SANBORN HEAD ENGINEERING

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REPORT OF INTERIM MEASURES AND INDOOR AIR QUALITY TESTING

BUILDING 330C

Former IBM East Fishkill Facility
Hopewell Junction, New York

Prepared for IBM Corporation
File No. 2999.06
July 2016

8976 Wellington Road
Manassas, VA 20109

July 22, 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 Interim Measures and Indoor Air Quality Testing – B330C
Former IBM East Fishkill Facility
Hopewell Junction, New York
EPA ID No. NYD000707901

Dear Mr. Czuhanich:

The enclosed report presents the results of indoor air quality (IAQ) testing that was conducted after interim measures had been completed in Building 330C 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, please contact me at (703) 257-2583.

Sincerely yours,

Dean W. Chartrand
Program Manager
Corporate Environmental Affairs

Encl: Report of Interim Measures and Indoor Air Quality Testing – B330C

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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Former IBM East Fishkill Facility
Hopewell Junction, New York
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Dear Mr. Chartrand:

The enclosed report presents the results of indoor air quality (IAQ) testing that was conducted after interim measures had been completed in Building 330C 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 Interim Measures and Indoor Air Quality Testing – B330C

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SANBORN HEAD ENGINEERING
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REPORT OF INTERIM MEASURES AND INDOOR AIR QUALITY TESTING
BUILDING 330C

Former IBM East Fishkill Facility
Hopewell Junction, New York

Prepared for
IBM Corporation

Prepared by
Sanborn, Head Engineering, P.C.

File 2999.06
July 2016

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1.0 INTRODUCTION

This report presents the results of indoor air quality (IAQ) testing conducted in Building 330C (B330C) in April 2016 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 B330C on the site is shown on Figure 2. The work described herein was conducted on behalf of IBM by Sanborn, Head Engineering, P.C. (SHPC) 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.

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

2.0 BACKGROUND AND PURPOSE OF WORK

B330C was subject to confirmatory sampling under the RFI Work Plan, the results of which were conveyed in the following reports submitted to the Agencies: *Confirmatory Sampling Results, Buildings 330C and 338 (*November 2009)[1]; and *Report of Supplemental Remedial Measures, Building 330C VOC Source Assessment* (July 2014)[2]. In recent years, decommissioning of certain manufacturing areas has been conducted and much of the building has been vacated; however, certain areas of the building remain routinely occupied. As a result, in August 2015, GF requested to either turn off air handling units (AHUs), or reduce the outside air (OA) flow, in certain HVAC zones.

Therefore, in November 2015, IAQ screening and sampling was conducted to assess the concentrations of certain volatile organic compound (VOC) under the HVAC system operating conditions requested by GF. The results of the November 2015 testing were provided to the Agencies by IBM in a report dated February 2016[3]. Based on the results of the November 2015 testing, the requested HVAC adjustments were made, except in three HVAC zones (AC-1, AC-7A, and AC-58) where IAQ testing did not support the requested reductions to the OA flow rates.

In February 2016, a temporary subslab depressurization system (SSDS) was installed and put into operation in the former Baseline Area of B330C proximate to zones AC-1, AC-7A,

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[1] IBM and Sanborn, Head Engineering, P.C., *Confirmatory Sampling Results, Buildings 330C and 338, VOC Source Assessment, IBM East Fishkill Facility, Hopewell Junction, NY*, November 2009.

[2] IBM and Sanborn, Head Engineering, P.C., *Report of Supplemental Remedial Measures, Building 330C VOC Source Assessment, IBM East Fishkill Facility, Hopewell Junction, NY*, July 2014.

[3] Sanborn, Head & Associates, Inc., "Report of HVAC Adjustment and Indoor Air Quality Testing – Buildings 330C and 338, Former IBM East Fishkill Facility, Hopewell Junction, New York", February 2016.

and AC-58. After the startup of the temporary SSDS, GF's requested adjustments to AC-1, AC-7A, and AC-58 were made, and IAQ screening and sampling in select HVAC zones was conducted in April 2016 to assess the influence of the temporary SSDS on IAQ. The purpose of this report is to describe the temporary SSDS and present the results of IAQ sampling conducted after startup of the temporary SSDS.

The original HVAC settings (i.e., before the November 2015 testing was conducted) and the adjusted HVAC settings (i.e., changes proposed based on the April 2016 testing) for B330C are provided in Table 1. Zones in which HVAC settings are significantly different than the original HVAC settings are represented by shaded rows. The location of the B330C HVAC zones and a depiction of their operating status during the April 2016 IAQ sampling is shown on Figure 3.

3.0 TEMPORARY SUBSLAB DEPRESSURIZATION SYSTEM

3.1 Subslab Vapor Conditions

Subslab vapor ports SS3001 through SS3031 were installed in B330C on April 7, 9, and 16, 2015. Subslab vapor screening was conducted at the ports between April 8 and May 5, 2015 using a portable gas chromatograph/mass spectrometer (GC/MS). Subslab vapor ports SS3055 through SS3058, located in the far southeastern corner of the building, were installed in January 2016 and were sampled on February 9 and 15, 2016 over a period of approximately 1 hour using 1-L SUMMA® canisters.[4]

Subslab vapor screening locations and concentration isopleths for PCE are shown on Figure 4. The results indicate that an area of elevated PCE concentrations is present in subslab vapor beneath the former Baseline Area and reliability lab located in the western area of the building, where PCE was detected at concentrations of up to 870,000 µg/m^3. Elevated concentrations of PCE in subslab vapor were also observed beneath the eastern and southern portions of the building, but at concentrations of about an order of magnitude lower than below the western side of the building.

3.2 Temporary Subslab Depressurization System Description

Based on the results of the subslab vapor sampling and the indoor air concentrations observed during November 2015 indoor air screening, a temporary SSDS was installed in the former Baseline Area to target the highest concentrations of PCE in subslab vapor. The placement of the temporary SSDS was informed by pilot testing conducted in July and October 2015 and February 2016.

The temporary SSDS began withdrawing subslab vapor from two extraction ports (EP3012 and EP3015) on March 22, 2016. A regenerative-type blower mounted on a portable cart, shown in Exhibit 1 below, is connected to the two extraction ports. Vapor is withdrawn from the two ports and pulled through a moisture knockout drum and two vapor-phase

[4] Extraction ports and subslab vapor ports not listed above were installed for pilot testing purposes, and their data were not used to generate the isopleths shown on Figures 4 and 5.

granular activated carbon (GAC) vessels. The treated vapor is vented to the building exterior via an active exhaust vent.

Exhibit 1 – Temporary SSDS Setup in Baseline Area of B330C

3.3 System Performance

The applied vacuum and flow rates for the two extraction ports are shown on Figure 5. Subslab differential pressure measurements were collected on March 23, 2016 after the SSDS had been running for approximately 1 day. The inferred extent of subslab pressure response is depicted by the pressure differential isopleths of -0.004 inches of water column (in. wc) relative to indoor air pressure; this value, or lower pressure (greater vacuum), is indication that vapor extraction has influence, and is expected to be sufficient to capture subslab soil vapor, within at least the area encompassed by the -0.004 in. wc isopleths.

The differential pressure data indicate substantial depressurization of the area delineated by the >500,000 µg/m^3 PCE isopleth encompassing the west portion of the building that is believed to be the primary source of indoor air VOC presence. The following section provides a summary of indoor air concentrations in the western portion of the building after starting up the temporary SSDS and making the adjustments to AC-1, AC-7A, and AC-58 as requested by GF.

4.0 B330C HVAC ADJUSTMENTS AND INDOOR AIR QUALITY TESTING

The following sections provide a summary of the HVAC modifications, IAQ screening, and results in B330C since the start-up of the temporary SSDS.

4.1 Scope of B330C Assessment

4.1.1 Summary of B330C HVAC Adjustments

GF and its contractor, US Test, made HVAC adjustments to zones AC-1, AC-7A, and AC-58, which are outlined on Figure 3. The HVAC adjustments were made approximately 4 days in advance of IAQ screening to allow conditions to stabilize. The purpose of the changes was to reduce the OA flow rates to those requested by GF in August 2015, but which had not been implemented because of the results of the November 2015 testing. A summary of the changes is provided on Table 1.

Three HVAC zones (AC-4, AC-90, and AC-91) have 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.

4.1.2 Summary of B330C IAQ Screening and Sampling

IAQ screening was conducted in B330C on April 12, 2016 under the adjusted HVAC settings using the portable GC/MS. The adjusted HVAC settings are shown on Table 1 and depicted on Figure 3.

After screening, indoor air sampling was conducted in occupied areas of B330C on April 13, 2016 to confirm the screening results. Indoor air samples were collected as 8-hour time-weighted-average samples into SUMMA® canisters collected in accordance with the procedures described in the RFI Work Plan and 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 trichloroethene (TCE), vinyl chloride, and carbon tetrachloride.

Indoor air samples were typically collected at a height of between 3.5 and 4 feet above the floor level within occupied areas of the building. 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 B, and a summary of field sampling information is provided in Table 2.

4.2 B330C Results

The following discussion of results represents conditions within B330C that reflect the adjusted AHU settings indicated on Table 1 and Figure 3 while the temporary SSDS was operating.

4.2.1 B330C Portable GC/MS Screening Results

PCE and TCE screening results are provided in Table 2 and depicted on Figure 4. TCE was not detected at 41 of the 42 indoor air screening locations. The only TCE detection occurred in a vacant and unoccupied area at a concentration of 0.77 µg/m^3.

PCE was detected at concentrations that ranged from less than the reporting limit (about 0.68 µg/m^3) up to a maximum of 16 µg/m^3. PCE concentrations were generally lowest in the north and northeast areas of the building, and increased toward the south and west portions of the building. The PCE screening results in zones AC-1, AC-7A, and AC-58 were less than those observed during the November 2015 screening round, when the OA flow rates were higher, and when the temporary SSDS was not in operation. Refer to Appendix C for a graphical summary of the November 2015 portable GC/MS results.

4.2.2 B330C Confirmatory Sample Results

As discussed above, outside air flow rates were adjusted in HVAC zones AC-1, AC-7A, and AC-58. Confirmatory indoor air samples were subsequently collected at 4 locations within occupied areas of AC-1, AC-7A, and AC-58. In addition, confirmatory samples were collected at 3 locations within occupied areas of adjacent HVAC zones AC-6, AC-90, and AC-91. The samples were collected under GF's adjusted HVAC conditions documented on Figure 3 and in Table 1 while the temporary SSDS was operating. The samples were collected at the same locations as in November 2015. Indoor air confirmatory sampling results, including the November 2015 results, are provided in Table 4, and the PCE and TCE results are depicted on Figure 5.

For the April 2016 round, PCE was detected at the 7 locations at concentrations ranging from 1.3 to 11 µg/m^3. TCE was not detected at 5 of 7 sample locations; the other 2 locations exhibited TCE concentrations at or below levels of 0.17 µg/m^3.

Figure 5 also shows the historical confirmatory sample results (prior to GF's HVAC adjustments). After GF's HVAC adjustments, the November 2015 and April 2016 results for PCE and TCE at each location were consistent with or less than the historical confirmatory results obtained prior to GF's HVAC adjustments. In addition, the April 2016 concentrations in and surrounding HVAC zones AC-1, AC-7A, and AC-58 were similar to or lower than the results from November 2015. Given that the OA flow rates were lower in April 2016 than in November 2015, the sample results indicate that the temporary SSDS has reduced vapor entry into that area of the building, resulting in similar or decreased PCE and TCE concentrations in indoor air in the areas sampled.

Low levels of eleven other analytes were detected in indoor air, including: acetone (18 to 300 µg/m^3); benzene (0.47 to 0.56 µg/m^3); carbon tetrachloride (0.33 to 0.46 µg/m^3); dichlorodifluoromethane (CFC12; [2.4 to 2.8 µg/m^3]); 1,1,2-trichloro-1,2,2-trifluoroethane (CFC113; [1.4 to 1.5 µg/m^3]); ethylbenzene (1.0 µg/m^3); methylene chloride (1.9 to 6.0 µg/m^3); toluene (0.86 to 43 µg/m^3); trichlorofluoromethane (CFC11; [3.1 to 4.6 µg/m^3]); xylene (o-); (1.0 µg/m^3); and xylene (m,p); (0.69 to 2.3 µg/m^3). With the exception of acetone, BTEX compounds (benzene, toluene, ethylbenzene, and xylene), and methylene chloride, 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 maximum concentration of acetone (300 µg/m^3) was reported at IA0401, which is located in an eMagin laboratory. Based on correspondence with GF personnel, acetone is

currently being used in the laboratory operations, which likely contributes to the higher indoor air concentration.

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

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The analytical data for the B330C confirmatory samples were provided to New Environmental Horizons, Inc. (NEH) of Arlington, MA and Skillman, NJ who conducted an 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:

- Acetone in sample IA0401 was reported at a level above the instrument calibration range and flagged "E" by the laboratory because it was not analyzed at a higher dilution. Acetone in IA0401 was estimated (J) with indeterminate bias due to uncertainty in quantitation above the instrument calibration range. As indicated previously, acetone is used in the laboratory in which the elevated result was detected.

- The nitrogen blank, or equipment blank, is associated with all samples collected in Building 330C. This blank reported a detected value for acetone. A comparison between the blank result and the samples led to estimation of 2 results with possible high bias (EB H).

- Precision was acceptable for all VOCs in the Field Duplicate pair of IA0436 and FD0436 except for acetone and toluene. The results for acetone and toluene in samples IA0436 and FD0436 were estimated (J) with indeterminate bias. This is an indication of acceptable precision and representativeness of the samples for the project-specific VOCs, except acetone and toluene.

- 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 sample IA0470 and several compounds in FB0401, which had RLs exceeding the expected RLs. This does not introduce significant uncertainty into the results since carbon tetrachloride was detected in the sample with an elevated RL, and because FB0401 is a field blank sample as opposed to a sample representative of indoor air quality.

6.0 CONCLUSIONS AND NEXT STEPS

We understand GF intends to maintain the HVAC settings to the adjusted settings listed in Table 1 upon receipt of this report. IBM understands GF will maintain the HVAC operating conditions until there are occupancy or other changes that warrant consideration of new adjustments and IAQ testing. IBM intends to continue operation and maintenance of the temporary SSDS in its current configuration as a means of reducing VOC vapor entry into the building and therefore reducing the amount of OA necessary from HVAC units AC-1, AC-7A, and AC-58.

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 B330C 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 B330C
Former IBM East Fishkill Facility
Hopewell Junction, NY

AC Unit	Services	Original HVAC Settings Prior to 2015/2016 Adjustments (Notes 2 and 3)						Adjusted HVAC Settings During Apr 2016 Testing (Note 4)						
		Operating Schedule	Outside Air (OA) Flow Rate	Return Air (RA) Flow Rate	Total Supply Air Flow Rate	OA Economizer	OA Damper Position	Current Occupancy	Operating Schedule	OA Flow Rate	RA Flow Rate	Total Supply Air Flow Rate	OA Economizer	OA Damper Position
AC-1	Offices/Corridors	M-F 6am-7pm	27,104	4,576	31,680	No	80% open	11	M-F 6am-7pm	5,460	26,297	31,757	No	5% open
AC-4	South Shop/labs	24/7	18,725	20,275	39,000	Yes	40% open (min)	2	24/7	4,409	34,102	38,511	Yes	10% open (min)
AC-5	Handled by AC-6	Off						0	Off					
AC-6	Corridors/laser lab/NEXX Tool Lab	24/7	16,250	0	16,250	No	50% open	Occ	24/7	16,250	0	16,250	No	50% open
AC-7(A)	NEXX Tool Lab	24/7	18,430	19,491	37,921	No	20% open	Occ	24/7	9,438	16,973	26,411	No	10% open
AB-7(B)	Unoccupied	NA (new zone) - split off from AC-7(A) during initial adjustments (Note 9)						0	Off					
AC-9	"Laser" Labs/corridors/offices	24/7	12,118	10,562	22,680	No	50% open	0	Off					
AC-10	Former truck dock	Off						0	Off					
AC-10(A)	Hydrogen tanks room	24/7	0	8,374	8,374	No	0% open	0	24/7	0	8,374	8,374	No	0% open
AC-11	Occupied Lab	24/7	1,793	42,335	44,128	No	Fed from AC-13	Occ	24/7	1,793	42,335	44,128	No	Fed from AC-13
AC-13	Emagin Clean Room	24/7	27,491	2,965	30,456	No	75% open	55	24/7	27,491	2,965	30,456	No	75% open
HVAC-15	Former tank room	24/7	0	8,900	8,900	No	0% open	0	24/7	0	8,900	8,900	No	0% open
AC-26	Unoccupied Labs/emagin	24/7	5,110	39,634	44,744	No	10% open	0	Off					
AC-40	Unoccupied Lab	Off						0	Off					
AC-41	Occupied Lab	24/7	1,152	12,720	13,872	No	10% open	1	24/7	1,152	12,720	13,872	No	10% open
AC-42/ RCU-111	Breakroom/lab	24/7	36,960	0	36,960	No	100% open	2	24/7	26,048	0	26,048	No	100% open
AC-50	Baseline	Off						0	Off					
AC-51	Unoccupied Lab	24/7	2,752	0	2,752	No	100% open	0	Off					
AC-54	Unoccupied labs/storage	Off						0	Off					
AC-55	Unoccupied labs/storage	Off						0	Off					
AC-56	Demo'd space	24/7	850	21,070	21,920	No	10% open	0	Off					
AC-57	Demo'd space	Off						0	Off					
AC-58	Reliability Lab	24/7	14,038	7,170	21,208	No	100% open	7	24/7	14,284	14,136	28,420	No	80% open
AC-90	Unoccupied Labs/emagin	24/7	16,285	4,739	21,024	Yes	20% open (min) 50% open (meas)	5	24/7	3,026	28,294	31,320	Yes	5% open (min)
AC-91	Unoccupied Labs/emagin	24/7	21,578	0	21,578	Yes	20% open (min) 100% open (meas)	5	24/7	3,560	14,746	18,306	Yes	20% open (min)
AC-93	Unoccupied labs/small emagin office	24/7	1,115	8,997	10,112	No	100% open	5	24/7	2,389	5,665	8,054	No	100% open
AC-99	Demo'd space	24/7	4,734	0	4,734	No	100% open	0	Off					
AC-100	Demo'd space	24/7	4,032	0	4,032	No	100% open	0	Off					
AC-101	Unoccupied Lab	Off						0	Off					
AC-102	Unoccupied Lab	24/7	11,560	15,550	27,110	No	25% open	0	Off					
AC-103	Unoccupied Lab	24/7	168	2,290	2,458	No	0% open	0	Off					
AC-104	Unoccupied Lab	Off						0	Off					

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. With the exception of AC-11, 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. Original HVAC flow rates for AC-11 were provided in a US Test report dated 9/25/15.
4. The flow rates and OA damper positions for the adjusted HVAC settings are based on US Test Reports dated 11/18/2015 and 4/8/2016.
5. Operating schedules, economizer information, and certain OA damper positions were provided verbally or via email to SHPC by GF.
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 for which the adjusted HVAC settings are different than the original HVAC settings based on GF's requested changes.
9. AC-7 was split into two new zones (AC-7(A) and AC-7(B)) prior to November 2015 testing. AC-7(B) was blanked off so that no supply air feeds that area.
10. The original OA damper position for AC-7A was provided in a US Test report dated 7/16/2015.
11. A portion of AC-9 (laser lab) was reconfigured to become part of AC-6 prior to November 2015 testing.

Table 2
Summary of Confirmatory Indoor Air Sample Information
Building 330C
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)	Temperature (°F)	Location Description	Chemicals Observed Near Sample Location
Collection Date: April 13, 2016											
Ambient Air	Roof	Ambient Air	33999	1	7:48	-30	15:40	-5	50	AHU 58 intake	None observed
Nitrogen Blank	Roof	Nitrogen	168	1	7:48	-30	16:37	-12.5	50	AHU 58 intake	None observed
IA0400	Ground	Indoor Air	12691	3.5	7:27	-28.5	14:55	-5	70	Break Room	None observed
IA0401	Ground	Indoor Air	64229	5.5	7:31	-30	15:29	-7	65	eMagin clean room	None observed
IA0404	Ground	Indoor Air	612	3	7:21	-30	15:24	-5	65	Reliability Lab	None observed
IA0436	Ground	Indoor Air	4380	3.5	7:23	-30	15:26	-6	65	Reliability Lab	None observed
FD0436	Ground	Indoor Air	171	3.5	7:23	-30	15:26	-6.5	65	Reliability Lab	None observed
IA0458	Ground	Indoor Air	5776	4	7:54	-30	15:45	-6	70	Office/Lab	None observed
IA0469	Ground	Indoor Air	3728	4	7:12	-30	15:22	-5	70	Nexx Tool Lab	None observed
IA0470	Ground	Indoor Air	650	3.5	7:16	-29	14:35	-6	65	Nexx Tool Lab	None observed

Notes:

1. Samples were collected by Sanborn, Head Engineering, PC on April 13, 2016.

2. Samples were collected into 6-liter, stainless steel, pre-evacuated SUMMA® canisters using 8-hour metering regulators. Each canister and regulator was laboratory-certified clean (100% certification). The samples were submitted to Eurofins/Air Toxics of Folsom, California for analysis of 22 project-specific analytes using modified USEPA Method TO-15 and Method TO-15 in selective ion monitoring (SIM) mode.

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

Location	Date and Time	HVAC Zone	µg/m³	
			PCE	TCE
IA0400	04/12/16	AC-1	4.6	<0.54
IA0401	04/12/16	AC-90	<0.68	<0.54
IA0402	04/12/16	AC-41	0.8	<0.54
IA0404	04/12/16	AC-58	4.4	<0.54
IA0405	04/12/16	AC-13	0.86	<0.54
IA0406	04/12/16	AC-93	1.9	<0.54
IA0408	04/12/16	AC-6	3.3	<0.54
IA0411	04/12/16	AC-9	4.6	<0.54
IA0412	04/12/16	AC-42	1.6	<0.54
IA0413	04/12/16	AC-6	2.8	<0.54
IA0416	04/12/16	AC-99/AC-100	13	0.77
IA0417	04/12/16	AC-93	3.8	<0.54
IA0418	04/12/16	AC-42	4	<0.54
IA0426	04/12/16	AC-54	6.6	<0.54
IA0436	04/12/16	AC-58	9.1	<0.54
IA0439	04/12/16	AC-7A	3.8	<0.54
IA0443	04/12/16	AC-13	<0.68	<0.54
IA0445	04/12/16	See Note 3	1.0	<0.54
IA0446	04/12/16	AC-102	0.79	<0.54
IA0447	04/12/16	AC-42	1.2	<0.54
IA0448	04/12/16	AC-6	4.4	<0.54
IA0449	04/12/16	AC-50	16	<0.54
IA0450	04/12/16	AC-1	4.5	<0.54
IA0455	04/12/16	AC-42	1.9	<0.54
IA0456	04/12/16	See Note 3	3.1	<0.54
IA0458	04/12/16	AC-91	1.7	<0.54
IA0459	04/12/16	See Note 3	2.6	<0.54
IA0460	04/12/16	AC-101	1.3	<0.54
IA0461	04/12/16	HVAC-15	3.1	<0.54
IA0464	04/12/16	AC-58	8.5	<0.54
IA0465	04/12/16	AC-26	3.5	<0.54
IA0466	04/12/16	AC-91	0.86	<0.54
IA0467	04/12/16	AC-4	<0.68	<0.54
IA0468	04/12/16	AC-42	2.2	<0.54
IA0469	04/12/16	AC-6	2.9	<0.54
IA0470	04/12/16	AC-7A	3.6	<0.54
IA0471	04/12/16	AC-6	3.7	<0.54
IA0472	04/12/16	AC-11	<0.68	<0.54
IA0476	04/12/16	AC-58	7.6	<0.54
IA0477	04/12/16	AC-10	<0.68	<0.54
IA0478	04/12/16	AC-51	1.8	<0.54
IA0479	04/12/16	AC-50	13	<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 vendor 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) by SHPC 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 330C
Former IBM East Fishkill Facility
Hopewell Junction, NY

	Field Sample Name	AA0401						FB0401 (Field Blank)						IA0400						IA0401						IA0404					
	Collection Date	11/18/2015			4/13/2016			11/18/2015			4/13/2016			11/18/2015			4/13/2016			11/18/2015			4/13/2016			11/18/2015			4/13/2016		
	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	4.4	EB	H	28			2.6			6.6	J	I	8.5	EB H		34			170	J	I	300	J	I	7.9	EB	H	31		
Benzene	µg/m^3	0.52			0.52	U		0.6	U		0.64	U		0.55			0.55			0.53			0.51	U		0.49	U		0.51	U	
Carbon tetrachloride	µg/m^3	0.37			0.47			0.24	U		0.25	U		0.39			0.4			0.38			0.44			0.42			0.41		
Chlorobenzene (Monochlorobenzene)	µg/m^3	0.69	U		0.75	U		0.86	U		0.93	U		0.73	U		0.66	U		0.73	U		0.74	U		0.71	U		0.74	U	
Dichlorobenzene (1,2-)	µg/m^3	0.9	U		0.98	U		1.1	U		1.2	U		0.96	U		0.86	U		0.95	U		0.96	U		0.92	U		0.96	U	
Dichlorobenzene (1,3-)	µg/m^3	0.9	U		0.98	U		1.1	U		1.2	U		0.96	U		0.86	U		0.95	U		0.96	U		0.92	U		0.96	U	
Dichlorobenzene (1,4-)	µg/m^3	0.9	U		0.98	U		1.1	U		1.2	U		0.96	U		0.86	U		0.95	U		0.96	U		0.92	U		0.96	U	
Dichlorodifluoromethane (CFC12)	µg/m^3	3.7	U		2.6			4.6	U		1	U		3.9	U		2.8			3.9	U		2.4			3.8	U		2.4		
Dichloroethene (1,1-)	µg/m^3	0.59	U		0.65	U		0.74	U		0.8	U		0.63	U		0.57	U		0.63	U		0.63	U		0.61	U		0.63	U	
Dichloroethene (cis-1,2-)	µg/m^3	0.59	U		0.65	U		0.74	U		0.8	U		0.63	U		0.57	U		0.63	U		0.63	U		0.61	U		0.63	U	
Ethane, 1,1,2-trichloro-1,2,2-trifluoro- (CFC113)	µg/m^3	1.1	U		1.2	U		1.4	U		1.5	U		1.2	U		1.1	U		1.2	U		1.2	U		1.2			1.2	U	
Ethylbenzene	µg/m^3	0.65	U		0.71	U		0.82	U		0.88	U		0.69	U		1			0.69	U		0.69	U		0.67	U		0.69	U	
Methylene Chloride (Dichloromethane)	µg/m^3	5.6			1.1	U		1.3	U		1.4	U		1.8			6			1.1	U		1.1	U		1.1	U		1.1	U	
Tetrachloroethene (PCE)	µg/m^3	1	U		1.1	U		1.3	U		1.4	U		5.6			5.9			1.9			1.3			6.7			5.2		
Toluene	µg/m^3	0.66			0.61	U		0.71	U		0.76	U		0.92			43			0.72			0.6	U		1.6			0.6	U	
Trichlorobenzene (1,2,4-)	µg/m^3	5.6	UJ	I	6	U		7	UJ	I	7.5	U		5.9	UJ	I	5.3	U		5.9	UJ	I	5.9	U		5.7	UJ	I	5.9	U	
Trichloroethane (1,1,1-)	µg/m^3	0.82	U		0.89	U		1	U		1.1	U		0.87	U		0.78	U		0.86	U		0.87	U		0.84	U		0.87	U	
Trichloroethene (TCE)	µg/m^3	0.16	U		0.18	U		0.2	U		0.22	U		0.17	U		0.15	U		0.17	U		0.17	U		0.19			0.17	U	
Trichlorofluoromethane	µg/m^3	1.3			1.6			1	U		1.1	U		1.8			3.8			2			3.4			1.8			3.1		
Vinyl chloride	µg/m^3	0.038	U		0.042	U		0.048	U		0.052	U		0.041	U		0.036	U		0.04	U		0.041	U		0.039	U		0.041	U	
Xylene (o-)	µg/m^3	0.65	U		0.71	U		0.82	U		0.88	U		0.69	U		1			0.69	U		0.69	U		0.67	U		0.69	U	
Xylene-m,p (Sum of Isomers)	µg/m^3	0.65	U		0.71	U		0.82	U		0.88	U		0.69	U		2.3			0.69	U		0.69	U		0.67	U		0.69	U	

Notes:

1. Samples were collected by Sanborn, Head Engineering, PC (SHPC) on the dates indicated over an approximately 8-hour sampling period. 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 Protection Agency (USEPA) Method TO-15 in the full scan and selective ion monitoring (SIM) modes.

2. Results are presented in micrograms per cubic meter (µg/m^3).

3. A 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 reporting limit (RL).
"J" indicates the result is an estimated value.
"UJ" indicates the non-detect is estimated at the indicated RL.
"EB" indicates analyte was also present in the associated field blank.
"H" indicates a high bias.
"I" indicates an indeterminate bias.

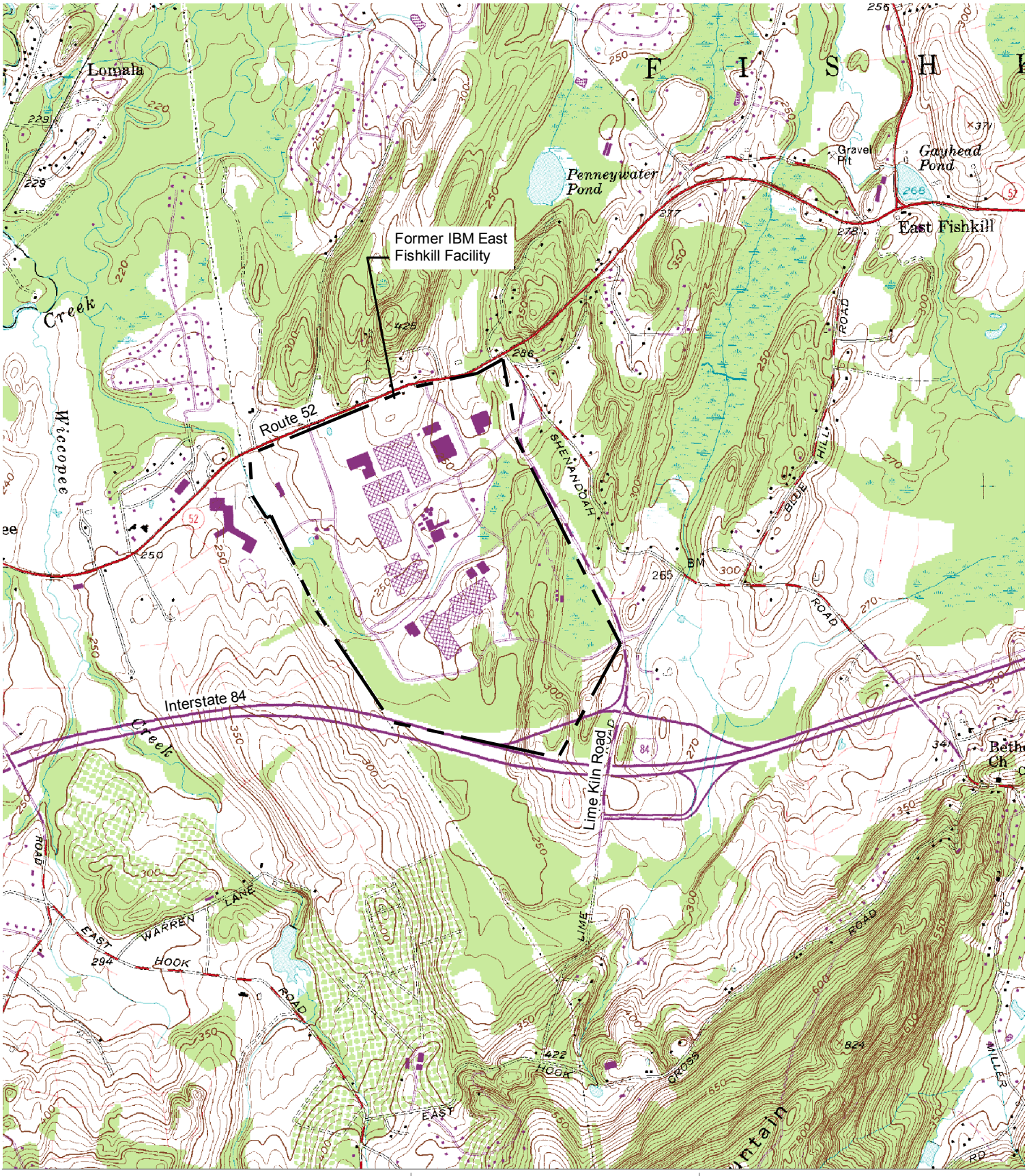
4. The "AA" designation indicates that the sample consists of ambient air collected from outside the building. The ambient air and field blank samples were collected from beneath the outside air intake to air handling unit AC-58, which serves the reliability lab.

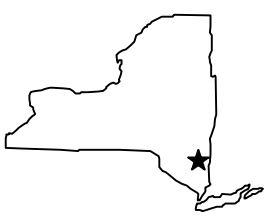
5. Results were rounded to two significant figures.

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

	Field Sample Name	IA0436						FD0436 (Field Dup.)			IA0458						IA0469						IA0470					
	Collection Date	11/18/2015			4/13/2016			4/13/2016			11/18/2015			4/13/2016			11/18/2015			4/13/2016			11/18/2015			4/13/2016		
	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
Acetone	µg/m^3	7.8	EB	H	27	J/UJ	I	39	J/UJ	I	37			110			9.7	EB	H	18	EB	H	12			21	EB	H
Benzene	µg/m^3	0.6			0.47	J	I	0.5	U		0.68			0.56			0.58			0.54			0.55			0.52	U	
Carbon tetrachloride	µg/m^3	0.4			0.33			0.46			0.43			0.38			0.39			0.34			0.43			0.43		
Chlorobenzene (Monochlorobenzene)	µg/m^3	0.74	U		0.7	U		0.71	U		0.73	U		0.67	U		0.77	U		0.67	U		0.71	U		0.76	U	
Dichlorobenzene (1,2-)	µg/m^3	0.97	U		0.92	U		0.93	U		0.95	U		0.87	U		1	U		0.87	U		0.93	U		0.99	U	
Dichlorobenzene (1,3-)	µg/m^3	0.97	U		0.92	U		0.93	U		0.95	U		0.87	U		1	U		0.87	U		0.93	U		0.99	U	
Dichlorobenzene (1,4-)	µg/m^3	0.97	U		0.92	U		0.93	U		0.95	U		0.87	U		1	U		0.87	U		0.93	U		0.99	U	
Dichlorodifluoromethane (CFC12)	µg/m^3	4	U		2.6			2.4			3.9	U		2.5			4.1	U		2.7			3.8	U		2.4		
Dichloroethene (1,1-)	µg/m^3	0.64	U		0.61	U		0.61	U		0.63	U		0.57	U		0.66	U		0.57	U		0.61	U		0.65	U	
Dichloroethene (cis-1,2-)	µg/m^3	0.64	U		0.61	U		0.61	U		0.63	U		0.57	U		0.66	U		0.57	U		0.61	U		0.65	U	
Ethane, 1,1,2-trichloro-1,2,2-trifluoro- (CFC113)	µg/m^3	1.8			1.5			1.4			1.2	U		1.1	U		1.4			1.1	U		1.2	U		1.2	U	
Ethylbenzene	µg/m^3	0.7	U		0.66	U		0.67	U		0.69	U		0.63	U		0.72	U		0.63	U		0.67	U		0.71	U	
Methylene Chloride (Dichloromethane)	µg/m^3	1.1	U		1.9			1.1	U		6.7			3.2			2.4			2.9			1.1	U		1.1	U	
Tetrachloroethene (PCE)	µg/m^3	15			11			11			3.8			3.2			14			4			3.6			4.1		
Toluene	µg/m^3	0.71			16	J/UJ	I	0.58	J/UJ	I	0.7			27			0.67			19			0.63			0.86		
Trichlorobenzene (1,2,4-)	µg/m^3	6	UJ	I	5.7	U		5.8	U		5.9	UJ	I	5.4	U		6.2	UJ	I	5.4	U		5.8	UJ	I	6.1	U	
Trichloroethane (1,1,1-)	µg/m^3	0.88	U		0.83	U		0.84	U		0.86	U		0.79	U		0.91	U		0.79	U		0.84	U		0.89	U	
Trichloroethene (TCE)	µg/m^3	0.21			0.16	U		0.17	U		0.32			0.16			0.28			0.17			0.18			0.18	U	
Trichlorofluoromethane	µg/m^3	2.2			4.6			4.5			2.2			3.5			3.2			3.1			3.1			4.5		
Vinyl chloride	µg/m^3	0.041	U		0.039	U		0.04	U		0.04	U		0.037	U		0.043	U		0.037	U		0.04	U		0.042	U	
Xylene (o-)	µg/m^3	0.7	U		0.66	U		0.67	U		0.69	U		0.63	U		0.72	U		0.63	U		0.67	U		0.71	U	
Xylene-m,p (Sum of Isomers)	µg/m^3	0.7	U		0.69			0.67	U		0.69	U		1.1			0.72	U		1.2			0.67	U		0.71	U	

FIGURES





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. Sanborn
Reviewed By: S. Soos / D. Shea
Project No: 2999.06
Date: July 2016

1,000' 0 2,000' Feet

SANBORN HEAD ENGINEERING

Figure 1

Site Location Plan

Former IBM East Fishkill Facility
Hopewell Junction, New York

Figure 2

B330C Location Plan

Former IBM East Fishkill Facility
Hopewell Junction, New York

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

Figure Narrative

This figure shows the buildings at the former IBM East Fishkill facility. Building B330C 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 B330C

N
W E
S

200' 100' 0 200' 400' Feet

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Figure 3

B330C HVAC Status

Building 330C

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:	July 2016

Figure Narrative

This figure shows the HVAC zones and operating status in April 2016 at the time of indoor air sampling reported in the text. Additional information is provided in the legend.

In the legend, the term "original settings" refers to the HVAC settings in-place prior to Global Foundries requesting changes in August 2015.

Legend

- AC-10 — HVAC Zone and Associated Air Handling Unit ID
- HVAC off prior to 2015/2016 HVAC adjustment testing. No changes from original settings.
- HVAC off as requested by GF.
- HVAC on. Outside air flow rate changed from original settings.
- HVAC on. No changes from original settings.
- HVAC adjustments were made to these zones in advance of the April 2016 indoor air screening and sampling
- Occupied area

Unshaded areas represent routinely unocccupied areas without direct HVAC service

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Figure 4

Concentration Isopleths for Tetrachloroethene in Subslab Vapor

Building 330C

Former IBM East Fishkill Facility

Hopewell Junction, New York

Drawn By:	C. LaVack / E. Wright
Designed By:	J. Corsello
Reviewed By:	S. Soos
Project No:	2999.06
Date:	July 2016

Figure Narrative

This figure shows the tetrachloroethene (PCE) results for subslab vapor screening conducted in April and May 2015 using a portable gas chromatograph/mass spectrometer (GC/MS). Results are shown in micrograms per cubic meter ($\mu g/m^3$).

Legend

- Subslab Vapor Sample Port
- Extraction Port
- 11,000 — PCE Results in Subslab Vapor ($\mu g/m^3$)

PCE Screening Concentrations ($\mu g/m^3$)

- <1,000
- 1,000 - 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 500,000
- >500,000
- Occupied area

40 20 0 40 80 Feet

SANBORN HEAD ENGINEERING

N
W E
S

SS3026
SS3047
SS3025
EP3004
SS3024
SS3048
SS3027
SS3049
SS3021
SS3035
SS3036
SS3028
SS3057
SS3019
-0.011
SS3023
SS3034
EP3010
SS3058
0.000
EP3005
SS3022
0.000
SS3033
SS3030
SS3055
SS3056
EP3001
SS3029
-0.010
SS3046
-0.007
SS3018
SS3032
-0.011
EP3011
SS3020
-0.007
SS3051
SS3031
SS3050
EP3015
EP3006
EP3012
SS3042
-0.034
SS3017
-0.044
-0.010
SS3045
SS3007
EP3014
-0.041
EP3003
-0.030
-0.018
SS3052
0.000
SS3008
-0.005
SS3043
SS3016
-0.009
EP3013
-0.022
SS3015
SS3040
SS3053
-0.010
SS3044
EP3017
EP3016
SS3041
SS3009
SS3002
EP3007
-0.008
-0.004
-0.004
EP3002
SS3014
SS3003
SS3001
SS3006
SS3054
SS3037
SS3013
SS3039
EP3008
SS3004
EP3009
SS3012
SS3010
SS3005
SS3038
SS3011

Former Baseline Area

Reliability Lab

Figure 5

Subslab Pressure Response to Vapor Extraction

Building 330C

Former IBM East Fishkill Facility

Hopewell Junction, New York

Drawn By:	C. LaVack / E. Wright
Designed By:	J. Corsello
Reviewed By:	S. Soos
Project No:	2999.06
Date:	July 2016

Figure Narrative

This figure shows the footprint of the subslab pressure response from the temporary subslab depressurization system (SSDS) extracting vapor from EP3012 and EP3015. The subslab pressure response footprint represents the outer limit of the 0.004 inches of water column differential pressure measured on March 23, 2016.

The subslab pressure response footprint represents inferred apparent vacuum conditions. Actual vacuum conditions include components of vertical flow and are likely more complex than shown. Other interpretations are possible.

Legend

- Subslab Vapor Sample Port
- Extraction Port
- -0.004 — Differential pressure contour (inches of water column). Dashed where inferred.
- -0.006 — Differential pressure (inches of water column)

PCE Screening Concentrations (µg/m³) in Subslab Vapor

- <1,000
- 1,000 - 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 500,000
- >500,000

40 20 0 40 80 Feet

SANBORN HEAD ENGINEERING

Last Edited By: clavack

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N
W E
S

B330C

B338

AC-102
AC-104
AC-101
AC-103
AC-4
AC-41
AC-51
AC-93
AC-42
AC-10
AC-1
AC-40
AC-90
AC-7B
HVAC-15
AC-13
AC-91
AC-9
AC-7A
AC-6
AC-58
AC-26
AC-54
AC-55
AC-56
AC-57
AC-99
AC-100
AC-10A
Loading Dock AC-1

IA0446 0.79 / <0.54
IA0460 1.3 / <0.54
IA0467 <0.68 / <0.54
IA0445 1.0 / <0.54
IA0459 2.6 / <0.54
IA0478 1.8 / <0.54
IA0406 1.9 / <0.54
IA0468 2.2 / <0.54
IA0472 <0.68 / <0.54
IA0402 0.80 / <0.54
IA0447 1.2 / <0.54
IA0450 4.5 / <0.54
IA0417 3.8 / <0.54
IA0461 3.1 / <0.54
IA0401 <0.68 / <0.54
IA0405 0.86 / <0.54
IA0418 4.0 / <0.54
IA0477 <0.68 / <0.54
IA0400 4.6 / <0.54
IA0466 0.86 / <0.54
IA0412 1.6 / <0.54
IA0443 <0.68 / <0.54
IA0455 1.9 / <0.54
IA0479 13 / <0.54
IA0470 3.6 / <0.54
IA0469 2.9 / <0.54
IA0449 16 / <0.54
IA0476 7.6 / <0.54
IA0458 1.7 / <0.54
IA0411 4.6 / <0.54
IA0436 9.1 / <0.54
IA0439 3.8 / <0.54
IA0408 3.3 / <0.54
IA0464 8.5 / <0.54
IA0404 4.4 / <0.54
IA0456 3.1 / <0.54
IA0416 13 / 0.77
IA0471 3.7 / <0.54
IA0448 4.4 / <0.54
IA0465 3.5 / <0.54
IA0426 6.6 / <0.54
IA0413 2.8 / <0.54

Figure 6

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

Building 330C

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:	July 2016

Figure Narrative

This figure shows tetrachloroethene (PCE) and trichloroethene (TCE) results for indoor air screening using a portable gas chromatograph/mass spectrometer (GC/MS) that was conducted under adjusted heating, ventilation, and air conditioning (HVAC) operating conditions. Results are shown in micrograms per cubic meter (ug/m3).

Legend

- Indoor Air Location
- HVAC Zone
- IA0468 4.8 / <0.54 — Control Point Name PCE result / TCE result (µg/m^3) (April 12, 2016)
- Occupied area

40 20 0 40 80 Feet

SANBORN HEAD ENGINEERING

N
W E
S

B330C Roof
AC-58 Outside Air Intake
AA-1
NS
<1.0 / <0.16
<1.1 / <0.18

B330C

IA0467
NS
<1.1 / <0.17
NS

IA0402
1.5 / <0.18
<1.1 / <0.17
NS

IA0472
NS
<1.1 / <0.17
NS

IA0401
2.2 / <0.18
1.9 / <0.17
1.3 / <0.17

IA0405
2.5 / 0.74
1.1 / <0.17
NS

IA0468
NS
2.3 / <0.17
NS

IA0417
5.9 / <0.18
3.3 / <0.18
NS

IA0400
11 / 0.20
5.6 / <0.17
5.9 / <0.15

IA0455
NS
3.6 / <0.17
NS

IA0455 (DUP)
NS
3.0 / <0.17
NS

IA0458
NS
3.8 / 0.32
3.2 / 0.16

IA0469
NS
14 / 0.28
4.0 / 0.17

IA0404
16 / 0.20
6.7 / 0.19
5.2 / <0.17

IA0470
NS
3.6 / 0.18
4.1 / <0.18

IA0436
24 / 0.20
15 / 0.21
11 / <0.16

EP3012
EP3015

Temporary subslab depressurization system location

AC-102 AC-104 AC-101 AC-103 AC-4 AC-51 AC-11 AC-1 AC-40 AC-90 AC-7B AC-93 AC-42 AC-10 HVAC-15 AC-13 AC-91 AC-9 AC-10A AC-7A AC-50 AC-6 AC-58 AC-26 AC-99 AC-100 AC-54 AC-55 AC-56 AC-57 Loading Dock AC-1

B338

Figure 7

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

Building 330C

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:	July 2016

Figure Narrative

This figure shows tetrachloroethene (PCE) and trichloroethene (TCE) results for indoor air sampling of occupied portions of B330C in November 2015 and April 2016. The results of the last historical sampling event are also shown for comparison at each location where a 2015 or 2016 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 operation conditions in B330C.

Legend

- Indoor Air Location
- Ambient Air Location
- Extraction Port Location
- HVAC Zone
- IA0405 / 2.5 / 0.74 / 1.1 / <0.17 / NS — Control Point Name; PCE/TCE (Historical Confirmatory Sample - Date Varies); PCE/TCE (Nov 18/19, 2015 Confirmatory Sample); PCE/TCE (April 13, 2016 Confirmatory Sample)
- NS — Not Sampled
- Occupied area

40 20 0 40 80 Feet

SANBORN HEAD ENGINEERING

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

PHOTOGRAPH LOG

B330C 8-Hour Confirmatory Sampling Photograph Log

Photo 1: Samples AA0401 and FB0401 on roof of 330C at the intake for AC-58

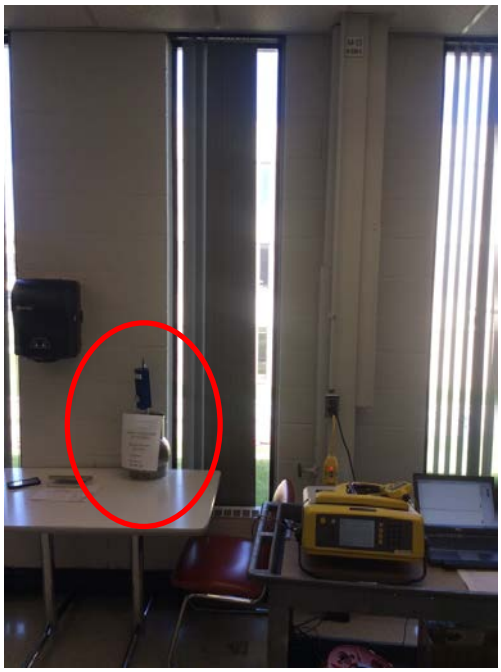

Photo 2: Sample IA0400, located in a break room

Photo 3: Sample IA0401, located in an eMagin laboratory

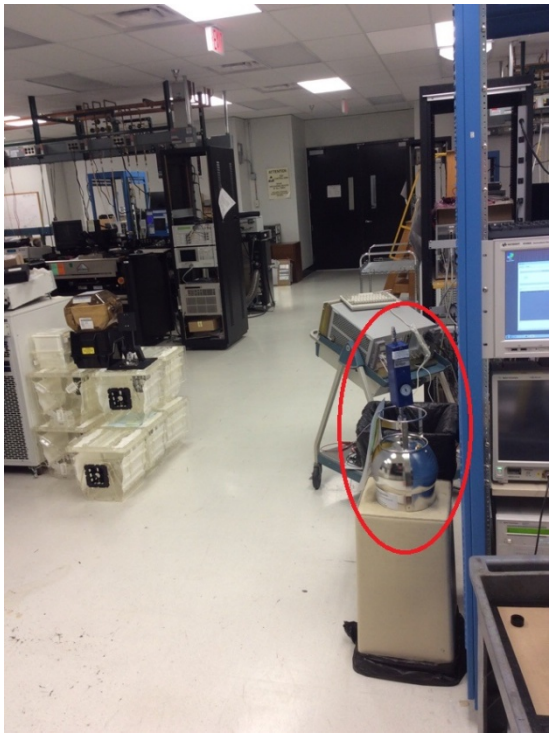

Photo 4: Sample IA0404, located in Reliability Lab

Photo 5: Sample IA0436 and FD0436, located in hallway of Reliability Lab

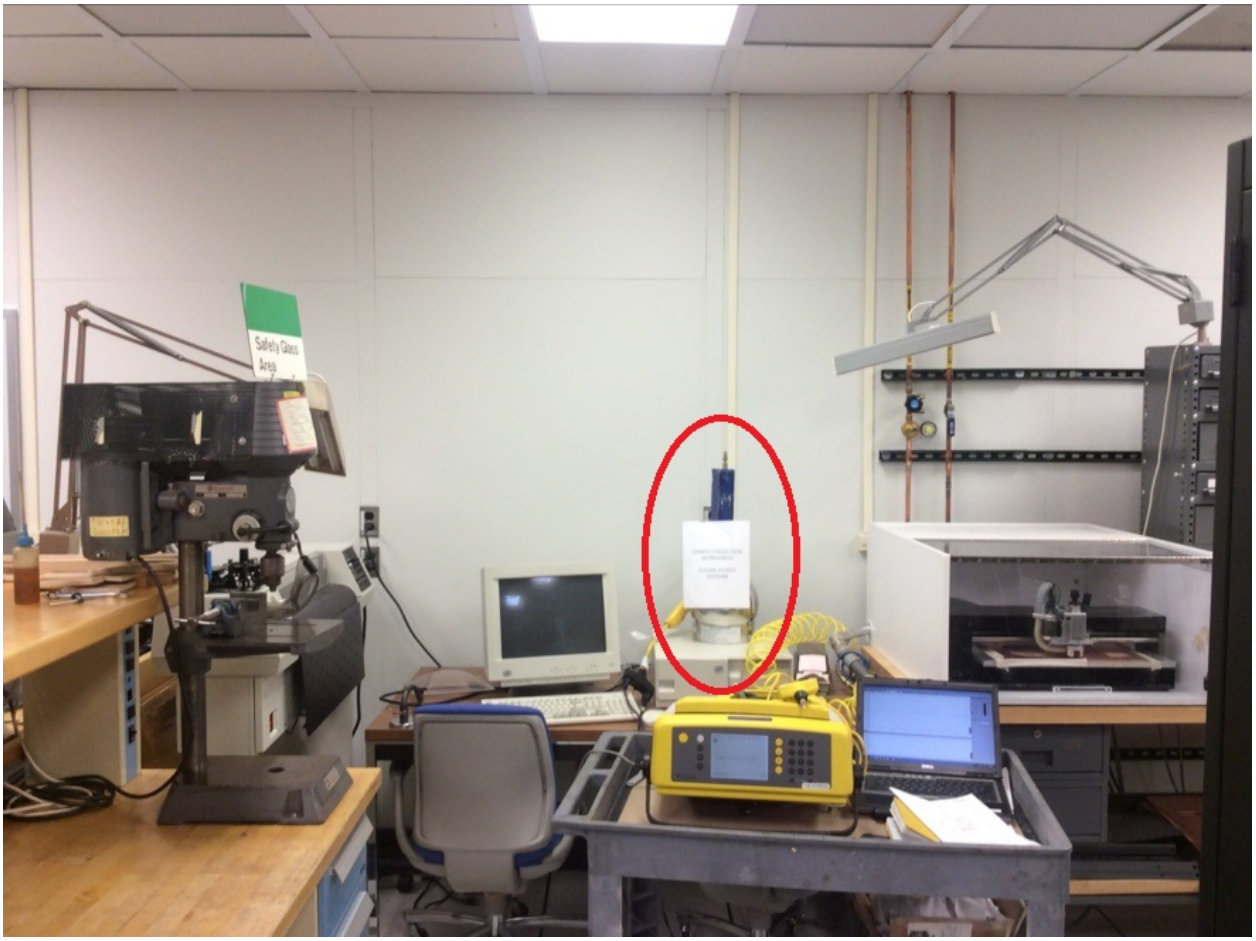

Photo 6: Sample IA0458, located in office on work bench

Photo 7: Sample IA0469, located in NEXX tool lab

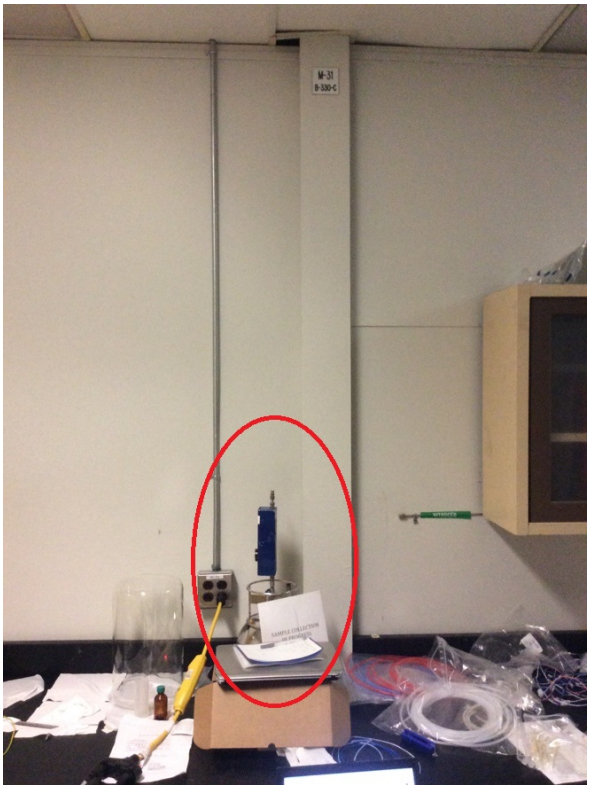

Photo 8: Sample IA0470, located in NEXX tool lab

APPENDIX C

SUMMARY OF NOVEMBER 2015 PORTABLE GC/MS RESULTS FIGURE

Figure 3 from Sanborn, Head Engineering, P.C.'s February 2016 report titled, "Report of HVAC Adjustments and Indoor Air Quality Testing, Buildings 330C and 338".

N W E S

B330C

B338

AC-102 AC-104 AC-101 AC-103 AC-4 AC-41 AC-1 AC-40 AC-90 AC-50 AC-91 AC-58 AC-6 AC-7B AC-42 AC-13 AC-9 AC-7A AC-51 AC-93 AC-10 HVAC-15 AC-26 AC-99 AC-100 AC-56 AC-57 AC-55

IA0446 1.7 / <0.54
IA0467 2.5 / <0.54
IA0445 6.8 / <0.54
IA0460 2.3 / <0.54
IA0459 2.6 / <0.54
IA0453 2.3 / <0.54
IA0478 12 / <0.54
IA0406 2.1 / <0.54
IA0472 1.5 / <0.54
IA0402 2.1 / <0.54
IA0468 4.8 / <0.54
IA0447 7.6 / <0.54
IA0450 7.8 / <0.54
IA0401 2.7 / <0.54
IA0451 2.6 / <0.54
IA0444 3.4 / <0.54
IA0417 5.1 / <0.54
IA0461 120 / 0.6
IA0477 600 / 1.5
IA0405 3 / <0.54
IA0410 5.7 / <0.54
IA0400 17 / <0.54
IA0466 3 / <0.54
IA0412 5.7 / <0.54
IA0462 4.5 / <0.54
IA0443 1.5 / <0.54
IA0457 2.8 / <0.54
IA0455 5.1 / <0.54
IA0470 7.7 / <0.54
IA0469 22 / <0.54
IA0411 14 / <0.54
IA0449 66 / <0.54
IA0476 20 / <0.54
IA0458 7 / <0.54
IA0439 9.6 / <0.54
IA0436 23 / <0.54
IA0464 24 / <0.54
IA0404 8.4 / <0.54
IA0456 22 / <0.54
IA0408 18 / <0.54
IA0416 16 / 3.2
IA0471 15 / <0.54
IA0465 17 / <0.54
IA0448 25 / <0.54
IA5014 30 / 2.6
IA0426 18 / <0.54
IA0413 25 / <0.54
IA0438 28 / 1.7

Loading Dock AC-1

Figure 3

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

Building 330C

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:	February 2016

Figure Narrative

This figure shows tetrachloroethene (PCE) and trichloroethene (TCE) results for indoor air screening using a portable gas chromatograph/mass spectrometer (GC/MS) that was conducted under adjusted heating, ventilation, and air conditioning (HVAC) operating conditions. Results are shown in micrograms per cubic meter (ug/m3). Refer to Table 2 of this report for further details on the HVAC operating conditions in B330C.

Legend

- Indoor Air Location
- HVAC Zone
- HVAC Zones Off During Testing
- IA0468 4.8 / <0.54 — Control Point Name, PCE result / TCE Result (µg/m^3) (November 17th, 2015)
- Occupied area

40 20 0 40 80 Feet

SANBORN HEAD ENGINEERING

APPENDIX D

ANALYTICAL LABORATORY REPORT

(ON CD)

eurofins | Air Toxics

5/5/2016

Ms. Erica Bosse
Sanborn, Head & Associates
24 Wade Road

Latham NY

Project Name:
Project #:
Workorder #: 1604483

Dear Ms. Erica Bosse

The following report includes the data for the above referenced project for sample(s) received on 4/22/2016 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 #: 1604483

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. #**	
FAX:		**PROJECT #**	
DATE RECEIVED:	04/22/2016	**CONTACT:**	Ausha Scott
DATE COMPLETED:	05/05/2016		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	IA0469	Modified TO-15	2 "Hg	5.2 psi
01B	IA0469	Modified TO-15	2 "Hg	5.2 psi
02A	IA0470	Modified TO-15	5.5 "Hg	5 psi
02B	IA0470	Modified TO-15	5.5 "Hg	5 psi
03A	IA0404	Modified TO-15	4.7 "Hg	5.2 psi
03B	IA0404	Modified TO-15	4.7 "Hg	5.2 psi
04A	IA0436	Modified TO-15	3.7 "Hg	5 psi
04B	IA0436	Modified TO-15	3.7 "Hg	5 psi
05A	FD0436	Modified TO-15	3.9 "Hg	5.2 psi
05B	FD0436	Modified TO-15	3.9 "Hg	5.2 psi
06A	IA0400	Modified TO-15	1.8 "Hg	5 psi
06B	IA0400	Modified TO-15	1.8 "Hg	5 psi
07A	IA0401	Modified TO-15	5.1 "Hg	4.8 psi
07B	IA0401	Modified TO-15	5.1 "Hg	4.8 psi
08A	IA0458	Modified TO-15	2 "Hg	5.2 psi
08B	IA0458	Modified TO-15	2 "Hg	5.2 psi
09A	FB0401	Modified TO-15	10.2 "Hg	4.9 psi
09B	FB0401	Modified TO-15	10.2 "Hg	4.9 psi
10A	AA0401	Modified TO-15	4.9 "Hg	5.3 psi
10B	AA0401	Modified TO-15	4.9 "Hg	5.3 psi
11A	Lab Blank	Modified TO-15	NA	NA
11B	Lab Blank	Modified TO-15	NA	NA
11C	Lab Blank	Modified TO-15	NA	NA

Continued on next page

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WORK ORDER #: 1604483

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. #**	
FAX:		**PROJECT #**	
DATE RECEIVED:	04/22/2016	**CONTACT:**	Ausha Scott
DATE COMPLETED:	05/05/2016		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
11D	Lab Blank	Modified TO-15	NA	NA
12A	CCV	Modified TO-15	NA	NA
12B	CCV	Modified TO-15	NA	NA
12C	CCV	Modified TO-15	NA	NA
12D	CCV	Modified TO-15	NA	NA
13A	LCS	Modified TO-15	NA	NA
13AA	LCSD	Modified TO-15	NA	NA
13B	LCS	Modified TO-15	NA	NA
13BB	LCSD	Modified TO-15	NA	NA
13C	LCS	Modified TO-15	NA	NA
13CC	LCSD	Modified TO-15	NA	NA
13D	LCS	Modified TO-15	NA	NA
13DD	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 05/05/16

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.
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 - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15 Full Scan/SIM
Sanborn, Head & Associates
Workorder# 1604483

Ten 6 Liter Summa Canister (SIM Certified) samples were received on April 22, 2016. 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 liters 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 Full Scan: 30% RSD with 4 compounds allowed out to < 40% RSD For SIM: Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	For Full Scan: </= 30% Difference with four 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	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 samples FD0436, FB0401 and AA0401 did not match the entries on the sample tags with regard to sample identification. Therefore the information on the sample tag was used to process and report the samples.

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

Nine 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.

CN - See case narrative explanation

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: IA0469

Lab ID#: 1604483-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.14	0.54	0.72	2.7
Freon 11	0.14	0.55	0.81	3.1
Acetone	0.72	7.7	1.7	18
Methylene Chloride	0.29	0.85	1.0	2.9
Benzene	0.14	0.17	0.46	0.54
Toluene	0.14	5.1	0.55	19
Tetrachloroethene	0.14	0.59	0.98	4.0
m,p-Xylene	0.14	0.27	0.63	1.2

Client Sample ID: IA0469

Lab ID#: 1604483-01B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.029	0.055	0.18	0.34
Trichloroethene	0.029	0.031	0.16	0.17

Client Sample ID: IA0470

Lab ID#: 1604483-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.81	2.4
Freon 11	0.16	0.80	0.92	4.5
Acetone	0.82	8.8	1.9	21
Toluene	0.16	0.23	0.62	0.86
Tetrachloroethene	0.16	0.60	1.1	4.1

Client Sample ID: IA0470

Lab ID#: 1604483-02B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.033	0.069	0.21	0.43

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

Client Sample ID: IA0404

Lab ID#: 1604483-03A

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	0.55	0.90	3.1
Acetone	0.80	13	1.9	31
Tetrachloroethene	0.16	0.77	1.1	5.2

Client Sample ID: IA0404

Lab ID#: 1604483-03B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.065	0.20	0.41

Client Sample ID: IA0436

Lab ID#: 1604483-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.15	0.53	0.76	2.6
Freon 11	0.15	0.82	0.86	4.6
Freon 113	0.15	0.19	1.2	1.5
Acetone	0.76	11	1.8	27
Methylene Chloride	0.31	0.56	1.1	1.9
Benzene	0.15	0.15 J	0.49	0.47 J
Toluene	0.15	4.3	0.58	16
Tetrachloroethene	0.15	1.6	1.0	11
m,p-Xylene	0.15	0.16	0.66	0.69

Client Sample ID: IA0436

Lab ID#: 1604483-04B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.031	0.053	0.19	0.33

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

Client Sample ID: FD0436

Lab ID#: 1604483-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.77	2.4
Freon 11	0.16	0.80	0.87	4.5
Freon 113	0.16	0.18	1.2	1.4
Acetone	0.78	16	1.8	39
Tetrachloroethene	0.16	1.7	1.0	11

Client Sample ID: FD0436

Lab ID#: 1604483-05B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.031	0.073	0.20	0.46

Client Sample ID: IA0400

Lab ID#: 1604483-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.14	0.56	0.71	2.8
Freon 11	0.14	0.68	0.80	3.8
Acetone	0.72	14	1.7	34
Methylene Chloride	0.29	1.7	0.99	6.0
Benzene	0.14	0.17	0.46	0.55
Toluene	0.14	11	0.54	43
Tetrachloroethene	0.14	0.88	0.97	5.9
Ethyl Benzene	0.14	0.23	0.62	1.0
m,p-Xylene	0.14	0.53	0.62	2.3
o-Xylene	0.14	0.24	0.62	1.0

Client Sample ID: IA0400

Lab ID#: 1604483-06B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.029	0.064	0.18	0.40

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

Client Sample ID: IA0401

Lab ID#: 1604483-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.49	0.79	2.4
Freon 11	0.16	0.60	0.90	3.4
Acetone	0.80	120 E	1.9	300 E
Tetrachloroethene	0.16	0.19	1.1	1.3

Client Sample ID: IA0401

Lab ID#: 1604483-07B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.069	0.20	0.44

Client Sample ID: IA0458

Lab ID#: 1604483-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.14	0.50	0.72	2.5
Freon 11	0.14	0.62	0.81	3.5
Acetone	0.72	45	1.7	110
Methylene Chloride	0.29	0.91	1.0	3.2
Benzene	0.14	0.17	0.46	0.56
Toluene	0.14	7.2	0.55	27
Tetrachloroethene	0.14	0.48	0.98	3.2
m,p-Xylene	0.14	0.26	0.63	1.1

Client Sample ID: IA0458

Lab ID#: 1604483-08B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.029	0.060	0.18	0.38
Trichloroethene	0.029	0.030	0.16	0.16

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

Client Sample ID: FB0401

Lab ID#: 1604483-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Acetone	1.0	2.8	2.4	6.6

Client Sample ID: FB0401

Lab ID#: 1604483-09B

No Detections Were Found.

Client Sample ID: AA0401

Lab ID#: 1604483-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.52	0.81	2.6
Freon 11	0.16	0.28	0.92	1.6
Acetone	0.82	12	1.9	28

Client Sample ID: AA0401

Lab ID#: 1604483-10B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.033	0.074	0.20	0.47

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Client Sample ID: IA0469

Lab ID#: 1604483-01A

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

File Name:	**20042509**	**Date of Collection:**	**4/13/16 3:22:00 PM**
Dil. Factor:	**1.45**	**Date of Analysis:**	**4/25/16 01:46 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.14	0.54	0.72	2.7
Freon 11	0.14	0.55	0.81	3.1
Freon 113	0.14	Not Detected	1.1	Not Detected
1,1-Dichloroethene	0.14	Not Detected	0.57	Not Detected
Acetone	0.72	7.7	1.7	18
Methylene Chloride	0.29	0.85	1.0	2.9
cis-1,2-Dichloroethene	0.14	Not Detected	0.57	Not Detected
1,1,1-Trichloroethane	0.14	Not Detected	0.79	Not Detected
Benzene	0.14	0.17	0.46	0.54
Toluene	0.14	5.1	0.55	19
Tetrachloroethene	0.14	0.59	0.98	4.0
Chlorobenzene	0.14	Not Detected	0.67	Not Detected
Ethyl Benzene	0.14	Not Detected	0.63	Not Detected
m,p-Xylene	0.14	0.27	0.63	1.2
o-Xylene	0.14	Not Detected	0.63	Not Detected
1,3-Dichlorobenzene	0.14	Not Detected	0.87	Not Detected
1,4-Dichlorobenzene	0.14	Not Detected	0.87	Not Detected
1,2-Dichlorobenzene	0.14	Not Detected	0.87	Not Detected
1,2,4-Trichlorobenzene	0.72	Not Detected	5.4	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	97	70-130

eurofins | Air Toxics

Client Sample ID: IA0469

Lab ID#: 1604483-01B

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

File Name:	**20042509sim**	**Date of Collection: 4/13/16 3:22:00 PM**	
Dil. Factor:	**1.45**	**Date of Analysis: 4/25/16 01:46 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.014	Not Detected	0.037	Not Detected
Carbon Tetrachloride	0.029	0.055	0.18	0.34
Trichloroethene	0.029	0.031	0.16	0.17

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

eurofins | Air Toxics

Client Sample ID: IA0470

Lab ID#: 1604483-02A

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

File Name:	**20042510**	**Date of Collection: 4/13/16 2:35:00 PM**	
Dil. Factor:	**1.64**	**Date of Analysis: 4/25/16 02:25 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.81	2.4
Freon 11	0.16	0.80	0.92	4.5
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Acetone	0.82	8.8	1.9	21
Methylene Chloride	0.33	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
Toluene	0.16	0.23	0.62	0.86
Tetrachloroethene	0.16	0.60	1.1	4.1
Chlorobenzene	0.16	Not Detected	0.76	Not Detected
Ethyl Benzene	0.16	Not Detected	0.71	Not Detected
m,p-Xylene	0.16	Not Detected	0.71	Not Detected
o-Xylene	0.16	Not Detected	0.71	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,2,4-Trichlorobenzene	0.82	Not Detected	6.1	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: IA0470

Lab ID#: 1604483-02B

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

File Name:	**20042510sim**	**Date of Collection: 4/13/16 2:35:00 PM**	
Dil. Factor:	**1.64**	**Date of Analysis: 4/25/16 02:25 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.042	Not Detected
Carbon Tetrachloride	0.033	0.069	0.21	0.43
Trichloroethene	0.033	Not Detected	0.18	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0404

Lab ID#: 1604483-03A

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

File Name:	**20042511**	**Date of Collection: 4/13/16 3:24:00 PM**	
Dil. Factor:	**1.60**	**Date of Analysis: 4/25/16 03:04 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	0.55	0.90	3.1
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Acetone	0.80	13	1.9	31
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	0.77	1.1	5.2
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	101	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	97	70-130

eurofins | Air Toxics

Client Sample ID: IA0404

Lab ID#: 1604483-03B

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

File Name:	**20042511sim**	**Date of Collection: 4/13/16 3:24:00 PM**	
Dil. Factor:	**1.60**	**Date of Analysis: 4/25/16 03:04 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	0.065	0.20	0.41
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	101	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0436

Lab ID#: 1604483-04A

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

File Name:	**20042512**	**Date of Collection: 4/13/16 3:26:00 PM**	
Dil. Factor:	**1.53**	**Date of Analysis: 4/25/16 03:44 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.15	0.53	0.76	2.6
Freon 11	0.15	0.82	0.86	4.6
Freon 113	0.15	0.19	1.2	1.5
1,1-Dichloroethene	0.15	Not Detected	0.61	Not Detected
Acetone	0.76	11	1.8	27
Methylene Chloride	0.31	0.56	1.1	1.9
cis-1,2-Dichloroethene	0.15	Not Detected	0.61	Not Detected
1,1,1-Trichloroethane	0.15	Not Detected	0.83	Not Detected
Benzene	0.15	0.15 J	0.49	0.47 J
Toluene	0.15	4.3	0.58	16
Tetrachloroethene	0.15	1.6	1.0	11
Chlorobenzene	0.15	Not Detected	0.70	Not Detected
Ethyl Benzene	0.15	Not Detected	0.66	Not Detected
m,p-Xylene	0.15	0.16	0.66	0.69
o-Xylene	0.15	Not Detected	0.66	Not Detected
1,3-Dichlorobenzene	0.15	Not Detected	0.92	Not Detected
1,4-Dichlorobenzene	0.15	Not Detected	0.92	Not Detected
1,2-Dichlorobenzene	0.15	Not Detected	0.92	Not Detected
1,2,4-Trichlorobenzene	0.76	Not Detected	5.7	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0436

Lab ID#: 1604483-04B

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

File Name:	**20042512sim**	**Date of Collection: 4/13/16 3:26:00 PM**	
Dil. Factor:	**1.53**	**Date of Analysis: 4/25/16 03:44 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.015	Not Detected	0.039	Not Detected
Carbon Tetrachloride	0.031	0.053	0.19	0.33
Trichloroethene	0.031	Not Detected	0.16	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: FD0436

Lab ID#: 1604483-05A

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

File Name:	**20042513**	**Date of Collection: 4/13/16 3:26:00 PM**	
Dil. Factor:	**1.55**	**Date of Analysis: 4/25/16 04:24 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.48	0.77	2.4
Freon 11	0.16	0.80	0.87	4.5
Freon 113	0.16	0.18	1.2	1.4
1,1-Dichloroethene	0.16	Not Detected	0.61	Not Detected
Acetone	0.78	16	1.8	39
Methylene Chloride	0.31	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.61	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.84	Not Detected
Benzene	0.16	Not Detected	0.50	Not Detected
Toluene	0.16	Not Detected	0.58	Not Detected
Tetrachloroethene	0.16	1.7	1.0	11
Chlorobenzene	0.16	Not Detected	0.71	Not Detected
Ethyl Benzene	0.16	Not Detected	0.67	Not Detected
m,p-Xylene	0.16	Not Detected	0.67	Not Detected
o-Xylene	0.16	Not Detected	0.67	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.93	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.93	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.93	Not Detected
1,2,4-Trichlorobenzene	0.78	Not Detected	5.8	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: FD0436

Lab ID#: 1604483-05B

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

File Name:	**20042513sim**	**Date of Collection: 4/13/16 3:26:00 PM**	
Dil. Factor:	**1.55**	**Date of Analysis: 4/25/16 04:24 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	0.073	0.20	0.46
Trichloroethene	0.031	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	101	70-130

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Client Sample ID: IA0400

Lab ID#: 1604483-06A

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

File Name:	**20042514**	**Date of Collection:**	**4/13/16 2:55:00 PM**
Dil. Factor:	**1.43**	**Date of Analysis:**	**4/25/16 05:03 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.14	0.56	0.71	2.8
Freon 11	0.14	0.68	0.80	3.8
Freon 113	0.14	Not Detected	1.1	Not Detected
1,1-Dichloroethene	0.14	Not Detected	0.57	Not Detected
Acetone	0.72	14	1.7	34
Methylene Chloride	0.29	1.7	0.99	6.0
cis-1,2-Dichloroethene	0.14	Not Detected	0.57	Not Detected
1,1,1-Trichloroethane	0.14	Not Detected	0.78	Not Detected
Benzene	0.14	0.17	0.46	0.55
Toluene	0.14	11	0.54	43
Tetrachloroethene	0.14	0.88	0.97	5.9
Chlorobenzene	0.14	Not Detected	0.66	Not Detected
Ethyl Benzene	0.14	0.23	0.62	1.0
m,p-Xylene	0.14	0.53	0.62	2.3
o-Xylene	0.14	0.24	0.62	1.0
1,3-Dichlorobenzene	0.14	Not Detected	0.86	Not Detected
1,4-Dichlorobenzene	0.14	Not Detected	0.86	Not Detected
1,2-Dichlorobenzene	0.14	Not Detected	0.86	Not Detected
1,2,4-Trichlorobenzene	0.72	Not Detected	5.3	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0400

Lab ID#: 1604483-06B

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

File Name:	**20042514sim**	**Date of Collection: 4/13/16 2:55:00 PM**	
Dil. Factor:	**1.43**	**Date of Analysis: 4/25/16 05:03 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.014	Not Detected	0.036	Not Detected
Carbon Tetrachloride	0.029	0.064	0.18	0.40
Trichloroethene	0.029	Not Detected	0.15	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA0401

Lab ID#: 1604483-07A

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

File Name:	**20042612**	**Date of Collection: 4/13/16 3:29:00 PM**	
Dil. Factor:	**1.60**	**Date of Analysis: 4/26/16 02:50 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.49	0.79	2.4
Freon 11	0.16	0.60	0.90	3.4
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Acetone	0.80	120 E	1.9	300 E
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	0.19	1.1	1.3
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

E = Exceeds instrument calibration range.

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	98	70-130

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Client Sample ID: IA0401

Lab ID#: 1604483-07B

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

File Name:	**20042612sim**	**Date of Collection: 4/13/16 3:29:00 PM**	
Dil. Factor:	**1.60**	**Date of Analysis: 4/26/16 02:50 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	0.069	0.20	0.44
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	102	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: IA0458

Lab ID#: 1604483-08A

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

File Name:	**20042613**	**Date of Collection: 4/13/16 3:45:00 PM**	
Dil. Factor:	**1.45**	**Date of Analysis: 4/26/16 03:30 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.14	0.50	0.72	2.5
Freon 11	0.14	0.62	0.81	3.5
Freon 113	0.14	Not Detected	1.1	Not Detected
1,1-Dichloroethene	0.14	Not Detected	0.57	Not Detected
Acetone	0.72	45	1.7	110
Methylene Chloride	0.29	0.91	1.0	3.2
cis-1,2-Dichloroethene	0.14	Not Detected	0.57	Not Detected
1,1,1-Trichloroethane	0.14	Not Detected	0.79	Not Detected
Benzene	0.14	0.17	0.46	0.56
Toluene	0.14	7.2	0.55	27
Tetrachloroethene	0.14	0.48	0.98	3.2
Chlorobenzene	0.14	Not Detected	0.67	Not Detected
Ethyl Benzene	0.14	Not Detected	0.63	Not Detected
m,p-Xylene	0.14	0.26	0.63	1.1
o-Xylene	0.14	Not Detected	0.63	Not Detected
1,3-Dichlorobenzene	0.14	Not Detected	0.87	Not Detected
1,4-Dichlorobenzene	0.14	Not Detected	0.87	Not Detected
1,2-Dichlorobenzene	0.14	Not Detected	0.87	Not Detected
1,2,4-Trichlorobenzene	0.72	Not Detected	5.4	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0458

Lab ID#: 1604483-08B

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

File Name:	**20042613sim**	**Date of Collection: 4/13/16 3:45:00 PM**	
Dil. Factor:	**1.45**	**Date of Analysis: 4/26/16 03:30 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.014	Not Detected	0.037	Not Detected
Carbon Tetrachloride	0.029	0.060	0.18	0.38
Trichloroethene	0.029	0.030	0.16	0.16

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: FB0401

Lab ID#: 1604483-09A

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

File Name:	**20042614**	**Date of Collection: 4/13/16 4:37:00 PM**	
Dil. Factor:	**2.02**	**Date of Analysis: 4/26/16 04:09 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.20	Not Detected	1.0	Not Detected
Freon 11	0.20	Not Detected	1.1	Not Detected
Freon 113	0.20	Not Detected	1.5	Not Detected
1,1-Dichloroethene	0.20	Not Detected	0.80	Not Detected
Acetone	1.0	2.8	2.4	6.6
Methylene Chloride	0.40	Not Detected	1.4	Not Detected
cis-1,2-Dichloroethene	0.20	Not Detected	0.80	Not Detected
1,1,1-Trichloroethane	0.20	Not Detected	1.1	Not Detected
Benzene	0.20	Not Detected	0.64	Not Detected
Toluene	0.20	Not Detected	0.76	Not Detected
Tetrachloroethene	0.20	Not Detected	1.4	Not Detected
Chlorobenzene	0.20	Not Detected	0.93	Not Detected
Ethyl Benzene	0.20	Not Detected	0.88	Not Detected
m,p-Xylene	0.20	Not Detected	0.88	Not Detected
o-Xylene	0.20	Not Detected	0.88	Not Detected
1,3-Dichlorobenzene	0.20	Not Detected	1.2	Not Detected
1,4-Dichlorobenzene	0.20	Not Detected	1.2	Not Detected
1,2-Dichlorobenzene	0.20	Not Detected	1.2	Not Detected
1,2,4-Trichlorobenzene	1.0	Not Detected	7.5	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

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

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Client Sample ID: FB0401

Lab ID#: 1604483-09B

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

File Name:	**20042614sim**	**Date of Collection: 4/13/16 4:37:00 PM**	
Dil. Factor:	**2.02**	**Date of Analysis: 4/26/16 04:09 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.020	Not Detected	0.052	Not Detected
Carbon Tetrachloride	0.040	Not Detected	0.25	Not Detected
Trichloroethene	0.040	Not Detected	0.22	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: AA0401

Lab ID#: 1604483-10A

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

File Name:	**20042615**	**Date of Collection: 4/13/16 3:40:00 PM**	
Dil. Factor:	**1.63**	**Date of Analysis: 4/26/16 04:49 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.52	0.81	2.6
Freon 11	0.16	0.28	0.92	1.6
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Acetone	0.82	12	1.9	28
Methylene Chloride	0.33	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
Toluene	0.16	Not Detected	0.61	Not Detected
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected
Chlorobenzene	0.16	Not Detected	0.75	Not Detected
Ethyl Benzene	0.16	Not Detected	0.71	Not Detected
m,p-Xylene	0.16	Not Detected	0.71	Not Detected
o-Xylene	0.16	Not Detected	0.71	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.98	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.98	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.98	Not Detected
1,2,4-Trichlorobenzene	0.82	Not Detected	6.0	Not Detected

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	103	70-130

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Client Sample ID: AA0401

Lab ID#: 1604483-10B

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

File Name:	**20042615sim**	**Date of Collection: 4/13/16 3:40:00 PM**	
Dil. Factor:	**1.63**	**Date of Analysis: 4/26/16 04:49 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.042	Not Detected
Carbon Tetrachloride	0.033	0.074	0.20	0.47
Trichloroethene	0.033	Not Detected	0.18	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1604483-11A

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

File Name:	**20042507**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 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	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1604483-11B

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

File Name:	**20042507sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 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	105	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1604483-11C

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

File Name:	**20042606**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 10:25 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	103	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1604483-11D

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

File Name:	**20042606sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 10:25 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	108	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: CCV

Lab ID#: 1604483-12A

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

File Name:	**20042503**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 07:25 AM**	

Compound	%Recovery
Freon 12	102
Freon 11	107
Freon 113	109
1,1-Dichloroethene	106
Acetone	104
Methylene Chloride	106
cis-1,2-Dichloroethene	111
1,1,1-Trichloroethane	107
Benzene	116
Toluene	116
Tetrachloroethene	120
Chlorobenzene	115
Ethyl Benzene	120
m,p-Xylene	116
o-Xylene	116
1,3-Dichlorobenzene	104
1,4-Dichlorobenzene	102
1,2-Dichlorobenzene	102
1,2,4-Trichlorobenzene	95

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	89	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: CCV

Lab ID#: 1604483-12B

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

File Name:	**20042503sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 07:25 AM**	

Compound	%Recovery
Vinyl Chloride	94
Carbon Tetrachloride	131
Trichloroethene	103

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: CCV

Lab ID#: 1604483-12C

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

File Name:	**20042602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 07:12 AM**	

Compound	%Recovery
Freon 12	106
Freon 11	108
Freon 113	110
1,1-Dichloroethene	106
Acetone	108
Methylene Chloride	109
cis-1,2-Dichloroethene	111
1,1,1-Trichloroethane	109
Benzene	114
Toluene	114
Tetrachloroethene	119
Chlorobenzene	114
Ethyl Benzene	119
m,p-Xylene	115
o-Xylene	117
1,3-Dichlorobenzene	103
1,4-Dichlorobenzene	101
1,2-Dichlorobenzene	101
1,2,4-Trichlorobenzene	92

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	91	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	105	70-130

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Client Sample ID: CCV

Lab ID#: 1604483-12D

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

File Name:	**20042602sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 07:12 AM**	

Compound	%Recovery
Vinyl Chloride	97
Carbon Tetrachloride	130
Trichloroethene	102

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	107	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: LCS

Lab ID#: 1604483-13A

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

File Name:	**20042504**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 09:03 AM**	

Compound	%Recovery	Method Limits
Freon 12	110	70-130
Freon 11	114	70-130
Freon 113	112	70-130
1,1-Dichloroethene	109	70-130
Acetone	110	70-130
Methylene Chloride	107	70-130
cis-1,2-Dichloroethene	107	70-130
1,1,1-Trichloroethane	110	70-130
Benzene	118	70-130
Toluene	117	70-130
Tetrachloroethene	126	70-130
Chlorobenzene	118	70-130
Ethyl Benzene	122	70-130
m,p-Xylene	121	70-130
o-Xylene	122	70-130
1,3-Dichlorobenzene	109	70-130
1,4-Dichlorobenzene	107	70-130
1,2-Dichlorobenzene	111	70-130
1,2,4-Trichlorobenzene	109	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	106	70-130

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Client Sample ID: LCSD

Lab ID#: 1604483-13AA

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

File Name:	**20042505**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 09:47 AM**	

Compound	%Recovery	Method Limits
Freon 12	105	70-130
Freon 11	112	70-130
Freon 113	109	70-130
1,1-Dichloroethene	108	70-130
Acetone	108	70-130
Methylene Chloride	107	70-130
cis-1,2-Dichloroethene	106	70-130
1,1,1-Trichloroethane	109	70-130
Benzene	119	70-130
Toluene	116	70-130
Tetrachloroethene	122	70-130
Chlorobenzene	112	70-130
Ethyl Benzene	116	70-130
m,p-Xylene	114	70-130
o-Xylene	115	70-130
1,3-Dichlorobenzene	105	70-130
1,4-Dichlorobenzene	101	70-130
1,2-Dichlorobenzene	101	70-130
1,2,4-Trichlorobenzene	108	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: LCS

Lab ID#: 1604483-13B

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

File Name:	**20042504sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 09:03 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	70-130
Carbon Tetrachloride	137	60-140
Trichloroethene	104	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: LCSD

Lab ID#: 1604483-13BB

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

File Name:	**20042505sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/16 09:47 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	98	70-130
Carbon Tetrachloride	136	60-140
Trichloroethene	103	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	95	70-130
Toluene-d8	107	70-130
4-Bromofluorobenzene	104	70-130

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Client Sample ID: LCS

Lab ID#: 1604483-13C

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

File Name:	**20042603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 08:04 AM**	

Compound	%Recovery	Method Limits
Freon 12	109	70-130
Freon 11	112	70-130
Freon 113	110	70-130
1,1-Dichloroethene	111	70-130
Acetone	110	70-130
Methylene Chloride	107	70-130
cis-1,2-Dichloroethene	106	70-130
1,1,1-Trichloroethane	108	70-130
Benzene	117	70-130
Toluene	114	70-130
Tetrachloroethene	121	70-130
Chlorobenzene	112	70-130
Ethyl Benzene	117	70-130
m,p-Xylene	113	70-130
o-Xylene	117	70-130
1,3-Dichlorobenzene	103	70-130
1,4-Dichlorobenzene	102	70-130
1,2-Dichlorobenzene	101	70-130
1,2,4-Trichlorobenzene	95	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	95	70-130
Toluene-d8	106	70-130
4-Bromofluorobenzene	103	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1604483-13CC

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

File Name:	**20042604**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 08:50 AM**	

Compound	%Recovery	Method Limits
Freon 12	115	70-130
Freon 11	122	70-130
Freon 113	118	70-130
1,1-Dichloroethene	118	70-130
Acetone	118	70-130
Methylene Chloride	116	70-130
cis-1,2-Dichloroethene	115	70-130
1,1,1-Trichloroethane	118	70-130
Benzene	116	70-130
Toluene	118	70-130
Tetrachloroethene	126	70-130
Chlorobenzene	120	70-130
Ethyl Benzene	125	70-130
m,p-Xylene	122	70-130
o-Xylene	124	70-130
1,3-Dichlorobenzene	112	70-130
1,4-Dichlorobenzene	110	70-130
1,2-Dichlorobenzene	113	70-130
1,2,4-Trichlorobenzene	113	70-130

Container Type: NA - Not Applicable

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

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Client Sample ID: LCS

Lab ID#: 1604483-13D

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

File Name:	**20042603sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 08:04 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	101	70-130
Carbon Tetrachloride	137	60-140
Trichloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	104	70-130

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Client Sample ID: LCSD

Lab ID#: 1604483-13DD

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

File Name:	**20042604sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/26/16 08:50 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	102	70-130
Carbon Tetrachloride	142 Q	60-140
Trichloroethene	106	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	105	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 330C
Laboratory:	Eurofins Air Toxics, Inc. (EATL), Folsom, California
SDG / Work Order:	1604483
Date(s) of Collection:	April 13, 2016
Number and type Samples & analyses:	8 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:	June 8, 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.

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34 Pheasant Run Drive, Skillman, New Jersey 08558 908-874-5686 nrothman@neh-inc.com

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
IA0469	1604483-01	4/13/16	Indoor Air	VOCs	Field Sample
IA0470	1604483-02	4/13/16	Indoor Air	VOCs	Field Sample
IA0404	1604483-03	4/13/16	Indoor Air	VOCs	Field Sample
IA0436	1604483-04	4/13/16	Indoor Air	VOCs	Field Sample
FD0436	1604483-05	4/13/16	Indoor Air	VOCs	Field Duplicate of IA0436
IA0400	1604483-06	4/13/16	Indoor Air	VOCs	Field Sample
IA0401	1604483-07	4/13/16	Indoor Air	VOCs	Field Sample
IA0458	1604483-08	4/13/16	Indoor Air	VOCs	Field Sample
FB0401	1604483-09	4/13/16	Nitrogen	VOCs	Equipment Blank
AA0401	1604483-10	4/13/16	Ambient Air	VOCs	Field Sample

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, UJ, or EB) 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.

The sample IDs on the canisters tags did not match the sample IDs on the Chain-of-Custody (COC) for three samples as follows: sample IDs on canister tags listed as FD0436, FB0401, and AA0401 were listed on the COC as IA0436 Dup, Nitrogen Blank, and Ambient Air, respectively. The sample IDs on the canisters were used for reporting of results.

Two results were reported at levels outside of the instrument calibration range. One result was below the calibration range (i.e., < RL) and flagged "J" by the laboratory and another result was reported above the calibration range and flagged "E" by the laboratory. These data were accepted as estimated results (J) with indeterminate bias due to uncertainty in quantitation outside the instrument calibration range, as shown in Table 2.

The field blank, FB0401, reported a detected result for acetone. A comparison between this equipment blank result and the sample results for acetone lead to estimation (EB) of two results, as shown in Table 2. These data may be biased high.

Precision was acceptable for all VOCs except for acetone and toluene in the Field Duplicate pair IA4036 and FD0436. The acetone and toluene results in IA4036 and FD0436 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 acetone and toluene.

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 sample IA0470 and several compounds in FB0401, which had RLs exceeding the expected RLs. However, since sensitivity of FB0401 is not important for overall indoor and ambient air sample usability and since carbon tetrachloride was detected in IA0470, 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
IA0469 IA0470	Acetone	EB	H	Equipment Blank Action
IA0436 FD0436	Acetone Toluene	J / UJ	I	FD imprecision
IA0436	Benzene	J	I	Result < RL
IA0401	Acetone	J	I	Result uncertain above the calibration range

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.

Date Sampled: 4/13/16 No. Samples 7 IA + 1 FD + 1 AA + 1 FB
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) 4 results in FD pair [2 in each sample]	Accept 1 "J" and 1 "E" as "J" values

Other Issues : ***Blank Action:*** 2 results estimated (EB) wit possible high bias since the associated FB reported a comparable result

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 4/22/16. The sample IDs on the canisters tags did not match the sample IDs on the Chain-of-Custody (COC) for three samples as follows: sample IDs on canister tags listed as FD0436, FB0401, and AA0401 were listed on the COC as IA0436 Dup, Nitrogen Blank, and Ambient Air, respectively. The sample IDs on the canisters were used for reporting of results.

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. All canisters were over-pressurized to 4.8 - 5.3 psi prior to analysis.

Samples were analyzed by 4/26/16; therefore HT was met. No Action required.

Date: ***6/7/16***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Associated Blanks: Method Blank: 20042507 / 20042507sim & 20042606 / 20042606 sim
FB: FB0401

Blank ID	Contaminant / Level (µg/m^3)		Action Level DF= 2.02		Sample and reported result (µg/m3)		Corrected Database Result
20042507	None				No Blank Action Required		
20042507 sim	None				No Blank Action Required		
20042606	None				No Blank Action Required		
20042606 sim	None				No Blank Action Required		
FB0401	Acetone 6.6		23.7		IA0469	18	18 EB
			26.8		IA0470	21	21 EB
			26.1		IA0404	31	No Action
			25		IA0436	27	No Action
			25.3		FD0436	39	No Action
			23.4		IA0400	34	No Action
			26.1		IA0401	300 E	No Action
			23.7		IA0458	110	No Action
			26.6		AA0401	28	No Action

Additional Notes:

ICALs : Instrument 20 Full Scan and SIM performed on 2/10 & 2/17/16. 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 0.02 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 at the end of this checklist for DF=2 analysis) were supported by the ICALs. No Action required

CCALs: 20042503/20042503sim & 20042602/20042602sim - % Recovery 70-130% for all 22 Target compounds - No Action required.

BFB Tunes: Instrument 20 4 Tunes (2 for ICAL + 2 for CCALs) - 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.

Date: ***6/7/16***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Additional Notes:

LCS/LCSD : 20042504/20042505 & 20042504sim/20042505sim and 20042603/20042604 & 20042603sim/20042604sim - %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 was 1 "J" results reported. This "J" data was accepted with indeterminate bias due to uncertainty in quantitation at a level below the Reporting limit (Result < RL). The result for acetone in sample IA0401 was reported at a level above the instrument calibration range and flagged "E" by the lab. This "E" result was accepted as an estimated (J) value with indeterminate bias due to the uncertainty in quantitation above the calibration range. The sample was not re-analyzed at a dilution to report acetone within the calibration range. There were no other qualifiers (except "U") reported on the data.

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 1,2,4-Trichlorobenzene, Chlorobenzene, Ethylbenzene, m,p-Xylene, and o-Xylene in sample FB0401 and Carbon Tetrachloride in samples IA0470 and FB0401, which had RLs exceeding the expected RL; however, as carbon tetrachloride was detected in IA0470 and since the sensitivity of FB0401 is not important for overall site sample usability, sensitivity for data is considered acceptable. No action required.

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

Field Duplicate Evaluation_ Sample IDs: Sample = IA0436 FD = FD0436

Analyte Name	CAS No.	DF = 1.53* RL (µg/m³)	Sample Result µg/m3	Q	Result Level	FD Result µg/m3	Q	FD Level	RPD	Action
Freon 12	75-71-8	0.76	2.6		< 5xRL	2.4		< 5xRL	8.0	None
Freon 11	75-69-4	0.86	4.6		< 5xRL	4.5		< 5xRL	2.2	None
Freon 113	76-13-1	1.2	1.5		< 5xRL	1.4		< 5xRL	6.9	None
1,1-Dichloroethene	75-35-4	0.61	0.61	U	RL	0.61	U	RL	NA	None
Acetone	67-64-1	1.8	27		> 5xRL	39		> 5xRL	36.4	**J Both**
Methylene Chloride	75-09-2	1.1	1.9		< 5xRL	1.1	U	RL	NA	None
cis-1,2-Dichloroethene	156-59-2	0.61	0.61	U	RL	0.61	U	RL	NA	None
1,1,1-Trichloroethane	71-55-6	0.83	0.83	U	RL	0.84	U	RL	NA	None
Benzene	71-43-2	0.49	0.47	J	< 5xRL	0.5	U	RL	NA	None
Toluene	108-88-3	0.58	16		> 5xRL	0.58	U	RL	NA	**J / UJ**
Tetrachloroethene	127-18-4	1	11		> 5xRL	11		> 5xRL	0.0	None
Chlorobenzene	108-90-7	0.7	0.7	U	RL	0.71	U	RL	NA	None
Ethyl Benzene	100-41-4	0.66	0.66	U	RL	0.67	U	RL	NA	None
m,p-Xylene	108-38-3/ 106-42-3	0.66	0.69		< 5xRL	0.67	U	< 5xRL	NA	None
o-Xylene	95-47-6	0.66	0.66	U	RL	0.67	U	RL	NA	None
1,3-Dichlorobenzene	541-73-1	0.92	0.92	U	RL	0.93	U	RL	NA	None
1,4-Dichlorobenzene	106-46-7	0.92	0.92	U	RL	0.93	U	RL	NA	None
1,2-Dichlorobenzene	95-50-1	0.92	0.92	U	RL	0.93	U	RL	NA	None
1,2,4-Trichlorobenzene	120-82-1	5.7	5.7	U	RL	5.8	U	RL	NA	None
Vinyl Chloride	75-01-4	0.039	0.039	U	RL	0.04	U	RL	NA	None
Carbon Tetrachloride	56-23-5	0.19	0.33		< 5xRL	0.46		< 5xRL	32.9	None **
Trichloroethene	79-01-6	0.16	0.16	U	RL	0.17	U	RL	NA	None

*The FD DF was 1.55

** 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 acetone and toluene.

ACTION: Acetone and Toluene estimated (J or UJ) in IA0436 and FD0436 with indeterminate bias due to FD imprecision.

Date: ***6/7/16***

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, p-Xylene		Full		0.86
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

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