8976 Wellington Road
Manassas, VA 20109

May 16, 2019

Jessica LaClair
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7014

Re: B386 Indoor Air Quality Data Summary Report
Former IBM East Fishkill Facility
Hopewell Junction, New York
NYSDEC Site No. 314054

Dear Ms. LaClair:

The enclosed report presents the results of indoor air quality (IAQ) testing that was conducted in Building 386 of the Former IBM East Fishkill Facility in Hopewell Junction, New York, which is currently owned by Global Foundries. 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,
International Business Machines Corporation

Dean W. Chartrand
Program Manager
Corporate Environmental Affairs

Enclosure: Report

Cc:	Julia Kenney	NYSDOH	(w/enclosure via e-mail)
	Gary Marone	Global Foundries	(w/enclosure via e-mail)
	Carl Monheit	National Resources	(w/enclosure via e-mail)
	David Shea	Sanborn Head	(w/enclosure via e-mail)

SANBORN HEAD ENGINEERING

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INDOOR AIR QUALITY DATA SUMMARY REPORT

BUILDING 386

Former IBM East Fishkill Facility
Hopewell Junction, New York

Prepared for IBM Corporation
File No. 2999.06
May 2019

SANBORN HEAD ENGINEERING
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20 Foundry Street
Concord, NH 03301

Dean Chartrand
IBM Corporate Environmental Affairs
8976 Wellington Road
Manassas, VA 20109

May 16, 2019
File No. 2999.06

Re: B386 Indoor Air Quality Data Summary Report
Former IBM East Fishkill Facility
Hopewell Junction, New York
EPA ID No. NYD000707901, NYSDEC Site No. 314054

Dear Mr. Chartrand:

The enclosed report presents the results of indoor air quality (IAQ) testing that was conducted in Building 386 of 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

JHS/DS: ds

Encl. B386 Indoor Air Quality Data Summary Report

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INDOOR AIR QUALITY DATA SUMMARY REPORT
BUILDING 386

Former IBM East Fishkill Facility
Hopewell Junction, New York

Prepared for
IBM Corporation

Corporate Environmental Affairs

Prepared by
Sanborn, Head Engineering, P.C.

File 2999.06
May 2019

TABLE OF CONTENTS

1.0 INTRODUCTION

This report summarizes the results of indoor air quality (IAQ) testing that was conducted in Building 386 (B386) in February 2019 at the former IBM East Fishkill Facility (the site), currently owned by Global Foundries (Global), iPark East Fishkill LLC, and iPark East Fishkill I LLC (the latter two entities collectively referred to as either iPark or National Resources). 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[1] (RFI Work Plan), which was approved by the New York State Department of Environmental Conservation and Department of Health (the Departments).

IBM sold its former East Fishkill facility to Global in July 2015. Global subsequently subdivided the property into 8 lots and sold 6 lots to iPark in September 2017. A site location plan is provided as Figure 1, and the lot lines are shown on Figure 2. B386 is located on Lot 5, which is owned by Global. IBM maintains responsibility for execution of the RFI Work Plan, and IBM is working cooperatively with Global and iPark 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. It is Global's and iPark's responsibility to communicate to IBM planned changes to occupancy or HVAC conditions in these buildings, so that IBM can assess whether additional IAQ testing is warranted.

Indoor air samples were originally collected under the RFI Work Plan in B386 in 2009. The building was resampled in February 2019 at the request of the Departments, as discussed in further detail in Section 2.0. This report presents a summary of the scope of work and results of the February 2019 indoor air sampling.

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

2.0 BACKGROUND INFORMATION

IAQ sampling was originally conducted in B386 in July 2009 in accordance with the RFI Work Plan, and the results were included in a September 2009 report[2]. Tetrachloroethene (PCE) and its breakdown products were not detected above the laboratory reporting limits (RLs) in the indoor air samples at that time.

In a March 13, 2013 letter to IBM, the Departments indicated that no further assessment is required unless there are changes in building infrastructure or HVAC modifications. In a follow-up letter from the Departments to IBM dated July 26, 2018, the Departments indicated that indoor air monitoring is recommended to ensure that conditions have not

[1] *Work Plan, RCRA Facility Investigation (RFI), VOC Source Assessment, IBM East Fishkill Facility, Hopewell Junction, New York,* prepared by Sanborn, Head Engineering, P.C., dated June 15, 2009.

[2] "Laboratory Data, Confirmatory Sampling Results, Buildings 309, 316, and 386, VOC Source Assessment, IBM East Fishkill Facility, Hopewell Junction, New York", prepared by Sanborn, Head Engineering, P.C., dated September 2009.

changed, since the building overlies VOC presence in the uppermost groundwater zone in overburden. Indoor air samples were subsequently collected by IBM and the results are presented herein.

3.0 INDOOR AIR QUALITY ASSESSMENT AND FINDINGS

The following sections provide a summary of the most recent IAQ sampling performed in B386 and associated results. A Building Layout Plan for B386 is provided as Figure 3.

3.1 Building Use, Occupancy, and HVAC Status

Building use, occupancy, and HVAC operating conditions are important factors to consider and review during IAQ testing to help inform the evaluation of results. HVAC operations strongly influence IAQ; therefore, it is important to review the status of HVAC operations during IAQ sampling.

Building 386 houses equipment and process operations for treatment of aqueous fluoride wastes from industrial processes on its western side; these areas are not routinely occupied. The routinely occupied portions of the building are on its eastern side, and include offices, a break room, and a work/storage room. There have reportedly been no changes made to the HVAC or building layout since the last sampling event in 2009.

B386 has two HVAC zones each served by an air handling unit (AHU). The occupied area on the eastern side of the building is served by AHU-1. The outside air intake damper on AHU-1 is fixed at 20% open and does not modulate. Outside air dampers were checked periodically to confirm that dampers did not modulate during sampling. The damper positions remained unchanged during the sampling period. A summary of the HVAC settings for the zone that was sampled are presented in Appendix B.

3.2 Summary of Indoor Air Quality Testing

IAQ samples were collected on February 26, 2019 using 6-liter, pre-evacuated, stainless-steel Summa® canisters equipped with flow controllers to obtain approximately 8-hour time-averaged samples. Indoor air samples were collected from a height of 4 to 5 feet above the floor at the four locations shown on Figure 3, all of which had been sampled previously.

One outdoor ambient air sample (AA0304) was collected at the intake to AHU-1 to assess for the presence of background conditions that could impact IAQ. One field blank (FB-1) was collected for quality assurance/quality control (QA/QC) purposes by transferring laboratory-supplied nitrogen from one SUMMA® canister into another.

A photographic log of sampling locations is provided in Appendix C, and a summary of field sampling information is provided in Table 1.

The samples were submitted to Eurofins Air Toxics, Inc (EATI) of Folsom, California for analysis of 22 VOCs listed in the RFI Work Plan using modified USEPA Method TO-15 with a combination of full scan and selective ion monitoring (SIM) mode.

3.3 Summary of Results

A summary of the laboratory analytical results are presented in Table 2 and shown on Figure 4, and the analytical laboratory report is included in Appendix D. Results of previous sampling rounds at the locations that were sampled in February 2019 are also shown on Figure 4 for reference.

Consistent with the 2009 sample results, PCE and its breakdown products were not detected above the laboratory RLs in the four indoor air samples.

Other compounds detected in indoor air include acetone (13 to 19 µg/m^3), carbon tetrachloride (0.43 to 0.50 µg/m^3), toluene (1.2 µg/m^3), and trichlorofluoromethane (CFC11) (2.3 to 2.4 µg/m^3). The outdoor air sample also contained acetone, carbon tetrachloride, and CFC11 at concentrations similar to the indoor air sample concentrations.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The analytical data for the 8-hour indoor air samples were provided to New Environmental Horizons, Inc. (NEH) of Arlington, MA and Skillman, NJ who completed a Data Usability Summary Report (DUSR) to assess whether the data meet NYSDEC Analytical Services Protocol (ASP) and EPA method QC acceptance, and the QC criteria presented in the Work Plan. 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:

- All results for target compound 1,2,4-trichlorobenzene were estimated (UJ) with indeterminate bias (I) because the initial calibration did not meet method acceptance criteria. This does not introduce significant uncertainty into the data since 1,2,4-trichlorobenzene has not been a vapor intrusion-related contaminant of concern in this or other buildings at the site.

- All reporting limits were at a level below the project-required RL (as shown in Table B.1 of the QAPP) with the following exceptions:

    - RLs for CFC12 in each sample exceeded the project-required RL due to an instrument calibration issue. This does not introduce significant uncertainty into the data since CFC12 has not been a vapor intrusion-related contaminant of concern in this or other buildings at the site.

    - The RL for 1,2,4-trichlorobenzene exceeded the project-required RL in the field blank sample (FB-01) due to a high receipt vacuum. This does not introduce significant uncertainty into the data since 1,2,4-trichlorobenzene has not been a vapor intrusion-related contaminant of concern at the site, and the RL was only elevated in the field blank sample.

5.0 CONCLUSIONS

Indoor air quality samples were collected at four locations in B386 over a period of approximately 8 hours on February 26, 2019. PCE and its breakdown products were not detected above the laboratory RLs in the indoor air samples.

Consistent with the requirements in the RFI Work Plan, IBM understands that Global will communicate the results of the 8-hour SUMMA® samples in B386 to building occupants within 45 days of IBM's receipt of validated data.

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TABLES

Table 1
Summary of Sample Information - B386
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: February 26, 2019											
AA0304	Roof	Ambient Air	6L0160	1	8:33	-29.5	16:33	-6.5	30	AHU-1 intake	None observed
FB-1	Roof	Nitrogen	872	1	8:23	-26	16:23	-8	30	AHU-1 intake	None observed
IA0300	Ground	Indoor Air	6L1231	4	8:16	-30	16:16	-6	70	Workshop/Storage Room	None observed
IA0301	Ground	Indoor Air	868	5	8:10	-27.5	15:20	-6.5	70	Office	None observed
IA0302	Ground	Indoor Air	6L2299	5	8:14	-27.5	16:14	-3	70	Control Room	None observed
IA0303	Ground	Indoor Air	6L1227	5	8:11	-30	16:11	-3.5	70	Break Room	None observed

Notes:

1. Samples were collected by Sanborn, Head Engineering, PC on February 26, 2019.

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 analyzed by Eurofins Air Toxics of Folsom, California for the project-specific list of volatile organic compounds (VOCs) by United States Protection Agency (USEPA) Method TO-15 using a combination of full scan and selective ion monitoring (SIM) mode.

Table 2
Summary of 8-Hour Indoor Air Analytical Results - B386
Former IBM East Fishkill Facility
Hopewell Junction, New York

Analyte	Field Sample Name	AA0304			IA0300			IA0301			IA0302			IA0303			Field Blank		
	Collection Date	2/26/2019			2/26/2019			2/26/2019			2/26/2019			2/26/2019			2/26/2019		
	Units	Result	Qual.	Bias	Result	Qual.	Bias	Result	Qual.	Bias	Result	Qual.	Bias	Result	Qual.	Bias	Result	Qual.	Bias
Acetone	µg/m3	16			13			19			15			16			2.4	U	
Benzene	µg/m3	0.48	U		0.51	U		0.55	U		0.51	U		0.50	U		0.66	U	
Carbon tetrachloride	µg/m3	0.50			0.48			0.43			0.50			0.50			0.26	U	
CFC113 (Ethane, 1,1,2-trichloro-1,2,2-trifluoro-)	µg/m3	1.1	U		1.2	U		1.3	U		1.2	U		1.2	U		1.6	U	
Chlorobenzene (Monochlorobenzene)	µg/m3	0.68	U		0.74	U		0.79	U		0.74	U		0.73	U		0.95	U	
Dichlorobenzene (1,2-)	µg/m3	0.90	U		0.97	U		1.0	U		0.97	U		0.95	U		1.2	U	
Dichlorobenzene (1,3-)	µg/m3	0.90	U		0.97	U		1.0	U		0.97	U		0.95	U		1.2	U	
Dichlorobenzene (1,4-)	µg/m3	0.90	U		0.97	U		1.0	U		0.97	U		0.95	U		1.2	U	
Dichlorodifluoromethane (CFC12)	µg/m3	3.7	U		4.0	U		4.2	U		4.0	U		3.9	U		5.1	U	
Dichloroethene (1,1-)	µg/m3	0.059	U		0.064	U		0.068	U		0.064	U		0.063	U		0.082	U	
Dichloroethene (cis-1,2-)	µg/m3	0.12	U		0.13	U		0.14	U		0.13	U		0.12	U		0.16	U	
Ethylbenzene	µg/m3	0.65	U		0.70	U		0.74	U		0.70	U		0.69	U		0.89	U	
Methylene Chloride (Dichloromethane)	µg/m3	1.0	U		1.1	U		1.2	U		1.1	U		1.1	U		1.4	U	
Tetrachloroethene (PCE)	µg/m3	1.0	U		1.1	U		1.2	U		1.1	U		1.1	U		1.4	U	
Toluene	µg/m3	0.56	U		1.2			0.64	U		0.61	U		0.60	U		0.78	U	
Trichlorobenzene (1,2,4-)	µg/m3	5.5	UJ	I	6.0	UJ	I	6.3	UJ	I	6.0	UJ	I	5.9	UJ	I	7.6	UJ	I
Trichloroethane (1,1,1-)	µg/m3	0.81	U		0.88	U		0.93	U		0.88	U		0.86	U		1.1	U	
Trichloroethene (TCE)	µg/m3	0.16	U		0.17	U		0.18	U		0.17	U		0.17	U		0.22	U	
Trichlorofluoromethane (CFC11)	µg/m3	1.4			2.4			2.3			2.4			2.3			1.2	U	
Vinyl chloride	µg/m3	0.038	U		0.041	U		0.044	U		0.041	U		0.04	U		0.053	U	
Xylene (m,p-)	µg/m3	0.65	U		0.70	U		0.74	U		0.70	U		0.69	U		0.89	U	
Xylene (o-)	µg/m3	0.65	U		0.70	U		0.74	U		0.70	U		0.69	U		0.89	U	

Notes:

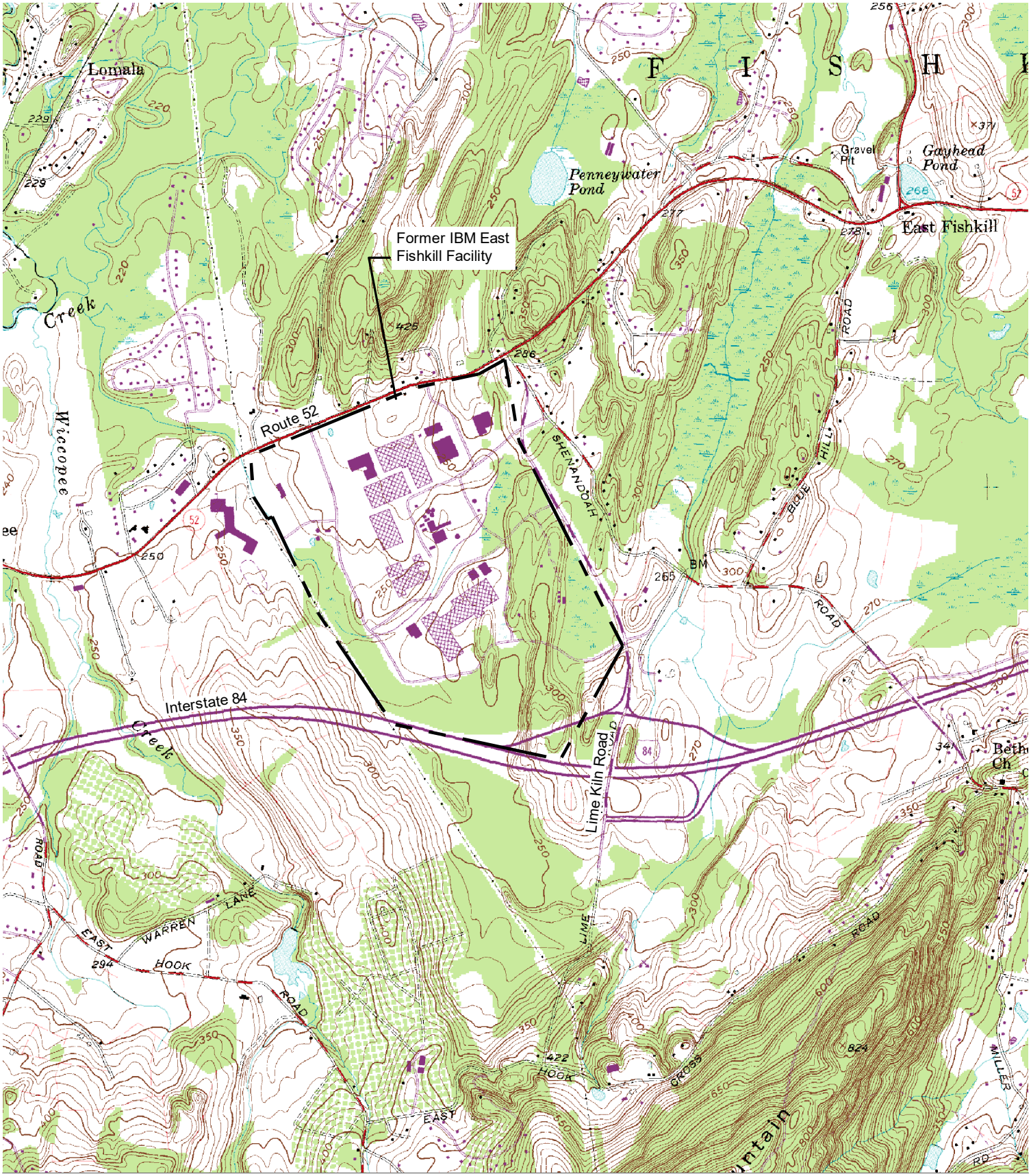
1. Samples were collected by Sanborn, Head Engineering P.C. on behalf of IBM Corporation on the dates indicated over an approximately 8-hour sampling interval using 6-liter, stainless steel, pre-evacuated SUMMA® canisters. The samples were analyzed by Eurofins Air Toxics of Folsom, California for the project-specific list of volatile organic compounds (VOCs) by United States Protection Agency (USEPA) Method TO-15 using a combination of full scan and selective ion monitoring (SIM) mode.

2. The "AA" designation indicates that the sample consists of ambient air collected from outside the building. The "Field Blank" designation represents a field blank sample, where laboratory-supplied nitrogen was transferred from one SUMMA® canister into another.

3. Results are displayed with two significant figures.

4. A data usability summary report (DUSR) 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 DUSR report for further details.
"U" indicates the analyte is non-detect at or above the indicated sample specific practical quantification limit (PQL).
"J" indicates the result is estimated.
"I" indicates an indeterminate bias.

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: D. Shea
Project No: 2999.06
Date: May 2019

1,000' 0 2,000' Feet

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Figure 1

Site Location Plan

Building 386 IAQ Summary Report

Former IBM East Fishkill Facility
Hopewell Junction, New York

Figure 2

Building Location Plan

Building 386 IAQ Summary Report

Former IBM East Fishkill Facility
Hopewell Junction, New York

Drawn By: E. Wright
Designed By: J. Sanborn
Reviewed By: D. Shea
Project No: 2999.06
Date: May 2019

Figure Narrative

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

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 B386

6 Lot number

GlobalFoundries
Lot 1 GlobalFoundries U.S 2 LLC
Lot 5 GlobalFoundries U.S 2 LLC

i.Park
Lot 2 i.Park East Fishkill I LLC
Lot 3 i.Park East Fishkill I LLC
Lot 4 i.Park East Fishkill LLC
Lot 6 i.Park East Fishkill LLC
Lot 7 i.Park East Fishkill LLC
Lot 8 i.Park East Fishkill LLC

- Subdivision (GlobalFoundries U.S. 2 LLC)
- Subdivision (i.Park East Fishkill LLC)
- Subdivision (i.Park East Fishkill I LLC)

N W E S

200' 100' 0 200' 400' Feet

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Figure 3

Building Layout Plan

Building 386 IAQ Summary Report

IBM East Fishkill Facility
Hopewell Junction, New York

Drawn By:	E. Wright
Designed By:	J. Sanborn
Reviewed By:	D. Shea
Project No:	2999.06
Date:	May 2019

Figure Narrative

This figure shows the building layout, HVAC zones, and indoor air sampling locations in B386.

Legend

- IA0300 — Indoor air location
- AA0304 — Ambient air location collected at AHU-1 intake
- HVAC Zone and designation

Tank
Tank
Tank
Tank
Tank
Tank
Tank
Tank
Maintenance Shop
Offices
Offices
IA0301
AHU-1
IA0300
Work Storage Room
Offices
Sump / Drain for "Industrial Waste' Pipe
AA0304
Break Room
IA0303
Control Room
IA0302
AHU-2
Process Area
Filter Press Dumpster Room

N
W E
S

10 5 0 10 20 Feet

SANBORN HEAD ENGINEERING

Figure 4

Summary of 8-Hour Indoor Air Sampling Results

Building 386 IAQ Summary Report

IBM East Fishkill Facility
Hopewell Junction, New York

Drawn By:	E. Wright
Designed By:	J. Sanborn
Reviewed By:	D. Shea
Project No:	2999.06
Date:	May 2019

Figure Narrative

This figure shows the results for a select set of compounds for indoor air samples collected in February 2019. The results of historical sampling events are also shown for comparison at each location where a 2019 sample was collected.

The samples were collected as 8-hour time weighted average samples using 6-L SUMMA canisters. Results are shown in micrograms per cubic meter (µg/m³).

Legend

- IA0300 — Indoor air location
- AA0304 — Ambient air location collected at AHU-1 intake
- HVAC Zone and designation

July 8, 2009 Data Results

IA0300	Location designation
PCE: <1.1	Tetrachloroethene
TCE: <0.17	Trichloroethene
DCE: <0.64	cis-1,2-Dichloroethene
VC: <0.041	Vinyl chloride

February 26, 2019 Data Results

IA0300

N W E S

10 5 0 10 20 Feet

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Tank
Tank
Tank
Tank
Tank
Tank
Tank
Maintenance Shop
Work Storage Room
IA0300
IA0300
PCE: <1.1
TCE: <0.17
DCE: <0.64
VC: <0.041
IA0300
PCE: <1.1
TCE: <0.17
DCE: <0.13
VC: <0.041
AHU-1
Offices
Offices
IA0301
IA0301
PCE: <1.1
TCE: <0.18
DCE: <0.67
VC: <0.043
IA0301
PCE: <1.2
TCE: <0.18
DCE: <0.14
VC: <0.044
Offices
Sump / Drain for "Industrial Waste' Pipe
AA0304
Control Room
IA0302
AA0304
PCE: <1.2
TCE: <0.19
DCE: <0.71
VC: <0.046
AA0304
PCE: <1.0
TCE: <0.16
DCE: <0.12
VC: <0.038
IA0302
PCE: <1.2
TCE: <0.19
DCE: <0.69
VC: <0.045
IA0302
PCE: <1.1
TCE: <0.17
DCE: <0.13
VC: <0.041
AHU-2
Process Area
Filter Press Dumpster Room
Break Room
IA0303
IA0303
PCE: <1.1
TCE: <0.17
DCE: <0.63
VC: <0.040
IA0303
PCE: <1.1
TCE: <0.17
DCE: <0.12
VC: <0.040

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APPENDIX A

LIMITATIONS

APPENDIX A
SHPC LIMITATIONS

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

2. It must be noted that additional compounds not searched for during the current study may be present in 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 indoor air may occur due to the passage of time, seasonal fluctuations, 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.

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APPENDIX B

HVAC OPERATIONS

Table B.1
HVAC Status and Documentation
B386
Former IBM EFK Facility

HVAC Unit	Outside Air Damper - Normal Operating Position	Outside Air Damper Minimum Position (% Open)	Notes
Building 386			
AHU-1	Fixed - do not modulate	20%	OA dampers were closed when checked on 2/21/19. Freeze stat tripped. Global re-opened to 20% prior to sampling.

Notes:

1. This table summarizes the normal operating configuration for the outside air dampers for air handler unit 1 (AHU-1), which serves a zone where indoor air samples were collected. The outside air dampers for AHU-1 are fixed at 20% and do not modulate.

APPENDIX C

PHOTOGRAPH LOG

Appendix C

B386 8-Hour Indoor Air Sampling Photograph Log

Photo 1: Samples AA0304 and FB-01; located on the roof of B386 at the intake for AHU-1.

Photo 2: Sample IA0300; located in a workshop/storage area.

Photo 3: Sample IA0301; located in an office space.

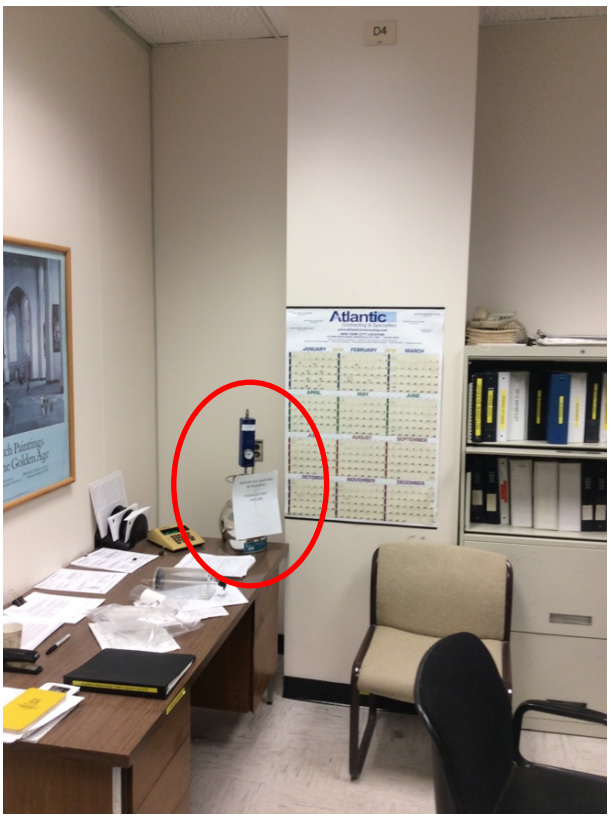

Photo 4: Sample IA0302; located in control room.

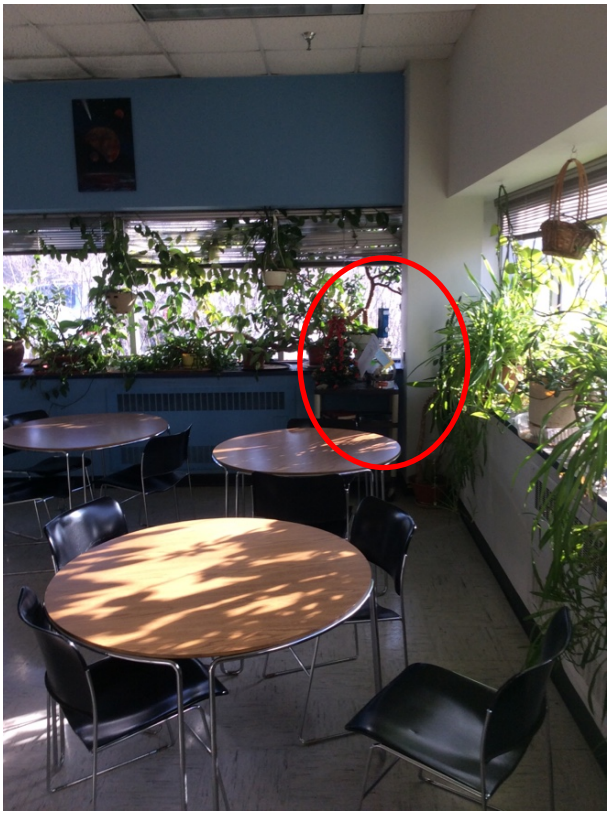

Photo 5: Sample IA0303; located in the break room.

APPENDIX D

ANALYTICAL LABORATORY REPORT

eurofins | Air Toxics

3/14/2019
Ms. Jennifer Sanborn
Sanborn, Head & Associates
20 Foundry Street

Concord NH 03301

Project Name: EFK
Project #: 2999.06
Workorder #: 1903048

Dear Ms. Jennifer Sanborn

The following report includes the data for the above referenced project for sample(s) received on 3/1/2019 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 contact 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 #: 1903048

Work Order Summary

CLIENT:	Ms. Jennifer Sanborn Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301	**BILL TO:**	Accounts Payable Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301
PHONE:	603-229-1900	**P.O. #**	
FAX:	603-229-1919	**PROJECT #**	2999.06 EFK
DATE RECEIVED:	03/01/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	03/14/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	AA0304_20190226	Modified TO-15	3.0 "Hg	5 psi
01B	AA0304_20190226	Modified TO-15	3.0 "Hg	5 psi
02A	IA0300_20190226	Modified TO-15	5.0 "Hg	5 psi
02B	IA0300_20190226	Modified TO-15	5.0 "Hg	5 psi
03A	IA0301_20190226	Modified TO-15	6.5 "Hg	5 psi
03B	IA0301_20190226	Modified TO-15	6.5 "Hg	5 psi
04A	IA0302_20190226	Modified TO-15	5.0 "Hg	5 psi
04B	IA0302_20190226	Modified TO-15	5.0 "Hg	5 psi
05A	IA0303_20190226	Modified TO-15	4.5 "Hg	5 psi
05B	IA0303_20190226	Modified TO-15	4.5 "Hg	5 psi
06A	Lab Blank	Modified TO-15	NA	NA
06B	Lab Blank	Modified TO-15	NA	NA
07A	CCV	Modified TO-15	NA	NA
07B	CCV	Modified TO-15	NA	NA
08A	LCS	Modified TO-15	NA	NA
08AA	LCSD	Modified TO-15	NA	NA
08B	LCS	Modified TO-15	NA	NA
08BB	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 03/14/19

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
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LABORATORY NARRATIVE
Modified TO-15 Full Scan/SIM
Sanborn, Head & Associates
Workorder# 1903048

Five 6 Liter Summa Canister (SIM Certified) samples were received on March 01, 2019. 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

A revised Chain of Custody (COC) was provided by the client on 3/5/19.

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: AA0304_20190226

Lab ID#: 1903048-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 11	0.15	0.24	0.84	1.4
Acetone	0.74	6.6	1.8	16

Client Sample ID: AA0304_20190226

Lab ID#: 1903048-01B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.030	0.079	0.19	0.50

Client Sample ID: IA0300_20190226

Lab ID#: 1903048-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 11	0.16	0.43	0.90	2.4
Acetone	0.80	5.6	1.9	13
Toluene	0.16	0.32	0.61	1.2

Client Sample ID: IA0300_20190226

Lab ID#: 1903048-02B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.077	0.20	0.48

Client Sample ID: IA0301_20190226

Lab ID#: 1903048-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 11	0.17	0.41	0.96	2.3
Acetone	0.86	8.0	2.0	19

Client Sample ID: IA0301_20190226

Lab ID#: 1903048-03B

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

Client Sample ID: IA0301_20190226

Lab ID#: 1903048-03B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.034	0.068	0.22	0.43

Client Sample ID: IA0302_20190226

Lab ID#: 1903048-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 11	0.16	0.43	0.90	2.4
Acetone	0.80	6.4	1.9	15

Client Sample ID: IA0302_20190226

Lab ID#: 1903048-04B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.079	0.20	0.50

Client Sample ID: IA0303_20190226

Lab ID#: 1903048-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 11	0.16	0.42	0.89	2.3
Acetone	0.79	6.5	1.9	16

Client Sample ID: IA0303_20190226

Lab ID#: 1903048-05B

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Carbon Tetrachloride	0.032	0.080	0.20	0.50

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Client Sample ID: AA0304_20190226

Lab ID#: 1903048-01A

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

File Name:	**21031208**	**Date of Collection: 2/26/19 4:33:00 PM**	
Dil. Factor:	**1.49**	**Date of Analysis: 3/12/19 02:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.74	Not Detected	3.7	Not Detected
Freon 11	0.15	0.24	0.84	1.4
Freon 113	0.15	Not Detected	1.1	Not Detected
Acetone	0.74	6.6	1.8	16
Methylene Chloride	0.30	Not Detected	1.0	Not Detected
1,1,1-Trichloroethane	0.15	Not Detected	0.81	Not Detected
Benzene	0.15	Not Detected	0.48	Not Detected
Toluene	0.15	Not Detected	0.56	Not Detected
Tetrachloroethene	0.15	Not Detected	1.0	Not Detected
Chlorobenzene	0.15	Not Detected	0.68	Not Detected
Ethyl Benzene	0.15	Not Detected	0.65	Not Detected
m,p-Xylene	0.15	Not Detected	0.65	Not Detected
o-Xylene	0.15	Not Detected	0.65	Not Detected
1,3-Dichlorobenzene	0.15	Not Detected	0.90	Not Detected
1,4-Dichlorobenzene	0.15	Not Detected	0.90	Not Detected
1,2-Dichlorobenzene	0.15	Not Detected	0.90	Not Detected
1,2,4-Trichlorobenzene	0.74	Not Detected	5.5	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	112	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: AA0304_20190226

Lab ID#: 1903048-01B

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

File Name:	**21031208sim**	**Date of Collection: 2/26/19 4:33:00 PM**	
Dil. Factor:	**1.49**	**Date of Analysis: 3/12/19 02:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.015	Not Detected	0.038	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.059	Not Detected
cis-1,2-Dichloroethene	0.030	Not Detected	0.12	Not Detected
Carbon Tetrachloride	0.030	0.079	0.19	0.50
Trichloroethene	0.030	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	98	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0300_20190226

Lab ID#: 1903048-02A

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

File Name:	**21031209**	**Date of Collection: 2/26/19 4:16:00 PM**	
Dil. Factor:	**1.61**	**Date of Analysis: 3/12/19 03:24 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.80	Not Detected	4.0	Not Detected
Freon 11	0.16	0.43	0.90	2.4
Freon 113	0.16	Not Detected	1.2	Not Detected
Acetone	0.80	5.6	1.9	13
Methylene Chloride	0.32	Not Detected	1.1	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	Not Detected	0.51	Not Detected
Toluene	0.16	0.32	0.61	1.2
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	Not Detected	0.70	Not Detected
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.80	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: IA0300_20190226

Lab ID#: 1903048-02B

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

File Name:	**21031209sim**	**Date of Collection: 2/26/19 4:16:00 PM**	
Dil. Factor:	**1.61**	**Date of Analysis: 3/12/19 03:24 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.064	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.13	Not Detected
Carbon Tetrachloride	0.032	0.077	0.20	0.48
Trichloroethene	0.032	Not Detected	0.17	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: IA0301_20190226

Lab ID#: 1903048-03A

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

File Name:	**21031210**	**Date of Collection: 2/26/19 3:20:00 PM**	
Dil. Factor:	**1.71**	**Date of Analysis: 3/12/19 03:59 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.86	Not Detected	4.2	Not Detected
Freon 11	0.17	0.41	0.96	2.3
Freon 113	0.17	Not Detected	1.3	Not Detected
Acetone	0.86	8.0	2.0	19
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.93	Not Detected
Benzene	0.17	Not Detected	0.55	Not Detected
Toluene	0.17	Not Detected	0.64	Not Detected
Tetrachloroethene	0.17	Not Detected	1.2	Not Detected
Chlorobenzene	0.17	Not Detected	0.79	Not Detected
Ethyl Benzene	0.17	Not Detected	0.74	Not Detected
m,p-Xylene	0.17	Not Detected	0.74	Not Detected
o-Xylene	0.17	Not Detected	0.74	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.86	Not Detected	6.3	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	91	70-130

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Client Sample ID: IA0301_20190226

Lab ID#: 1903048-03B

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

File Name:	**21031210sim**	**Date of Collection: 2/26/19 3:20:00 PM**	
Dil. Factor:	**1.71**	**Date of Analysis: 3/12/19 03:59 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.044	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.068	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.14	Not Detected
Carbon Tetrachloride	0.034	0.068	0.22	0.43
Trichloroethene	0.034	Not Detected	0.18	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: IA0302_20190226

Lab ID#: 1903048-04A

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

File Name:	**21031211**	**Date of Collection: 2/26/19 4:14:00 PM**	
Dil. Factor:	**1.61**	**Date of Analysis: 3/12/19 04:34 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.80	Not Detected	4.0	Not Detected
Freon 11	0.16	0.43	0.90	2.4
Freon 113	0.16	Not Detected	1.2	Not Detected
Acetone	0.80	6.4	1.9	15
Methylene Chloride	0.32	Not Detected	1.1	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.88	Not Detected
Benzene	0.16	Not Detected	0.51	Not Detected
Toluene	0.16	Not Detected	0.61	Not Detected
Tetrachloroethene	0.16	Not Detected	1.1	Not Detected
Chlorobenzene	0.16	Not Detected	0.74	Not Detected
Ethyl Benzene	0.16	Not Detected	0.70	Not Detected
m,p-Xylene	0.16	Not Detected	0.70	Not Detected
o-Xylene	0.16	Not Detected	0.70	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.97	Not Detected
1,2,4-Trichlorobenzene	0.80	Not Detected	6.0	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	112	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: IA0302_20190226

Lab ID#: 1903048-04B

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

File Name:	**21031211sim**	**Date of Collection: 2/26/19 4:14:00 PM**	
Dil. Factor:	**1.61**	**Date of Analysis: 3/12/19 04:34 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.064	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.13	Not Detected
Carbon Tetrachloride	0.032	0.079	0.20	0.50
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	106	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: IA0303_20190226

Lab ID#: 1903048-05A

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

File Name:	**21031212**	**Date of Collection: 2/26/19 4:11:00 PM**	
Dil. Factor:	**1.58**	**Date of Analysis: 3/12/19 05:12 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.79	Not Detected	3.9	Not Detected
Freon 11	0.16	0.42	0.89	2.3
Freon 113	0.16	Not Detected	1.2	Not Detected
Acetone	0.79	6.5	1.9	16
Methylene Chloride	0.32	Not Detected	1.1	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	112	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: IA0303_20190226

Lab ID#: 1903048-05B

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

File Name:	**21031212sim**	**Date of Collection: 2/26/19 4:11:00 PM**	
Dil. Factor:	**1.58**	**Date of Analysis: 3/12/19 05:12 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.063	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.12	Not Detected
Carbon Tetrachloride	0.032	0.080	0.20	0.50
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	107	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1903048-06A

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

File Name:	**21031206a**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 11:37 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 11	0.10	Not Detected	0.56	Not Detected
Freon 113	0.10	Not Detected	0.77	Not Detected
Acetone	0.50	Not Detected	1.2	Not Detected
Methylene Chloride	0.20	Not Detected	0.69	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	116	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	86	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1903048-06B

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

File Name:	**21031206sima**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 11:37 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	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	97	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: CCV

Lab ID#: 1903048-07A

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

File Name:	**21031202**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 08:06 AM**	

Compound	%Recovery
Freon 12	86
Freon 11	100
Freon 113	94
Acetone	99
Methylene Chloride	94
1,1,1-Trichloroethane	96
Benzene	103
Toluene	105
Tetrachloroethene	89
Chlorobenzene	92
Ethyl Benzene	104
m,p-Xylene	100
o-Xylene	99
1,3-Dichlorobenzene	85
1,4-Dichlorobenzene	78
1,2-Dichlorobenzene	81
1,2,4-Trichlorobenzene	96

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: CCV

Lab ID#: 1903048-07B

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

File Name:	**21031202sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 08:06 AM**	

Compound	%Recovery
Vinyl Chloride	93
1,1-Dichloroethene	92
cis-1,2-Dichloroethene	101
Carbon Tetrachloride	89
Trichloroethene	91

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	104	70-130

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Client Sample ID: LCS

Lab ID#: 1903048-08A

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

File Name:	**21031203**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:00 AM**	

Compound	%Recovery	Method Limits
Freon 12	99	70-130
Freon 11	111	70-130
Freon 113	100	70-130
Acetone	112	70-130
Methylene Chloride	104	70-130
1,1,1-Trichloroethane	103	70-130
Benzene	107	70-130
Toluene	110	70-130
Tetrachloroethene	104	70-130
Chlorobenzene	107	70-130
Ethyl Benzene	114	70-130
m,p-Xylene	117	70-130
o-Xylene	113	70-130
1,3-Dichlorobenzene	98	70-130
1,4-Dichlorobenzene	88	70-130
1,2-Dichlorobenzene	97	70-130
1,2,4-Trichlorobenzene	109	70-130

Container Type: NA - Not Applicable

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

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Client Sample ID: LCSD

Lab ID#: 1903048-08AA

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

File Name:	**21031204**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:48 AM**	

Compound	%Recovery	Method Limits
Freon 12	105	70-130
Freon 11	114	70-130
Freon 113	104	70-130
Acetone	116	70-130
Methylene Chloride	107	70-130
1,1,1-Trichloroethane	106	70-130
Benzene	102	70-130
Toluene	109	70-130
Tetrachloroethene	101	70-130
Chlorobenzene	104	70-130
Ethyl Benzene	115	70-130
m,p-Xylene	118	70-130
o-Xylene	114	70-130
1,3-Dichlorobenzene	97	70-130
1,4-Dichlorobenzene	95	70-130
1,2-Dichlorobenzene	100	70-130
1,2,4-Trichlorobenzene	108	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	106	70-130

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Client Sample ID: LCS

Lab ID#: 1903048-08B

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

File Name:	**21031203sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:00 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	70-130
1,1-Dichloroethene	97	70-130
cis-1,2-Dichloroethene	116	70-130
Carbon Tetrachloride	120	70-130
Trichloroethene	98	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	104	70-130

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Client Sample ID: LCSD

Lab ID#: 1903048-08BB

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

File Name:	**21031204sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:48 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	70-130
1,1-Dichloroethene	98	70-130
cis-1,2-Dichloroethene	116	70-130
Carbon Tetrachloride	120	70-130
Trichloroethene	97	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	108	70-130

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3/14/2019
Ms. Jennifer Sanborn
Sanborn, Head & Associates
20 Foundry Street

Concord NH 03301

Project Name: EFK
Project #: 2999.06
Workorder #: 1903071

Dear Ms. Jennifer Sanborn

The following report includes the data for the above referenced project for sample(s) received on 3/1/2019 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 contact 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

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WORK ORDER #: 1903071

Work Order Summary

CLIENT:	Ms. Jennifer Sanborn Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301	**BILL TO:**	Accounts Payable Sanborn, Head & Associates 20 Foundry Street Concord, NH 03301
PHONE:	603-229-1900	**P.O. #**	
FAX:	603-229-1919	**PROJECT #**	2999.06 EFK
DATE RECEIVED:	03/01/2019	**CONTACT:**	Ausha Scott
DATE COMPLETED:	03/14/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	FB-01_20190226	Modified TO-15	10.5 "Hg	5 psi
01B	FB-01_20190226	Modified TO-15	10.5 "Hg	5 psi
02A	Lab Blank	Modified TO-15	NA	NA
02B	Lab Blank	Modified TO-15	NA	NA
03A	CCV	Modified TO-15	NA	NA
03B	CCV	Modified TO-15	NA	NA
04A	LCS	Modified TO-15	NA	NA
04AA	LCSD	Modified TO-15	NA	NA
04B	LCS	Modified TO-15	NA	NA
04BB	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 03/14/19

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# 1903071

One 6 Liter Summa Canister (SIM Certified) sample was received on March 01, 2019. 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

A revised Chain of Custody (COC) was provided by the client on 3/5/19.

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: FB-01_20190226

Lab ID#: 1903071-01A

No Detections Were Found.

Client Sample ID: FB-01_20190226

Lab ID#: 1903071-01B

No Detections Were Found.

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Client Sample ID: FB-01_20190226

Lab ID#: 1903071-01A

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

File Name:	**21031207**	**Date of Collection: 2/26/19 4:23:00 PM**	
Dil. Factor:	**2.06**	**Date of Analysis: 3/12/19 01:19 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.0	Not Detected	5.1	Not Detected
Freon 11	0.21	Not Detected	1.2	Not Detected
Freon 113	0.21	Not Detected	1.6	Not Detected
Acetone	1.0	Not Detected	2.4	Not Detected
Methylene Chloride	0.41	Not Detected	1.4	Not Detected
1,1,1-Trichloroethane	0.21	Not Detected	1.1	Not Detected
Benzene	0.21	Not Detected	0.66	Not Detected
Toluene	0.21	Not Detected	0.78	Not Detected
Tetrachloroethene	0.21	Not Detected	1.4	Not Detected
Chlorobenzene	0.21	Not Detected	0.95	Not Detected
Ethyl Benzene	0.21	Not Detected	0.89	Not Detected
m,p-Xylene	0.21	Not Detected	0.89	Not Detected
o-Xylene	0.21	Not Detected	0.89	Not Detected
1,3-Dichlorobenzene	0.21	Not Detected	1.2	Not Detected
1,4-Dichlorobenzene	0.21	Not Detected	1.2	Not Detected
1,2-Dichlorobenzene	0.21	Not Detected	1.2	Not Detected
1,2,4-Trichlorobenzene	1.0	Not Detected	7.6	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: FB-01_20190226

Lab ID#: 1903071-01B

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

File Name:	**21031207sim**	**Date of Collection: 2/26/19 4:23:00 PM**	
Dil. Factor:	**2.06**	**Date of Analysis: 3/12/19 01:19 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.021	Not Detected	0.053	Not Detected
1,1-Dichloroethene	0.021	Not Detected	0.082	Not Detected
cis-1,2-Dichloroethene	0.041	Not Detected	0.16	Not Detected
Carbon Tetrachloride	0.041	Not Detected	0.26	Not Detected
Trichloroethene	0.041	Not Detected	0.22	Not Detected

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	97	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1903071-02A

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

File Name:	**21031206**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 11:37 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 11	0.10	Not Detected	0.56	Not Detected
Freon 113	0.10	Not Detected	0.77	Not Detected
Acetone	0.50	Not Detected	1.2	Not Detected
Methylene Chloride	0.20	Not Detected	0.69	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	116	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	86	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1903071-02B

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

File Name:	**21031206sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 11:37 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	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	97	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: CCV

Lab ID#: 1903071-03A

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

File Name:	**21031202**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 08:06 AM**	

Compound	%Recovery
Freon 12	86
Freon 11	100
Freon 113	94
Acetone	99
Methylene Chloride	94
1,1,1-Trichloroethane	96
Benzene	103
Toluene	105
Tetrachloroethene	89
Chlorobenzene	92
Ethyl Benzene	104
m,p-Xylene	100
o-Xylene	99
1,3-Dichlorobenzene	85
1,4-Dichlorobenzene	78
1,2-Dichlorobenzene	81
1,2,4-Trichlorobenzene	96

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	93	70-130

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Client Sample ID: CCV

Lab ID#: 1903071-03B

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

File Name:	**21031202sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 08:06 AM**	

Compound	%Recovery
Vinyl Chloride	93
1,1-Dichloroethene	92
cis-1,2-Dichloroethene	101
Carbon Tetrachloride	89
Trichloroethene	91

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	104	70-130

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Client Sample ID: LCS

Lab ID#: 1903071-04A

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

File Name:	**21031203**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:00 AM**	

Compound	%Recovery	Method Limits
Freon 12	99	70-130
Freon 11	111	70-130
Freon 113	100	70-130
Acetone	112	70-130
Methylene Chloride	104	70-130
1,1,1-Trichloroethane	103	70-130
Benzene	107	70-130
Toluene	110	70-130
Tetrachloroethene	104	70-130
Chlorobenzene	107	70-130
Ethyl Benzene	114	70-130
m,p-Xylene	117	70-130
o-Xylene	113	70-130
1,3-Dichlorobenzene	98	70-130
1,4-Dichlorobenzene	88	70-130
1,2-Dichlorobenzene	97	70-130
1,2,4-Trichlorobenzene	109	70-130

Container Type: NA - Not Applicable

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

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Client Sample ID: LCSD

Lab ID#: 1903071-04AA

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

File Name:	**21031204**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:48 AM**	

Compound	%Recovery	Method Limits
Freon 12	105	70-130
Freon 11	114	70-130
Freon 113	104	70-130
Acetone	116	70-130
Methylene Chloride	107	70-130
1,1,1-Trichloroethane	106	70-130
Benzene	102	70-130
Toluene	109	70-130
Tetrachloroethene	101	70-130
Chlorobenzene	104	70-130
Ethyl Benzene	115	70-130
m,p-Xylene	118	70-130
o-Xylene	114	70-130
1,3-Dichlorobenzene	97	70-130
1,4-Dichlorobenzene	95	70-130
1,2-Dichlorobenzene	100	70-130
1,2,4-Trichlorobenzene	108	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	106	70-130

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Client Sample ID: LCS

Lab ID#: 1903071-04B

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

File Name:	**21031203sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:00 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	70-130
1,1-Dichloroethene	97	70-130
cis-1,2-Dichloroethene	116	70-130
Carbon Tetrachloride	120	70-130
Trichloroethene	98	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	104	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1903071-04BB

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

File Name:	**21031204sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/12/19 09:48 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	70-130
1,1-Dichloroethene	98	70-130
cis-1,2-Dichloroethene	116	70-130
Carbon Tetrachloride	120	70-130
Trichloroethene	97	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	108	70-130

APPENDIX E

DATA VALIDATION REPORT

Data Usability Summary Report (DUSR)

NYSDEC ASP Category B

Client:	Sanborn, Head & Associates, Inc., Concord, New Hampshire (SHA)
Site:	IBM East Fishkills Facility, Hopewell Junction, New York Building 386
Laboratory:	Eurofins Air Toxics, Inc. (EATL), Folsom, California
SDG / Work Order:	1903048 & 1903071
Date(s) of Collection:	February 26, 2019
Number and type Samples & analyses:	4 Indoor Air, 1 Ambient Air, and 1 Field 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:	April 8, 2019

This Data Usability Summary Report (DUSR) is based on guidance developed by the New York State Department of Conservation (NYSDEC), June 1999, for technical review of analytical data in lieu of a full third-party data validation. The objective of the DUSR is to determine whether or not the data as presented meet NYSDEC ASP 2005 or EPA method QC acceptance criteria.

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I. Required DUSR Questions

1. ***Is the data package complete as defined under the requirements for the most current NYSDEC ASP Category B or USEPA CLP deliverables?***

   Yes.

2. ***Have all holding times been met?***

   Yes.

3. ***Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?***

   Yes, in general except some QC exceptions resulted in qualification of data as noted in the Data Validation Checklists (DV Checklists).

4. ***Have all of the data been generated using established and agreed upon analytical protocols?***

   Yes. Analytical data were generated using established EPA Methods (see analytical references in Section II below). Deviations from EPA and NYSDEC ASP 2005 QC protocols are discussed in the DV Checklists of this DUSR.

5. ***Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?***

   Yes. The raw data were checked to verify that detected results met retention time and mass spectral criteria, where applicable, for qualitative identification. A spot check was performed to verify quantitative accuracy for reporting of all results (see the DV Checklists).

6. ***Have the correct data qualifiers been used and are they consistent with the most current NYSDEC ASP?***

   Yes. The laboratory used the correct data qualifiers in reporting of results. The data were unchanged as a consequence of this review.

7. ***Have any quality control (QC) exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR?***

   Yes. QC exceedances are specified in the DV Checklists. QC summary sheets from the data package have not been attached; however, all QC exceedances that required data qualification are summarized in Table 2 of the DUSR and flagged in the validated electronic data deliverable (EDD).

II. 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
AA0304_20190226	1903048-01	02/26/2019	Ambient Air	VOCs	Field Sample
IA0300_20190226	1903048-02	02/26/2019	Indoor Air	VOCs	Field Sample
IA0301_20190226	1903048-03	02/26/2019	Indoor Air	VOCs	Field Sample
IA0302_20190226	1903048-04	02/26/2019	Indoor Air	VOCs	Field Sample
IA0303_20190226	1903048-05	02/26/2019	Indoor Air	VOCs	Field Sample
FB-01_20190226	1903071-01A	02/26/2019	Air	VOCs	Equipment Blank

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

III. 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) and Laboratory Control Sample Duplicate (LCSD) Recoveries and Precision
- Internal Standard (IS) and Surrogate 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 (UJ) due to QC issues. Table 2 summarizes the actions taken during this review. NEH generated validated data spreadsheets based on the electronic project database files received from SHA for these Work Orders. 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.

As required by the DUSR, the DV Checklist attached to this DUSR documents the QC reviewed and the issues that required action or affected the data certainty in terms of the project data quality objectives (DQO) of accuracy, precision, representativeness, comparability, and sensitivity. The DQO of completeness can be evaluated by the project manager after all data are generated.

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

There were no Field Duplicate (FD) samples collected for B386; therefore, precision and representativeness of the samples to the site location for the project-specific VOCs could not be evaluated.

All non-detects were reported at levels below the Project required RLs (as shown in Table B.1 of the QAPP) except for Freon 12 in all samples due to a calibration issue and 1,2,4-Trichlorobenzene in FB-01_20190226 due to a higher than expected sample receipt vacuum causing project sensitivity requirements to not be met for these compounds. The data users will need to evaluate the non-detects for these compounds above project sensitivity criteria for project uses.

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

Table 2. Summary of Data Validation Actions

Field Sample ID	Analyte	Qualifier	Bias	Validation Comments
All Samples	1,2,4-Trichlorobenzene	UJ	I	Initial Calibration outside criteria

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 with indeterminate bias; J+ = Result is estimated with possible high bias; J- = Result is estimated with possible low bias;; 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

Date Sampled: 2/26/19
Method of Analysis: TO-15 SIM

No. Samples: 4 IA + 1 AA

Data Element Acceptable	Canister Receipt	HT	GC/MS Tunes + Calibrations	Internal Stds + Surrogates	LCS	Lab Dup (LCS and LD)	Field Duplicates	RL & Quant.
Yes	√	√		√	√	√	NA	
No			Estimate (UJ) 5 results					Freon 12 RL > Proj. Req. RL

Other Issues : None

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 the second to last page 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.

Data usability review was performed on Quality Control forms associated with this data package, which involved evaluation of the following (where applicable): agreement of analyses conducted with COC requests; Holding times and sample preservation; Laboratory blanks/equipment blanks/ field blanks results compared to field sample results; Field duplicate results; Quantitation limits and sample results; Surrogate and Internal Standard recoveries; LCS/LCSD results; Laboratory duplicate results; instrument tuning and calibration information; sample chromatograms; and laboratory qualifiers applied to the dataset. The project narrative was also reviewed to determine whether additional issues were found that were not reported in the QC previously evaluated. This review is consistent with the requirements set forth in NYSDEC Technical Guidance for Site Investigation and Remediation, DER-10, Appendix 2B (May 2010).

Data Package Completeness: All required forms (results, summary QC, COC), as needed to validate the data in accordance with NYSDEC ASP and the Work Plan were present in the data package. The laboratory provided the equivalent of the Category B deliverable. One e-mailed COC contained all samples collected on 2/26/19-2/27/19 and a second COC only contained the samples reported in this Work Order 1903048, which is associated with collection of samples from B386.

Sample receipt: The 5 6-L canisters were received intact and in good condition on 3/5/19. The laboratory did not note any issues with log-in - no Action required.

Date: ***3/25/19***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Associated Blanks: Method Blank: 21031206a /21031206sima

FB = FB-01_20190226 (reported in Work Order 1903071)

Blank ID	Contaminant / Level (µg/m^3)		Action Level DF=		Sample and reported result (µg/m3)	Corrected Database Result
21031206a	None				No Blank Action Required	
21031206sima	None				No Blank Action Required	
FB-01_20190226	None				No Blank Action Required	

Additional Notes:

Certification: Canisters were each Certified pre-cleaned on 2/20/19 & 2/21/19 prior to shipment to the field indicating all 22 target VOCs were non-detect prior to use.

Sample Integrity: All samples were collected for about 8 hours on 2/26/19. The field receipt vacuums (27.5 - 30 ”Hg), field final vacuums (3-6.5 "Hg) and lab receipt vacuums (3-6.5"Hg) were acceptable. All canisters were over-pressurized to 5 psi prior to analysis. No Action required.

Holding Time (HT): Samples were analyzed by 3/12/19; therefore HT was met. No Action required.

BFB Tunes: Instrument MSD-21 3 tunes (2 ICAL + 1 CCV). Method TO-15 tune criteria used and tunes were acquired properly (average of 3 scans across BFB peak with background subtraction). All criteria in all tunes were met and all samples were analyzed within 12 hours of tune; therefore, No Action Required.

ICALs : Instrument 21 Full Scan and SIM performed on 2/5/19. Additional standards were analyzed 2/20/19 but these were for compounds that are not targets for this project. Full Scan = 7- to 9-level calibration from 0.05, 0.1, or 0.5 to 40 ppbV for all 22 Target compounds plus several non-target compounds. SIM = 9- to 10-level calibration from 0.01 or 0.02 to 20 ppbV for 3 Targets shown in the Table on page 5 plus 1,1-dichloroethene and cis-1,2-dichloroethene plus several other non-target compounds. %RSD ≤ 30% for all 22 Target Compounds except 1,2,4-Trichlorobenzene %RSD = 31.1%, which is high outside criteria. RLs reported were supported by the ICALs (i.e., for DF=1, RLs were at or above the concentration of the lowest level ICAL standard analyzed). NOTE: 1,1-dichloroethene and cis-1,2-dichloroethene were reported by SIM analysis even though RLs by full scan met project sensitivity requirements.

****ACTION: All results for 1,2,4-Trichlorobenzene estimated (UJ) with indeterminate bias due to the initial calibration not meeting criteria.***

Date: ***3/25/19***

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

Additional Notes:

CCALs: 21031202/21031202sim - % Recovery 70-130% for all 22 Target compounds - No Action required.

Surrogates & Internal Standards **:** Surrogates (1,2-Dichloroethane-d4, Toluene-d8, and 4-Bromofluorobenzene) had %Recovery within criteria and all 3 IS' (Chlorobenzene-d5, 1,4-Difluorobenzene, and Bromochloromethane) had areas and RTs within criteria for both full scan and SIM in all analyses; therefore, No Action Required.

LCS/LCSD : 21031203/21031204 & 21031203sim/21031204sim - %Recovery acceptable for all 22 Targets in both 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. No Action required

LD: not performed for these samples since LCS/LCSD performed allowing precision evaluation.

FD: there was no Field Duplicate sample associated with the collection for B386; therefore, precision from sample collection through analysis could not be assessed.

Compound Reporting: the lab reported results for 22 Target VOCs, as requested in Table B.1 of the Work Plan. 17 compounds were reported from the Full Scan analysis and 5 from the SIM analysis as shown on the second to last page of this DV Checklist.

Qualifier Action: There were no qualifiers other than "U" placed on the data (i.e., no "J" results reported). All data were reported within the instrument calibration range.

Compound Reporting & Sensitivity: All reporting limits were at a level below the Project required RL (as shown in Table B.1, which is reproduced on the second to last page of this Checklist) except for Freon 12 RLs were higher than required due to a calibration issue causing project sensitivity requirements to not be met (data were non-detect in all samples). The data users will need to evaluate these Freon 12 non-detects above project sensitivity criteria for project uses.

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

The sample chromatograms, mass spectra of detects and quantitation reports were scanned and data appeared to have been reported correctly. Although Tentatively Identified Compound (TIC) analysis was not requested, some samples appear to have extra peaks that are not target compounds.

Calculation Verification Checks:

Initial Calibration : Verification MSD-21 SIM ICAL on 2/5/19 for Carbon Tetrachloride with IS Bromochloromethane:

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8
Std Conc.	0.01	0.02	0.05	0.1	0.5	1	5	10
Cpd Resp	231	420	1194	4900	22092	43097	299082	543203
IS Conc.	5	5	5	5	5	5	5	5
IS Resp	85994	90830	82999	100084	97228	96507	112627	112954
RRF	1.3431	1.1560	1.4386	2.4479	2.2722	2.2328	2.6555	2.4045

	Level 9	Level 10	Avg. RRF	%RSD
Std Conc.	15	20		
Cpd Resp	724558	971412		
IS Conc.	5	5		
IS Resp	103326	107563		
RRF	2.3374	2.2578	2.0546	25.81%

√

ICAL verified, no action required

CCV : Verification MSD-21 3/12/19 for 10 ppbV Standard of Tetrachloroethene: Response for Compound = 428058; IS (Chlorobenzene-d5) Response = 302941 @5 ppbV; RRF from ICAL = 0.79029

$$\text{Concentration} = \frac{428058 \times 5}{302941 \times 0.79029} = 8.94 \text{ ppbV}$$ √

$$\%\text{Recovery} = \frac{100 \times 8.94}{10} = 89\%$$

QL & Result Verification: IA0300_20190226; Freon 11

Normal 250 mL analyzed (same as for Method Blank) but since canister was over-pressurize, effective DF = 1.61; MWt = 137.38

Sample Response = 11925; IS Response = 79380@ 5; RRF ICAL = 2.80347

$$\text{Conc.} = \frac{11925 \times 5 \times 1.61}{79380 \times 2.80347} = 0.43 \text{ ppbV}$$

$\mu g/m^3$ = (ppbv x Mwt x DF) / 24.45 = (0.43 x 137.38 x 1)/24.45 = 2.4 $\mu g/m^3$ √

Date: ***3/25/19***

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

Method of Analysis: TO-15 Hi/Lo

Compound List and Project-required Reporting Limits (RL): Table B-1 of Work Plan

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	*Reported by SIM for this Work Order*
1,1-Dichloroethene (DCE)		Full		0.8	*Reported by SIM for this Work Order*
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 continued (see references below):

Canister Integrity:	If certification forms indicate issues, J/U or UJ results in samples; if Flow controller RPD > 20% for pre- and post-flow calibrations, J detect/UJ non-detects
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:	Sample-specific Blank Action Level = Blank Level x (Sample DF/Blank DF)
	Method Blank (MB): ***If MB < RL*** : and sample < RL, negate (U) result in sample RL; if sample is > RL but < 2 x RL (or 4 x RL for acetone, 2-butanone, and methylene chloride), negate (U) result at level found in sample. ***If MB > RL*** : and sample < RL, negate (U) result in sample RL; if sample is > RL but < Sample-Specific Blank Action Level, negate (U) the sample at the Sample-Specific Blank Action Level.
	Equipment Blank (EB): Result<Blank Action, EB result at level reported in sample
BFB Tune:	SW-846 method 8260B or TO-15 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)
DV Qualifier Definitions:	U = analyte is non-detect at the sample-specific Quantitation Limit (usable); UJ = non-detect is usable as an estimated value; J = result is usable as an estimated value with indeterminate bias; J+ = result is usable as an estimated value with possible high bias; J- = result is usable as an estimated value with possible low bias; NJ = the analyte has been "tentatively identified" and the result is usable as an estimated value with indeterminate bias; and R = result is rejected due to severe QC exceedance and unusable for project objectives. Bias: L = Low; H = High; I = Indeterminate.
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. 6, June 2014; *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

Date: ***3/25/19***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Date Sampled: 2/26/19
Method of Analysis: TO-15 SIM

No. Samples 1 FB

Data Element Acceptable	Canister Receipt	HT	GC/MS Tunes + Calibrations	Internal Stds + Surrogates	LCS	Lab Dup (LCS and LD)	Field Duplicates	RL & Quant.
Yes	√	√		√	√	√	NA	
No			Estimate (UJ) 1 result					1,2,4-TCB & Freon 12 RL > Proj. Req. RL

Other Issues : None

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 the second to last page 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.

Data usability review was performed on Quality Control forms associated with this data package, which involved evaluation of the following (where applicable): agreement of analyses conducted with COC requests; Holding times and sample preservation; Laboratory blanks/equipment blanks/ field blanks results compared to field sample results; Field duplicate results; Quantitation limits and sample results; Surrogate and Internal Standard recoveries; LCS/LCSD results; Laboratory duplicate results; instrument tuning and calibration information; sample chromatograms; and laboratory qualifiers applied to the dataset. The project narrative was also reviewed to determine whether additional issues were found that were not reported in the QC previously evaluated. This review is consistent with the requirements set forth in NYSDEC Technical Guidance for Site Investigation and Remediation, DER-10, Appendix 2B (May 2010).

Data Package Completeness: All required forms (results, summary QC, COC), as needed to validate the data in accordance with NYSDEC ASP and the Work Plan were present in the data package. The laboratory provided the equivalent of the Category B deliverable. One e-mailed COC contained all samples collected on 2/26/19-2/27/19 and a second revised COC received on 3/5/19 only contained FB-01_20190226 reported in this Work Order 1903071, which, according to SHA, is associated with collection of samples from B323 and B386.

Sample receipt: The 1 6-L canisters was received intact and in good condition on 3/5/19. The laboratory did not note any issues with log-in - no Action required.

Date: ***4/1/19***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Associated Blanks: Method Blank: 21031206 /21031206

FB = NA

Blank ID	Contaminant / Level (µg/m^3)		Action Level DF= 1.68		Sample and reported result (µg/m3)	Corrected Database Result
21031206	None				No Blank Action Required	
21031206sim	None				No Blank Action Required	

Additional Notes:

Certification: Canister was Certified pre-cleaned on 2/20/19 prior to shipment to the field indicating all 22 target VOCs were non-detect prior to use.

Sample Integrity: FB was collected for about 8 hours on 2/26/19. The field receipt vacuum (26 ”Hg), field final vacuum (8 "Hg) and lab receipt vacuum (10.5"Hg) were acceptable. The canister was over-pressurized to 5 psi prior to analysis. No Action required.

Holding Time (HT): Sample was analyzed on 3/12/19; therefore HT was met. No Action required.

BFB Tunes: Instrument MSD-21 3 tunes (2 ICAL + 1 CCV). Method TO-15 tune criteria used and tunes were acquired properly (average of 3 scans across BFB peak with background subtraction). All criteria in all tunes were met and all samples were analyzed within 12 hours of tune; therefore, No Action Required.

ICALs : Instrument 21 Full Scan and SIM performed on 2/5/19. Additional standards were analyzed 2/20/19 but these were for compounds that are not targets for this project. Full Scan = 7- to 9-level calibration from 0.05, 0.1, or 0.5 to 40 ppbV for all 22 Target compounds plus several non-target compounds. SIM = 9- to 10-level calibration from 0.01 or 0.02 to 20 ppbV for 3 Targets shown in the Table on page 5 plus 1,1-dichloroethene and cis-1,2-dichloroethene plus several other non-target compounds. %RSD ≤ 30% for all 22 Target Compounds except 1,2,4-Trichlorobenzene %RSD = 31.1%, which is high outside criteria. RLs reported were supported by the ICALs (i.e., for DF=1, RLs were at or above the concentration of the lowest level ICAL standard analyzed). NOTE: 1,1-dichloroethene and cis-1,2-dichloroethene were reported by SIM analysis even though RLs by full scan met project sensitivity requirements.

****ACTION: 1,2,4-Trichlorobenzene estimated (UJ) with indeterminate bias due to the initial calibration not meeting criteria in the FB-01_20190226***

Additional Notes:

CCALs: 21031202/21031202sim - % Recovery 70-130% for all 22 Target compounds - No Action required.

Surrogates & Internal Standards **:** Surrogates (1,2-Dichloroethane-d4, Toluene-d8, and 4-Bromofluorobenzene) had %Recovery within criteria and all 3 IS' (Chlorobenzene-d5, 1,4-Difluorobenzene, and Bromochloromethane) had areas and RTs within criteria for both full scan and SIM in all analyses; therefore, No Action Required.

LCS/LCSD : 21031203/21031204 & 21031203sim/21031204sim - %Recovery acceptable for all 22 Targets in both 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. No Action required

LD: not performed for this sample since LCS/LCSD performed allowing precision evaluation.

FD: not applicable for a Field Blank.

Compound Reporting: the lab reported results for 22 Target VOCs, as requested in Table B.1 of the Work Plan. 17 compounds were reported from the Full Scan analysis and 5 from the SIM analysis as shown on the second to last page of this DV Checklist.

Qualifier Action: There were no qualifiers other than "U" placed on the data (i.e., no "J" results reported). All data were reported within the instrument calibration range.

Compound Reporting & Sensitivity: All reporting limits were at a level below the Project required RL (as shown in Table B.1, which is reproduced on the second to last page of this Checklist) except for 1,2,4-Trichlorobenzene and Freon 12 RLs were higher than required due to a calibration issue causing project sensitivity requirements to not be met (data were non-detect in FB). The data users will need to evaluate the 1,2,4-Trichlorobenzene and Freon 12 non-detects above project sensitivity criteria for project uses.

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

The sample chromatogram, and quantitation report was reviewed and data appeared to have been reported correctly. Although Tentatively Identified Compound (TIC) analysis was not requested, there were no extra peaks not identified in the FB sample.

Calculation Verification Checks: see results for other Work Groups for calculation verification. All results in the FB-01_20190226 were non-detect so calculation verification was not required.

Date: ***4/1/19***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***

Method of Analysis: TO-15 Hi/Lo

Compound List and Project-required Reporting Limits (RL): Table B-1 of Work Plan

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	*Reported by SIM for this Work Order*
1,1-Dichloroethene (DCE)		Full		0.8	*Reported by SIM for this Work Order*
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 continued (see references below):

Canister Integrity:	If certification forms indicate issues, J/U or UJ results in samples; if Flow controller RPD > 20% for pre- and post-flow calibrations, J detect/UJ non-detects
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:	Sample-specific Blank Action Level = Blank Level x (Sample DF/Blank DF)
	Method Blank (MB): ***If MB < RL*** : and sample < RL, negate (U) result in sample RL; if sample is > RL but < 2 x RL (or 4 x RL for acetone, 2-butanone, and methylene chloride), negate (U) result at level found in sample. ***If MB > RL*** : and sample < RL, negate (U) result in sample RL; if sample is > RL but < Sample-Specific Blank Action Level, negate (U) the sample at the Sample-Specific Blank Action Level.
	Equipment Blank (EB): Result<Blank Action, EB result at level reported in sample
BFB Tune:	SW-846 method 8260B or TO-15 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)
DV Qualifier Definitions:	U = analyte is non-detect at the sample-specific Quantitation Limit (usable); UJ = non-detect is usable as an estimated value; J = result is usable as an estimated value with indeterminate bias; J+ = result is usable as an estimated value with possible high bias; J- = result is usable as an estimated value with possible low bias; NJ = the analyte has been "tentatively identified" and the result is usable as an estimated value with indeterminate bias; and R = result is rejected due to severe QC exceedance and unusable for project objectives. Bias: L = Low; H = High; I = Indeterminate.
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. 6, June 2014; *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

Date: ***4/1/19***
Data Reviewer: ***Nancy C. Rothman, Ph.D.***