units)
- Other method-specific QC if applicable and reported
- Deficiencies or protocol deviations as noted in the Laboratory Narrative

During this review of VOCs several results were estimated (J or UJ) due to QC issues. Table 2 summarizes the actions taken during this review. NEH generated validated data spreadsheets based on the electronic project database files received from SHA for this Work Order. All results were considered acceptable compared to QAPP and method criteria and usable for project decisions with the understanding of the potential uncertainty (bias) in the qualified results.

The laboratory reported results for 22 project-specific VOCs from a single analysis with two mass spectrometer (MS) detectors, each operated in a different detection mode: one operated in the full scan electron impact mode and the other operated in the Selected Ion Monitoring (SIM) mode. This analysis, called TO-15 Hi/Lo by ATL, allowed the sensitivity requirements of the project, unless otherwise discussed in this report, to be met for all of the compounds. The Data Review Checklist indicates the compounds reported from each of the two modes of MS operation. The full scan analysis was reported with an "A" suffix and the SIM analysis with a "B" suffix appended to the laboratory sample ID.

There were three issues with sample receiving and Chain-of-Custody (COC) documentation as follows:

- All samples originally appeared on a single COC; however, after receipt, SHA sent ATL revised COCs so that the sample information was legible and complete on two COC forms.
- The sample tag on the canister and the COC information for IA4019 did not match; however, the COC ID was used for reporting of results.
- All collection times on the sample tags on the canisters did not match the collection times on the COC; however, the COC collection times were used for reporting of results.

The "Nitrogen Blank" sample (lab ID 1512401-08) was supposed to be the Equipment Blank (EB) associated with the collection of all of these samples; however, a comparison of the Nitrogen Blank to the Ambient Air sample shows that both contain the same detected compounds at about the same concentration. SHA believes that there was a leak in the connections between the Nitrogen source and the EB canister so that this EB is really another Ambient Air sample. SHA directed NEH to not associate this EB with the samples (i.e., no blank actions were evaluated using this EB).

Three results were reported at levels below the reporting limit and flagged "J" by the laboratory. These data were accepted as estimated results (J) with indeterminate bias due to uncertainty in quantitation below the instrument calibration range, as shown in Table 2.

Precision was acceptable for all VOCs except for trichloroethene in the Field Duplicate pair IA4019 and IA4019 Duplicate. The trichloroethene results in IA4019 and IA4019 Duplicate were estimated (UJ and J) with indeterminate bias due to FD imprecision. These results are an indication of acceptable precision and representativeness of the samples for this site location for all the project-specific VOCs except for trichloroethene.

All reporting limits were at a level below the Project required RL (as shown in Table B.1 of the QAPP) except for Carbon Tetrachloride in samples IA4016, IA BG-38, IA BH-40, Ambient Air, and IA AY-43, which had RLs exceeding the expected RL. However, since carbon tetrachloride was detected in all of these samples, sensitivity is considered acceptable for these data.

All other quality control information associated with accuracy, precision, and sensitivity for the VOCs reported met method criteria for the samples in this Work Order with the exceptions included in Table 2.

Table 2. Summary of Data Validation Actions

Field Sample ID	Analyte	Qualifier	Bias	Validation Comments
IA4017	o-Xylene	J	I	Result < RL
Ambient Air IA AY-43	Toluene	J	I	Result < RL
IA4019 IA4019 Duplicate	Trichloroethene	UJ / J	I	FD imprecision

Qualifiers: U = Analyte is non-detect at or above the sample-specific reporting limit (RL); UJ = Non-detect is estimated at the RL; J = Result is estimated; EB = Analyte was also present in a Field Equipment Blank; R = Result is rejected and is unusable for project decisions.

Bias: L = Low; H = High; I = Indeterminate

Abbreviations used in Table 2:
RL = Reporting Limit
FD = Field Duplicate

The attached Data Review Checklist documents the method and matrix-specific QC reviewed and the issues that required action (as listed in Table 2) or affected the data certainty in terms of data quality objectives (DQO) of accuracy, precision, and sensitivity.

Air Data Review Checklist - Method TO-15

Date Sampled: 12/17/15 No. Samples 9 IA + 1 FD + 1 AA + 1 EB

Method of Analysis: TO-15 Hi/Lo

Data Element Acceptable	Canister Receipt	HT	GC/MS Tunes + Calibrations	Internal Stds + Surrogates	LCS	Lab Dup (LCS and LD)	Field Duplicates	RL & Quant.
Yes	√	√	√	√	√	√		
No							Estimate (J or UJ) TCE in FD pair	Accept 3 "J" values

Other Issues :

A combined Full Scan and SIM Analysis was performed for each sample for 22 Project-specific VOCs listed in Table B.1 of the Work Plan, as shown on page 5 of this checklist. The full scan analysis was reported with an "A" suffix and the SIM analysis with a "B" suffix appended to the laboratory sample ID.

The samples were received intact and in good condition on 12/21/15. The sample tag on the canister did not match the sample ID on the COC for sample IA4019 (COC was used to match client ID to canister number) and the times shown on the COC for all samples didn't match the times listed on the sample tags (COC was used for reporting times of collection for all samples). In addition, all samples were originally on one COC but after receipt on 12/21/15, SHA sent ATL revised COCs so that the sample information was legible and complete on two COC forms.

Canisters were Certified pre-cleaned - certificates of analysis were reported and indicate that all Target compounds were non-detect in the canisters prior to being sent to the field.

The canister vacuums (field initial, field final and lab receipt) were all acceptable; therefore, no action required.

Samples were analyzed on 12/23/15; therefore HT was met. No Action required.

Date: ***1/25/16***

Data Reviewer: ***Nancy C. Rothman, Ph.D.***

The "Nitrogen Blank" sample (lab ID 1512401-08) was supposed to be the Equipment Blank (EB) associated with the collection of all of these samples; however, a comparison of the Nitrogen Blank to the Ambient Air sample shows that both contain the same detected compounds at about the same concentrations. SHA believes that there was a leak in the connections between the Nitrogen source and the EB canister so that this EB is really another Ambient Air sample. SHA directed NEH to not associate this EB with these samples (i.e., no blank actions were evaluated using this EB).

Associated Blanks: Method Blank: v122305 &v122305sim

Blank ID	Contaminant / Level (µg/m^3)		Action Level DF=		Sample and reported result (µg/m3)	Corrected Database Result
v122305	None				No Blank Action Required	
v122305sim	None				No Blank Action Required	

Additional Notes:

ICALs : Instrument V Full Scan and SIM performed on 12/22/15. Full Scan = 6- to 8-level calibration from 0.05, 0.1, or 0.5 to 40 ppbV for all 22 Target compounds plus several non-target compounds. SIM = 10- to 11-level calibration from 0.003 or 0.005 to 20 ppbV for 3 Target plus several other non-target compounds. %RSD ≤ 30% for all 22 Target Compounds. RLs reported (as indicated in the table on page 4 of this checklist for DF=2 analysis) were supported by the ICALs. No Action required

CCALs: v122302 / v122302sim - % Recovery 70-130% for all 22 Target compounds - No Action required.

BFB Tunes: Instrument V 2 Tunes (1 for ICAL + 1 for CCAL) - all criteria in all tunes were met and all samples were analyzed within 12 hours of tune; therefore, No Action Required.

Surrogates & Internal Standards **:** All 3 Surrogates had %Recovery within criteria and all IS' had areas and RTs within criteria in all analyses; therefore, No Action Required.

LCS/LCSD : v122303/v122304 & v122303sim/v122304sim - %Recovery acceptable for all 22 Targets in LCS and LCSD and LCS/LCSD RPDs all OK; therefore, acceptable accuracy and precision demonstrated for analysis of the 22 VOCs by Full Scan + SIM analysis.

LD analysis not performed for the samples in this Work Order. LCS/LCSD reported instead, which reported acceptable precision except as listed above.

There were 3 "J" results reported. These "J" data were accepted with indeterminate bias due to uncertainty in quantitation at a level below the Reporting limit (Result < RL). There were no other qualifiers (except "U") reported on the data.

Date: ***1/25/16***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Additional Notes:

All reporting limits were at a level below the Project required RL (as shown in Table B.1, which is reproduced on page 5 of this Checklist) except for Carbon Tetrachloride in samples IA4016, IA BG-38, IA BH-40, Ambient Air, and IA AY-43, which had RLs exceeding the expected RL; however, as carbon tetrachloride was detected in all of these samples, sensitivity for data is considered acceptable. No action required.

The narrative did not raise any additional issues that would affect data quality.

Date: ***1/25/16***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Field Duplicate Evaluation_ Sample IDs: Sample = IA4019 FD = IA4019 Duplicate

Analyte Name	CAS No.	DF = 1.62* RL (µg/m³)	Sample Result µg/m3	Q	Result Level	FD Result µg/m3	Q	FD Level	RPD	Action
Freon 12	75-71-8	0.8	2.8		< 5xRL	2.4		< 5xRL	15.4	None
Freon 11	75-69-4	0.91	1.4		< 5xRL	1.4		< 5xRL	0.0	None
Freon 113	76-13-1	1.2	1.2	U	RL	1.2	U	RL	NA	None
1,1-Dichloroethene	75-35-4	0.64	0.64	U	RL	0.63	U	RL	NA	None
Acetone	67-64-1	1.9	6.2		< 5xRL	6.1		< 5xRL	1.6	None
Methylene Chloride	75-09-2	1.1	1.1	U	RL	1.1	U	RL	NA	None
cis-1,2-Dichloroethene	156-59-2	0.64	0.64	U	RL	0.63	U	RL	NA	None
1,1,1-Trichloroethane	71-55-6	0.88	0.88	U	RL	0.87	U	RL	NA	None
Benzene	71-43-2	0.52	0.52	U	RL	0.51	U	RL	NA	None
Toluene	108-88-3	0.61	0.61	U	RL	0.6	U	RL	NA	None
Tetrachloroethene	127-18-4	1.1	11		> 5xRL	9.9		> 5xRL	10.5	None
Chlorobenzene	108-90-7	0.74	0.74	U	RL	0.74	U	RL	NA	None
Ethyl Benzene	100-41-4	0.7	0.7	U	RL	0.69	U	RL	NA	None
m,p-Xylene	108-38-3/ 106-42-3	0.7	0.7	U	RL	0.69	U	RL	NA	None
o-Xylene	95-47-6	0.7	0.7	U	RL	0.69	U	RL	NA	None
1,3-Dichlorobenzene	541-73-1	0.97	0.97	U	RL	0.96	U	RL	NA	None
1,4-Dichlorobenzene	106-46-7	0.97	0.97	U	RL	0.96	U	RL	NA	None
1,2-Dichlorobenzene	95-50-1	0.97	0.97	U	RL	0.96	U	RL	NA	None
1,2,4-Trichlorobenzene	120-82-1	6	6	U	RL	5.9	U	RL	NA	None
Vinyl Chloride	75-01-4	0.041	0.041	U	RL	0.041	U	RL	NA	None
Carbon Tetrachloride	56-23-5	0.2	0.48		< 5xRL	0.45		< 5xRL	6.5	None
Trichloroethene	79-01-6	0.17	0.17	U	RL	1.3		> 5xRL	NA	**UJ / J**

*The FD DF was 1.60

** Action only taken for RPD > 20% if one or both results are > 5 x RL or if one result ND and other results > 5 x RL

Q = Data Qualifier as reported by EATL and/or NEH; U = non-detect, J = estimated result; UJ = non-detect is estimated

NA = Not Applicable. RPD not calculated since one or both results were non-detect.

FD precision was acceptable for all 22 Target VOCs in the FD pair except for Trichloroethene which was non-detect in IA4019 and was reported at a value > 5 x RL in IA4019 Duplicate. The raw data for IA4019 Duplicate was reviewed and the mass spectral and retention time evaluation indicates that Trichloroethene was accurately reported in this Duplicate sample.

ACTION: Trichloroethene estimated (J or UJ) in IA4019 and IA4019 Duplicate with indeterminate bias due to FD imprecision.

Date: ***1/25/16***

Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Method of Analysis: TO-15 Hi/Lo

Compound List and Project-required Reporting Limits (RL)

Target Analyte Name		Full Scan (Full) or SIM		RL (µg/m^3)
Tetrachloroethene (PCE)		Full		1.4
Trichloroethene (TCE)		SIM		0.22
cis-1,2-Dichloroethene (cDCE)		Full		0.8
1,1-Dichloroethene (DCE)		Full		0.8
Vinyl chloride (VC)		SIM		0.06
1,1,1-Trichloroethane (TCA)		Full		1.1
Carbon Tetrachloride		SIM		0.2
Methylene chloride (MeCL)		Full		1.4
Chlorobenzene		Full		0.92
1,2,4-Trichlorobenzene		Full		7.4
1,2-Dichlorobenzene		Full		1.2
1,3-Dichlorobenzene		Full		1.2
1,4-Dichlorobenzene		Full		1.2
Acetone		Full		2.4
Benzene		Full		0.64
Ethylbenzene		Full		0.86
m-Xylene		Full		0.86
p-Xylene				
o-Xylene		Full		0.86
Toluene		Full		0.77
Trichlorofluoromethane (Freon 11)		Full		1.1
Dichlorodifluoromethane (Freon 12)		Full		1
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)		Full		1.5

Date: ***1/25/16***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Actions (see References below):

Canister Integrity:	If certification forms indicate issues, J/U or UJ results in samples
Canister Vacuum (Vac):	Initial Field Vac < 25" Hg, J/UJ all results; Lab Receipt Vac > 15" Hg, J/UJ results; Lab Receipt Vac > ± 5" Hg of Final Field Vac, J/UJ results
Hold Time (HT):	HT > 30 days, J detects/ UJ non-detects
Blank Actions:	Action Level = 5 x Level in Blank; Sample-specific Blank Action Level = Action Level x (Sample DF/Blank DF) Method Blank (MB): Result < RL, U result at RL; RL<Result<Blank Action, U result at level reported Equipment Blank (EB): Result<Blank Action, EB result at level reported
BFB Tune:	SW-846 method 8260B tune criteria not met, professional judgment on R of all data; samples analyzed > 12-hours after tune; professional judgment on J/UJ or R of results
LCS and CCV:	Percent Recovery (%Rec) <10%, J detects, R non-detects; 10% < %Rec <70%; J/UJ all associated data; %Rec >130%, J detects - no action for non-detects
Initial Calibration (ICAL):	%RSD > 30%, J/UJ associated results
Internal Standard (IS):	RT > ±0.33 min of IS RT in daily CCV, J/UJ associated results; Area < 25% Area in CCV, J detects, R non-detects (or professional judgment); 25%< Area < 60% of CCV Area, J/UJ associated results; Area > 140% of CCV Area, J detects, no action for non-detects
Surrogates:	%Rec <10%, J detects, R non-detects; 10% < %Rec <70%; J/UJ all associated data; %Rec >130%, J detects - no action for non-detects
Laboratory Duplicates:	LCS/LCSD RPD or Sample/LD RPD > 20% for detects > 5x RL, J associated data; professional judgment for results < 5 x RL
Field Duplicates:	RPD > 20% for detects > 5x RL, J associated data; professional judgment for results < 5 x RL
RLs + Quant:	Compound reported outside calibration range (< RL or at ppbV level > sample-specific highest ICAL standard for compound), J data. Note if RL > expected RL from Table B.1 of Work Plan (see above)

References: *Work Plan, RCRA Facility Investigation (RFI), VOC Source Assessment IBM East Fishkill Facility, Hopewell Junction, New York* , prepared by Sanborn, Head & Associates, June 2009; NYSDEC Analytical Services Protocol, June 2005 with NYSDEC Modifications to the EPA Region 9 TO-15 QA/QC Criteria, February 2008; USEPA Region II SOP HW-31, Validating Air Samples, Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, Rev. 4, October 2006; and Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), Publication EPA/625/R-96/010b, January 1999