Trichlorobenzene Investigation Report

Index No. R9-4171-94-08
Olin Niagara Falls Plant
Niagara Falls, New York

Prepared for:

OLIN CORPORATION

Amec Foster Wheeler Environment &Infrastructure, Inc.
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April 19, 2016
Project 6107-16-0002

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

LIST OF APPENDICES

Appendix

ABBREVIATIONS AND ACRONYMS

Acronym	Definition
Hg	mercury
NYSDEC	New York State Department of Environmental Conservation
TCB	1,2,4-Trichlorobenzene
VOC	volatile organic compound

1.0 INTRODUCTION

In a letter dated June 18, 2015, the New York State Department of Environmental Conservation (NYSDEC) requested Olin Corporation (Olin) evaluate 1,2,4-Trichlorobenzene (TCB) concentrations detected in B-zone groundwater at monitoring well OBA-8B located in the southwestern portion of the Niagara Falls Plant 1 area. In response to this request, Olin conducted a literature review that encompassed existing site documents and other available environmental information to evaluate the potential for TCB sources in the OBA-8B area. Olin has also completed the groundwater sampling program proposed in their October 14, 2015 letter responding to NYSDEC. This report describes the groundwater investigation sample collection and analysis procedures, the results and summarizes findings from literature review. Lastly, this data report provides preliminary conclusions and initial recommendations resulting from these efforts.

2.0 SAMPLE COLLECTION AND ANALYSIS

Groundwater samples were collected on December 16, 2015 from the following Olin and Chemours monitoring wells as proposed.

Olin	Chemours
OBA-8B	22B
OBA-11B	20B
OBA-1B	19B
OBA-7B	16B
	5BR

The Olin and Chemours wells were sampled using low flow sampling procedures. Chemours monitoring wells were sampled with Chemours permission and oversight. Purge water from Chemours monitoring wells was containerized and disposed of at the Chemours treatment system under direction of their representative. Groundwater samples were submitted to ALS Environmental laboratory in Rochester, NY for site specific volatile organic compound (VOC) analysis by SW-846 method 8260C; which includes reporting of TCB.

Water level measurements were collected on December 17, 2015 to coincide with the other locations listed in the Olin *Groundwater Treatment System Operation, Maintenance, and Monitoring Plan* (Amec Foster Wheeler, 2014).

3.0 INVESTIGATION RESULTS

The December 16, 2015 groundwater sampling results are presented on Table 3.1. The TCB results are shown for both the Olin and Chemour well locations on Figure 3.1. The laboratory analytical reports are provided in Appendix A. TCB was detected at OBA-8B, OBA-11B, and OBA-7B at concentrations consistent with previous sampling. TCB was not detected in groundwater from the Chemours wells that were sampled.

Figure 3.2 shows the interpreted B-zone potentiometric surface in the investigation area based on the contemporaneous synoptic water levels. Groundwater flow is westerly, turning toward the northwest within the Plant 1 area and is consistent with previous interpretations of groundwater flow direction.

Historical site documents and groundwater monitoring data were also reviewed as part of this TCB evaluation. The RCRA Facility Investigation (RFI) and related documents indicate that organic compounds were not manufactured in the area near OBA-8B. A mercury (Hg) chlor-alkali cell was operated in the area until 1964. A calcium hypochlorite plant was operated in the area until 1982 after which the area was for warehousing. TCB was only manufactured in the ARGC area between Alundum Road and Gill Creek from 1950 to 1956 at which time organic chemical manufacturing was discontinued.

Figures 3.3 and 3.4 present TCB concentration time trends for OBA-8B and OBA-11B, respectively based on all available data. These figures show that TCB was not detected in OBA-8B when sampling began during the RFI. TCB was not detected in OBA-8B in September 1991 and March 1992. TCB was first detected in OBA-8B in June 1992 and the concentration then increased by an order of magnitude when sampled again in November 1998. Figure 3.4 shows a similar trend in OBA-11B which is located in the general down gradient direction from OBA-8B. TCB concentrations in OBA-11B were initially low or not detected from 1994 through 2000 and then increased rapidly in 2002 suggesting migration from an upgradient source that was also affecting OBA-8B. This places the time of a potential release in the early 1990s.

4.0 POTENTIAL SOURCES OF 1,2,4-TRICHLOROBENZENE

As mentioned previously, Olin manufactured TCB in the ARGC area only, and the manufacturing ceased in 1956, approximately 36 years before the detections were observed at OBA-8B. The manufacturing location, history, and potentiometric surface figures suggest a TCB release associated with ARGC operations is likely unrelated to the TCB associated with OBA-8B. Lack of potential for migration from the ARGC area is reinforced by the Groundwater Treatment System operation since 1998.

The December 2015 data also document that there were no TCB detections in groundwater from the Chemours' wells. This indicates that the TCB observed in OBA-8B and OBA-11B did not likely migrate across Chemours property from the ARGC area.

The OBA-8B well location is essentially on the upgradient edge of the Olin property boundary. Lower level concentrations of TCB were also detected in the A-zone well at this location (OBA-8A) in the same time frame possibly indicating a release from an upgradient location that percolated vertically to the bedrock surface impacting both A-zone and B-zone groundwater.

Possible areas where releases could have occurred include the rail spur just outside of Olin's property boundary or the Washington Mills property located to the south and west of Olin. However, as mentioned previously, Olin ceased TCB manufacturing in the 1950s. Therefore, rail cars of TCB manufactured by Olin would not have been present on the rail spur in the 1990s.

Olin has performed preliminary research on the Washington Mills property and its past operations. Washington Mills manufactured electro-fused mineral abrasives at its Buffalo Avenue facility. It is unknown whether the process used solvents, or more specifically TCB, but the process was electrical in nature and would have used transformers. Information from the Environmental Protection Agency's (EPA) website indicates TCB was used as a solvent as well as in transformer oil (https://www3.epa.gov/airtoxics/hlthef/tri-zene.html).

On behalf of Olin, Amec Foster Wheeler procured an Environmental Data Resource (EDR) report for the property which includes aerial photographs and environmental incident logs. The aerial photographs show that for many decades there was an extensive manufacturing facility in the area just to the south of OBA-8B. The buildings in this area were demolished at some point

between 1985 and 1995. By 1995 two demolition debris piles are indicated by aerial photographs south of the Olin property boundary (Appendix B). The incident reports indicate several tank failures (most appear fuel related) and related cleanups in the 1990s during demolition activities. However, the incident reports do not give complete information regarding the exact locations of the incidents or the specific constituents that were monitored during clean-up. There are indications that some clean-ups involved polychlorinated biphenyls (PCBs) and base neutral extractable compounds. The base neutral extractable compound analysis during that time period would have included TCB as a semi-volatile organic compound. Internet searches concerning use of TCB in the abrasives industry identified one very non-specific reference in the ATSDR toxicological profile for TCB that "other former uses of trichlorobenzene include use of the substance in degreasing agents, […] and abrasive formulations (European Communities 2003)" (http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=1168&tid=255).

While readily available information from the EDR does not pinpoint a TCB source or release, it does indicate that plant demolition activities were being performed near the upgradient boundary of the Olin property at the moment in time when indications of a release to groundwater occurred at OBA-8B.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the review of historical information, as well as the December 2015 investigation results, the source of TCB at OBA-8B appears to be unrelated to Olin's production of TCB in the ARGC area in the 1950s. TCB concentrations in the ARGC are separated from the TCB in OBA-8B by the Chemours property where TCB was not observed. Therefore, there is no indication that TCB migrated across the Chemours property from ARGC area.

OBA-8B is located on the upgradient edge of Olin's property. The groundwater flow direction in the area near OBA-8B is northwest to north-northwest. TCB at OBA-8B would have migrated to the area from off-property areas located to the southeast. Additionally, the concentration trends at OBA-8B and OBA-11B suggest that the TCB observed in those wells migrated to the area in the early 1990s which was approximately 36 years after TCB manufacturing ceased on Olin property.

Olin recommends continuing to monitor OBA-8B and OBA-11B on an annual basis in accordance with the Groundwater Treatment System Operations and Maintenance Plan. Results will be reported to NYSDEC in the annual Operations, Maintenance, and Monitoring Reports.

6.0 REFERENCES

Amec Foster Wheeler, 2014. *Groundwater Treatment System Operations, Maintenance, and Monitoring Plan.* Kennesaw, GA. Amec Foster Wheeler Environment & Infrastructure, Inc. August 15, 2014

TABLES

Table 3.1: December 2015 Investigation Groundwater Analytical Results

Well ID: / Sample Date:	OBA-1B 12/16/2015	OBA-8B 12/16/2015	OBA-11B 12/16/2015	OBA-7B 12/16/2015	20B 12/16/2015	19B 12/16/2015
Volatile Organic Compound Concentrations - SW846 8260C µg/L						
Aliphatic Compounds						
1,1,1-Trichloroethane	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
1,1-Dichloroethene	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
Carbon tetrachloride	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
Chloromethane (Methyl chloride)	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
cis-1,2-Dichloroethene	10	50 U	4200	2.9	1300	8.6
Methylene chloride (Dichloromethane)	1.0 U	50 U	25 U	2.0 U	5.0 U	1.0 U
Tetrachloroethene (PCE)	9.6	50 U	25 U	2.0 U	8.0	1.0 U
trans-1,2-Dichloroethene	3.8	50 U	38	2.0 U	22	1.0 U
Trichloroethene (TCE)	12	50 U	35	3.6	82	1.9
Vinyl Chloride	1.0 U	50 U	1700	2.0 U	26	4.3
Aromatic Compounds						
1,2,4-Trichlorobenzene	1.0 U	5200	430	210	5.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	160	25 U	24	5.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	310	47	22	5.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	60	25 U	4.2	5.0 U	1.0 U
Benzene	1.0 U	50 U	25 U	5.0	5.0 U	1.0 U
Chlorobenzene	1.0 U	50 U	25 U	4.6	5.0 U	1.0 U

Notes:
U - constituent not detected - reporting limit shown.
ug/L - micrograms per liter

Table 3.1: December 2015 Investigation Groundwater Analytical Results

Well ID: / Sample Date:	16B 12/16/2015	22B 12/16/2015	5BR 12/16/2015
Volatile Organic Compound Concentrations - SW846 8260C µg/L			
Aliphatic Compounds			
1,1,1-Trichloroethane	10 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	10 U	1.0 U	1.0 U
1,1,2-Trichloroethane	10 U	1.0 U	1.0 U
1,1-Dichloroethene	10 U	1.0 U	1.0 U
Carbon tetrachloride	10 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	10 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	70	1.0 U	2.0
Methylene chloride (Dichloromethane)	10 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	55	1.0 U	1.0 U
trans-1,2-Dichloroethene	10 U	1.0 U	1.0 U
Trichloroethene (TCE)	61	1.0 U	1.0 U
Vinyl Chloride	10 U	1.0 U	12
Aromatic Compounds			
1,2,4-Trichlorobenzene	10 U	1.0 U	1.0 U
1,2-Dichlorobenzene	10 U	1.0 U	1.0 U
1,3-Dichlorobenzene	10 U	1.0 U	1.3
1,4-Dichlorobenzene	10 U	1.0 U	1.4
Benzene	10 U	1.0 U	1.8
Chlorobenzene	10 U	1.0 U	2.6

Notes:
U - constituent not detected - reporting limit shown.
ug/L - micrograms per liter

Prepared By: T. Donnell 1/31/2016
Checked By: T. Englund 1/31/2016

FIGURES

N

22B
1.0 U

OBA-11B
430

20B
5.0 U

OBA-1B
1.0 U

OBA-7B
210

OBA-8B
5200

19B
1.0 U

16B
10.0 U

5BR
1.0 U

Legend

1,2,4-Trichlorobenzene (µg/L)

- 0.5 - 5
- 5 - 50
- 50 - 500
- 500 - 5000
- 5000 - 50000
- Alundum Road
- Gill Creek
- Approximate Olin Boundary
- Approximate DuPont Boundary
- Approximate Solvent Boundary

Olin Monitoring Well Location

Chemours Monitoring Well Location

Feet
0 200 400

Document Path: G:\olin_niagara\mxds\2015 TCB Investigation Report\TCB_Evaluation_2_4_16.mxd

December 2015 TCB Investigation Report

Olin Chemicals Plant, Niagara Falls, NY

1,2,4-Trichlorobenzene Concentrations - B-Zone December 2015

Prepared By-Date: JRM - 02/04/2016	amec foster wheeler	Figure: 3.1
Checked By-Date: AWE - 02/04/2016		
Project Number: 6107150002		

N

22B
556.55

OBA-11B
555.31

20B
557.59

OBA-1B
554.98*

OBA-7B
563.09

OBA-8B
557.61

19B
558.66

16B
562.01

5BR
557.83

556
557
558
559
560
561
562
563

Gill Creek

Legend

- Olin Monitoring Well
- Chemour Monitoring Well
- Interpreted Equipotential Lines
- Alundum Road
- Approximate Olin Boundary
- Approximate DuPont Boundary
- Approximate Solvent Boundary

*Note: Anomalous low elevation in OBA-1B - Not used in contouring.

0 200 400 Feet

December 2015 TCB Investigation Report

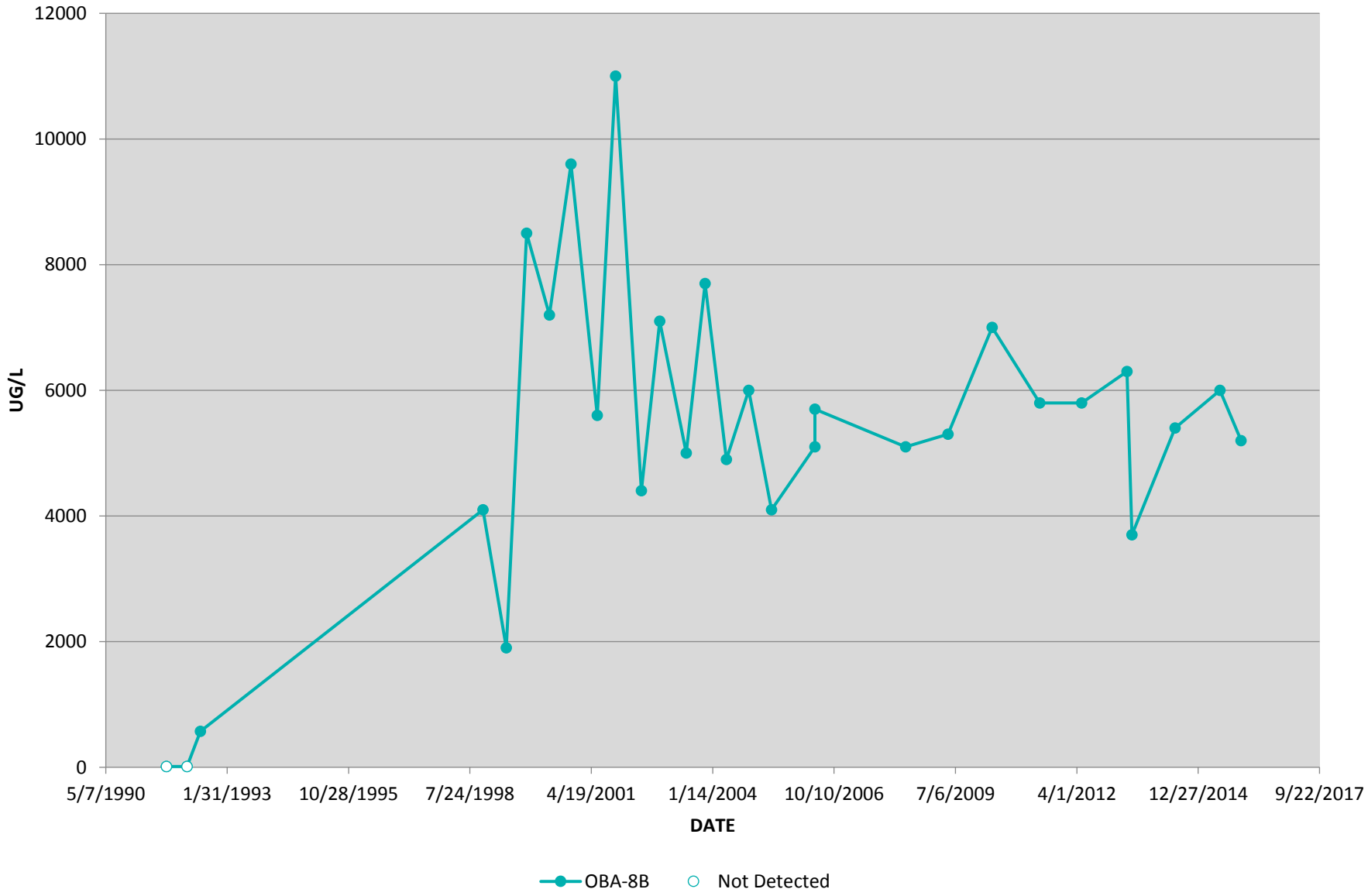
Olin Chemicals Plant, Niagara Falls, NY

B-Zone Potentiometric Contours December 2015

Prepared By-Date: JRM - 02/04/2016	amec foster wheeler
Checked By-Date: AWE - 02/04/2016	Figure: 3.2
Project Number: 6107150002	

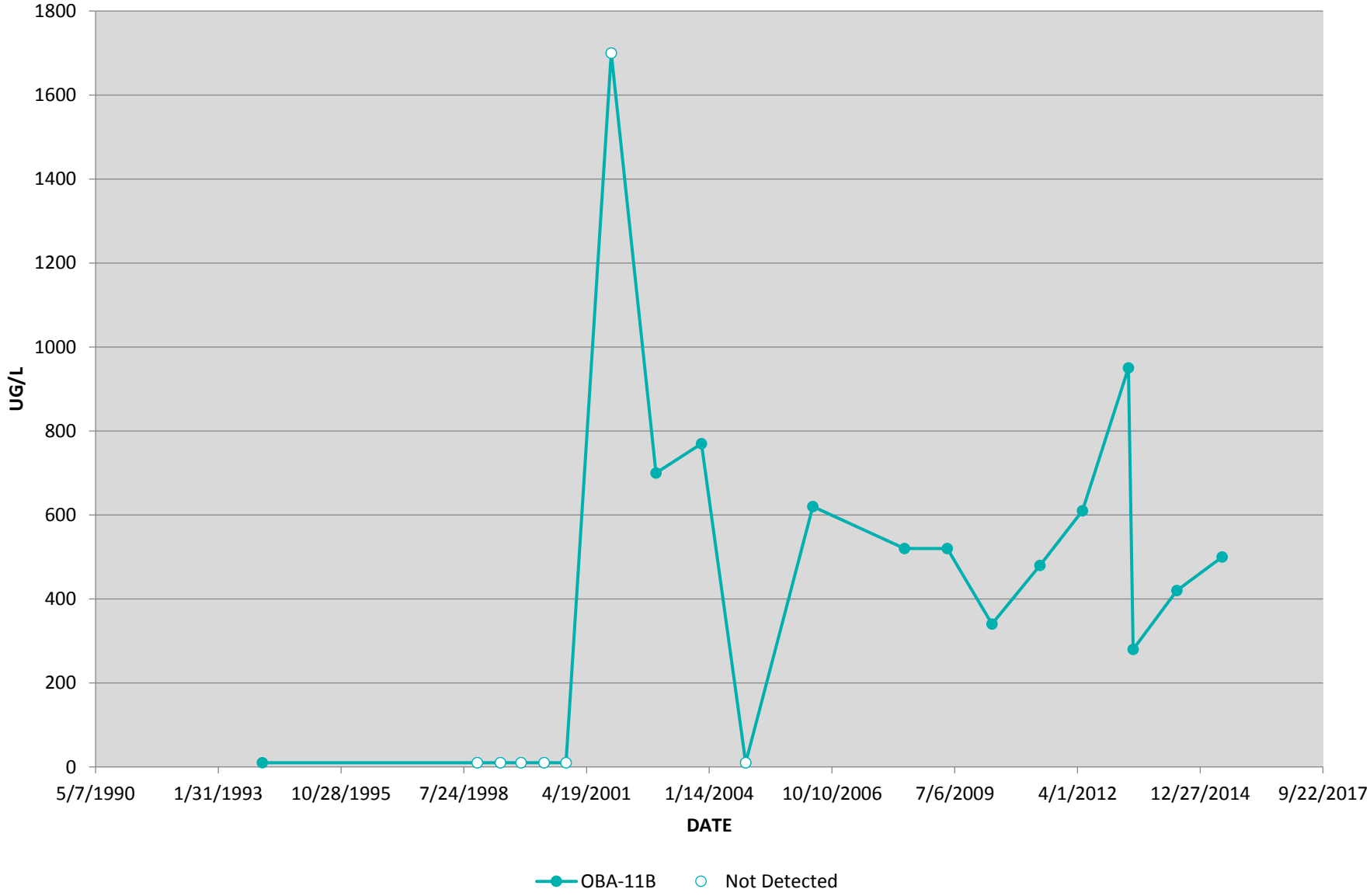
Document Path: G:\olin_niagara\mxds\2016 Annual Report\mxds\TCB_locs_potmap2.mxd

Figure 3.3: OBA-8B TCB Concentrations



Prepared by: T. Donnell 01/25/2016
Checked by: T. Englund 01/25/2016

Figure 3.4: OBA-11B TCB Concentrations



Prepared by: T. Donnell 01/25/2016
Checked by: T. Englund 01/25/2016

APPENDIX A

DECEMBER 2015 ANALYTICAL DATA

December 31, 2015 Service Request No:R1511005

Mr. Rick McClure
Olin Corporation
3855 North Ocoee Street
Suite 200
Cleveland, TN 37312

Laboratory Results for: Niagara Falls

Dear Mr.McClure,

Enclosed are the results of the sample(s) submitted to our laboratory December 17, 2015
For your reference, these analyses have been assigned our service request number **R1511005.**

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

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ALS Group USA, Corp.
dba ALS Environmental

CASE NARRATIVE

This report contains analytical results for the following samples:

Service Request Number: R1511005

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R1511005-001	20B-1215	12/16/2015	0935
R1511005-002	19B-1215	12/16/2015	1040
R1511005-003	16B-1215	12/16/2015	1140
R1511005-004	27B-1215	12/16/2015	1240
R1511005-005	5BR-1215	12/16/2015	1335
R1511005-006	TRIP BLANK	12/16/2015	0935

All samples were received in good condition unless otherwise noted on the cooler receipt and preservation check form located at the end of this report.

All samples were preserved in accordance with approved analytical methods.

All samples have been analyzed by the approved methods cited on the analytical results pages.

All holding times and associated QC were within limits.

No analytical or QC problems were encountered.

All sampling activities performed by ALS personnel have been in accordance with "ALS Field Procedures and Measurements Manual" or by client specifications.

ALS Environmental

REPORT QUALIFIERS AND DEFINITIONS

U Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.

J Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).

B Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.

E Inorganics- Concentration is estimated due to the serial dilution was outside control limits.

E Organics- Concentration has exceeded the calibration range for that specific analysis.

D Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.

* Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.

H Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.

Spike was diluted out.

\+ Correlation coefficient for MSA is <0.995.

N Inorganics- Matrix spike recovery was outside laboratory limits.

N Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.

S Concentration has been determined using Method of Standard Additions (MSA).

W Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.

P Concentration >40% (25% for CLP) difference between the two GC columns.

C Confirmed by GC/MS

Q DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).

X See Case Narrative for discussion.

MRL Method Reporting Limit. Also known as:
LOQ Limit of Quantitation (LOQ)
The lowest concentration at which the method analyte may be reliably quantified under the method conditions.

MDL Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

LOD Limit of Detection. A value at or above the MDL which has been verified to be detectable.

ND Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

ACCREDITED IN ACCORDANCE WITH nelac

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	New Hampshire ID # 294100 A/B
Delaware Accredited	Nebraska Accredited	
DoD ELAP #65817	New Jersey ID # NY004	Pennsylvania ID# 68-786
Florida ID # E87674	New York ID # 10145	Rhode Island ID # 158
Illinois ID #200047	North Carolina #676	Virginia #460167

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to http://www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads/North-America-Downloads

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	12/16/15 09:35
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	20B-1215	**Units:**	ug/L
Lab Code:	R1511005-001	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	5.0 U	5.0	5	12/27/15 20:42	
1,1,2,2-Tetrachloroethane	5.0 U	5.0	5	12/27/15 20:42	
1,1,2-Trichloroethane	5.0 U	5.0	5	12/27/15 20:42	
1,1-Dichloroethene	5.0 U	5.0	5	12/27/15 20:42	
1,2,4-Trichlorobenzene	5.0 U	5.0	5	12/27/15 20:42	
1,2-Dichlorobenzene	5.0 U	5.0	5	12/27/15 20:42	
1,3-Dichlorobenzene	5.0 U	5.0	5	12/27/15 20:42	
1,4-Dichlorobenzene	5.0 U	5.0	5	12/27/15 20:42	
Benzene	5.0 U	5.0	5	12/27/15 20:42	
Carbon Tetrachloride	5.0 U	5.0	5	12/27/15 20:42	
Chlorobenzene	5.0 U	5.0	5	12/27/15 20:42	
Chloromethane	5.0 U	5.0	5	12/27/15 20:42	
Methylene Chloride	5.0 U	5.0	5	12/27/15 20:42	
Tetrachloroethene (PCE)	**8.0**	5.0	5	12/27/15 20:42	
Trichloroethene (TCE)	**82**	5.0	5	12/27/15 20:42	
Vinyl Chloride	**26**	5.0	5	12/27/15 20:42	
cis-1,2-Dichloroethene	**1300 D**	10	10	12/28/15 19:26	
trans-1,2-Dichloroethene	**22**	5.0	5	12/27/15 20:42	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	112	85 - 122	12/27/15 20:42	
Dibromofluoromethane	109	89 - 119	12/27/15 20:42	
Toluene-d8	113	87 - 121	12/27/15 20:42	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	12/16/15 10:40
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	19B-1215	**Units:**	ug/L
Lab Code:	R1511005-002	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/27/15 19:41	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/27/15 19:41	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/27/15 19:41	
1,1-Dichloroethene	1.0 U	1.0	1	12/27/15 19:41	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/27/15 19:41	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/27/15 19:41	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/27/15 19:41	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/27/15 19:41	
Benzene	1.0 U	1.0	1	12/27/15 19:41	
Carbon Tetrachloride	1.0 U	1.0	1	12/27/15 19:41	
Chlorobenzene	1.0 U	1.0	1	12/27/15 19:41	
Chloromethane	1.0 U	1.0	1	12/27/15 19:41	
Methylene Chloride	1.0 U	1.0	1	12/27/15 19:41	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/27/15 19:41	
Trichloroethene (TCE)	**1.9**	1.0	1	12/27/15 19:41	
Vinyl Chloride	**4.3**	1.0	1	12/27/15 19:41	
cis-1,2-Dichloroethene	**8.6**	1.0	1	12/27/15 19:41	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 19:41	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	111	85 - 122	12/27/15 19:41	
Dibromofluoromethane	108	89 - 119	12/27/15 19:41	
Toluene-d8	112	87 - 121	12/27/15 19:41	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	12/16/15 11:40
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	16B-1215	**Units:**	ug/L
Lab Code:	R1511005-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	10 U	10	10	12/27/15 21:43	
1,1,2,2-Tetrachloroethane	10 U	10	10	12/27/15 21:43	
1,1,2-Trichloroethane	10 U	10	10	12/27/15 21:43	
1,1-Dichloroethene	10 U	10	10	12/27/15 21:43	
1,2,4-Trichlorobenzene	10 U	10	10	12/27/15 21:43	
1,2-Dichlorobenzene	10 U	10	10	12/27/15 21:43	
1,3-Dichlorobenzene	10 U	10	10	12/27/15 21:43	
1,4-Dichlorobenzene	10 U	10	10	12/27/15 21:43	
Benzene	10 U	10	10	12/27/15 21:43	
Carbon Tetrachloride	10 U	10	10	12/27/15 21:43	
Chlorobenzene	10 U	10	10	12/27/15 21:43	
Chloromethane	10 U	10	10	12/27/15 21:43	
Methylene Chloride	10 U	10	10	12/27/15 21:43	
Tetrachloroethene (PCE)	**55**	10	10	12/27/15 21:43	
Trichloroethene (TCE)	**61**	10	10	12/27/15 21:43	
Vinyl Chloride	10 U	10	10	12/27/15 21:43	
cis-1,2-Dichloroethene	**70**	10	10	12/27/15 21:43	
trans-1,2-Dichloroethene	10 U	10	10	12/27/15 21:43	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	110	85 - 122	12/27/15 21:43	
Dibromofluoromethane	111	89 - 119	12/27/15 21:43	
Toluene-d8	114	87 - 121	12/27/15 21:43	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	12/16/15 12:40
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	27B-1215	**Units:**	ug/L
Lab Code:	R1511005-004	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/27/15 20:12	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/27/15 20:12	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/27/15 20:12	
1,1-Dichloroethene	1.0 U	1.0	1	12/27/15 20:12	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/27/15 20:12	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/27/15 20:12	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/27/15 20:12	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/27/15 20:12	
Benzene	1.0 U	1.0	1	12/27/15 20:12	
Carbon Tetrachloride	1.0 U	1.0	1	12/27/15 20:12	
Chlorobenzene	1.0 U	1.0	1	12/27/15 20:12	
Chloromethane	1.0 U	1.0	1	12/27/15 20:12	
Methylene Chloride	1.0 U	1.0	1	12/27/15 20:12	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/27/15 20:12	
Trichloroethene (TCE)	1.0 U	1.0	1	12/27/15 20:12	
Vinyl Chloride	1.0 U	1.0	1	12/27/15 20:12	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 20:12	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 20:12	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	110	85 - 122	12/27/15 20:12	
Dibromofluoromethane	109	89 - 119	12/27/15 20:12	
Toluene-d8	113	87 - 121	12/27/15 20:12	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	12/16/15 13:35
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	5BR-1215	**Units:**	ug/L
Lab Code:	R1511005-005	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/28/15 18:56	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/28/15 18:56	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/28/15 18:56	
1,1-Dichloroethene	1.0 U	1.0	1	12/28/15 18:56	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/28/15 18:56	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/28/15 18:56	
1,3-Dichlorobenzene	**1.3**	1.0	1	12/28/15 18:56	
1,4-Dichlorobenzene	**1.4**	1.0	1	12/28/15 18:56	
Benzene	**1.8**	1.0	1	12/28/15 18:56	
Carbon Tetrachloride	1.0 U	1.0	1	12/28/15 18:56	
Chlorobenzene	**2.6**	1.0	1	12/28/15 18:56	
Chloromethane	1.0 U	1.0	1	12/28/15 18:56	
Methylene Chloride	1.0 U	1.0	1	12/28/15 18:56	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/28/15 18:56	
Trichloroethene (TCE)	1.0 U	1.0	1	12/28/15 18:56	
Vinyl Chloride	**12**	1.0	1	12/28/15 18:56	
cis-1,2-Dichloroethene	**2.0**	1.0	1	12/28/15 18:56	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/28/15 18:56	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	108	85 - 122	12/28/15 18:56	
Dibromofluoromethane	107	89 - 119	12/28/15 18:56	
Toluene-d8	108	87 - 121	12/28/15 18:56	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	12/16/15 09:35
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	TRIP BLANK	**Units:**	ug/L
Lab Code:	R1511005-006	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/27/15 13:02	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/27/15 13:02	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/27/15 13:02	
1,1-Dichloroethene	1.0 U	1.0	1	12/27/15 13:02	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/27/15 13:02	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/27/15 13:02	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/27/15 13:02	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/27/15 13:02	
Benzene	1.0 U	1.0	1	12/27/15 13:02	
Carbon Tetrachloride	1.0 U	1.0	1	12/27/15 13:02	
Chlorobenzene	1.0 U	1.0	1	12/27/15 13:02	
Chloromethane	1.0 U	1.0	1	12/27/15 13:02	
Methylene Chloride	1.0 U	1.0	1	12/27/15 13:02	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/27/15 13:02	
Trichloroethene (TCE)	1.0 U	1.0	1	12/27/15 13:02	
Vinyl Chloride	1.0 U	1.0	1	12/27/15 13:02	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 13:02	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 13:02	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	109	85 - 122	12/27/15 13:02	
Dibromofluoromethane	112	89 - 119	12/27/15 13:02	
Toluene-d8	103	87 - 121	12/27/15 13:02	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ1515913-05	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/27/15 12:31	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/27/15 12:31	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/27/15 12:31	
1,1-Dichloroethene	1.0 U	1.0	1	12/27/15 12:31	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/27/15 12:31	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/27/15 12:31	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/27/15 12:31	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/27/15 12:31	
Benzene	1.0 U	1.0	1	12/27/15 12:31	
Carbon Tetrachloride	1.0 U	1.0	1	12/27/15 12:31	
Chlorobenzene	1.0 U	1.0	1	12/27/15 12:31	
Chloromethane	1.0 U	1.0	1	12/27/15 12:31	
Methylene Chloride	1.0 U	1.0	1	12/27/15 12:31	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/27/15 12:31	
Trichloroethene (TCE)	1.0 U	1.0	1	12/27/15 12:31	
Vinyl Chloride	1.0 U	1.0	1	12/27/15 12:31	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 12:31	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/27/15 12:31	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	111	85 - 122	12/27/15 12:31	
Dibromofluoromethane	109	89 - 119	12/27/15 12:31	
Toluene-d8	115	87 - 121	12/27/15 12:31	

Client:	Olin Corporation	**Service Request:**	R1511005
Project:	Niagara Falls	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ1515926-04	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/28/15 11:53	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/28/15 11:53	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/28/15 11:53	
1,1-Dichloroethene	1.0 U	1.0	1	12/28/15 11:53	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/28/15 11:53	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/28/15 11:53	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/28/15 11:53	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/28/15 11:53	
Benzene	1.0 U	1.0	1	12/28/15 11:53	
Carbon Tetrachloride	1.0 U	1.0	1	12/28/15 11:53	
Chlorobenzene	1.0 U	1.0	1	12/28/15 11:53	
Chloromethane	1.0 U	1.0	1	12/28/15 11:53	
Methylene Chloride	1.0 U	1.0	1	12/28/15 11:53	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/28/15 11:53	
Trichloroethene (TCE)	1.0 U	1.0	1	12/28/15 11:53	
Vinyl Chloride	1.0 U	1.0	1	12/28/15 11:53	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/28/15 11:53	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/28/15 11:53	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	111	85 - 122	12/28/15 11:53	
Dibromofluoromethane	109	89 - 119	12/28/15 11:53	
Toluene-d8	114	87 - 121	12/28/15 11:53	

Client: Olin Corporation
Project: Niagara Falls
Sample Matrix: Water

Service Request: R1511005
Date Analyzed: 12/28/15

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Units:ug/L
Basis:NA

Lab Control Sample
RQ1515926-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1-Trichloroethane	8260C	19.4	20.0	97	74-120
1,1,2,2-Tetrachloroethane	8260C	18.1	20.0	90	78-122
1,1,2-Trichloroethane	8260C	19.3	20.0	96	82-118
1,1-Dichloroethene	8260C	20.2	20.0	101	74-135
1,2,4-Trichlorobenzene	8260C	21.5	20.0	108	68-147
1,2-Dichlorobenzene	8260C	20.7	20.0	104	80-119
1,3-Dichlorobenzene	8260C	21.1	20.0	106	79-121
1,4-Dichlorobenzene	8260C	21.8	20.0	109	79-119
Benzene	8260C	21.0	20.0	105	76-118
Carbon Tetrachloride	8260C	18.9	20.0	94	68-125
Chlorobenzene	8260C	20.2	20.0	101	80-121
Chloromethane	8260C	19.8	20.0	99	69-145
Methylene Chloride	8260C	18.9	20.0	94	73-122
Tetrachloroethene (PCE)	8260C	21.7	20.0	109	78-124
Trichloroethene (TCE)	8260C	20.4	20.0	102	78-123
Vinyl Chloride	8260C	19.5	20.0	98	69-133
cis-1,2-Dichloroethene	8260C	18.9	20.0	94	80-121
trans-1,2-Dichloroethene	8260C	19.6	20.0	98	80-120

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Olin Corporation
Project: Niagara Falls
Sample Matrix: Water

Service Request: R1511005
Date Analyzed: 12/27/15

Duplicate Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Units:ug/L
Basis:NA

		Lab Control Sample RQ1515913-03			Duplicate Lab Control Sample RQ1515913-04					
Analyte Name	**Analytical Method**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,1,1-Trichloroethane	8260C	18.8	20.0	94	18.7	20.0	93	74-120	<1	30
1,1,2,2-Tetrachloroethane	8260C	20.4	20.0	102	19.7	20.0	98	78-122	3	30
1,1,2-Trichloroethane	8260C	20.8	20.0	104	20.3	20.0	102	82-118	2	30
1,1-Dichloroethene	8260C	19.0	20.0	95	18.8	20.0	94	74-135	<1	30
1,2,4-Trichlorobenzene	8260C	22.6	20.0	113	21.7	20.0	108	68-147	4	30
1,2-Dichlorobenzene	8260C	21.2	20.0	106	20.6	20.0	103	80-119	3	30
1,3-Dichlorobenzene	8260C	20.8	20.0	104	20.8	20.0	104	79-121	<1	30
1,4-Dichlorobenzene	8260C	21.4	20.0	107	21.6	20.0	108	79-119	1	30
Benzene	8260C	20.1	20.0	101	20.7	20.0	103	76-118	3	30
Carbon Tetrachloride	8260C	18.6	20.0	93	18.3	20.0	92	68-125	2	30
Chlorobenzene	8260C	20.0	20.0	100	20.5	20.0	103	80-121	2	30
Chloromethane	8260C	17.9	20.0	90	18.7	20.0	94	69-145	4	30
Methylene Chloride	8260C	18.1	20.0	91	18.6	20.0	93	73-122	2	30
Tetrachloroethene (PCE)	8260C	20.3	20.0	101	20.8	20.0	104	78-124	2	30
Trichloroethene (TCE)	8260C	19.1	20.0	96	19.6	20.0	98	78-123	2	30
Vinyl Chloride	8260C	18.2	20.0	91	19.0	20.0	95	69-133	4	30
cis-1,2-Dichloroethene	8260C	19.3	20.0	96	19.4	20.0	97	80-121	<1	30
trans-1,2-Dichloroethene	8260C	18.2	20.0	91	19.4	20.0	97	80-120	6	30

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

32366

ALS Environmental

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE _____ OF _____

Project Name: OLIN NIAGARA FALLS	Project Number: JOB 1133
Project Manager: RICK MCCLURE	Report CC: RICK MCCLURE
Company/Address: OLIN CORP 3855 NORTH OCOEE RD CLEVELAND TN 37312	
Phone #: 423-336-4000	Email: RWMCCLURE@Olin.com
Sampler's Signature:	Sampler's Printed Name: CHRIS JONES

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 1

NUMBER OF CONTAINERS

GC/MS VOAs ◦ 8260 ◦ 624 ◦ CLP
GC/MS SVOAs ◦ 8270 ◦ 625
GC VOAs ◦ 8021 ◦ 601/602
PESTICIDES ◦ 8081 ◦ 608
PCBs ◦ 8082 ◦ 608
METALS, TOTAL (List in comments below)
METALS, DISSOLVED (List in comments below)

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

REMARKS/ ALTERNATE DESCRIPTION

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX		
20B-1215		12/16/15	935	GW	3	3
19B-1215			1040		3	3
16B-1215			1140		3	3
27B-1215			1240		3	3
5BR-1215			1335		3	3
TRIP BLANKS						

SPECIAL INSTRUCTIONS/COMMENTS
Metals

CHEMBIOLOGICS SAMPLES

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 1 day _____ 2 day _____ 3 day
_____ 4 day _____ 5 day

REQUESTED REPORT DATE
STANDARD

REPORT REQUIREMENTS
_____ I. Results Only
X II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Ra

Edata _____Yes _____N

INVOICE INFORMATION
PO # REN 10012
BILL TO: OLIN CORP

R1511005 5
Olin Corporation
Niagara Falls GW System O&M

STATE WHERE SAMPLES WERE COLLECTED

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: CHRIS JONES	Printed Name: CHRIS JONES	Printed Name: CHRIS JONES	Printed Name: ALS DRIVER	Printed Name	Printed Name
Firm: SES	Firm: SES	Firm: SES	Firm	Firm	Firm
Date/Time: 12/16/15 1600	Date/Time: 12/16/15 1600	Date/Time: 12/17/15 800	Date/Time	Date/Time	Date/Time: 12/17/15 1315

Distribution: White - Lab Copy; Yellow - Return to Originator

Cooler Receipt and Preservation Check Form

R1511005 5
Olin Corporation
Niagara Falls GW System O&M

Project/Client Olin Folder Number R1511005

Cooler received on 12/17/15 by: @ COURIER: (ALS) UPS FEDEX VELOCITY CLIENT

1	Were **Custody seals** on outside of cooler?	(Y) N	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk, or Sulfide have sig* **bubbles**?	Y N NA
3	Did all bottles arrive in good **condition** (unbroken)?	(Y) N	6	Where did the bottles originate?	(ALS/ROC) CLIENT
4	Circle: (Wet Ice) **Dry Ice Gel packs** present?	(Y) N	7	Soil VOA received as: Bulk Encore 5035set	(NA)

8. Temperature Readings Date: 12/17/15 Time: 1327 ID: (IR#3) IR#5 From: (Temp Blank) Sample Bottle

Observed Temp (°C)	2.4	3.0	6.0	3.3			
Correction Factor (°C)	+0.5	-0.6	-0.6	-0.6			
Corrected Temp (°C)	2.9°	2.4°	5.4°	2.7°			
Within 0-6°C?	(Y) N	(Y) N	(Y) N	(Y) N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: 12-002 by @ 12/17/15 ~~18:14:05~~ at 1405
5035 samples placed in storage location: _____ by _____ on 12/17/15 at _____

PC Secondary Review: JMS 12/21/15

Cooler Breakdown: Date: 12/17/15 Time: 1836 by: DM

1. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? (YES) NO
2. Did all bottle labels and tags agree with custody papers? (YES) NO
3. Were correct containers used for the tests indicated? (YES) NO
4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated (NA)

Explain any discrepancies:

pH	Reagent	Yes	No	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3								
≤2	H_2SO_4								
<4	$NaHSO_4$								
Residual Chlorine (-)	For CN Phenol and 522			If +, contact PM to add $Na_2S_2O_3$ (CN), ascorbic (phenol).					
	$Na_2S_2O_3$	-	-						
	ZnAcetate	-	-						
	HCl	**	**	4114070	11/16				

**Not to be tested before analysis – pH tested and recorded by VOAs on a separate worksheet

Yes=All samples OK
No=Samples were preserved at The lab as listed
PM OK to Adjust: _____

Bottle lot numbers: 5-211-002
Other Comments:

PC Secondary Review: JMS 12/21/15

*significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

January 05, 2016 Service Request No:R1511006

Mr. Rick McClure
Olin Corporation
3855 North Ocoee Street
Suite 200
Cleveland, TN 37312

Laboratory Results for: Olin Niagara Falls

Dear Mr.McClure,

Enclosed are the results of the sample(s) submitted to our laboratory December 17, 2015
For your reference, these analyses have been assigned our service request number **R1511006.**

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

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ALS Group USA, Corp.
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CASE NARRATIVE

This report contains analytical results for the following samples:
Service Request Number: R1511006

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R1511006-001	OBA-1B-1215	12/15/2015	1350
R1511006-002	OBA-8B-1215	12/15/2015	1425
R1511006-003	OBA-11B-1215	12/15/2015	1505
R1511006-004	OBA-7B-1215	12/15/2015	1545
R1511006-005	DUP02-1215	12/15/2015	
R1511006-006	TRIP BLANK	12/15/2015	

All samples were received in good condition unless otherwise noted on the cooler receipt and preservation check form located at the end of this report.

All samples were preserved in accordance with approved analytical methods.

All samples have been analyzed by the approved methods cited on the analytical results pages.

All holding times and associated QC were within limits.

No analytical or QC problems were encountered.

All sampling activities performed by ALS personnel have been in accordance with "ALS Field Procedures and Measurements Manual" or by client specifications.

ALS Environmental

REPORT QUALIFIERS AND DEFINITIONS

U Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.

J Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).

B Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.

E Inorganics- Concentration is estimated due to the serial dilution was outside control limits.

E Organics- Concentration has exceeded the calibration range for that specific analysis.

D Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.

* Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.

H Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.

Spike was diluted out.

\+ Correlation coefficient for MSA is <0.995.

N Inorganics- Matrix spike recovery was outside laboratory limits.

N Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.

S Concentration has been determined using Method of Standard Additions (MSA).

W Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.

P Concentration >40% (25% for CLP) difference between the two GC columns.

C Confirmed by GC/MS

Q DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).

X See Case Narrative for discussion.

MRL Method Reporting Limit. Also known as:
LOQ Limit of Quantitation (LOQ)
The lowest concentration at which the method analyte may be reliably quantified under the method conditions.

MDL Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

LOD Limit of Detection. A value at or above the MDL which has been verified to be detectable.

ND Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

ACCREDITED IN ACCORDANCE WITH nelac

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	New Hampshire ID # 294100 A/B
Delaware Accredited	Nebraska Accredited	
DoD ELAP #65817	New Jersey ID # NY004	Pennsylvania ID# 68-786
Florida ID # E87674	New York ID # 10145	Rhode Island ID # 158
Illinois ID #200047	North Carolina #676	Virginia #460167

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to http://www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads/North-America-Downloads

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	12/15/15 13:50
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	OBA-1B-1215	**Units:**	ug/L
Lab Code:	R1511006-001	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/23/15 17:59	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/23/15 17:59	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/23/15 17:59	
1,1-Dichloroethene	1.0 U	1.0	1	12/23/15 17:59	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/23/15 17:59	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/23/15 17:59	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/23/15 17:59	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/23/15 17:59	
Benzene	1.0 U	1.0	1	12/23/15 17:59	
Carbon Tetrachloride	1.0 U	1.0	1	12/23/15 17:59	
Chlorobenzene	1.0 U	1.0	1	12/23/15 17:59	
Chloromethane	1.0 U	1.0	1	12/23/15 17:59	
Methylene Chloride	1.0 U	1.0	1	12/23/15 17:59	
Tetrachloroethene (PCE)	**9.6**	1.0	1	12/23/15 17:59	
Trichloroethene (TCE)	**12**	1.0	1	12/23/15 17:59	
Vinyl Chloride	1.0 U	1.0	1	12/23/15 17:59	
cis-1,2-Dichloroethene	**10**	1.0	1	12/23/15 17:59	
trans-1,2-Dichloroethene	**3.8**	1.0	1	12/23/15 17:59	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	98	85 - 122	12/23/15 17:59	
Dibromofluoromethane	103	89 - 119	12/23/15 17:59	
Toluene-d8	104	87 - 121	12/23/15 17:59	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	12/15/15 14:25
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	OBA-8B-1215	**Units:**	ug/L
Lab Code:	R1511006-002	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	50 U	50	50	12/23/15 19:12	
1,1,2,2-Tetrachloroethane	50 U	50	50	12/23/15 19:12	
1,1,2-Trichloroethane	50 U	50	50	12/23/15 19:12	
1,1-Dichloroethene	50 U	50	50	12/23/15 19:12	
1,2,4-Trichlorobenzene	**5200**	50	50	12/23/15 19:12	
1,2-Dichlorobenzene	**160**	50	50	12/23/15 19:12	
1,3-Dichlorobenzene	**310**	50	50	12/23/15 19:12	
1,4-Dichlorobenzene	**60**	50	50	12/23/15 19:12	
Benzene	50 U	50	50	12/23/15 19:12	
Carbon Tetrachloride	50 U	50	50	12/23/15 19:12	
Chlorobenzene	50 U	50	50	12/23/15 19:12	
Chloromethane	50 U	50	50	12/23/15 19:12	
Methylene Chloride	50 U	50	50	12/23/15 19:12	
Tetrachloroethene (PCE)	50 U	50	50	12/23/15 19:12	
Trichloroethene (TCE)	50 U	50	50	12/23/15 19:12	
Vinyl Chloride	50 U	50	50	12/23/15 19:12	
cis-1,2-Dichloroethene	50 U	50	50	12/23/15 19:12	
trans-1,2-Dichloroethene	50 U	50	50	12/23/15 19:12	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	98	85 - 122	12/23/15 19:12	
Dibromofluoromethane	100	89 - 119	12/23/15 19:12	
Toluene-d8	103	87 - 121	12/23/15 19:12	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	12/15/15 15:05
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	OBA-11B-1215	**Units:**	ug/L
Lab Code:	R1511006-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	25 U	25	25	12/26/15 20:32	
1,1,2,2-Tetrachloroethane	25 U	25	25	12/26/15 20:32	
1,1,2-Trichloroethane	25 U	25	25	12/26/15 20:32	
1,1-Dichloroethene	25 U	25	25	12/26/15 20:32	
1,2,4-Trichlorobenzene	**430**	25	25	12/26/15 20:32	
1,2-Dichlorobenzene	25 U	25	25	12/26/15 20:32	
1,3-Dichlorobenzene	**47**	25	25	12/26/15 20:32	
1,4-Dichlorobenzene	25 U	25	25	12/26/15 20:32	
Benzene	25 U	25	25	12/26/15 20:32	
Carbon Tetrachloride	25 U	25	25	12/26/15 20:32	
Chlorobenzene	25 U	25	25	12/26/15 20:32	
Chloromethane	25 U	25	25	12/26/15 20:32	
Methylene Chloride	25 U	25	25	12/26/15 20:32	
Tetrachloroethene (PCE)	25 U	25	25	12/26/15 20:32	
Trichloroethene (TCE)	**35**	25	25	12/26/15 20:32	
Vinyl Chloride	**1700**	25	25	12/26/15 20:32	
cis-1,2-Dichloroethene	**4200**	25	25	12/26/15 20:32	
trans-1,2-Dichloroethene	**38**	25	25	12/26/15 20:32	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	97	85 - 122	12/26/15 20:32	
Dibromofluoromethane	104	89 - 119	12/26/15 20:32	
Toluene-d8	103	87 - 121	12/26/15 20:32	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	12/15/15 15:45
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	OBA-7B-1215	**Units:**	ug/L
Lab Code:	R1511006-004	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	2.0 U	2.0	2	12/26/15 20:57	
1,1,2,2-Tetrachloroethane	2.0 U	2.0	2	12/26/15 20:57	
1,1,2-Trichloroethane	2.0 U	2.0	2	12/26/15 20:57	
1,1-Dichloroethene	2.0 U	2.0	2	12/26/15 20:57	
1,2,4-Trichlorobenzene	**210**	2.0	2	12/26/15 20:57	
1,2-Dichlorobenzene	**24**	2.0	2	12/26/15 20:57	
1,3-Dichlorobenzene	**22**	2.0	2	12/26/15 20:57	
1,4-Dichlorobenzene	**4.2**	2.0	2	12/26/15 20:57	
Benzene	**5.0**	2.0	2	12/26/15 20:57	
Carbon Tetrachloride	2.0 U	2.0	2	12/26/15 20:57	
Chlorobenzene	**4.6**	2.0	2	12/26/15 20:57	
Chloromethane	2.0 U	2.0	2	12/26/15 20:57	
Methylene Chloride	2.0 U	2.0	2	12/26/15 20:57	
Tetrachloroethene (PCE)	2.0 U	2.0	2	12/26/15 20:57	
Trichloroethene (TCE)	**3.6**	2.0	2	12/26/15 20:57	
Vinyl Chloride	2.0 U	2.0	2	12/26/15 20:57	
cis-1,2-Dichloroethene	**2.9**	2.0	2	12/26/15 20:57	
trans-1,2-Dichloroethene	2.0 U	2.0	2	12/26/15 20:57	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	97	85 - 122	12/26/15 20:57	
Dibromofluoromethane	103	89 - 119	12/26/15 20:57	
Toluene-d8	104	87 - 121	12/26/15 20:57	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	12/15/15
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	DUP02-1215	**Units:**	ug/L
Lab Code:	R1511006-005	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	50 U	50	50	12/23/15 18:47	
1,1,2,2-Tetrachloroethane	50 U	50	50	12/23/15 18:47	
1,1,2-Trichloroethane	50 U	50	50	12/23/15 18:47	
1,1-Dichloroethene	50 U	50	50	12/23/15 18:47	
1,2,4-Trichlorobenzene	**5600**	50	50	12/23/15 18:47	
1,2-Dichlorobenzene	**170**	50	50	12/23/15 18:47	
1,3-Dichlorobenzene	**330**	50	50	12/23/15 18:47	
1,4-Dichlorobenzene	**55**	50	50	12/23/15 18:47	
Benzene	50 U	50	50	12/23/15 18:47	
Carbon Tetrachloride	50 U	50	50	12/23/15 18:47	
Chlorobenzene	50 U	50	50	12/23/15 18:47	
Chloromethane	50 U	50	50	12/23/15 18:47	
Methylene Chloride	50 U	50	50	12/23/15 18:47	
Tetrachloroethene (PCE)	50 U	50	50	12/23/15 18:47	
Trichloroethene (TCE)	50 U	50	50	12/23/15 18:47	
Vinyl Chloride	50 U	50	50	12/23/15 18:47	
cis-1,2-Dichloroethene	50 U	50	50	12/23/15 18:47	
trans-1,2-Dichloroethene	50 U	50	50	12/23/15 18:47	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	101	85 - 122	12/23/15 18:47	
Dibromofluoromethane	104	89 - 119	12/23/15 18:47	
Toluene-d8	104	87 - 121	12/23/15 18:47	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	12/15/15
Sample Matrix:	Water	**Date Received:**	12/17/15 13:15
Sample Name:	TRIP BLANK	**Units:**	ug/L
Lab Code:	R1511006-006	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/23/15 17:34	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/23/15 17:34	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/23/15 17:34	
1,1-Dichloroethene	1.0 U	1.0	1	12/23/15 17:34	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/23/15 17:34	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/23/15 17:34	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/23/15 17:34	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/23/15 17:34	
Benzene	1.0 U	1.0	1	12/23/15 17:34	
Carbon Tetrachloride	1.0 U	1.0	1	12/23/15 17:34	
Chlorobenzene	1.0 U	1.0	1	12/23/15 17:34	
Chloromethane	1.0 U	1.0	1	12/23/15 17:34	
Methylene Chloride	1.0 U	1.0	1	12/23/15 17:34	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/23/15 17:34	
Trichloroethene (TCE)	1.0 U	1.0	1	12/23/15 17:34	
Vinyl Chloride	1.0 U	1.0	1	12/23/15 17:34	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/23/15 17:34	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/23/15 17:34	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	99	85 - 122	12/23/15 17:34	
Dibromofluoromethane	100	89 - 119	12/23/15 17:34	
Toluene-d8	102	87 - 121	12/23/15 17:34	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ1516080-01	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/23/15 11:51	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/23/15 11:51	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/23/15 11:51	
1,1-Dichloroethene	1.0 U	1.0	1	12/23/15 11:51	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/23/15 11:51	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/23/15 11:51	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/23/15 11:51	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/23/15 11:51	
Benzene	1.0 U	1.0	1	12/23/15 11:51	
Carbon Tetrachloride	1.0 U	1.0	1	12/23/15 11:51	
Chlorobenzene	1.0 U	1.0	1	12/23/15 11:51	
Chloromethane	1.0 U	1.0	1	12/23/15 11:51	
Methylene Chloride	1.0 U	1.0	1	12/23/15 11:51	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/23/15 11:51	
Trichloroethene (TCE)	1.0 U	1.0	1	12/23/15 11:51	
Vinyl Chloride	1.0 U	1.0	1	12/23/15 11:51	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/23/15 11:51	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/23/15 11:51	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	96	85 - 122	12/23/15 11:51	
Dibromofluoromethane	99	89 - 119	12/23/15 11:51	
Toluene-d8	103	87 - 121	12/23/15 11:51	

Client:	Olin Corporation	**Service Request:**	R1511006
Project:	Olin Niagara Falls	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ1600002-01	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1-Trichloroethane	1.0 U	1.0	1	12/26/15 13:39	
1,1,2,2-Tetrachloroethane	1.0 U	1.0	1	12/26/15 13:39	
1,1,2-Trichloroethane	1.0 U	1.0	1	12/26/15 13:39	
1,1-Dichloroethene	1.0 U	1.0	1	12/26/15 13:39	
1,2,4-Trichlorobenzene	1.0 U	1.0	1	12/26/15 13:39	
1,2-Dichlorobenzene	1.0 U	1.0	1	12/26/15 13:39	
1,3-Dichlorobenzene	1.0 U	1.0	1	12/26/15 13:39	
1,4-Dichlorobenzene	1.0 U	1.0	1	12/26/15 13:39	
Benzene	1.0 U	1.0	1	12/26/15 13:39	
Carbon Tetrachloride	1.0 U	1.0	1	12/26/15 13:39	
Chlorobenzene	1.0 U	1.0	1	12/26/15 13:39	
Chloromethane	1.0 U	1.0	1	12/26/15 13:39	
Methylene Chloride	1.0 U	1.0	1	12/26/15 13:39	
Tetrachloroethene (PCE)	1.0 U	1.0	1	12/26/15 13:39	
Trichloroethene (TCE)	1.0 U	1.0	1	12/26/15 13:39	
Vinyl Chloride	1.0 U	1.0	1	12/26/15 13:39	
cis-1,2-Dichloroethene	1.0 U	1.0	1	12/26/15 13:39	
trans-1,2-Dichloroethene	1.0 U	1.0	1	12/26/15 13:39	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	96	85 - 122	12/26/15 13:39	
Dibromofluoromethane	101	89 - 119	12/26/15 13:39	
Toluene-d8	100	87 - 121	12/26/15 13:39	

Client: Olin Corporation
Project: Olin Niagara Falls
Sample Matrix: Water

Service Request: R1511006
Date Analyzed: 12/23/15

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Units:ug/L
Basis:NA

Lab Control Sample
RQ1516080-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1-Trichloroethane	8260C	20.6	20.0	103	74-120
1,1,2,2-Tetrachloroethane	8260C	20.5	20.0	102	78-122
1,1,2-Trichloroethane	8260C	19.8	20.0	99	82-118
1,1-Dichloroethene	8260C	22.5	20.0	113	74-135
1,2,4-Trichlorobenzene	8260C	21.2	20.0	106	68-147
1,2-Dichlorobenzene	8260C	21.3	20.0	106	80-119
1,3-Dichlorobenzene	8260C	21.3	20.0	107	79-121
1,4-Dichlorobenzene	8260C	21.5	20.0	107	79-119
Benzene	8260C	21.0	20.0	105	76-118
Carbon Tetrachloride	8260C	18.9	20.0	95	68-125
Chlorobenzene	8260C	20.2	20.0	101	80-121
Chloromethane	8260C	20.9	20.0	104	69-145
Methylene Chloride	8260C	21.5	20.0	108	73-122
Tetrachloroethene (PCE)	8260C	19.6	20.0	98	78-124
Trichloroethene (TCE)	8260C	21.1	20.0	106	78-123
Vinyl Chloride	8260C	21.0	20.0	105	69-133
cis-1,2-Dichloroethene	8260C	21.5	20.0	108	80-121
trans-1,2-Dichloroethene	8260C	21.0	20.0	105	80-120

Client: Olin Corporation
Project: Olin Niagara Falls
Sample Matrix: Water

Service Request: R1511006
Date Analyzed: 12/26/15

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Units:ug/L
Basis:NA

Lab Control Sample
RQ1600002-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1-Trichloroethane	8260C	21.3	20.0	106	74-120
1,1,2,2-Tetrachloroethane	8260C	20.5	20.0	103	78-122
1,1,2-Trichloroethane	8260C	19.9	20.0	99	82-118
1,1-Dichloroethene	8260C	22.2	20.0	111	74-135
1,2,4-Trichlorobenzene	8260C	18.1	20.0	90	68-147
1,2-Dichlorobenzene	8260C	19.4	20.0	97	80-119
1,3-Dichlorobenzene	8260C	19.9	20.0	99	79-121
1,4-Dichlorobenzene	8260C	20.1	20.0	100	79-119
Benzene	8260C	19.8	20.0	99	76-118
Carbon Tetrachloride	8260C	20.7	20.0	103	68-125
Chlorobenzene	8260C	19.4	20.0	97	80-121
Chloromethane	8260C	20.0	20.0	100	69-145
Methylene Chloride	8260C	19.9	20.0	99	73-122
Tetrachloroethene (PCE)	8260C	18.6	20.0	93	78-124
Trichloroethene (TCE)	8260C	20.2	20.0	101	78-123
Vinyl Chloride	8260C	20.6	20.0	103	69-133
cis-1,2-Dichloroethene	8260C	20.9	20.0	105	80-121
trans-1,2-Dichloroethene	8260C	20.7	20.0	104	80-120

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

32365

ALS Environmental

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE _____ OF _____

Project Name: OLIN - NIAGARA FALLS	Project Number: JOB 1133
Project Manager: RICK McCLURE	Report CC: Rick McClure
Company/Address: OLIN CORP 3855 NORTH OCOEE RD CLEVELAND TN 37312	
Phone #: 423 - 336 - 4000	Email: RWMcClure@Olin.com
Sampler's Signature:	Sampler's Printed Name: CHRIS JONES

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 1

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS		GC/MS VOAs ● 8260 ○ 624 ○ CLP	GC/MS SVOAs ○ 8270 ○ 625	GC VOAs ● 8021 ○ 601/602	PESTICIDES ○ 8081 ○ 608	PCBs ○ 8082 ○ 608	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)
OBA - 1B - 1215		12/15/15	1350	GW	3	3			X				
OBA - 8B - 1215			1425		3	3							
OBA - 11B - 1215			1505		3	3							
OBA - 7B - 1215			1545		3	3							
DUP02 - 1215			—		3	3							
TRIP BLANKS													

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

REMARKS/ ALTERNATE DESCRIPTION

SPECIAL INSTRUCTIONS/COMMENTS
Metals

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 1 day _____ 2 day _____ 3 day
_____ 4 day _____ 5 day
REQUESTED REPORT DATE: STANDARD

REPORT REQUIREMENTS
_____ I. Results Only
X II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
Edata _____ Yes _____ No

INVOICE INFORMATION
PO # REN 100 12
BILL TO: OLIN CORP

STATE WHERE SAMPLES WERE COLLECTED

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: CHRIS JONES	Printed Name: CHRIS JONES	Printed Name: CHRIS JONES	Printed Name	Printed Name	Printed Name
Firm: SES	Firm: SES	Firm: SES	Firm	Firm	Firm
Date/Time: 12/15/15 1600	Date/Time: 12/15/15 1600	Date/Time: 12/17/15 800	Date/Time	Date/Time	Date/Time: 12/17/15 1315

R1511006 5
Olin Corporation
Niagara Falls GW System O&M

Distribution: White - Lab Copy; Yellow - Return to Originator

Cooler Receipt and Preservati

R1511006 5
Olin Corporation
Niagara Falls GW System O&M

Project/Client Olin Folder Number

Cooler received on 12/17/15 by: @

COURIER: (ALS) UPS FEDEX VELOCITY CLIENT

1	Were **Custody seals** on outside of cooler?	(Y) N	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	Y N NA
3	Did all bottles arrive in good **condition** (unbroken)?	(Y) N	6	Where did the bottles originate?	(ALS/ROC) CLIENT
4	Circle: (Wet Ice) **Dry Ice Gel packs** present?	(Y) N	7	Soil VOA received as: Bulk Encore 5035set	(NA)

8. Temperature Readings Date: 12/17/15 Time: 1327 ID: (IR#3) IR#5 From: (Temp Blank) Sample Bottle

Observed Temp (°C)	2.4	3.0	6.0	3.3			
Correction Factor (°C)	+0.5	-0.6	-0.6	-0.6			
Corrected Temp (°C)	2.90	2.4	5.4°	2.7°			
Within 0-6°C?	(Y) N	(Y) N	(Y) N	(Y) N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: 12-002 by @ 12/17/15 ~~12/17/15 1405~~ at 1405
5035 samples placed in storage location: _____ by _____ on 12/17/15 at _____

PC Secondary Review: JMS 12/21/15

Cooler Breakdown: Date: 12/17/15 Time: 1405 by: MDS

1. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? (YES) NO
2. Did all bottle labels and tags agree with custody papers? (YES) NO
3. Were correct containers used for the tests indicated? (YES) NO
4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated (N/A)

Explain any discrepancies:

pH	Reagent	Yes	No	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3								
≤2	H_2SO_4								
<4	$NaHSO_4$								
Residual Chlorine (-)	For CN Phenol and 522			If+, contact PM to add $Na_2S_2O_3$ (CN), ascorbic (phenol).					
	$Na_2S_2O_3$	-	-						
	ZnAcetate	-	-						
	HCl	**	**	4114070	11/16				

**Not to be tested before analysis -- pH tested and recorded by VOAs on a separate worksheet

Yes=All samples OK

No=Samples were preserved at The lab as listed

PM OK to Adjust: _____

Bottle lot numbers: 5-211-002
Other Comments:

PC Secondary Review: JMS 12/21/15

*significant air bubbles: VOA > 5-6 mm ; WC >1 in. diameter

APPENDIX B

HISTORICAL AERIAL PHOTOGRAPHS

2400 Buffalo Ave
2400 Buffalo Ave
Niagara Falls, NY 14303

Inquiry Number: 4533271.12
February 09, 2016

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography February 09, 2016

Target Property:

2400 Buffalo Ave

Niagara Falls, NY 14303

Year	***Scale***	***Details***	***Source***
1938	Aerial Photograph. Scale: 1"=500'	Flight Date: August 03, 1938	USGS
1951	Aerial Photograph. Scale: 1"=500'	Flight Date: October 14, 1951	USGS
1963	Aerial Photograph. Scale: 1"=500'	Flight Date: May 07, 1963	USGS
1970	Aerial Photograph. Scale: 1"=500'	Flight Date: June 23, 1970	EDR
1978	Aerial Photograph. Scale: 1"=500'	Flight Date: October 31, 1978	USGS
1981	Aerial Photograph. Scale: 1"=1000'	Flight Date: October 21, 1981	EDR
1985	Aerial Photograph. Scale: 1"=500'	Flight Date: May 03, 1985	USGS
1995	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: March 28, 1995	USGS/DOQQ
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
2008	Aerial Photograph. Scale: 1"=500'	Flight Year: 2008	USDA/NAIP
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	USDA/NAIP
2011	Aerial Photograph. Scale: 1"=500'	Flight Year: 2011	USDA/NAIP

INQUIRY #: 4533271.12

YEAR: 1938

= 500'

N

EDR

INQUIRY #: 4533271.12

YEAR: 1951

= 500'

N

EDR


INQUIRY #: 4533271.12
YEAR: 1963
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 1970
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 1978
= 500'
N
EDR

INQUIRY #: 4533271.12

YEAR: 1981

= 1000'

N

EDR


INQUIRY #: 4533271.12
YEAR: 1985
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 1995
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 2006
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 2008
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 4533271.12
YEAR: 2011
= 500'
N
EDR