



28 March 2022

Mr. Chris Locarno
Director of Finance and Facilities
Central Vermont Supervisory Union #68
111B Brush Hill Road
Williamstown, Vermont 05679

Re: Indoor Air Quality Assessment – Williamstown Middle and High School
Williamstown, Vermont
K-D Project No. 20173-001

Dear Mr. Locarno:

At your request, K-D Associates, Inc. conducted an indoor air quality assessment of the Williamstown Middle and High School in Williamstown, Vermont. This assessment was conducted as part of a periodic monitoring plan for all schools within the Central Vermont Supervisory Union. The assessment included measurements of carbon monoxide (CO), carbon dioxide (CO₂), relative humidity (%RH), temperature (°F), and volatile organic compounds (VOC's). Measurements were made both indoors and outdoors for comparison purposes. The assessment was conducted on the morning of February 22, 2022. This report includes a description of the testing methodologies and measurements made while on site, laboratory analysis results for VOC's and airborne mold spores, a floor plan sketch showing the location of mold and VOC sampling, and a discussion of the sampling results.

Field Screening Results

Field screening results for carbon monoxide (CO), carbon dioxide (CO₂), relative humidity (%RH), and temperature (F) are presented below. All measurements were made using an Extech EA80 Indoor Air Quality Meter, MSA Altair4 Carbon Monoxide meter.

<u>Location</u>	<u>CO</u> <u>(ppm)</u>	<u>CO₂</u> <u>(ppm)</u>	<u>Temp</u> <u>(°F)</u>	<u>RH</u> <u>(%)</u>
Outdoors	0	430	38.0	20.0
Room 235	0	410	73.0	21.6
Hallway	0	386	70.6	20.8
Cafeteria	0	400	71.2	21.8
Room 170	0	398	70.0	21.7
Room 168	0	397	70.1	21.5
Hallway	0	399	70.0	20.9
Room 123	0	400	70.3	21.6
Entry	0	395	69.2	22.1
Gymnasium	0	395	69.0	22.8
Room 256	0	407	70.1	22.4
Room 113	0	401	70.0	23.0
Health Office	0	408	70.8	22.1
Men's Room	0	411	70.0	22.0
Student Support	0	401	71.0	22.2

Temperature and Relative Humidity

Indoor temperatures ranged from 69.0 to 73.0 degrees F throughout the school. Most people are comfortable in this temperature range when sedentary or slightly active with a relative humidity above 20%. Relative humidity ranged from 20.9% to 22.8%, which is within what is generally a comfortable range of 20% to 60%.

Carbon Dioxide

The adequacy of ventilation can sometimes be evaluated using CO₂ measurements. CO₂ is a normal constituent of exhaled breath and, if monitored, can be used as a screening technique to evaluate whether adequate quantities of fresh air are being introduced and CO₂ exhausted. The outdoor ambient concentration of CO₂ is typically between 375 and 450 parts per million (ppm). Usually the CO₂ level is higher inside than outside, even in buildings with few complaints about indoor air quality. CO₂ levels ranged from a low of 395 ppm to a high of 411 ppm. As a rule of thumb, indoor CO₂ concentrations greater than 1000 ppm are an indication of inadequate ventilation. These measurements are within expected limits. The school was unoccupied at the time of these measurements.

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless and toxic gas. Improperly vented gas, oil or kerosene heaters, or poorly adjusted and maintained combustion devices are typical sources of carbon monoxide. Auto and bus exhaust also contains carbon monoxide, which can be introduced into indoor air through poorly located fresh air intakes to a heating/ventilation system. Monitored with a calibrated, direct-reading air monitor, the levels of carbon monoxide in the office were recorded for comparison to the OSHA Permissible Exposure Limit (PEL) of 50 parts per million (ppm). Carbon Monoxide measurements were found to be 0 ppm in all areas.

Volatile Organic Compounds

The VOC sampling utilized Mini Can collection devices and high flow regulators to collect grab samples of the indoor air. The indoor sampler was placed in Room 162 as shown on the attached floor plan. At the end of the sampling period, the sample canisters were shipped under chain-of-custody to EMSL Analytical, Inc, for laboratory analysis. Analysis was performed by EPA Method TO-15, using GC/MS to identify 62 regulated target compounds. The EMSL laboratory report for this sample is attached. All target compounds sampled for, were found to be either none detected (ND) or well within the National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Level (REL) and the Occupational Safety and Health Administration (OSHA) Permissible Exposure Level (PEL). None of the compounds sampled for, exceeded the EPA Residential Screening Levels or the Vermont Residential Indoor Air Standard.

Airborne Mold Spores

Laboratory analysis results for four Air-O-Cell cassettes, which were used to collect air samples from three areas within the school and outdoors (for comparison) are attached. Analysis of these samples provides a rough measure of airborne spores and a general description of the species present.

Air-O-Cell cassettes are a self-contained sampling device with a pre-applied collection/sampling media. Potential, inadvertent contamination is prevented because the media does not require handling. This method generally provides good consistency between samples. The cassettes are attached to a high volume, sampling pump with an adaptor and air is drawn through the cassettes. Particles (spores, pollen and other particles) in the air being sampled impact the slide, coated with a sticky transparent "acrylic" substrate and adhere. The pump is calibrated at the beginning and the end of the sampling period, using a rotometer to measure the flow rate at the face of the cassette. The cassette inlet orifice is oriented at a 45° angle downward and a minimum of 15 liters per minute is maintained for approximately 5 to 10 minutes. At the completion of sampling, the cassette is sealed and transported to the laboratory for analysis. Analysis data is separated into three categories: fungal spores, pollen, and other particles. Each category is looked at individually for interpretation. We are primarily concerned with the number of spores per cubic meter of air and the variety of spores found.

The total airborne spore count in Location A (Room 235) was 0 spores per cubic meter of air, 0 spores per cubic meter of air in Location B (Room 168), and 53 spores per cubic meter of air in Location C (Gymnasium). The total airborne spore counts in the interior locations sampled at the school were all very low and at a level that would not be considered unusual in an indoor environment. The spores identified are also common in both indoor and outdoor environments.

Mold Types Identified

Basidiospores - Are usually unicellular spores produced by thousands of different fungi generally considered to be outdoor molds (fungi including mushrooms, bracket fungi, puffballs, etc.).

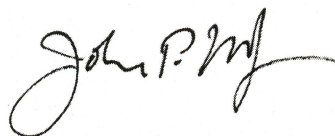
Discussion

None of the testing results described above indicate unusual conditions that would suggest poor indoor air quality at the time of testing.

The field measurements made were well within expected limits. Temperature and relative humidity appear to be adequately controlled, to the extent that the system allows, within comfortable levels. No detectable level of carbon monoxide could be detected at the time of the survey and carbon dioxide measurements did not appear to be elevated. The results of the screening for volatile organic compounds does not appear to represent an indoor air quality concern and airborne mold spores are within an expected range.

Please do not hesitate to call if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "John P. Madigan". The signature is fluid and cursive, with the first name "John" being the most prominent part.

John P. Madigan



Environmental Consulting
& Contracting

Date Sampled: 2/22/22

Date Analyzed: 3/1/22

Fungal Spore Air Sample Report

Air Cassette Analysis by Optical Microscopy (KDAI SOP-MICRO)

Client:	Central Vermont Supervisory Union
Address:	111B Brush Hill Rd., Williamstown, VT 05679
KDAI Proj. No.:	20173-001
Sample Location:	Williamstown Middle & High School, 120 Herbert Rd., Williamstown, VT

Lab ID No.	3381-2988	3381-2960	3381-7743	
Sample ID/Location	A Room 235	B Room 168	C Gymnasium	
Sample Vol. (Liters)	75	75	75	
Background Debris*	1	1	1	

	raw count	spores/M3	%	raw count	spores/M3	%	raw count	spores/M3	%	
<i>Alternaria</i>										
Ascospores-other										
<i>Aspergillus/Penicillium</i>										
Basidiospores-other							1	53	100.0	
<i>Bipolaris/Drechslera</i>										
<i>Botrytis</i>										
<i>Chaetomium</i>										
<i>Cladosporium</i>										
<i>Curvularia</i>										
<i>Epicoccum</i>										
<i>Ganoderma</i>										
deuteromycetes-other										
<i>Pithomyces</i>										
Rusts										
Smuts, <i>Myxomycetes</i>										
<i>Stachybotrys</i>										
<i>Ulocladium</i>										
Unidentifiable spores										
Other:										
TOTAL		0	/M³		0	/M³		53	/M³	

* Background debris is an indicator of the amount of non-fungal biological and non-biological particulate matter present on the sample and is characterized as 1-very light, 2-moderate, 3-heavy, or 4-very heavy. Very heavy background debris (+4) may obscure spores, reducing spore visibility during analysis, prohibiting accurate identification and quantification.

Note: When the raw count of fungal spores is greater than 500, estimation techniques are used in the calculation of the reported counts.

Bryan Schultz

Bryan Schultz, Laboratory Manager

**EMSL ANALYTICAL, INC.**

200 Route 130 North
 Cinnaminson, NJ 08077
 Telephone: (856)858-4800 FAX: (856)858-4571
to15lab@EMSL.com | <http://www.EMSL.com>

EMSL ORDER ID: 492200129
EMSL CUSTOMER ID: KDAI50
EMSL SAMPLE ID: 492200129-0002
CUSTOMER SAMPLE ID: Williamstown HS

Attention: John Madigan
 KD Associates, Inc.
 41 IDX Drive
 Suite 209
 South Burlington, VT 05403-7757

Customer PO:
EMSL Project ID:
Project Name: CVSU IAQ

Phone: 802-862-7490
Email: john@kdassociatesinc.com

Collected: 02/23/2022 11:00
Received: 03/02/2022 13:25
Analyzed: See Results
Reported: 3/14/2022

Analysis Initial	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
	03/08/2022	TP	J3391.D	HD9513	250 cc	1

Target Compound Results Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
Propylene	115-07-1	42.08	ND	1.0		ND	1.7	
Freon 12(Dichlorodifluoromethane)	75-71-8	120.9	ND	0.50		ND	2.5	
Freon 114(1,2-Dichlorotetrafluoroethan	76-14-2	170.9	ND	0.50		ND	3.5	
Chloromethane	74-87-3	50.49	0.62	0.50		1.3	1.0	
n-Butane	106-97-8	58.12	7.5	0.50		18	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	64.51	ND	0.50		ND	1.3	
Ethanol	64-17-5	46.07	77	0.50	E	140	0.94	
Bromoethene(Vinyl bromide)	593-60-2	106.9	ND	0.50		ND	2.2	
Freon 11(Trichlorofluoromethane)	75-69-4	137.4	0.75	0.50		4.2	2.8	
Isopropyl alcohol(2-Propanol)	67-63-0	60.09	3.2	0.50		7.8	1.2	
Freon 113(1,1,2-Trichlorotrifluoroethan	76-13-1	187.4	ND	0.50		ND	3.8	
Acetone	67-64-1	58.08	5.6	0.50		13	1.2	
1,1-Dichloroethene	75-35-4	96.94	ND	0.50		ND	2.0	
Acetonitrile	75-05-8	41.05	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	109.0	ND	0.50		ND	2.2	
3-Chloropropene(Allyl chloride)	107-05-1	76.52	ND	0.50		ND	1.6	
Carbon disulfide	75-15-0	76.14	ND	0.50		ND	1.6	
Methylene chloride	75-09-2	84.93	ND	0.50		ND	1.7	
Acrylonitrile	107-13-1	53.08	ND	0.50		ND	1.1	
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	86.18	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	86.09	ND	0.50		ND	1.8	
2-Butanone(MEK)	78-93-3	72.11	ND	0.50		ND	1.5	
cis-1,2-Dichloroethene	156-59-2	96.94	ND	0.50		ND	2.0	
Ethyl acetate	141-78-6	88.11	1.4	0.50		4.9	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)	540-84-1	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	
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	88.11	ND	0.50		ND	1.8	

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	03/08/2022	TP	J3391.D	HD9513	250 cc	1

Target Compound Results Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
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	100.2	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	187.9	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 (p,m)	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	252.7	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	126.6	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	181.4	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	
Total Target Compound Concentrations:			100	ppbv		190	ug/m3	

Surrogate
 4-Bromofluorobenzene

Result 9.8 **Spike** 10 **Recovery** 98%

Qualifier Definitions**ND = Non Detect**

B = Compound also found in method blank.

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

J= Concentration estimated between Reporting Limit and MDL.

Method Reference

USEPA: Compendium Method TO-15, "Determination of Volatile Organic Compounds (VOCs) in Air..." Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), January 1999, (EPA/625/R-96/010b).

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EMSL SAMPLE ID: 492200129-0002

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Attention: John Madigan
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Analysis Initial	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
	03/08/2022	TP	J3391.D	HD9513	250 cc	1

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
Propylene	NC	115-07-1	42.08	ND		ND	N.E.		N.E.	
Freon 12(Dichlorodifluoromethane)	NC	75-71-8	120.9	ND		ND	4900000		4900000	
Freon 114(1,2-Dichlorotetrafluoroethan	--	76-14-2	170.9	ND		ND	7000000		7000000	
Chloromethane	NC	74-87-3	50.49	0.62		1.3	LFC		210000	
n-Butane	--	106-97-8	58.12	7.5		18	1900000		N.E.	
Vinyl chloride	C	75-01-4	62.50	ND		ND	LFC		2600	
1,3-Butadiene	C	106-99-0	54.09	ND		ND	LFC		2200	
Bromomethane	NC	74-83-9	94.94	ND		ND	LFC		78000	
Chloroethane	NC	75-00-3	64.51	ND		ND	LFC		2600000	
Ethanol	--	64-17-5	46.07	77	E	140	1900000		1900000	
Bromoethene(Vinyl bromide)	C	593-60-2	106.9	ND		ND	LFC		N.E.	
Freon 11(Trichlorofluoromethane)	--	75-69-4	137.4	0.75		4.2	5600000		5600000	
Isopropyl alcohol(2-Propanol)	NC	67-63-0	60.09	3.2		7.8	980000		980000	
Freon 113(1,1,2-Trichlorotrifluoroethan	NC	76-13-1	187.4	ND		ND	7700000		7700000	
Acetone	NC	67-64-1	58.08	5.6		13	590000		2400000	
1,1-Dichloroethene	NC	75-35-4	96.94	ND		ND	790000		N.E.	
Acetonitrile	NC	75-05-8	41.05	ND		ND	34000		67000	
Tertiary butyl alcohol(TBA)	--	75-65-0	74.12	ND		ND	300000		300000	
Bromoethane(Ethyl bromide)	--	74-96-4	109.0	ND		ND	880000		880000	
3-Chloropropene(Allyl chloride)	C	107-05-1	76.52	ND		ND	3100		3100	
Carbon disulfide	NC	75-15-0	76.14	ND		ND	3100		62000	
Methylene chloride	C	75-09-2	84.93	ND		ND	LFC		87000	
Acrylonitrile	C	107-13-1	53.08	ND		ND	2200		4300	
Methyl-tert-butyl ether(MTBE)	C	1634-04-4	88.15	ND		ND	N.E.		N.E.	
trans-1,2-Dichloroethene	--	156-60-5	96.94	ND		ND	790000		790000	
n-Hexane	NC	110-54-3	86.18	ND		ND	180000		1800000	
1,1-Dichloroethane	C	75-34-3	98.96	ND		ND	400000		400000	
Vinyl acetate	NC	108-05-4	86.09	ND		ND	14000		N.E.	
2-Butanone(MEK)	NC	78-93-3	72.11	ND		ND	590000		590000	
cis-1,2-Dichloroethene	--	156-59-2	96.94	ND		ND	790000		790000	
Ethyl acetate	NC	141-78-6	88.11	1.4		4.9	1400000		1400000	
Chloroform	C	67-66-3	119.4	ND		ND	9800		240000	
Tetrahydrofuran	NC	109-99-9	72.11	ND		ND	590000		590000	
1,1,1-Trichloroethane	NC	71-55-6	133.4	ND		ND	1900000		1900000	
Cyclohexane	NC	110-82-7	84.16	ND		ND	1000000		1000000	
2,2,4-Trimethylpentane(Isooctane)	--	540-84-1	114.2	ND		ND	N.E.		N.E.	
Carbon tetrachloride	C	56-23-5	153.8	ND		ND	13000		63000	
n-Heptane	NC	142-82-5	100.2	ND		ND	350000		2000000	
1,2-Dichloroethane	C	107-06-2	98.96	ND		ND	4000		200000	
Benzene	C	71-43-2	78.11	ND		ND	320		3200	
Trichloroethene	C	79-01-6	131.4	ND		ND	130000		540000	
1,2-Dichloropropane	C	78-87-5	113.0	ND		ND	LFC		350000	
Methyl Methacrylate	NC	80-62-6	100.1	ND		ND	410000		410000	
Bromodichloromethane	C	75-27-4	163.8	ND		ND	N.E.		N.E.	
1,4-Dioxane	C	123-91-1	88.11	ND		ND	3600		360000	
4-Methyl-2-pentanone(MIBK)	NC	108-10-1	100.2	ND		ND	200000		410000	
cis-1,3-Dichloropropene**	C	10061-01-5	111.0	ND		ND	4500		N.E.	

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Collected: 02/23/2022 11:00
 Received: 03/02/2022 13:25
 Analyzed: See Results
 Reported: 3/14/2022

Analysis Initial	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
	03/08/2022	TP	J3391.D	HD9513	250 cc	1

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
Toluene	NC	108-88-3	92.14	ND		ND	380000		750000	
trans-1,3-Dichloropropene**	C	10061-02-6	111.0	ND		ND	4500		N.E.	
1,1,2-Trichloroethane	C	79-00-5	133.4	ND		ND	55000		55000	
2-Hexanone(MBK)	NC	591-78-6	100.2	ND		ND	4100		410000	
Tetrachloroethene	C	127-18-4	165.8	ND		ND	LFC		680000	
Dibromochloromethane	--	124-48-1	208.3	ND		ND	N.E.		N.E.	
1,2-Dibromoethane	C	106-93-4	187.9	ND		ND	350		150000	
Chlorobenzene	NC	108-90-7	112.6	ND		ND	N.E.		350000	
Ethylbenzene	C	100-41-4	106.2	ND		ND	430000		430000	
Xylene (p,m)	NC	1330-20-7	106.2	ND		ND	430000		430000	
Xylene (Ortho)	NC	95-47-6	106.2	ND		ND	430000		430000	
Styrene	NC	100-42-5	104.1	ND		ND	210000		430000	
Isopropylbenzene (cumene)	NC	98-82-8	120.2	ND		ND	250000		250000	
Bromoform	C	75-25-2	252.7	ND		ND	5200		5200	
1,1,2,2-Tetrachloroethane	C	79-34-5	167.9	ND		ND	6900		34000	
4-Ethyltoluene	--	622-96-8	120.2	ND		ND	N.E.		N.E.	
1,3,5-Trimethylbenzene	NC	108-67-8	120.2	ND		ND	120000		N.E.	
2-Chlorotoluene	--	95-49-8	126.6	ND		ND	260000		N.E.	
1,2,4-Trimethylbenzene	NC	95-63-6	120.2	ND		ND	120000		N.E.	
1,3-Dichlorobenzene	--	541-73-1	147.0	ND		ND	N.E.		N.E.	
1,4-Dichlorobenzene	C	106-46-7	147.0	ND		ND	LFC		450000	
Benzyl chloride	C	100-44-7	126.6	ND		ND	5200		5200	
1,2-Dichlorobenzene	NC	95-50-1	147.0	ND		ND	300000		300000	
1,2,4-Trichlorobenzene	NC	120-82-1	181.4	ND		ND	37000		N.E.	
Hexachloro-1,3-butadiene	C	87-68-3	260.8	ND		ND	210		N.E.	
Naphthalene	C	91-20-3	128.2	ND		ND	52000		52000	

**The concentrations of each isomer should be added if multiple isomers are present and compared to the total screening level.

Exposure Limit Definitions

REL= Recommended Exposure Limit, PEL= Permissible Exposure Limit

Agency Definitions

NIOSH= The National Institute for Occupational Safety and Health

OSHA= Occupational Safety and Health Administration

Reference

Occupational Safety and Health Administration (OSHA) (2017) Air Contaminants. 29 CFR 1910.1000 [82 FR 2735, January 9, 2017].

Carcinogenic (C) Exceedance

Value exceeds the theoretical risk that 1 additional case of cancer will occur in a population of 1 million than statistically expected.

Thus is a theoretical risk and not an actual epidemiological one.

The > column is used to flag exceedances as marked

Compound Exposure Definitions

NE= No Limit Established NS= No Screening Value

LFC= Lowest Feasible Concentration

Qualifier Definitions

B = Compound also found in method blank.

ND = Non Detect

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

J= Concentration estimated between Reporting Limit and MDL.

NonCarcinogenic (NC) Exceedance

Value exceeds the theoretical risk that 1 in a population of 100,000 will experience deleterious health effects.

Thus is a theoretical risk and not an actual epidemiological one.

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EMSL SAMPLE ID: 492200129-0002

CUSTOMER SAMPLE ID: Williamstown HS

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	03/08/2022	TP	J3391.D	HD9513	250 cc	1

USEPA Residential Regional Screening Levels (RSL) at THQ 0.1

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	Carcinogenic ug/m3	>	Non-Carcin. ug/m3	>
Propylene	NC	115-07-1	42.08	ND		ND	N.E.		310	
Freon 12(Dichlorodifluoromethane)	NC	75-71-8	120.9	ND		ND	N.E.		10.0	
Freon 114(1,2-Dichlorotetrafluoroethan	--	76-14-2	170.9	ND		ND	N.E.		N.E.	
Chloromethane	NC	74-87-3	50.49	0.62		1.3	N.E.		9.40	
n-Butane	--	106-97-8	58.12	7.5		18	N.E.		N.E.	
Vinyl chloride	C	75-01-4	62.50	ND		ND	0.170		10.0	
1,3-Butadiene	C	106-99-0	54.09	ND		ND	0.0940		0.210	
Bromomethane	NC	74-83-9	94.94	ND		ND	N.E.		0.520	
Chloroethane	NC	75-00-3	64.51	ND		ND	N.E.		1000	
Ethanol	--	64-17-5	46.07	77	E	140	N.E.		N.E.	
Bromoethene(Vinyl bromide)	C	593-60-2	106.9	ND		ND	0.190		0.310	
Freon 11(Trichlorofluoromethane)	--	75-69-4	137.4	0.75		4.2	N.E.		N.E.	
Isopropyl alcohol(2-Propanol)	NC	67-63-0	60.09	3.2		7.8	N.E.		21.0	
Freon 113(1,1,2-Trichlorotrifluoroethan	NC	76-13-1	187.4	ND		ND	N.E.		520	
Acetone	NC	67-64-1	58.08	5.6		13	N.E.		3200	
1,1-Dichloroethene	NC	75-35-4	96.94	ND		ND	N.E.		21.0	
Acetonitrile	NC	75-05-8	41.05	ND		ND	N.E.		6.30	
Tertiary butyl alcohol(TBA)	--	75-65-0	74.12	ND		ND	N.E.		N.E.	
Bromoethane(Ethyl bromide)	--	74-96-4	109.0	ND		ND	N.E.		N.E.	
3-Chloropropene(Allyl chloride)	C	107-05-1	76.52	ND		ND	0.470		0.100	
Carbon disulfide	NC	75-15-0	76.14	ND		ND	N.E.		73.0	
Methylene chloride	C	75-09-2	84.93	ND		ND	100		63.0	
Acrylonitrile	C	107-13-1	53.08	ND		ND	0.0410		0.210	
Methyl-tert-butyl ether(MTBE)	C	1634-04-4	88.15	ND		ND	11.0		310	
trans-1,2-Dichloroethene	--	156-60-5	96.94	ND		ND	N.E.		4.20	
n-Hexane	NC	110-54-3	86.18	ND		ND	N.E.		73.0	
1,1-Dichloroethane	C	75-34-3	98.96	ND		ND	1.80		N.E.	
Vinyl acetate	NC	108-05-4	86.09	ND		ND	N.E.		21.0	
2-Butanone(MEK)	NC	78-93-3	72.11	ND		ND	N.E.		520	
cis-1,2-Dichloroethene	--	156-59-2	96.94	ND		ND	N.E.		N.E.	
Ethyl acetate	NC	141-78-6	88.11	1.4		4.9	N.E.		7.30	
Chloroform	C	67-66-3	119.4	ND		ND	0.120		10.0	
Tetrahydrofuran	NC	109-99-9	72.11	ND		ND	N.E.		210	
1,1,1-Trichloroethane	NC	71-55-6	133.4	ND		ND	N.E.		520	
Cyclohexane	NC	110-82-7	84.16	ND		ND	N.E.		630	
2,2,4-Trimethylpentane(Isooctane)	--	540-84-1	114.2	ND		ND	N.E.		N.E.	
Carbon tetrachloride	C	56-23-5	153.8	ND		ND	0.470		10.0	
n-Heptane	NC	142-82-5	100.2	ND		ND	N.E.		42.0	
1,2-Dichloroethane	C	107-06-2	98.96	ND		ND	0.110		0.730	
Benzene	C	71-43-2	78.11	ND		ND	0.360		3.10	
Trichloroethene	C	79-01-6	131.4	ND		ND	0.480		0.210	
1,2-Dichloropropane	C	78-87-5	113.0	ND		ND	0.760		0.420	
Methyl Methacrylate	NC	80-62-6	100.1	ND		ND	N.E.		73.0	
Bromodichloromethane	C	75-27-4	163.8	ND		ND	0.0760		N.E.	
1,4-Dioxane	C	123-91-1	88.11	ND		ND	0.560		3.10	
4-Methyl-2-pentanone(MIBK)	NC	108-10-1	100.2	ND		ND	N.E.		310	
cis-1,3-Dichloropropene**	C	10061-01-5	111.0	ND		ND	0.700		2.10	

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South Burlington, VT 05403-7757

Customer PO:
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Project Name: CVSU IAQ

Phone: 802-862-7490
Email: john@kdassociatesinc.com

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Analysis Initial	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
	03/08/2022	TP	J3391.D	HD9513	250 cc	1

USEPA Residential Regional Screening Levels (RSL) at THQ 0.1

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	Carcinogenic ug/m3	>	Non-Carcin. ug/m3	>
Toluene	NC	108-88-3	92.14	ND		ND	N.E.		520	
trans-1,3-Dichloropropene**	C	10061-02-6	111.0	ND		ND	0.700		2.10	
1,1,2-Trichloroethane	C	79-00-5	133.4	ND		ND	0.180		0.0210	
2-Hexanone(MBK)	NC	591-78-6	100.2	ND		ND	N.E.		3.10	
Tetrachloroethene	C	127-18-4	165.8	ND		ND	11.0		4.20	
Dibromochloromethane	--	124-48-1	208.3	ND		ND	N.E.		N.E.	
1,2-Dibromoethane	C	106-93-4	187.9	ND		ND	0.00470		0.940	
Chlorobenzene	NC	108-90-7	112.6	ND		ND	N.E.		5.20	
Ethylbenzene	C	100-41-4	106.2	ND		ND	1.10		100	
Xylene (p,m)	NC	1330-20-7	106.2	ND		ND	N.E.		10.0	
Xylene (Ortho)	NC	95-47-6	106.2	ND		ND	N.E.		10.0	
Styrene	NC	100-42-5	104.1	ND		ND	N.E.		100	
Isopropylbenzene (cumene)	NC	98-82-8	120.2	ND		ND	N.E.		42.0	
Bromoform	C	75-25-2	252.7	ND		ND	2.60		N.E.	
1,1,2,2-Tetrachloroethane	C	79-34-5	167.9	ND		ND	0.0480		N.E.	
4-Ethyltoluene	--	622-96-8	120.2	ND		ND	N.E.		N.E.	
1,3,5-Trimethylbenzene	NC	108-67-8	120.2	ND		ND	N.E.		6.30	
2-Chlorotoluene	--	95-49-8	126.6	ND		ND	N.E.		N.E.	
1,2,4-Trimethylbenzene	NC	95-63-6	120.2	ND		ND	N.E.		6.30	
1,3-Dichlorobenzene	--	541-73-1	147.0	ND		ND	N.E.		N.E.	
1,4-Dichlorobenzene	C	106-46-7	147.0	ND		ND	0.260		83.0	
Benzyl chloride	C	100-44-7	126.6	ND		ND	0.0570		0.100	
1,2-Dichlorobenzene	NC	95-50-1	147.0	ND		ND	N.E.		21.0	
1,2,4-Trichlorobenzene	NC	120-82-1	181.4	ND		ND	N.E.		0.210	
Hexachloro-1,3-butadiene	C	87-68-3	260.8	ND		ND	0.130		N.E.	
Naphthalene	C	91-20-3	128.2	ND		ND	0.0830		0.310	

**The concentrations of each isomer should be added if multiple isomers are present and compared to the total screening level.

Exposure Limit Definitions

RSL= Regional Screening Level at Target Hazard Quotient (THQ) =0.1 if available, otherwise THQ = 1

Agency Definitions

USEPA= United States Environmental Protection Agency

Reference

EPA Regional Screening Levels (RSL) Table, November 2021

Carcinogenic (C) Exceedance

Value exceeds the theoretical risk that 1 additional case of cancer will occur in a population of 1 million than statistically expected.

Thus is a theoretical risk and not an actual epidemiological one.

The > column is used to flag exceedances as marked

Compound Exposure Definitions

NE= No Limit Established NS= No Screening Value
LFC= Lowest Feasible Concentration

Qualifier Definitions

B = Compound also found in method blank. ND = Non Detect
E= Estimated concentration exceeding upper calibration range.
D= Result reported from diluted analysis.
J= Concentration estimated between Reporting Limit and MDL.

NonCarcinogenic (NC) Exceedance

Value exceeds the theoretical risk that 1 in a population of 100,000 will experience deleterious health effects.

Thus is a theoretical risk and not an actual epidemiological one.



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Analysis Initial	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
	03/08/2022	TP	J3391.D	HD9513	250 cc	1

Possible Background Sources of Contaminants

Target Compounds	CAS#	Result	Q	Result	*Typical Indoor Air Data			Use and Possible Sources
		ppbv		ug/m3	% of Samples Detected	Min. Conc. (ppbv)	Max. Conc. (ppbv)	
Chloromethane	74-87-3	0.62		1.3	77%	ND	0.81	Chloromethane is present at very low concentrations throughout the atmosphere. Naturally occurring chloromethane is continuously released into the atmosphere from oceans, rotting wood, forest fires, and volcanoes. Manmade sources of chloromethane include cigarette smoke, polystyrene insulation, aerosol propellants, home burning of wood, grass, coal, or certain plastics, chlorinated swimming pools, refrigerators over 30 years old. (2)
n-Butane	106-97-8	7.5		18	87%	ND	33	Butane is contained in natural gas. Its main uses are in the production of chemicals, as a refrigerant, as an aerosol propellant, as a constituent in liquefied petroleum gas, and as the main component of gas lighter refills. (13)
Ethanol	64-17-5	77	E	140	100%	3.4	658	Ethanol is ubiquitous in air samples as it is found in many products: cleaners (home, auto, pets), disinfectants/sanitizers, laundry care products, pesticide sprays, mouthwash, deoderants, first aid sprays, paints, air fresheners, auto care products. Ethanol is also contained in gasoline. Please see citation for an extensive list. (6)
Freon 11 (Trichlorofluoromethane)	75-69-4	0.75		4.2	None Detected in Study			This is a halogenated chlorofluorocarbon (CFC), which has a long atmospheric residence time, previously used as a refrigerant and aerosol spray propellant. Complying with the Montreal Protocol, its manufacture was banned in the United States along with many other countries in 1994. (12)



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	03/08/2022	TP	J3391.D	HD9513	250 cc	1

Possible Background Sources of Contaminants

Target Compounds	CAS#	Result	Q	Result	*Typical Indoor Air Data			Use and Possible Sources
		ppbv		ug/m3	% of Samples Detected	Min. Conc. (ppbv)	Max. Conc. (ppbv)	
Isopropyl alcohol(2-Propanol)	67-63-0	3.2		7.8	97%	ND	268	IPA is very common in air samples. Multiple types of cleaners (home, auto, pet) and disinfecting/sanitizing/polishing wipes, ink cartridges, paints, personal care products: nail polish, nail polish remover, colognes, perfumes, rubbing alcohol, hair spray. Please see citation for an extensive list. (6)
Acetone	67-64-1	5.6		13	100%	2.6	45	Another very common VOC in air samples, found in home products such as glues, rubber cement and adhesives, expanding foams/crack fillers, air fresheners, paint thinners and paint clean up products. Please see citation for an extensive list. (6)
Ethyl acetate	141-78-6	1.4		4.9	100%	0.53	34	Ethyl acetate is used as a solvent for varnishes, lacquers and dry cleaning. It is released during the manufacture of linoleum, and 'plastic' wood, dyes, artificial fruit flavorings and essences, and perfumes and fragrances. Ethyl acetate is used as a solvent in nail polish, nail polish remover, base coats and other manicuring products. Ethyl acetate is present in wines. (15)

*Based on EMSL in-house data collection 04/2019-06/2019

Qualifier Definitions

ND = Non Detect

B = Compound also found in method blank.

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

J= Concentration estimated between lower calibration standard and MDL.

Sources References

¹ <https://www.epa.gov/sites/production/files/2016-09/documents>

² <https://www.atsdr.cdc.gov/toxfags/IndividualFAQs/IndividualFAQsHaveDifferentUpdateDates>

³ EPA Document# EPA-740-R1-7012 May 2018

⁴ Delaware Health and Social Services, Division of Public Health FAQ Sheets. January 2010.

⁵ New York Department of Environmental Conservation, Uses, Sources and Potential Exposure to Toxic Air Pollutants.

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	03/08/2022	TP	J3391.D	HD9513	250 cc	1

Possible Background Sources of Contaminants

Target Compounds	CAS#	Result		Result	*Typical Indoor Air Data			Use and Possible Sources
		ppbv	Q		% of Samples Detected	Min. Conc. (ppbv)	Max. Conc. (ppbv)	

⁶ US Department of Health and Human Services, Household Products Database.

⁷ NJDEP "Common Household Sources of Background Indoor Air Contamination". June 26, 2012.

⁸ IARC Working Group on the Evaluation of Carcinogenic Risk to Humans. Some Chemicals Present in Industrial and Consumer Products, Food and Drinking-Water.

Lyon (FR): International Agency for Research on Cancer; 2013.

⁹ <http://apps.sepa.org.uk/sripa/Pages/SubstanceInformation.aspx?pid=53>

¹⁰ <https://nj.gov/health/eoh/rtkweb/documents/fs>

¹¹ 1-Propene CAS 115-07-1, Environment Canada_Health Canada, September 2014. <http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=AD74EA35-1>

¹² <https://pubchem.ncbi.nlm.nih.gov/compound>

¹³ Committee on Acute Exposure Guideline Levels; Committee on Toxicology; Board on Environmental Studies and Toxicology; Division on Earth and Life Studies;

National Research Council. Acute Exposure Guideline Levels for Selected Airborne Chemicals: Volume 12. Washington (DC): National Academies Press (US); 2012

¹⁴ All about Acrylonitrile <http://angroup.org/about/index.php>

¹⁵ <http://www.npi.gov.au/resource/ethyl-acetate>

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