SANBORN HEAD ENGINEERING

Building Trust. Engineering Success.

DATA TRANSMITTAL FOR B322 INDOOR AIR QUALITY TESTING

IBM'S FORMER EAST FISHKILL FACILITY

Hopewell Junction, New York

Prepared for IBM
File No. 2999.06
January 2016

8976 Wellington Road
Manassas, VA 20109

January 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: Data Transmittal for B322 Indoor Air Quality Testing
Former IBM East Fishkill Facility
Hopewell Junction, New York
EPA ID No. NYD00707901

Dear Mr. Czuhanich:

The enclosed report presents the results of indoor air quality (IAQ) testing that was conducted in October 2015 within Building 322 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 wish to discuss this document or have questions, please contact me (703) 257-2583.

Sincerely yours,

Dean Chartrand
Program Manager
Corporate Environmental Affairs

Encl: Data Transmittal for B322 Indoor Air Quality Testing

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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1.0 INTRODUCTION

This report summarizes the results of indoor air quality (IAQ) testing that was conducted in Building 322 (B322) in October 2015 at the former IBM East Fishkill Facility (the site), currently owned by Global Foundries (GF). The work described herein was conducted by Sanborn Head Engineering, PC (SHPC), on behalf of IBM, in general accordance with IBM's Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan dated June 15, 2009 (RFI Work Plan).

The purpose of IAQ testing was to assess the potential presence and concentrations of certain volatile organic compounds (VOCs) in indoor air in an area of B322 that is routinely occupied by GF. The sampling was conducted under the current heating, ventilating, and air conditioning (HVAC) system operating conditions maintained by GF. The investigation and this report are subject to the standard limitations for this type of work, as described in Appendix A.

2.0 BACKGROUND INFORMATION

IBM sold its former East Fishkill facility to GF in July 2015. IBM maintains responsibility for execution of the RFI Work Plan. IBM is working cooperatively with GF to maintain HVAC operating conditions in routinely occupied portions of the buildings that were the focus of the RFI Work Plan.

Prior to the indoor air sampling described in this report, indoor air sampling in B322 was last conducted on August 21, 2008 following procedures consistent with those set forth in the RFI Work Plan, and the results were reported in the RFI Work Plan. Based on the 2008 sampling results, the New York State Department of Environmental Conservation and Department of Health (collectively, the Agencies) determined no further assessment of this building was necessary[1].

During the 2008 indoor air sampling event, most the building was being used as a clean room. Based on information provided by GF and SHPC's observations, B322 is no longer being used for manufacturing and much of the clean room has been decommissioned. As shown on Figures 1 and 2, B322 is currently unoccupied, with the exception of the telephone room and an associated office in the southern corner of the building. In addition, pedestrians occasionally use the perimeter hallways to access adjacent buildings. Given the significant changes in building use since 2008, IBM elected to perform the IAQ testing described below, focusing on the occupied portion of the building (telephone room and office).

Four HVAC zones are currently running and serve the perimeter hallways and several perimeter rooms, including the telephone room and associated office. HVAC units are not running in the interior, unoccupied portion of the building. A summary of current air handling unit (AHU) settings is included in Table 1, and the operating HVAC zones are shown on Figures 1 and 2.

[1] See letter from the Agencies to IBM dated March 13, 2013.

3.0 SCOPE OF INDOOR AIR QUALITY TESTING

IAQ testing was conducted in B322 on October 26, 2015 in conformance with the procedures described in the RFI Work Plan using 6-L pre-evacuated SUMMA® canisters to collect 8-hour time-weighted-average samples. The 8-hour samples were collected under the 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 modified USEPA Method TO-15.

Indoor air samples were collected at a height of approximately 4.5 feet above the floor level at two occupied locations in B322: the telephone room and the associated office. A field duplicate sample and an ambient outdoor air sample 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.

Prior to the indoor air sampling, a building-wide IAQ screening round was conducted using a HAPSITE® portable gas chromatograph/mass spectrometer (GC/MS) on October 26, 2015. The purpose of the HAPSITE® screening was to assess tetrachloroethene (PCE) and trichloroethene (TCE) concentrations in the building under current HVAC settings (i.e., with the HVAC units in the central portion of the building turned off) prior to completion of the above-described 8-hour indoor air SUMMA® sampling. The portable GC/MS was calibrated to analyze for PCE and TCE to reporting limits of approximately 0.68 and 0.54 micrograms per cubic meter ($\mu g/m^3$), respectively.

4.0 RESULTS

PCE and TCE screening results using the portable GC/MS are provided in Table 3 and depicted on Figure 1. TCE was detected at only 2 of the 27 indoor air screening locations at concentrations of 0.78 and 1.1 $\mu g/m^3$ in the northeast corner of the building. PCE was detected at levels at or below 2.8 $\mu g/m^3$ in 12 of the 14 screening locations in the northern portion of the building, and in 2 of the 13 screening locations in the southern and central portions of the building. In all cases but three, the detected PCE was observed only in areas where HVAC systems are not operating. PCE and TCE were not detected at the screening locations in the routinely occupied telephone room or associated office.

Indoor air sampling results for the 22 project-specific analytes are provided in Table 4, and the PCE and TCE results are depicted on Figure 2. PCE and TCE were not detected above the laboratory reporting limit in the indoor air samples collected from the routinely occupied telephone room or associated office area, or the ambient outdoor air sample.

Low levels of five analytes were detected in indoor air, including: acetone (4.0 to 4.4 $\mu g/m^3$); carbon tetrachloride (0.21 to 0.35 $\mu g/m^3$); dichlorodifluoromethane (CFC12; [3.0 to 3.1 $\mu g/m^3$]); toluene (0.64 to 0.69 $\mu g/m^3$); and trichlorofluoromethane (CFC11; [1.8 $\mu g/m^3$]). With the exception of toluene, 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 toluene concentrations were slightly lower than those detected in other areas of the building during the August 2008 confirmatory sampling round, at which time the tenant was using toluene in its operations. While toluene was not identified as a constituent in the chemicals located near the sample locations, it may be present in paint, adhesives, cleaning supplies, or other common products used in the building and is unlikely related to vapor intrusion.

The analytical laboratory report for the indoor air samples is provided in Appendix C. The analytical data were provided to New Environmental Horizons, Inc. (NEH) of Arlington, MA and Skillman, NJ who conducted an In-Depth data usability review. The review found that all results were considered acceptable compared to the project-specific QA/QC Plan (QAPP; Appendix B of the RFI Work Plan) and method criteria, and usable for project objectives/decisions. The data validation report is provided in Appendix D.

5.0 CONCLUSIONS AND NEXT STEPS

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

Because neither PCE nor TCE were detected in the indoor air samples, IBM believes these results support keeping B322 in the category of no further assessment. IBM will continue to work cooperatively with GF to evaluate GF's planned changes to occupancy or HVAC conditions in B322 and other buildings so that IBM can assess whether additional IAQ testing is needed at that time.

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TABLES

TABLE 1
Current AHU Settings
B322 Indoor Air Quality Testing
IBM's Former East Fishkill Facility
Hopewell Junction, New York

Air Handling Unit (AHU) ID	Current Settings			
	Occupancy	Operating Schedule	Outside Air (OA) Damper Position	OA Flow Rate (cfm)
AC-4	Unoccupied	On	80% Open	3,693
AC-6	Unoccupied	On	10% Open	13,390
AC-8	Occupied	On	20% Open	7,746
AC-9	Unoccupied	On	90% Open	2,214

Notes:

1. Current OA damper positions and flow rates are based on measurements conducted by US Test in June 2015. Measurements were included in a spreadsheet titled "HVAC Management for VI Mitigation R7 - 7-16-15" provided to Sanborn, Head Engineering, PC (SHPC) by Global Foundries.

TABLE 2
Summary of Confirmatory Indoor Air Sample Information
B322 Indoor Air Quality Testing
IBM's Former East Fishkill Facility
Hopewell Junction, New York

Sample Location	Building Floor	Sample Matrix	Canister Number	Sample Height (ft above floor)	Start Time (hours)	Start Pressure (mm Hg)	Stop Time (hours)	Stop Pressure (mm Hg)	PID (ppbv)	Temperature (°F)	Location Description	Chemicals Observed Near Sample Location
Collection Date: October 26, 2015												
AA6001	NA	Ambient Air	4229	Ground Surface	8:04	-30	16:03	-6.0	NM	55	Outside, along southern exterior wall of B322	-
FD6001	Ground	Indoor Air	94943	4.5	7:59	-30	15:28	-3.0	46	65	Office and electrical equipment storage area	Cetaphil skin cleanser, highlighters/Sharpie markers, isopropanol, fluid for M90 system (Corning cable system), Loctite 860 retaining compound, Loctite 7649 primer, Scrubs hand cleanser towels, dry erase markers, dry erase board cleaning fluid
IA6012	Ground	Indoor Air	14887	4.5	7:59	-30	15:28	-4.0				
IA6013	Ground	Indoor Air	416	4.5	7:57	-30	16:00	-4.5	45	65	Telephone room	Fire extinguisher

Notes:

1. Samples were collected by Sanborn, Head Engineering, PC (SHPC) on October 26, 2015.

2. Samples were collected into 6-liter, stainless steel, pre-evacuated SUMMA® canisters using 8-hour metering regulators and inline 2-micron filters. Canisters and regulators were laboratory-certified clean (100% certification).

3. PID screening was conducted using a ppbRAE, calibrated to a 10 parts per million by volume (ppmv) isobutylene-in-air standard.

4. "NM" indicates not monitored.
"NA" indicates not applicable.
"ND" indicates the instrument read 0 ppbv.

Table 3
Summary of Portable GC/MS Indoor Air Screening Results
IBM's Former East Fishkill Facility
Hopewell Junction, NY

Location	Date and Time	µg/m^3	
		PCE	TCE
B322-B-8	10/26/2015 15:47	2.8	1.1
B322-C-15	10/26/2015 9:09	1.3	<0.54
B322-C-21	10/26/2015 8:54	0.74	<0.54
B322-F-12	10/26/2015 9:23	1.3	<0.54
B322-F-8	10/26/2015 9:42	2.1	0.78
B322-G-26	10/26/2015 8:30	<0.68	<0.54
B322-I-21	10/26/2015 8:19	<0.68	<0.54
B322-J-8	10/26/2015 9:52	1.4	<0.54
IA6001	10/26/2015 7:39	<0.68	<0.54
IA6002	10/26/2015 7:46	<0.68	<0.54
IA6003	10/26/2015 7:53	0.86	<0.54
IA6004	10/26/2015 8:11	1.1	<0.54
IA6005	10/26/2015 8:39	<0.68	<0.54
IA6006	10/26/2015 8:45	<0.68	<0.54
IA6007	10/26/2015 9:01	1.1	<0.54
IA6008	10/26/2015 9:35	1.3	<0.54
IA6009	10/26/2015 10:00	1.2	<0.54
IA6010	10/26/2015 14:21	<0.68	<0.54
IA6011	10/26/2015 14:48	<0.68	<0.54
IA6012	10/26/2015 7:27	<0.68	<0.54
IA6013	10/26/2015 7:19	<0.68	<0.54
IA6014	10/26/2015 11:36	<0.68	<0.54
IA6015	10/26/2015 15:12	1.8	<0.54
IA6016	10/26/2015 10:54	0.8	<0.54
IA6017	10/26/2015 11:03	<0.68	<0.54
IA6018	10/26/2015 11:15	1.6	<0.54
IA6019	10/26/2015 11:21	<0.68	<0.54

Notes:

1. This table summarizes data recorded during field screening of grab indoor air samples using a HAPSITE Smart portable gas chromatograph/mass spectrometer (GC/MS), manufactured by Inficon. The instrument was calibrated to manufacturer prepared standards 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 by Sanborn, Head Engineering, PC (SHPC) 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 portable GC/MS was used as a field screening tool; therefore, the data should be considered estimated and not suitable for final decision-making. The findings should be considered in conjunction with results of samples analyzed in accordance with USEPA TO-15 protocols.

3. Legend
< - The analyte was not detected above the indicated reporting limit.
NA - Not Applicable.

TABLE 4
Summary of 8-Hour Confirmatory Sampling Results
B322 Indoor Air Quality Testing
IBM's Former East Fishkill Facility
Hopewell Junction, New York

Compound	Sample Location	AA6001			IA6012			IA6012			IA6013		
	Field Sample Name	AA6001			FD6001			IA6012			IA6013		
	Collection Date	10/26/2015			10/26/2015			10/26/2015			10/26/2015		
	Units	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias	Result	Qualifier	Bias
Acetone	µg/m^3	2.9			4.4			4.0			4.3		
Benzene	µg/m^3	0.5	U		0.5	U		0.5	U		0.49	U	
Carbon tetrachloride	µg/m^3	0.35			0.21			0.30			0.35		
Chlorobenzene	µg/m^3	0.73	U		0.73	U		0.71	U		0.71	U	
Dichlorobenzene (1,2-)	µg/m^3	0.95	U		0.95	U		0.93	U		0.92	U	
Dichlorobenzene (1,3-)	µg/m^3	0.95	U		0.95	U		0.93	U		0.92	U	
Dichlorobenzene (1,4-)	µg/m^3	0.95	U		0.95	U		0.93	U		0.92	U	
Dichlorodifluoromethane (CFC12)	µg/m^3	2.1			3.0			3.0			3.1		
Dichloroethene (1,1-)	µg/m^3	0.63	U		0.63	U		0.61	U		0.61	U	
Dichloroethene (cis-1,2-)	µg/m^3	0.63	U		0.63	U		0.61	U		0.61	U	
Ethane, 1,1,2-trichloro-1,2,2-trifluoro- (CFC113)	µg/m^3	1.2	U		1.2	U		1.2	U		1.2	U	
Ethylbenzene	µg/m^3	0.69	U		0.69	U		0.67	U		0.67	U	
Methylene Chloride	µg/m^3	1.1	U		1.1	U		1.1	U		1.1	U	
Tetrachloroethene (PCE)	µg/m^3	1.1	U		1.1	U		1	U		1	U	
Toluene	µg/m^3	0.6	U		0.69			0.68			0.64		
Trichlorobenzene (1,2,4-)	µg/m^3	5.9	U		5.9	U		5.8	U		5.7	U	
Trichloroethane (1,1,1-)	µg/m^3	0.86	U		0.86	U		0.84	U		0.84	U	
Trichloroethene (TCE)	µg/m^3	0.17	U		0.17	U		0.17	U		0.16	U	
Trichlorofluoromethane (CFC11)	µg/m^3	1.2			1.8			1.8			1.8		
Vinyl chloride	µg/m^3	0.04	U		0.04	U		0.04	U		0.039	U	
Xylene (o-)	µg/m^3	0.69	U		0.69	U		0.67	U		0.67	U	
Xylene (-m,p)	µg/m^3	0.69	U		0.69	U		0.67	U		0.67	U	

Notes:

1. Samples were collected by Sanborn, Head Engineering, PC (SHPC) on the dates indicated over an 8-hour sampling interval. The samples were analyzed by Eurofins Air Toxics, Inc. (EATI) of Folsom, California for the project-specific list of volatile organic compounds (VOCs) by United States 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. An in-depth data usability review (DUR) was performed on the data by New Environmental Horizons, Inc. (NEH) of Arlington, Massachusetts and Skillman, NJ. All results were considered acceptable, with the understanding of the potential uncertainty (bias) in the qualified results. In some cases, NEH assigned the following qualifiers and biases to the data. Refer to the DUR report for further details.
"U" indicates the analyte is non-detect at or above the indicated sample specific practical quantification limit (PQL).

4. The "AA" designation indicates that the sample consists of ambient air collected from outside the building.

5. FD6001 is a field duplicate sample of IA6012.

FIGURES

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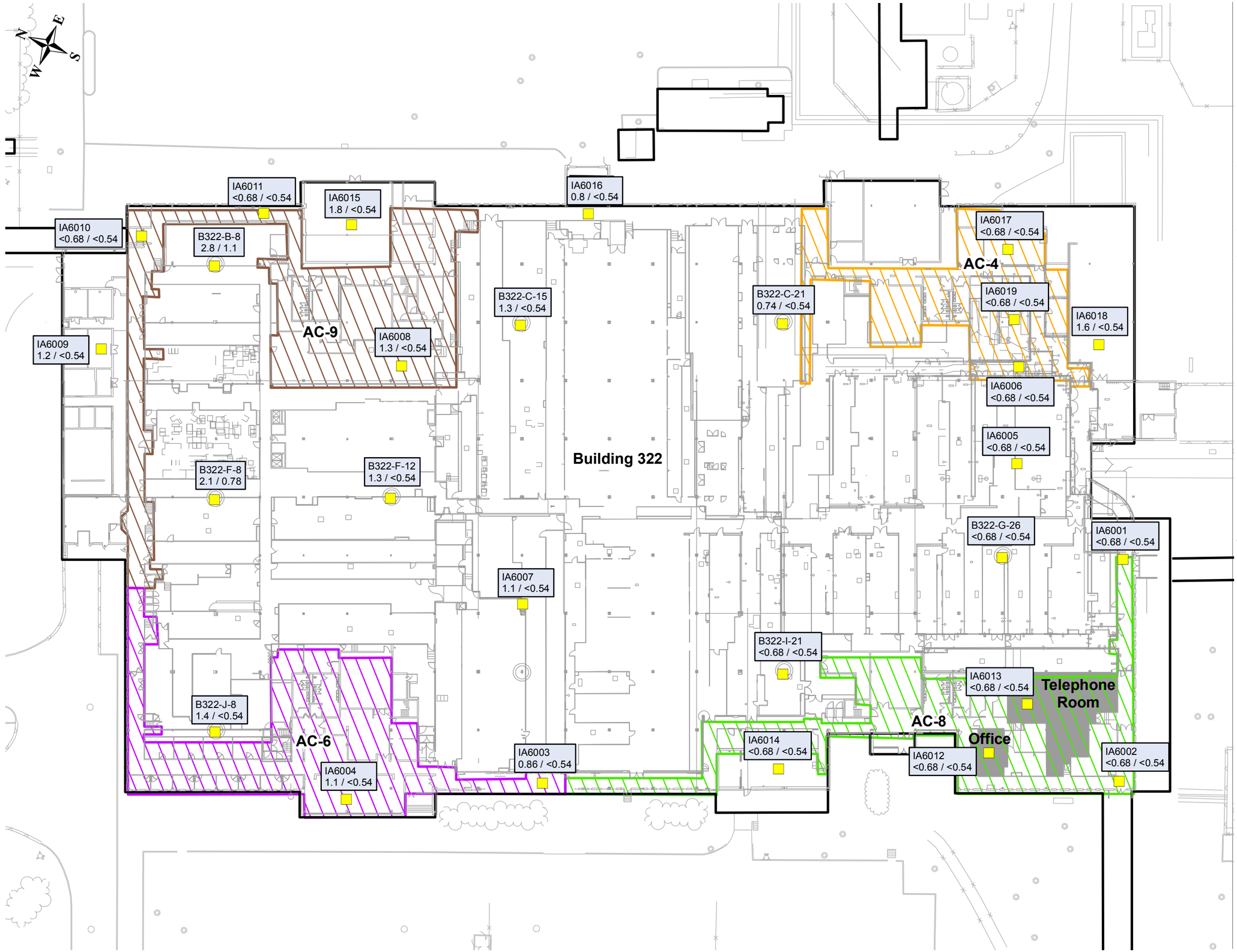

Figure 1

Summary of Portable GC/MS Screening Results

Building 322

Global Foundries East Fishkill Facility

Hopewell Junction, New York

Drawn By:	C. LaVack / E. Wright
Designed By:	J. Sanborn
Reviewed By:	B. Green
Project No:	2999.06
Date:	January 2016

Figure Narrative

This figure shows tetrachloroethene (PCE) and trichloroethene (TCE) results for indoor air screening in B322 conducted using a portable gas chromatograph / mass spectrometer (GC/MS), The screening was conducted concurrently with 8-hour Summa canister sampling on October 26, 2015.

Results are shown in micrograms per cubic meter (µg/m3).

Legend

- IA6005 — Indoor air location
- IA6010 <0.68 / <0.54 — Indoor air location name PCE / TCE portable GC/MS screening results (µg/m^3)
- HVAC Zone (on during sampling)
- Routinely occupied area

25 12.5 0 25 50
Feet

SANBORN HEAD ENGINEERING

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Figure 2

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

Building 322

Global Foundries East Fishkill Facility

Hopewell Junction, New York

Drawn By:	E. Wright
Designed By:	J. Sanborn
Reviewed By:	B. Green
Project No:	2999.06
Date:	January 2016

Figure Narrative

This figure shows the results of indoor air sampling of occupied portions of B322 conducted by Sanborn Head personnel on October 26, 2015. The samples were collected as 8-hour time-weighted-average samples using 6-L Summa canisters. The results for PCE and TCE are shown in units of micrograms per cubic meter (µg/m3).

Legend

- IA6012 — Indoor air location
- AA6001 — Ambient air location
- <1.0 / <0.17 — PCE and TCE 8-hour sampling results (µg/m^3)
- HVAC zone (on during sampling)
- Routinely occupied area

25 12.5 0 25 50

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

APPENDIX B
PHOTOGRAPH LOG

Photo 1: Sample AA6001, located along the southern exterior wall of B322.

Photo 2: Samples FD6001 and IA6012, located in the office and electrical equipment storage area adjacent to the telephone room (see Photo 3).

Photo 3: Sample IA6013, located in the telephone room.

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APPENDIX C

ANALYTICAL LABORATORY REPORT

(on CD)

eurofins | Air Toxics

11/24/2015
Ms. Erica Bosse
Sanborn, Head & Associates
24 Wade Road

Latham NY

Project Name: IBM-EFK
Project #: 2999.06
Workorder #: 1510604R1

Dear Ms. Erica Bosse

The following report includes the data for the above referenced project for sample(s) received on 10/29/2015 at Air Toxics Ltd.

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

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

Regards,

Ausha Scott

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1510604R1

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
FAX:
DATE RECEIVED: 10/29/2015
DATE COMPLETED: 11/07/2015
DATE REISSUED: 11/23/2015

P.O. #
PROJECT # 2999.06 IBM-EFK
CONTACT: Ausha Scott

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA6001	Modified TO-15	4.5 "Hg	5 psi
01B	AA6001	Modified TO-15	4.5 "Hg	5 psi
02A	FD6001	Modified TO-15	4.7 "Hg	4.9 psi
02B	FD6001	Modified TO-15	4.7 "Hg	4.9 psi
03A	IA6013	Modified TO-15	4.1 "Hg	4.8 psi
03B	IA6013	Modified TO-15	4.1 "Hg	4.8 psi
04A	IA6012	Modified TO-15	4.1 "Hg	5 psi
04B	IA6012	Modified TO-15	4.1 "Hg	5 psi
05A	Lab Blank	Modified TO-15	NA	NA
05B	Lab Blank	Modified TO-15	NA	NA
06A	CCV	Modified TO-15	NA	NA
06B	CCV	Modified TO-15	NA	NA
07A	LCS	Modified TO-15	NA	NA
07AA	LCSD	Modified TO-15	NA	NA
07B	LCS	Modified TO-15	NA	NA
07BB	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 11/23/15

Technical Director

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

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

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

LABORATORY NARRATIVE
Modified TO-15 Full Scan/SIM
Sanborn, Head & Associates
Workorder# 1510604R1

Four 6 Liter Summa Canister (SIM Certified) samples were received on October 29, 2015. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the Full Scan and SIM acquisition modes. The method involves concentrating up to 1.0 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

There were no receiving discrepancies.

The work order was reissued on November 23, 2015 to correct identification of samples AA6001, FD6001, IA6013 and IA6012 per revised Chain of Custody (COC) form.

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: AA6001

Lab ID#: 1510604R1-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.42	0.78	2.1
Freon 11	0.16	0.22	0.89	1.2
Acetone	0.79	1.2	1.9	2.9

Client Sample ID: AA6001

Lab ID#: 1510604R1-01B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.055	0.20	0.35

Client Sample ID: FD6001

Lab ID#: 1510604R1-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.61	0.78	3.0
Freon 11	0.16	0.32	0.89	1.8
Acetone	0.79	1.9	1.9	4.4
Toluene	0.16	0.18	0.60	0.69

Client Sample ID: FD6001

Lab ID#: 1510604R1-02B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.033	0.20	0.21

Client Sample ID: IA6013

Lab ID#: 1510604R1-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.15	0.62	0.76	3.1
Freon 11	0.15	0.32	0.86	1.8
Acetone	0.77	1.8	1.8	4.3

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

Client Sample ID: IA6013

Lab ID#: 1510604R1-03A

Toluene	0.15	0.17	0.58	0.64

Client Sample ID: IA6013

Lab ID#: 1510604R1-03B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.031	0.056	0.19	0.35

Client Sample ID: IA6012

Lab ID#: 1510604R1-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.62	0.77	3.0
Freon 11	0.16	0.32	0.87	1.8
Acetone	0.78	1.7	1.8	4.0
Toluene	0.16	0.18	0.58	0.68

Client Sample ID: IA6012

Lab ID#: 1510604R1-04B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.031	0.048	0.20	0.30

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Client Sample ID: AA6001

Lab ID#: 1510604R1-01A

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

File Name:	**e110309**	**Date of Collection:**	**10/26/15 8:04:00 AM**
Dil. Factor:	**1.58**	**Date of Analysis:**	**11/3/15 04:25 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.42	0.78	2.1
Freon 11	0.16	0.22	0.89	1.2
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Acetone	0.79	1.2	1.9	2.9
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	0.86	Not Detected
Benzene	0.16	Not Detected	0.50	Not Detected
Toluene	0.16	Not Detected	0.60	Not Detected
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected
Chlorobenzene	0.16	Not Detected	0.73	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	0.95	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.95	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.95	Not Detected
1,2,4-Trichlorobenzene	0.79	Not Detected	5.9	Not Detected

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	101	70-130

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Client Sample ID: AA6001

Lab ID#: 1510604R1-01B

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

File Name:	**e110309sim**	**Date of Collection: 10/26/20 8:04:00 AM**	
Dil. Factor:	**1.58**	**Date of Analysis: 11/3/15 04:25 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	0.032	0.055	0.20	0.35
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	99	70-130

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Client Sample ID: FD6001

Lab ID#: 1510604R1-02A

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

File Name:	**e110310**	**Date of Collection: 10/26/15 7:59:00 AM**	
Dil. Factor:	**1.58**	**Date of Analysis: 11/3/15 05:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.61	0.78	3.0
Freon 11	0.16	0.32	0.89	1.8
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Acetone	0.79	1.9	1.9	4.4
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	0.86	Not Detected
Benzene	0.16	Not Detected	0.50	Not Detected
Toluene	0.16	0.18	0.60	0.69
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected
Chlorobenzene	0.16	Not Detected	0.73	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	0.95	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.95	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.95	Not Detected
1,2,4-Trichlorobenzene	0.79	Not Detected	5.9	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: FD6001

Lab ID#: 1510604R1-02B

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

File Name:	**e110310sim**	**Date of Collection:**	**10/26/20 7:59:00 AM**
Dil. Factor:	**1.58**	**Date of Analysis:**	**11/3/15 05:11 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	0.032	0.033	0.20	0.21
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	99	70-130

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Client Sample ID: IA6013

Lab ID#: 1510604R1-03A

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

File Name:	**e110311**	**Date of Collection: 10/26/15 7:57:00 AM**	
Dil. Factor:	**1.54**	**Date of Analysis: 11/3/15 06:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.15	0.62	0.76	3.1
Freon 11	0.15	0.32	0.86	1.8
Freon 113	0.15	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.15	Not Detected	0.61	Not Detected
Acetone	0.77	1.8	1.8	4.3
Methylene Chloride	0.31	Not Detected	1.1	Not Detected
cis-1,2-Dichloroethene	0.15	Not Detected	0.61	Not Detected
1,1,1-Trichloroethane	0.15	Not Detected	0.84	Not Detected
Benzene	0.15	Not Detected	0.49	Not Detected
Toluene	0.15	0.17	0.58	0.64
Tetrachloroethene	0.15	Not Detected	1.0	Not Detected
Chlorobenzene	0.15	Not Detected	0.71	Not Detected
Ethyl Benzene	0.15	Not Detected	0.67	Not Detected
m,p-Xylene	0.15	Not Detected	0.67	Not Detected
o-Xylene	0.15	Not Detected	0.67	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	0.77	Not Detected	5.7	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA6013

Lab ID#: 1510604R1-03B

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

File Name:	**e110311sim**	**Date of Collection:**	**10/26/20 7:57:00 AM**
Dil. Factor:	**1.54**	**Date of Analysis:**	**11/3/15 06:05 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	0.056	0.19	0.35
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	105	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA6012

Lab ID#: 1510604R1-04A

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

File Name:	**e110312**	**Date of Collection: 10/26/15 7:59:00 AM**	
Dil. Factor:	**1.55**	**Date of Analysis: 11/3/15 06:54 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.16	0.62	0.77	3.0
Freon 11	0.16	0.32	0.87	1.8
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.61	Not Detected
Acetone	0.78	1.7	1.8	4.0
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	0.18	0.58	0.68
Tetrachloroethene	0.16	Not Detected	1.0	Not Detected
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	105	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA6012

Lab ID#: 1510604R1-04B

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

File Name:	**e110312sim**	**Date of Collection: 10/26/20 7:59:00 AM**	
Dil. Factor:	**1.55**	**Date of Analysis: 11/3/15 06:54 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	0.048	0.20	0.30
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	106	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1510604R1-05A

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

File Name:	**e110308**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 03:01 PM**	

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	104	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1510604R1-05B

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

File Name:	**e110308sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 03:01 PM**	

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	102	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: CCV

Lab ID#: 1510604R1-06A

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

File Name:	**e110304**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 11:48 AM**	

Compound	%Recovery
Freon 12	100
Freon 11	93
Freon 113	95
1,1-Dichloroethene	95
Acetone	103
Methylene Chloride	97
cis-1,2-Dichloroethene	103
1,1,1-Trichloroethane	100
Benzene	105
Toluene	104
Tetrachloroethene	114
Chlorobenzene	103
Ethyl Benzene	107
m,p-Xylene	108
o-Xylene	109
1,3-Dichlorobenzene	107
1,4-Dichlorobenzene	108
1,2-Dichlorobenzene	106
1,2,4-Trichlorobenzene	81

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	94	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: CCV

Lab ID#: 1510604R1-06B

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

File Name:	**e110304sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 11:48 AM**	

Compound	%Recovery
Vinyl Chloride	101
Carbon Tetrachloride	104
Trichloroethene	94

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	94	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: LCS

Lab ID#: 1510604R1-07A

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

File Name:	**e110305**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 12:32 PM**	

Compound	%Recovery	Method Limits
Freon 12	109	70-130
Freon 11	103	70-130
Freon 113	101	70-130
1,1-Dichloroethene	103	70-130
Acetone	116	70-130
Methylene Chloride	101	70-130
cis-1,2-Dichloroethene	125	70-130
1,1,1-Trichloroethane	109	70-130
Benzene	110	70-130
Toluene	110	70-130
Tetrachloroethene	119	70-130
Chlorobenzene	106	70-130
Ethyl Benzene	110	70-130
m,p-Xylene	116	70-130
o-Xylene	115	70-130
1,3-Dichlorobenzene	114	70-130
1,4-Dichlorobenzene	115	70-130
1,2-Dichlorobenzene	114	70-130
1,2,4-Trichlorobenzene	100	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: LCSD

Lab ID#: 1510604R1-07AA

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

File Name:	**e110306**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 01:31 PM**	

Compound	%Recovery	Method Limits
Freon 12	108	70-130
Freon 11	102	70-130
Freon 113	117	70-130
1,1-Dichloroethene	103	70-130
Acetone	109	70-130
Methylene Chloride	102	70-130
cis-1,2-Dichloroethene	116	70-130
1,1,1-Trichloroethane	104	70-130
Benzene	107	70-130
Toluene	107	70-130
Tetrachloroethene	117	70-130
Chlorobenzene	109	70-130
Ethyl Benzene	111	70-130
m,p-Xylene	115	70-130
o-Xylene	116	70-130
1,3-Dichlorobenzene	112	70-130
1,4-Dichlorobenzene	110	70-130
1,2-Dichlorobenzene	108	70-130
1,2,4-Trichlorobenzene	91	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: LCS

Lab ID#: 1510604R1-07B

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

File Name:	**e110305sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 12:32 PM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	110	70-130
Carbon Tetrachloride	105	60-140
Trichloroethene	98	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: LCSD

Lab ID#: 1510604R1-07BB

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

File Name:	**e110306sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 11/3/15 01:31 PM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	110	70-130
Carbon Tetrachloride	104	60-140
Trichloroethene	98	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	94	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

APPENDIX D

DATA VALIDATION REPORT

In- Depth Data Usability Review
Method TO-15 SIM Analysis

Client:	Sanborn, Head & Associates, Inc., Concord, New Hampshire (SHA)
Site:	IBM East Fishkills Facility, Hopewell Junction, New York
Laboratory:	Eurofins Air Toxics, Inc. (EATL), Folsom, California
SDG:	1510604R1
Date(s) of Collection:	October 26, 2015
Number and type Samples & analyses:	2 Indoor Air and 2 Ambient Air samples for twenty-two project-specific VOCs by Method TO-15 SIM
Senior Data Reviewers:	Dr. Nancy C. Rothman, New Environmental Horizons, Inc. Susan D. Chapnick, New Environmental Horizons, Inc.
Date Completed:	December 11, 2015

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

I. Sample Descriptions and Analytical Parameters

The sample IDs, date of sampling, identification of quality control (QC) samples, if applicable, and the analytical parameters reviewed in this In-Depth data usability review are listed in Table 1. Any deviations noted for sample collection or 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
AA6001	1510604R1-01	10/26/15	Ambient Air	VOCs	Field Sample
FD6001	1510604R1-02	10/26/15	Ambient Air	VOCs	Field Duplicate of IA6012
IA6013	1510604R1-03	10/26/15	Indoor Air	VOCs	Field Sample
IA6012	1510604R1-04	10/26/15	Indoor 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, the data reported by the laboratory were unchanged as a consequence of this in-depth Data Usability Review. NEH generated a validated data spreadsheet based on the electronic project database file (EDD) received from SHA for this SDG. There were no rejected

results; therefore, all results were considered acceptable compared to QAPP and method criteria and usable for project decisions.

The following sections document the QC reviewed in terms of the project data quality objectives (DQO) of accuracy, precision, representativeness, comparability, and sensitivity. The attached In-Depth Data Usability Review Checklist includes all QA/QC reviewed during validation. The DQO of completeness can be evaluated by the project manager after all data are generated.

Data Package Completeness and Reporting Protocols

- The initial and continuing calibrations for VOCs contained many compounds in addition to the targets requested. During this review, only the target compounds were assessed.

Sample Receipt, Holding Times, and Canister Condition

- The samples were received intact and the canister vacuums (initial field, field final, and lab receipt) were acceptable for all samples. There were no issues with sample receipt.
- After sample receipt, SHA supplied EATL with a revised Chain-of-Custody (COC) changing the samples IDs, which necessitated EATL issuing the revised data package (1510604R1). The hardcopy and EDD report data based on these revised sample IDs.
- All samples were analyzed within holding time.

Calibration Criteria

- There were no issues with the instrument tuning or initial and continuing calibrations.

Method and Field Blank Results

- There was no Field Blank associated with these samples.

Laboratory Control Sample (LCS) Recoveries

- There were no issues with the accuracy and precision of the laboratory control samples (LCS and LCSD).

Internal Standard Recoveries

- There were no issues with internal standard recoveries.

Matrix Quality Control (Laboratory Duplicate and Field Duplicate Samples)

- A laboratory duplicate (LD) was not performed; however, the LCS/LCSD was analyzed to evaluate method precision in the absence of the site matrix and demonstrated acceptable precision.
- The field duplicate pair IA6012 and FD6001 results met criteria for all twenty-two target compounds. These results are an indication of acceptable precision and representativeness of the samples to the locations collected for VOC analysis in air.

Sample result reporting (including reporting limits and units)

- Sensitivity requirements compared to the Reporting Limits (RLs) defined in Table B.1 of the Work Plan were met for all samples.
- A check on the calculations made by EATL to report calibration statistics, sample-specific RLs, and results indicated that the laboratory reported the data properly. See the In-Depth Review Checklist (attached) for details.

TO-15 In-Depth Data Review Checklist

Lab: Eurofins/Air Toxics, Inc. (EATL), Folsom, California

Project ID: 1510604R1

The Data Validation Criteria used within this checklist are based upon the following:

Work Plan, RCRA Facility Investigation (RFI), VOC Source Assessment IBM East Fishkill Facility, Hopewell Junction, New York, prepared by Sanborn, Head & Associates, June 2009;

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;

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;

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 Sample, Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15,* Rev. 4, August 2009; and

USEPA Contract Laboratory Program National Functional Guideline for Organic Data Review; Publication USEPA540/R-07/003, July 2007.

Date Reviewed: December 11, 2015

Data Reviewer: *Nancy C. Rothman, Ph.D.*
New Environmental Horizons, Inc.

II. Data Package Completeness

The data package is reviewed for completeness as follows:

Were all required reporting forms and associated raw data included in the data package? **Yes (see note below).**

Was the data accompanied by a Data Review Checklist / Project Narrative explaining any non-compliance issues with the analyses? **Yes.**

Were all sample analyses requested on the Chain-of-Custody performed by the laboratory? **Yes**.

Were there any Chain-of-custody deviations noted? (e.g., labeling discrepancy between SUMMA canisters, obvious problems with canisters, etc.) **No.** Was a "Sample Discrepancy Report" Issued? **No.**

ACTION:

Comments:

2 Indoor Air, 1 Ambient Air, and 1 FD were collected as grab samples on 10/26/15 in 6 L Summa Canisters. The original COC identified the samples as "AA4001, FD4001, IA4013, and IA4012"; however, a revised COC from SHA to EATL changed the IDs for these samples to "AA6001, FD6001, IA6013, and IA6012". The vacuums for all canisters were > 29″ Hg in field prior to sample collection (acceptable). COC clearly indicates date and time of collection, initial and final vacuum in the field, matrix, sampler's initials, and canister IDs. Samples were received at EATL on 10/29/15 in good condition.

Analysis was for Method TO-15 with simultaneous Full Scan and Selected Ion Monitoring (SIM) analysis for twenty-two project-specific VOCs – called TO-15 Hi/Lo by EATL.

Case Narrative Review

1. Review the Case Narrative provided with the data package. Were there any issues addressed in the case narrative that were not addressed in the Data Usability Checklist. Was the narrative complete? **Yes**. If modifications to the TO-15 method were made, did EATL clearly identify them in the project? **Yes.**

Comments:

Narrative contains a Table clearly listing TO-15 requirements and ATL modifications to these requirements (e.g., TO-15 requires Blanks to consist of Zero Air but ATL uses Nitrogen instead, etc.) The ATL modifications to TO-15 listed in the narrative were reasonable and acceptable.

Narrative indicates that for each sample two separate data files were reported: one for full scan (Hi) and the other for the SIM analysis (Lo). Files ending in "sim" were from the Lo analysis.

III. Review of Volatile Air Data

1. Canister Condition

The quality control related to the canisters is reviewed to ensure the accuracy of the reported results.

Does the laboratory indicate that the canisters were cleaned prior to being shipped to the field for analysis? **Yes.** Was the cleanliness of the canisters verified by analysis? **Yes.** Were the canisters leak checked by the laboratory prior to shipment to the field? **Unknown.** Was data presented in the data package to verify these results or did the laboratory indicate these canister conditions in their narrative? **Certification data present in EATL eCVP.**

Were all Canisters at 28″Hg ± 2″Hg in the field prior to sample collection (NYSDEC mod)? **Yes**. Were the vacuums as received at EATL after sample collection between 3-10″Hg (QAPP criteria)? **Yes**. Did the final field vacuum (as recorded on COC) and lab receipt vacuum agree for each canister (i.e., were within ≤ ±5″ Hg)? **Yes**. Were the RPDs of the pre- and post-flow controller calibration checks ≤20? **NA.**

Were there any anomalies noted in the field sampling records about the SUMMA canister conditions? **No**. If yes, list issues below.

Action: If there is no indication about how the canisters were prepared, contact the laboratory for documentation. If there were issues noted in the field sampling logs or on the COC about the canister conditions, action may be required to qualify sample data as estimated (J or UJ) or, if issues are deemed severe enough, data may require rejection (R). If contaminants of concern were reported in the "cleaned" canisters prior to sample collection, action to negate (U) data flowing Blank Action process may be warranted. Professional judgment is required in data qualification.
If the initial Pressure (vacuum) in the field of a canister is < 26″ Hg, or pressure of a canister upon receipt at the lab is > 10″ Hg, or the receipt pressure measured at EATL is > ± 5″ Hg from the final pressure recorded for the canister in the field (as it appears on the COC), estimate all results (J and UJ). If the flow controller pre- and post- flow calibrations have RPDs > 20%, estimated (J or UJ) all results.

Comments:

Canister certifications present in EATL eCVP and all canisters were non-detect for 22 target compounds at 0.02 U ppbV (SIM) and 0.1-0.5 ppbV (EI).

All canisters field final and lab receipt vacuums agreed within ± 5″ Hg – no action.

All canisters had both field final and lab receipt vacuums within QAPP criteria - No Action required.

2. Holding Times

Holding times are reviewed to ensure the accuracy of the reported results. The table on the following page (Table 2a) was completed to document the holding times and QC association for the samples.

Were the samples analyzed within 30 days of sample receipt? **Yes**. If no, list below the affected samples and the number of days outside of holding time.

Action: If HT > 30 days, estimate (J) detects and reject (R) non-detects, or use professional judgment.

Comments:

Samples were over-pressurized with air prior to analysis to improve analytical precision. All samples were analyzed by 11/3/15, which is within HT – No Action required.

Table 2a. Holding Time and Associated QC Table

Sample Matrix: Air

Sample ID	Date Sampled	Field Blanks	Method Blank	LCS/LCSD	Date Analyzed	DF
AA6001	10/26/15	NA	e110308 & e110308sim	e110305/ e110306	11/3/15	1.58
FD6001	10/26/15	NA	e110308 & e110308sim	e110305/ e110306	11/3/15	1.58
IA6013	10/26/15	NA	e110308 & e110308sim	e110305/ e110306	11/3/15	1.54
IA6012	10/26/15	NA	e110308 & e110308sim	e110305/ e110306	11/3/15	1.55

3. GC/MS Instrument Performance Check

The BFB instrument performance checks (tunes) are reviewed to assess the accuracy and sensitivity of the results relative to instrument performance.

Review the tune summaries for BFB

Were all TO-15 defined mass calibration and ion abundance criteria met for the BFB analyses? **Yes**. If no, list below the tune and affected samples.

BFB MASS INTENSITY CRITERIA PER METHOD TO-15

m/z	Required Intensity (relative abundance)
50	8.0 to 40.0% of m/z 95
75	30.0 to 66.0% of m/z 95
95	Base peak, 100% relative abundance
96	5.0 to 9.0% of m/z 95
173	Less than 2.0% of m/z 174
174	50.0 to 120.0% of m/z 95
175	4.0 to 9.0% of m/z 174
176	93.0 to 101.0% of m/z 174
177	5.0 to 9.0% of m/z 176

Review the raw data for one tune. Did the laboratory obtain the BFB mass spectrum in a straight-forward manner (e.g., average of three scans centered across the BFB peak with background subtraction from a scan within 20 scans prior to the BFB scan)? **Yes**. If no, list below the method used to obtain the mass spectrum and the affected samples.

Were all samples (including QC) analyzed within 12 hours of an acceptable tune (Region 9 TO-15 QC requirement)? **Yes**. If no, list below the affected samples.

Action: If the mass assignment criteria were not met reject (R) all associated data. Use professional judgment to qualify data acquired outside of tune time.

Comments:
Instrument msde.i 11/2/15 Tune @ 11:15 am (ICAL) and 11/3/15 Tune @10:31 am (Sample Analyses). All standards and samples were analyzed within 12-hours of tune – acceptable Tunes – No action.

Raw data evaluated and tunes were acquired properly.

4. Initial Calibration

The initial calibration (ICAL) data are reviewed to determine if the standards were compliant with the method protocols.

Review the Initial Calibration Data Summary. Check and recalculate the RRFs, avg. RRF and %RSD for at least one volatile analyte across the ICAL. Does the avg. RRF and %RSD check back to the raw data? **Yes** . Were the RRFs for all analytes in the standard all greater than or equal to 0.05 (HW-31 criteria)? **Yes.**

Were at least five concentration levels of each compound analyzed during the initial calibration? **Yes.** Were all calibration standards analyzed within 12 hours of BFB tune? **Yes.**

Were retention times for each target analyte stable across the calibration (i.e., within ± 0.06 RRT units of the mean RT for each compound)? **Yes.**

Did the initial calibration meet %RSD criteria of ≤ 30% for all project target analytes? **Yes**. Was the average %RSD across all analytes ≤ 30%? **Yes.**

Action: If RRF < 0.05, estimate (J) positive detects and reject (R) non-detects. If the %RSD >30%, qualify positive and non-detected results as estimated (J and UJ). Sound technical judgment should be used in qualification of the data. The results for each sample associated with ICAL should be evaluated to determine if a result reported would be impacted by the miss-calibration.

ICAL Check: Compound Checked Trichloroethene / IS = 1,4-Difluorobenzene -SIM

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Concentration (ppbV)	0.003	0.005	0.01	0.02	0.05	0.1	0.5
Response Cpd	533	602	887	1596	3947	9135	40627
Response IS	755570	736614	718074	709740	698357	709560	717389
Conc. IS	5	5	5	5	5	5	5
RRF	1.1757	0.8173	0.6176	0.5622	0.5652	0.6437	0.5663

	Level 8	Level 12	Level 13	Level 15	Avg. RRF	%RSD
Concentration (ppbV)	1.0	5.0	10	20		
Response Cpd	80245	496625	909718	1728431		
Response IS	708827	742394	738436	736607		
Conc. IS	5	5	5	5		
RRF	0.5660	0.6690	0.6160	0.5866	0.6714	27.3%

Vinyl Chloride, Carbon Tetrachloride, and Trichloroethene reported by SIM and remaining 19 Target compounds reported by Full Scan EI analysis. SIM RLs (equivalent to 0.01 or 0.02 ppbV) and EI RLs (equivalent to 0.1, 0.2, or 0.5 ppbV) were supported by the calibrations. No Action required – Note ICALs contained many more compounds than requested.

5. Continuing Calibration Check

The continuing calibration (CCAL or CCV) data are reviewed to determine if the standards were contractually compliant.

Review the Continuing Calibrations and Summaries. Check and recalculate the RRF and %D (or %Rec or %R) for at least one of the target volatile compounds in one of the CCALs. Does the RRF and %D check back to the raw data? **Yes**. Were the RRFs for all analytes in the standard all greater than or equal to 0.05? **Yes.**

Was a continuing calibration check performed every 12 hours following tuning verification of the instrument? **Yes**. If no, list below all the affected samples.

Were the target analytes recovered within the expected retention time window based upon the initial calibration (i.e., drift of instrument was acceptable)? **Yes**.

Did the continuing calibrations meet criteria for verification of %D $\leq \pm$ 30% for all 8 target compounds? **Yes.**

Were the daily calibration RRFs used to calculate sample results for those samples analyzed within the same 12-hour tune ? **No.** (Region 9 TO-15 QC mod) If no, were the average RRFs from the ICAL used (SW-846 and Method TO-15 requirements)? **Yes.**

Action: If a %D > ± 30%, this compound should be checked in each sample.
Non-detects: If the CCAL indicates the system had enhanced detection of the compound on the day of CCAL as compared in the ICAL, and the compound is non-detect in the associated samples, no action is required. If the CCAL indicates a loss in instrument sensitivity on day of analysis for detection of a compound, estimate (UJ) the result with possible low bias.
Positive detects if the ICAL RRFs are used for sample quantitation: If CCAL %D shows loss in instrument sensitivity, estimated (J) result with possible low bias. If CCAL %D shows increase in instrument sensitivity, estimated (J) result with possible high bias.
Positive detects if the CCAL RRFs are used for sample quantitation: estimate (J) results with indeterminate bias.

CCAL Check: Standard ID 12/3/15 @11:48 Compound Checked Freon 12

Responses	RRF	avg. RRF ICAL	% D
Cpd: 730640 & 5ppbV	4.1651	4.1826	0.42%
IS: 175421@5 ppbV			

Lab used convention that negative %D is enhanced sensitivity and positive %D is decreased sensitivity. All target compounds met RRF and %D criteria in CCAL. No Action required.

6. Laboratory Method and Field Equipment Blank Results

   Laboratory method and field blank (equipment blanks) results are reviewed to assess the presence of contaminants, which affect the accuracy and sensitivity of the results. See Table 2a. where the Holding Time and Associated QC Table was completed for the samples within this SDG.

   Were equipment blanks (EB) associated with the samples received at the lab? **No**.

   Was each sample analysis associated with an appropriate method blank? **Yes**. Was there a method blank for each 12-hour tune? **Yes.** If no, list below affected samples.

   Review the reporting forms for each method and equipment blank. Were any target compounds in the blanks detected? **No**.

Action: - Blanks should not contain contaminants above the RL. The Blank Action Level is defined as five times the level seen in the blanks on a sample-specific basis (i.e., all dilutions for a sample analysis taken into consideration). The following actions should be taken if conditions warrant:

Method Blank Evaluation

1. If the reported result in a sample is below the reporting limit (sample < RL) and if the method blank contains a result above the sample-equivalent level reported, the result in the sample should be negated (U) and raised to the sample-specific RL for that sample
2. If the sample result is between the reporting limit and the blank Action Level for the method blank (RL < sample < Action Level), the result for the sample is negated (U) at the level found in the sample.
3. If the sample result is greater than the RL and the blank Action Level, no action is taken.

Equipment Blank Evaluation

1. If the reported result in a sample is below the blank Action Level, the result should be qualified (EB) to indicate that the results may be biased high (false positive).

Comments:
Blanks evaluated: MBs: e110308/e11308sim

There was no Equipment Blank Associated with the samples reported in this SDG.

6. Laboratory and Field Blank Results - continued

Blank ID	Contaminant / Level (ppbV)	Action Level (ppbV)	Sample/Reported Result	Corrected Result
e110308	None		No Blank Action Required	
e110308sim	None		No Blank Action Required	

7. Internal Standards

Review the Internal Standard (IS) Recovery Summary information.

Was the Retention Time for the IS' within ± 0.33 min of the corresponding IS in the associated CCAL? **Yes**. Were the Area Counts for each IS within 60% to 140% of the Areas from the associated CCAL? **Yes.**

Action: Action is taken on only those compounds associated with a specific IS. If 20% < IS Response < 60% compared to IS in CCAL, estimate all associated compound results (J and UJ) with possible low bias. If the IS response is > 140%, estimate (J) positive results with possible high bias, no action required for non-detects. If the IS response is < 20% relative to CCAL, estimate detects (J) and reject (R) non-detect. If surrogate recovery > 10% but <70%, U/UJ results, if %Rec > 130%, J detects only.

Comment:

IS = Bromochloromethane, 1,4-Difluorobenzene, and Chlorobenzene-d5 (as specified in Region 9 TO-15 QC requirements)

All IS' met criteria in all samples and QC – No Action required.

8. Laboratory Control Sample Analysis

The Laboratory Control Samples (LCS) are reviewed to assess the accuracy of the results relative to the analytical procedure.

Review the raw data and recovery information for the LCS.

Did the laboratory perform a LCS daily prior to sample analysis (at least once per every 12-hour tune)? **Yes**. If no, list below the affected samples.

Were the LCS recoveries within 70-130% for the target compounds? **Yes**. If no, was only 1 of the 6 standard compounds outside criteria? **NA**. Was reanalysis of the samples performed if the LCS or LCSD was outside of acceptance criteria? **NA**.

Was an LCSD performed? **Yes.** If yes, was the RPD between the LCS/LCSD ≤ 25%. **Yes.**

Action: If the LCS recoveries are above criteria, estimate (J) positive results due to potential high bias, no qualification of non-detected results is necessary. If the LCS recoveries are between 10% and the lower recovery limit, estimate (J and UJ) positive and non-detect results for the samples associated with the analytical batch due to potential low bias in the results. If the recovery in the LCS is less than 10%, estimate (J) positive results due to low bias and use professional judgment to estimate (UJ) or reject (R) non-detect results due to potential false negatives. If the LCS/LCSD RPD > 25%, estimate results (J and UJ) for those compounds affected in the analytical batch.

Comments:
LCS/LCSD = e110305/e110306 & e110305sim/e110306sim. Accuracy and precision was acceptable for all target compounds by EI full scan and SIM analysis – No Action required.

9. Sample Quantitation/Reporting Limits

Review raw data and reporting forms. What was the lowest concentration (ppbv) standard analyzed with the samples? 0.01 ppbV for SIM and 0.10 ppbV for Full Scan EI Were the sample-specific RLs based on these standards? **Yes or RLs were above these lowest standards so that Calibrations supported RLs reported.**

$\mu g/m^3 = (ppbv \times Mwt \times DF) / 24.45$

where: Mwt = Molecular weight for the compound, g/mole
DF = Dilution Factor for analysis, unitless
24.45 = RT/P from ideal gas law with R at 0.08206 L-atm/mole-K; P = 1 atm (Standard pressure), and T = 25°C=298K (Room Temperature)

Reporting Limit checked (pick a non-detect in one sample and using the sample-specific DF, verify the RL
Compound checked: Carbon Tetrachloride in AA6001
Mwt = 153.84
RL basis = 0.02 ppbV standard
DF = 1.58

RL calculated 0.20 $\mu g/m^3$; RL reported 0.20 $\mu g/m^3$ √

Were all the compounds in the calibration standards reported for the samples? **No.** Were Tentatively Identified Compounds (TICs) reported for the samples? **No.**

Did the sample-specific RLs for non-detected data meet the following levels (Table B.1 of RFI Work Plan)? **Yes, all RLs were ≤ RL required in Work Plan. Sensitivity acceptable, no action required.**

Table B.1 shown on following page

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

10. Sample Qualitative and Quantitative Determination

Were the canisters pressurized with zero grade nitrogen or humid air prior to analysis? **Yes.** If yes, was a dilution factor applied to the sample data? **Yes.**

For samples, check the Mass Spectra of all positive detects. Did the Mass Spectra meet criteria (e.g., all ions > 10% matched those in reference spectra, etc. – SOP/method criteria)? **Yes.**

Was the retention time (RT) for the detected result within ± 0.06 relative RT minutes of the standard component RT? **Yes.** Did the primary/quantitation ion and secondary ion maximize at the same relative RT? **Yes.**

Were all components reported in the samples quantitated within the calibration region of the instrument for the detected analytes? **Yes.** Were results reported below the sample-specific RL reported as estimated due to uncertainty in quantitation? **NA.** Were there any other data qualifiers on the results which may affect usability of the data? **NA.** Explain all qualifiers below.

Comments:

Sample spectra for all detects verified – all results were reported properly.

There were no qualifiers other than "U" reported on the data (i.e., there were no "J" or "E" qualified data reported).

11. Laboratory Duplicates and Field Duplicate Precision

Laboratory Duplicates (LDs) and Field Duplicate (FD) samples are reviewed to assess representativeness of the sample aliquot to the area sampled and the precision of the results relative to field sampling techniques. RFI Work Plan Table B.2 requires at least one FD sample per SDG.

Was an FD reported in this SDG? **Yes. Lab didn't do a LD but rather reported LCS/LCSD**

Action: For LDs, if RPD > 25% and both results are > 5xRL, then estimate both results (J) with indeterminate bias. If RPD > 25% and one result > 5xRL and the other < 5xRL, estimate both results (J). If one result is non-detect, and the other is < RL or < 5xRL, do not take action. If one result is non-detect and the other is > 5xRL, estimate (J and UJ) both results.

For FDs, If RPD > 30% and both results are > 5xRL, then estimate both results (J) with indeterminate bias. If RPD > 30% and one result > 5xRL and the other < 5xRL, estimate both results (J). If one result is non-detect, and the other is < RL or < 5xRL, do not take action. If one result is non-detect and the other is > 5xRL, estimate (J and UJ) both results.

Comments:
FD pair = IA6012 / FD6001 – A comparison of detected results shown below

Analyte Name	RL	Sample ug/m3	Q	Sample Result Level	FD ug/m3	Q	FD Result Level	RPD	Action
Freon 12	0.77	3.0		< 5 x RL	3.0		< 5 x RL	0%	None
Freon 11	0.87	1.8		< 5 x RL	1.8		< 5 x RL	0%	None
Acetone	1.8	4.0		< 5 x RL	4.4		< 5 x RL	9.5%	None
Toluene	0.58	0.68		< 5 x RL	0.69		< 5 x RL	1.5%	None
Carbon Tetrachloride	0.20	0.30		< 5 x RL	0.21		< 5 x RL	35%	None

Even though RPD was > 25% for carbon tetrachloride, since the values reported in the samples were < 5 x RL, no action required.

FD precision acceptable – No Action required.

12. Additional QA/QC Issues

Were there any additional QA/QC issues noted in the project narrative or found during this review that were not previously addressed? **No.**

List any additional issues which may affect the quality of the results. List the affected samples, QA/QC issue, and necessary actions taken in the comments section below.

There were no other issues noted in the data – No Actions required.

IV. Example Sample Calculations

Review of one sample per data package is performed to determine if sample results were correctly calculated and reported.

Sample ID: FD6001 was selected for review in this data package.

A. Data Sheet Review

Were the data sheets completed according to the method requirements? **Yes**. If no, list below the affected fields.

B. Quantitation Review

Reproduce a calculation for one volatile analyte in one of the samples that contained a positive result and compare the calculated result to the result reported by the laboratory.

Analyte Checked: Acetone

Laboratory Result: 4.4 µg/m^3 Calculated Result: 4.4 µg/m^3 √

Example Calculation:

Sample DF = 1.58; Acetone Response = 24465
Bromochloromethane IS Response = 150101 @ 5 ppbV
Average RRF from ICAL = 0.6887

Conc. (ppbV) = (24465 x 5 x 1.58) / (150101 x 0.6887) = 1.87 ppbV

Acetone Mwt = 58.08

Conc. (µg/m^3) = (1.87 x 58.08)/24.45 = 4.4 µg/m^3