



# Forensic Analytical

ENVIRONMENTAL HEALTH CONSULTANTS

## Odor Evaluation

*Findings of Volatile Organic Compound Sampling*

**Riverside Community College**

**Math Science Building**

**4578 Saunders St.**

**Riverside, CA 92501**

**March 21, 2013**

**Prepared for:**

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**FACS Project #PJ19003**

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## Introduction

Forensic Analytical Consulting Services, Inc. (FACS) was retained by Riverside City College (RCC) to perform an odor evaluation in Room 306, at the Math Science Building at Riverside City College. The evaluation was at the request of Mr. Michael Simmons of RCC following odor complaints by building occupants which they attribute to potentially poor indoor air quality.

The purpose of the evaluation was to 1) in general, identify and evaluate potential explanations, sources and pathways for the odors observed by the occupants; 2) provide information for consideration in assessing risk to occupants; and 3) provide recommendations for additional investigation and/or corrective actions as necessary.

## Site Characterization

The subject building is a four story structure located on campus at Riverside Community College. The building houses the Math and Science department on campus; which includes laboratories, classrooms, teacher office spaces, a chemical storage room, restrooms, conference rooms and auditorium.

The subject room (complaint - 306) is a laboratory classroom located on the third floor of the building. The room is currently being used as an Organismal and Evolutionary Biology room and includes typical laboratory equipment and furniture. The adjacent room (control – 305) was also similar in nature and usage.

The subject building is served by one large air handling unit.

## History

Based on conversations with various parties, the following history was developed.

- The LEED certified building began occupancy in February 2012.
- Between May 10 – August 31, 2012: FACS visited the subject building on numerous occasions, specifically the 4<sup>th</sup> floor, to assess in environment health services. (See FACS reports dated June 8, 2012; June 25, 2012; & September 9, 2012).
- According to school, building and room occupants, a disagreeable odor is intermittently being observed by occupants during classroom hours. According to the parties, the odor occurs on no specific day or time. The odor was described as both a solvent-type odor and a WD-40- like odor.

## Scope of Work

In the course of this project, FACS conducted the following scope of work:

1. Development of a site characterization and history (see sections above).
2. Visual inspection of two subject classrooms.
3. Collection of air samples for volatile organic compounds (VOCs) in complaint room – 306 (odor observed) and non-complaint room - 305 (no odor observed).

The data collected in the course of the investigation is presented in this report as follows:

- Appendix A - FACS Data Collection Methods
- Appendix B – Evaluation Criteria
- Appendix C – Sampling Results Table
- Appendix D – Analytical Laboratory Report

## Findings

### March 12, 2013

#### *General Findings*

On March 12, 2013, FACS arrived on site to perform environmental health services at the subject building, specifically classroom 306, following complaints of a disagreeable odor by building occupants. The investigation includes a visual assessment of the building for possible odor sources. Per building representatives, the odor was described as a WD-40 type odor.

At the time of the assessment no odor observed by FACS or any occupants in the area during the assessment. No potential sources contributing to the disagreeable odor was identified.

Due to the absence of the disagreeable odor during the FACS assessment, sampling media (evacuated canisters - Summa) were provided to building representatives for sample collection during the odor occurrence.

### March 13, 2013

#### *General Findings*

According to Dr. Virginia White, the disagreeable odor was observed in Room 306 at approximately 4 p.m. on March 13, 2013. Dr. White opened one of the evacuated canisters in the complaint classroom, as well as the non-complaint (no odor observed) classroom (305). The canisters were set to collect air instantaneously (< 5 minutes).

#### *Sampling & Monitoring Results*

Evacuated canisters (i.e. Summa) were used to collect air samples for analysis by GC/MS (gas chromatography/mass spectrometry) for VOCs using EPA T0-15 method. Laboratory analysis requests also included total volatile organic compounds (TVOCs, quantified as toluene), and tentatively identified compounds (top ten peaks in each sample's chromatogram). Concentration results were expressed in parts per billion (ppb).

When comparing the complaint sample to the control sample, the following findings were developed:

- Twenty four chemicals were observed above their respective detection limit in Room 306 (complaint). Only seven chemicals were observed above their respective detection limit in Room 305 (non-complaint).
- All seven chemicals observed in Room 305 were also observed in Room 306. Six of the seven measured chemicals were at concentrations less than Room 306, with the exception of n-Butane.
- Laboratory results revealed that the majority of compounds and their respective concentrations were similar to those found in a typical indoor environment (i.e. acetone, ethanol, isopropyl alcohol) for both samples.

- Results from the tentatively identified compounds collected in the complaint classroom (306) revealed compounds suspected to be the source of the odor issue. Several benzene derivatives, specifically “heavy aromatics” were measured in Room 306. Odors associated with these compounds are similar to those described by Room 306 occupants (WD-40-like).
- No tentatively identified compounds were found in the non-complaint room.

All samples were further compared with a series of occupational exposure limits and environmental reference levels (see Appendix B for evaluation criteria). However, it should be noted that the absence of a specific occupational exposure limit or environmental reference level should not be interpreted as a non-hazardous chemical.

With regard to the reference levels, the following findings are made:

- Where applicable, all indoor VOC level were below available occupational exposure references.
- VOCs with concentrations greater than the control sample, but lower than the OEHHA levels were not deemed to present significant exposure risk.
- There were no VOCs observed with concentrations greater than the OEHHA reference levels (when applicable).
- Currently no occupational exposure limits or environmental reference levels available for any of the benzene derivatives measured in the complaint sample. However, all results were measured at relatively low concentrations <10ppb. Additional research is necessary to evaluate potential hazards associated with the measured compounds.

## Conclusions

There are many chemicals that can contribute to odors in indoor environments. Odor itself is not a good indication if something is hazardous. For example, some dangerous chemicals have no odor (carbon monoxide) or what some would consider a pleasant odor (vinyl chloride), while some relatively safe substances may have a very offensive odor.

Based on this investigation, the following conclusions are reached:

1. All samples had concentration levels at a fraction of occupational exposure limits such as Cal/OSHA PELs or ACGIH TLVs (where applicable). These standards and guidelines are applicable mainly to occupational environments and not necessarily relevant to non-industrial indoor environments. Additionally, indoor VOC levels found were also below levels that would present health concerns based on OEHHA and EPA guidelines designed to be protective of sensitive individuals over a lifetime of exposure (where applicable).
2. In general, the majority of VOC data collected is representative of that commonly found in indoor environment, with the exception of the benzene derivatives observed in Room 306 (see information below).
3. Benzene derivatives measured in the complaint room sample appear to be the source of the disagreeable odor observed by the occupants. Odors typically associated with these compounds are similar to those described by occupants. Benzene derivatives, similar to those observed in the laboratory report, are generally associated with adhesive products, petroleum distillate carriers (i.e. pesticides) and cleaning products. Additional research is necessary in order to determine the health hazard risks associated with the compounds.

## Recommendations

Based on this investigation, the following recommendations are made. FACS recommends that an investigation into the specific product source of the WD-40 like odor be performed. Benzene derivatives, similar to those observed in the laboratory report are generally associated with adhesive products, petroleum distillate carriers (i.e. pesticides) and cleaning products. Therefore, FACS recommends that an interview of building occupants of Room 306 be conducted. Specifically to find out if any recent changes have been made to the room (i.e. pesticidal use; use of adhesives; renovation). If no additional information can be provided, FACS recommends the use of a direct reading instrument for total VOC levels (e.g. photo ionization detector) during the next odor occurrence. An area survey for the room could be used to potentially determine the specific location of the odor source.

## Limitations

This investigation is limited to the conditions and practices observed and information made available to FACS. The methods, conclusions, and recommendations provided are based on FACS' judgment, experience and the standard of practice for professional service. They are subject to the limitations and variability inherent in the methodology employed. As with all environmental investigations, this investigation is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.

Please do not hesitate to contact our office at 310-668-5600 if you have any additional questions or concerns. Thank you for the opportunity to assist Riverside City College in promoting a more healthful environment.

Respectfully,  
FORENSIC ANALYTICAL

REVIEWED BY

*Michelle Rosales*

Michelle Rosales, MPH, CIH



# Appendix A: Materials and Methods

## Volatile Organic Compounds in Air

Samples for VOCs were collected using an evacuated (negative pressure relative to the surrounding atmosphere) canister supplied by LA Testing of Garden Grove (an AIHA accredited laboratory). In the laboratory the air captured in the canisters was analyzed using a GC/MS (Gas Chromatography/ Mass Spectroscopy) according to the EPA method TO-15 (including tentatively identified compounds and total VOC analysis).

# Appendix B:

## Detailed Reference Levels

### Occupational Exposure Limits

- California Occupational Safety & Health Administration (Cal/OSHA) Permissible Exposure Limits (PELs)
  - Definition: The Cal/OSHA PELs are regulated by the California Code of Regulations §5155 and represent the maximum permitted 8-hour time-weighted average concentration of an airborne contaminant. Employee exposure to an airborne contaminant during the workday shall not exceed the PEL specified for that substance. Table AC-1 of CCR §5155 presents concentration limits for airborne contaminants to which nearly all workers may be exposed daily during a 40-hour workweek for a working lifetime without adverse effect.
  - Source: California Code of Regulations § 5155, Table AC-1  
[http://www.dir.ca.gov/title8/5155table\\_ac1.html](http://www.dir.ca.gov/title8/5155table_ac1.html)
- National Institute of Occupational Safety & Health (NIOSH) Recommended Exposure Limits (RELs)
  - Definition: The NIOSH RELs represent the maximum recommended time-weighted average concentration for up to a 10-hour work day to which nearly all workers may be exposure daily during a 40-hour work week over a working lifetime without adverse effect. These RELs are not regulatory limits or standards, but recommendations made to OSHA based on NIOSH's evaluation of all known and available medical, biological, engineering, chemical, trade and other information relevant to the hazard.
  - Source: NIOSH Pocket Guide to Chemical Hazards <http://www.cdc.gov/niosh/npg/>
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs)
  - Definition: The ACGIH TLVs represent the maximum recommended 8-hour time weighted average daily exposure to which nearly all workers may be exposed during a 40-hour work week over a working lifetime without an unreasonable risk of diseases or injury. TLVs are not regulatory standards, but are designed for use as guidelines by industrial hygiene professionals. TLVs are health-based values established by committees that review existing published and peer-reviewed literature in various scientific disciplines (e.g., industrial hygiene, toxicology, occupational medicine and epidemiology) for relevant hazards.
  - Source: ACGIH 2012 TLVs and BEIs

### Environmental Reference Levels

- California Office of Environmental Health Hazard Assessment (OEHHA) Non-Cancer Reference Exposure Levels (RELs)
  - Definition: OEHHA RELs present the concentration at or below which no adverse health effects are anticipated for the specified time in the general human population. These levels were developed as part of the Air Toxics Hot Spots Program. RELs are based on the most sensitive relevant adverse health effect reported in the medical and toxicological literature; they are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety. OEHHA reports three categories of REL: chronic, acute, and inhalation, which are further described below:



- Chronic: intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health over a lifetime of exposure to a particular hazard.
    - Acute: intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health due to acute exposure to a particular hazard. The Acute REL is based on the lowest available severity level derived from acute exposure studies. The target exposure averaging time period for evaluation using the Acute REL is 1 hour.
    - 8-hour Inhalation: intended to protect individuals with low susceptibility for chemical injury as well as identifiable sensitive subpopulations (high-risk individuals) from adverse health due to exposure to a particular hazard. The 8-hour inhalation REL is based on the lowest available severity level derived from exposure studies. The target exposure averaging time period for evaluation using the Acute REL is 8 hours.
  - Source: <http://oehha.ca.gov/air/allrels.html>
- EPA Building Assessment Survey and Evaluation (BASE) Study
    - Definition: The EPA BASE Study was conducted over a five-year period from 1994-1998 in order to characterize indoor air quality in representative public and commercial office buildings in the United States. Among other data, the study provides ranges of indoor air quality data that is expected to be observed in typical indoor office environments, based on data collected from one hundred randomly selected public and commercial office buildings in thirty-seven cities in twenty-five States. The following publication details the VOC data collected and reported as part of the EPA BASE Study, and was used as a reference for normative levels of VOCs in indoor office environments.
    - Source: Girman, JR, et.al., "Individual Volatile Organic Compound Prevalence and Concentrations in 56 Buildings of the Building Assessment Survey and Evaluation (BASE) Study". Proceedings of Indoor Air 1999, II, pp. 460-465, (1999) ([http://www.epa.gov/iaq/base/pdfs/base\\_2\\_460.pdf](http://www.epa.gov/iaq/base/pdfs/base_2_460.pdf))

## Appendix C: Results Table

Analyte	RCC Building (ppb)		Environmental Reference Levels (ppb)				Occupational Ref. Levels (ppb)		
	Room 306 Complaint	Room 305 Non-Comp	OEHHA Chronic (CREL)	OEHHA 1-Hr Acute (AREL)	OEHHA 8-Hr Inhal. (REL)	EPA Base Range	Cal/OSHA (PEL)	NIOSH (REL)	ACGIH (TLV)
Freon 12 (Dichlorodifluoromethane)	0.54	0.53	N/A	N/A	N/A	N/A	42,000	4,950,000	4,950,000
Chloromethane	0.61	0.56	N/A	N/A	N/A	N/A	105,000	Ca	103,000
n-Butane	0.69	0.88	N/A	N/A	N/A	N/A	1,900,000	1,900,000	1,900,000
Ethanol	37	14	N/A	N/A	N/A	N/A	1,900,000	1,900,000	1,900,000
isopropyl alcohol	3.1	0.9	7,000	3,200	N/A	N/A	980,000	980,000	490,000
Acetone	16	7.7	N/A	N/A	N/A	7.1-220	1,200,000	590,000	1,200,000
2-Butanone (MEK)	0.86	0.59	N/A	N/A	N/A	0.7-18	590,000	590,000	590,000
Cyclohexane	0.83	BD	N/A	N/A	N/A	NA	300,000	300,000	300,000
Toluene	0.93	BD	300	37,000	N/A	1.6-360	188,000	376,000	75,200
xylene (para & meta)	1.7	BD	700	22,000	N/A	0.8-96	100,000	100,000	100,000
xylene (ortho)	0.73	BD	700	22,000	N/A	.3-38	100,000	100,000	100,000
Naphthalene	0.71	BD	9	N/A	N/A	0.3-9.7	10,000	10,000	10,000
butane, 2-methyl	1.5	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
d-limonene	9.5	BD	N/A	N/A	N/A	0.3-140	N/A	N/A	N/A
Acetic Acid, 1,1-dimethylethyl e..	3.1	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene, 1-methyl-3-propyl-	2	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene, 1-methyl-2-(1-methyleth.	3.1	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene,2-ethyl-1,4-dimethyl-	2.2	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene,2-ethyl-1,4-(1-methyleth	2.5	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene, 4-ethyl-1,2-dimethyl	4.4	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene, 1,2,3,4-tetramethyl-	4.7	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene, 1,2,4,5-tetramethyl-	9	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unknown	3.2	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A
benzene, 1-ethenyl-3-ethyl	1.6	BD	N/A	N/A	N/A	N/A	N/A	N/A	N/A

BD - Below Detection Limit; N/A – Not Applicable



## Appendix D: Analytical Laboratory Reports

The following analytical laboratory report and chain of custody / submittal form can be found in this Appendix.

LA Testing 33130367



11652 Knott St, Unit F5  
Garden Grove, CA 92841  
Phone: (800)755-1794  
Fax: (714) 828-4944

[losalamitoslab@latesting.com](mailto:losalamitoslab@latesting.com)

03/19/13

Michelle Rosales  
Forensic Analytical  
3777 Depot Road, Suite 413  
Hayward, CA 94545  
Phone: 510-887-8828

**Lab ID No. 331303673**  
**RE: TO-15 Results**  
**Project: N/A**

Attached please find the lab report and associated results for the above referenced analysis. If you have any questions or need further information please do not hesitate to contact LA Testing at the above listed number.

Reviewed By:

Sam Lee, TO15 Chemist

Approved By:

Mike Chapman, Laboratory Manager





# Air Analysis Data Summary

## EPA Compendium TO-15

### Target Compound List

<b>Client Project Name:</b> N/A	<b>LA Testing ID:</b> 331303673-1
<b>Client Sample ID:</b> 306	<b>Canister ID:</b> T2064
<b>Primary Lab File ID:</b> 03181307.D	<b>Dilution Lab File ID:</b> 03181319.D
<b>Analysis Date:</b> 03/18/13	<b>Analysis Date:</b> 03/18/13
<b>Sample Volume(mL):</b> 250	<b>Sample Volume(mL):</b> 50
<b>Dilution Factor:</b> 1	<b>Dilution Factor:</b> 5

Target Compound	CAS#	MW	Results ppbv	RL ppbv	Q	Results ug/m <sup>3</sup>	RL ug/m <sup>3</sup>
Propylene	115-07-1	58.08	ND	1.0		ND	2.4
Freon 12(Dichlorodifluoromethane)	75-71-8	120.9	0.54	0.50		2.7	2.5
Freon 114(1,2-Dichlorotetrafluoroethane)	76-14-2	170.9	ND	0.50		ND	3.5
Chloromethane	74-87-3	50.49	0.61	0.50		1.3	1.0
n-Butane	106-97-8	58.12	0.69	0.50		1.6	1.2
Vinyl chloride	75-01-4	62.50	ND	0.50		ND	1.3
1,3-Butadiene	106-99-0	54.09	ND	0.50		ND	1.1
Bromomethane	74-83-9	94.94	ND	0.50		ND	1.9
Chloroethane	75-00-3	64.52	ND	0.50		ND	1.3
Ethanol	64-17-5	46.07	37	2.50	D	70	4.71
Bromoethene (Vinyl bromide)	593-60-2	109.9	ND	0.50		ND	2.2
Freon 11(Trichlorofluoromethane)	75-69-4	137.4	ND	0.50		ND	2.8
Isopropyl alcohol(2-Propanol)	67-63-0	60.10	3.1	0.50		7.5	1.2
Freon 113(1,1,2-Trichlorotrifluoroethane)	76-13-1	187.4	ND	0.50		ND	3.8
Acetone	67-64-1	58.08	16	0.50		39	1.2
1,1-Dichloroethene	75-35-4	96.94	ND	0.50		ND	2.0
Acetonitrile	75-05-8	41.00	ND	0.50		ND	0.84
Tertiary butyl alcohol (TBA)	75-65-0	74.12	ND	0.50		ND	1.5
Bromoethane (Ethyl bromide)	74-96-4	108.0	ND	0.50		ND	2.2
3-Chloropropene (Allyl chloride)	107-05-1	76.53	ND	0.50		ND	1.6
Carbon disulfide	75-15-0	76.14	ND	0.50		ND	1.6
Methylene chloride	75-09-2	84.94	ND	0.50		ND	1.7
Acrylonitrile	107-13-1	53.00	ND	1.00		ND	2.2
Methyl-tert-butyl ether(MTBE)	1634-04-4	88.15	ND	0.50		ND	1.8
trans-1,2-Dichloroethene	156-60-5	96.94	ND	0.50		ND	2.0
n-Hexane	110-54-3	86.17	ND	0.50		ND	1.8
1,1-Dichloroethane	75-34-3	98.96	ND	0.50		ND	2.0
Vinyl acetate	108-05-4	86.00	ND	0.50		ND	1.8
2-Butanone(MEK)	78-93-3	72.10	0.86	0.50		2.5	1.5
cis-1,2-Dichloroethene	156-59-2	96.94	ND	0.50		ND	2.0
Ethyl acetate	141-78-6	88.10	ND	0.50		ND	1.8
Chloroform	67-66-3	119.4	ND	0.50		ND	2.4
Tetrahydrofuran	109-99-9	72.11	ND	0.50		ND	1.5
1,1,1-Trichloroethane	71-55-6	133.4	ND	0.50		ND	2.7
Cyclohexane	110-82-7	84.16	0.83	0.50		2.9	1.7
2,2,4-Trimethylpentane (Isooctane)	540-54-1	114.2	ND	0.50		ND	2.3
Carbon tetrachloride	56-23-5	153.8	ND	0.50		ND	3.1
n-Heptane	142-82-5	100.2	ND	0.50		ND	2.0
1,2-Dichloroethane	107-06-2	98.96	ND	0.50		ND	2.0
Benzene	71-43-2	78.11	ND	0.50		ND	1.6
Trichloroethene	79-01-6	131.4	ND	0.50		ND	2.7



# Air Analysis Data Summary

## EPA Compendium TO-15

### Target Compound List

<b>Client Project Name:</b> N/A	<b>LA Testing ID:</b> 331303673-1
<b>Client Sample ID:</b> 306	<b>Canister ID:</b> T2064
<b>Primary Lab File ID:</b> 03181307.D	<b>Dilution Lab File ID:</b> 03181319.D
<b>Analysis Date:</b> 03/18/13	<b>Analysis Date:</b> 03/18/13
<b>Sample Volume(mL):</b> 250	<b>Sample Volume(mL):</b> 50
<b>Dilution Factor:</b> 1	<b>Dilution Factor:</b> 5

Target Compound	CAS#	MW	Results ppbv	RL ppbv	Q	Results ug/m <sup>3</sup>	RL ug/m <sup>3</sup>
1,2-Dichloropropane	78-87-5	113.0	ND	0.50		ND	2.3
Methyl Methacrylate	80-62-6	100.1	ND	0.50		ND	2.0
Bromodichloromethane	75-27-4	163.8	ND	0.50		ND	3.3
1,4-Dioxane	123-91-1	88.12	ND	0.50		ND	1.8
4-Methyl-2-pentanone(MIBK)	108-10-1	100.2	ND	0.50		ND	2.0
cis-1,3-Dichloropropene	10061-01-5	111.0	ND	0.50		ND	2.3
Toluene	108-88-3	92.14	0.93	0.50		3.5	1.9
trans-1,3-Dichloropropene	10061-02-6	111.0	ND	0.50		ND	2.3
1,1,2-Trichloroethane	79-00-5	133.4	ND	0.50		ND	2.7
2-Hexanone(MBK)	591-78-6	100.1	ND	0.50		ND	2.0
Tetrachloroethene	127-18-4	165.8	ND	0.50		ND	3.4
Dibromochloromethane	124-48-1	208.3	ND	0.50		ND	4.3
1,2-Dibromoethane	106-93-4	187.8	ND	0.50		ND	3.8
Chlorobenzene	108-90-7	112.6	ND	0.50		ND	2.3
Ethylbenzene	100-41-4	106.2	ND	0.50		ND	2.2
Xylene (para & meta)	1330-20-7	106.2	1.7	1.0		7.3	4.3
Xylene (Ortho)	95-47-6	106.2	0.73	0.50		3.2	2.2
Styrene	100-42-5	104.1	ND	0.50		ND	2.1
Isopropylbenzene (cumene)	98-82-8	120.2	ND	0.50		ND	2.5
Bromoform	75-25-2	252.8	ND	0.50		ND	5.2
1,1,2,2-Tetrachloroethane	79-34-5	167.9	ND	0.50		ND	3.4
4-Ethyltoluene	622-96-8	120.2	ND	0.50		ND	2.5
1,3,5-Trimethylbenzene	108-67-8	120.2	ND	0.50		ND	2.5
2-Chlorotoluene	95-49-8	126.6	ND	0.50		ND	2.6
1,2,4-Trimethylbenzene	95-63-6	120.2	ND	0.50		ND	2.5
1,3-Dichlorobenzene	541-73-1	147.0	ND	0.50		ND	3.0
1,4-Dichlorobenzene	106-46-7	147.0	ND	0.50		ND	3.0
Benzyl chloride	100-44-7	126.0	ND	0.50		ND	2.6
1,2-Dichlorobenzene	95-50-1	147.0	ND	0.50		ND	3.0
1,2,4-Trichlorobenzene	120-82-1	181.5	ND	0.50		ND	3.7
Hexachloro-1,3-butadiene	87-68-3	260.8	ND	0.50		ND	5.3
Naphthalene	91-20-3	128.2	0.71	0.50		3.7	2.6

#### Surrogate

4-Bromofluorobenzene

Result

10.34

Spike

10

%Recovery

103

#### Qualifier Definitions

B= Compound also found in method blank.

E = Estimated concentration exceeding upper calibration range.

D = Result reported from diluted analysis

ND = Non Detect





# Air Analysis Data Summary

## EPA Compendium TO-15

### Target Compound List

<b>Client Project Name:</b> N/A	<b>LA Testing ID:</b> 331303673-2
<b>Client Sample ID:</b> 305	<b>Canister ID:</b> T1978
<b>Primary Lab File ID:</b> 03181308.D	<b>Dilution Lab File ID:</b> N/A
<b>Analysis Date:</b> 03/18/13	<b>Analysis Date:</b> N/A
<b>Sample Volume(mL):</b> 250	<b>Sample Volume(mL):</b> N/A
<b>Dilution Factor:</b> 1	<b>Dilution Factor:</b> N/A

Target Compound	CAS#	MW	Results ppbv	RL ppbv	Q	Results ug/m <sup>3</sup>	RL ug/m <sup>3</sup>
Propylene	115-07-1	58.08	ND	1.0		ND	2.4
Freon 12(Dichlorodifluoromethane)	75-71-8	120.9	0.53	0.50		2.6	2.5
Freon 114(1,2-Dichlorotetrafluoroethane)	76-14-2	170.9	ND	0.50		ND	3.5
Chloromethane	74-87-3	50.49	0.56	0.50		1.2	1.0
n-Butane	106-97-8	58.12	0.88	0.50		2.1	1.2
Vinyl chloride	75-01-4	62.50	ND	0.50		ND	1.3
1,3-Butadiene	106-99-0	54.09	ND	0.50		ND	1.1
Bromomethane	74-83-9	94.94	ND	0.50		ND	1.9
Chloroethane	75-00-3	64.52	ND	0.50		ND	1.3
Ethanol	64-17-5	46.07	14	0.50		26	0.94
Bromoethene (Vinyl bromide)	593-60-2	109.9	ND	0.50		ND	2.2
Freon 11(Trichlorofluoromethane)	75-69-4	137.4	ND	0.50		ND	2.8
Isopropyl alcohol(2-Propanol)	67-63-0	60.10	0.90	0.50		2.2	1.2
Freon 113(1,1,2-Trichlorotrifluoroethane)	76-13-1	187.4	ND	0.50		ND	3.8
Acetone	67-64-1	58.08	7.7	0.50		18	1.2
1,1-Dichloroethene	75-35-4	96.94	ND	0.50		ND	2.0
Acetonitrile	75-05-8	41.00	ND	0.50		ND	0.84
Tertiary butyl alcohol (TBA)	75-65-0	74.12	ND	0.50		ND	1.5
Bromoethane (Ethyl bromide)	74-96-4	108.0	ND	0.50		ND	2.2
3-Chloropropene (Allyl chloride)	107-05-1	76.53	ND	0.50		ND	1.6
Carbon disulfide	75-15-0	76.14	ND	0.50		ND	1.6
Methylene chloride	75-09-2	84.94	ND	0.50		ND	1.7
Acrylonitrile	107-13-1	53.00	ND	1.00		ND	2.2
Methyl-tert-butyl ether(MTBE)	1634-04-4	88.15	ND	0.50		ND	1.8
trans-1,2-Dichloroethene	156-60-5	96.94	ND	0.50		ND	2.0
n-Hexane	110-54-3	86.17	ND	0.50		ND	1.8
1,1-Dichloroethane	75-34-3	98.96	ND	0.50		ND	2.0
Vinyl acetate	108-05-4	86.00	ND	0.50		ND	1.8
2-Butanone(MEK)	78-93-3	72.10	0.59	0.50		1.7	1.5
cis-1,2-Dichloroethene	156-59-2	96.94	ND	0.50		ND	2.0
Ethyl acetate	141-78-6	88.10	ND	0.50		ND	1.8
Chloroform	67-66-3	119.4	ND	0.50		ND	2.4
Tetrahydrofuran	109-99-9	72.11	ND	0.50		ND	1.5
1,1,1-Trichloroethane	71-55-6	133.4	ND	0.50		ND	2.7
Cyclohexane	110-82-7	84.16	ND	0.50		ND	1.7
2,2,4-Trimethylpentane (Isooctane)	540-54-1	114.2	ND	0.50		ND	2.3
Carbon tetrachloride	56-23-5	153.8	ND	0.50		ND	3.1
n-Heptane	142-82-5	100.2	ND	0.50		ND	2.0
1,2-Dichloroethane	107-06-2	98.96	ND	0.50		ND	2.0
Benzene	71-43-2	78.11	ND	0.50		ND	1.6
Trichloroethene	79-01-6	131.4	ND	0.50		ND	2.7





# Air Analysis Data Summary

## EPA Compendium TO-15

### Target Compound List

<b>Client Project Name:</b> N/A	<b>LA Testing ID:</b> 331303673-2
<b>Client Sample ID:</b> 305	<b>Canister ID:</b> T1978
<b>Primary Lab File ID:</b> 03181308.D	<b>Dilution Lab File ID:</b> N/A
<b>Analysis Date:</b> 03/18/13	<b>Analysis Date:</b> N/A
<b>Sample Volume(mL):</b> 250	<b>Sample Volume(mL):</b> N/A
<b>Dilution Factor:</b> 1	<b>Dilution Factor:</b> N/A

Target Compound	CAS#	MW	Results ppbv	RL ppbv	Q	Results ug/m <sup>3</sup>	RL ug/m <sup>3</sup>
1,2-Dichloropropane	78-87-5	113.0	ND	0.50		ND	2.3
Methyl Methacrylate	80-62-6	100.1	ND	0.50		ND	2.0
Bromodichloromethane	75-27-4	163.8	ND	0.50		ND	3.3
1,4-Dioxane	123-91-1	88.12	ND	0.50		ND	1.8
4-Methyl-2-pentanone(MIBK)	108-10-1	100.2	ND	0.50		ND	2.0
cis-1,3-Dichloropropene	10061-01-5	111.0	ND	0.50		ND	2.3
Toluene	108-88-3	92.14	ND	0.50		ND	1.9
trans-1,3-Dichloropropene	10061-02-6	111.0	ND	0.50		ND	2.3
1,1,2-Trichloroethane	79-00-5	133.4	ND	0.50		ND	2.7
2-Hexanone(MBK)	591-78-6	100.1	ND	0.50		ND	2.0
Tetrachloroethene	127-18-4	165.8	ND	0.50		ND	3.4
Dibromochloromethane	124-48-1	208.3	ND	0.50		ND	4.3
1,2-Dibromoethane	106-93-4	187.8	ND	0.50		ND	3.8
Chlorobenzene	108-90-7	112.6	ND	0.50		ND	2.3
Ethylbenzene	100-41-4	106.2	ND	0.50		ND	2.2
Xylene (para & meta)	1330-20-7	106.2	ND	1.0		ND	4.3
Xylene (Ortho)	95-47-6	106.2	ND	0.50		ND	2.2
Styrene	100-42-5	104.1	ND	0.50		ND	2.1
Isopropylbenzene (cumene)	98-82-8	120.2	ND	0.50		ND	2.5
Bromoform	75-25-2	252.8	ND	0.50		ND	5.2
1,1,2,2-Tetrachloroethane	79-34-5	167.9	ND	0.50		ND	3.4
4-Ethyltoluene	622-96-8	120.2	ND	0.50		ND	2.5
1,3,5-Trimethylbenzene	108-67-8	120.2	ND	0.50		ND	2.5
2-Chlorotoluene	95-49-8	126.6	ND	0.50		ND	2.6
1,2,4-Trimethylbenzene	95-63-6	120.2	ND	0.50		ND	2.5
1,3-Dichlorobenzene	541-73-1	147.0	ND	0.50		ND	3.0
1,4-Dichlorobenzene	106-46-7	147.0	ND	0.50		ND	3.0
Benzyl chloride	100-44-7	126.0	ND	0.50		ND	2.6
1,2-Dichlorobenzene	95-50-1	147.0	ND	0.50		ND	3.0
1,2,4-Trichlorobenzene	120-82-1	181.5	ND	0.50		ND	3.7
Hexachloro-1,3-butadiene	87-68-3	260.8	ND	0.50		ND	5.3
Naphthalene	91-20-3	128.2	ND	0.50		ND	2.6

#### Surrogate

4-Bromofluorobenzene

Result

10.48

Spike

10

%Recovery

105

#### Qualifier Definitions

B= Compound also found in method blank.

E = Estimated concentration exceeding upper calibration range.

D = Result reported from diluted analysis

ND = Non Detect



# Air Analysis Data Summary

## EPA Compendium TO-15

### Tentatively Identified Compounds

<b>Client Project Name:</b> N/A	<b>LA Testing ID:</b> 331303673-2
<b>Client Sample ID:</b> 305	<b>Canister ID:</b> T1978
<b>Primary Lab File ID:</b> 03181308.D	<b>Dilution Lab File ID:</b> N/A
<b>Analysis Date:</b> 03/18/13	<b>Analysis Date:</b> N/A
<b>Sample Volume(mL):</b> 250	<b>Sample Volume(mL):</b> N/A
<b>Dilution Factor:</b> 1	<b>Dilution Factor:</b> N/A

Tentatively Identified Compounds	CAS#	MW(1)	Results ppbv	Q	Results ug/m3	Retention Time
No TICs Found						

**Qualifier Definitions**

B = Compound also found in method blank  
 J = Estimated value based on a 1:1 response to internal standard  
 N = Presumptive evidence of compound based on library match

(1) = If unknown, MW is assigned as equivalent Toluene (92) for ug/m3 conversion purposes





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