



# Environmental Resources Group

Assessment • Remediation • Compliance • Risk Management

## INDOOR AIR QUALITY EVALUATION REPORT



**OKEMOS PUBLIC SCHOOLS  
CORNELL ELEMENTARY SCHOOL  
4371 CORNELL ROAD  
OKEMOS, MICHIGAN 48864**

PREPARED FOR:

**OKEMOS PUBLIC SCHOOLS-OPERATIONS  
4000 OKEMOS ROAD  
OKEMOS, MICHIGAN 48864  
ATTENTION: MR. BRIAN LIEBER**

PREPARED BY:

**ENVIRONMENTAL RESOURCES GROUP, LLC  
3125 SOVEREIGN DRIVE, SUITE 9B,  
LANSING, MICHIGAN 48911**

**ERG PROJECT NO.: 251047**

**PROJECT DATES: SEPTEMBER 6, 8, 12 AND 17,  
2025 FINAL REPORT DATE: OCTOBER 27, 2025**

# TABLE OF CONTENTS

1.0	INTRODUCTION AND BACKGROUND .....	1
1.1	Introduction .....	1
1.2	Background Information .....	1
1.3	Evaluation Equipment and Methods .....	2
2.0	VISUAL AND OLFACTORY OBSERVATIONS .....	3
3.0	RESULTS OF TESTING.....	5
4.0	CONCLUSIONS.....	6
4.1	Direct-Read Instrument Measurements.....	6
4.2	Analytical Sample Results .....	7
5.0	RECOMMENDATIONS.....	9

## LIST OF APPENDICES

Appendix A	Air Sample Data Sheets and Laboratory Data
Appendix B	Digital Photograph Log

## 1.0 INTRODUCTION AND BACKGROUND

### 1.1 INTRODUCTION

Environmental Resources Group, LLC (ERG) was retained by Okemos Public Schools to conduct an Odor Evaluation within Rooms 12 and 22 at Cornell Elementary School in Okemos, Michigan. The specific tasks of the evaluation were as follows:

- Conduct visual and olfactory observations in and around Rooms 12 and 22.
- Conduct air sampling for carbon dioxide, oxygen, carbon monoxide, lower explosive limit (LEL) and hydrogen sulfide and conduct measurements of temperature and relative humidity in and around Rooms 12 and 22.
- Conduct bioaerosol (air) sampling for mold, pollen and other particulate using Zefon Air-O-Cell cassettes in Rooms 12 and 22 and out-of-doors.
- Conduct screen testing for volatile organic compounds (VOCs) using a handheld photoionization detector (PID).
- Conduct air sampling for VOCs, including odor-causing compounds, using a sorbent tube and predict test.
- Inspect the perimeter tunnel for evidence of odors like those occurring in Rooms 12 and 22.
- Collect digital photographs of current conditions.

Phillip A. Peterson conducted the evaluation on September 6, 8, 12 and 17, 2025, to determine current indoor air quality conditions in these rooms following reports of the presence of objectionable odors within each room. No other rooms in the building were reported to have objectionable odors at the time of this evaluation.

### 1.2 BACKGROUND INFORMATION

The structure is a single-story building of steel and masonry construction with a flat, membrane roof. The building is believed to have been constructed in the 1950's and was estimated to occupy approximately 35,000 square feet. The school was constructed slab-on-grade and has a perimeter service tunnel serving all but the northernmost set of classrooms.

The building is heated and cooled by unit ventilators with air conditioning equipment located on the roof.

Since the beginning of the school year, staff have reported objectionable odors in both Rooms 12 and 22. No water leaks, roof leaks, toilet overflows or other water intrusions have been reported. The odor was described like that of burning plastic or burning or melting crayons; the odor has not been characterized as moldy. During the week of September 1, the odors were particularly strong. Operations Department staff inspected unit ventilators, finding no malfunctions. In Room 22 an ozone treatment was performed and a HEPA filter-equipped air filtration device was operated within the room. In spite of Operations Department efforts, the odors remained.

### 1.3 EVALUATION EQUIPMENT AND METHODS

Phillip A. Peterson, a trained investigator with over 37 years of environmental experience, made visual and olfactory observations and collected samples.

Carbon dioxide measurements were made using a TSI IAQCalc Carbon Dioxide Meter. The meter was allowed to equilibrate for five minutes prior to the collection of data from the instrument and was used pursuant to the manufacturer's recommendations.

Oxygen, carbon monoxide, LEL and hydrogen sulfide concentrations were measured using an RKI Instruments Inc., Model GX-3R four-gas meter. The instrument was allowed to equilibrate for five minutes prior to the collection of data from the instrument and the instrument was used pursuant to the manufacturer's recommendations.

Temperature and relative humidity measurements were made using a Protmex, Model MS6508, digital temperature humidity meter. This instrument was allowed to equilibrate for five minutes prior to the collection of data and the instrument was used pursuant to the manufacturer's recommendations.

Bioaerosol (air) samples were collected using Zefon Air-O-Cell cassettes, tubing, a calibrated rotometer and a high-volume vacuum pump. All bioaerosol samples were submitted to and analyzed in the ERG Indoor Air Quality Laboratory pursuant to the requirements of modified ASTM International Standard D7391-09.

The volatile organic compound screen testing was performed using a calibrated handheld PID with an 11.7 electron Volt (eV) lamp. This device is capable of detecting a wide range of VOCs including aromatic hydrocarbons, sulfides and mercaptans, ketones, ethers, aldehydes, alcohols, ammonia, hydrogen sulfide, chloroform, formaldehyde, methanol, acetylene and many other compounds. Screening for VOCs was performed at multiple points around Room 22 immediately above the carpet and 8' above the carpet. Additional screening was performed in the restroom and at the unit ventilator intake and supply air grilles.

Volatile organic compound and odor compound testing was performed using a sorbent tube, low-flow vacuum pump and calibrated flow meter. The sample was submitted to Enthalpy Laboratories for VOC (Predict) analysis using gas chromatography and mass spectroscopy.

The tunnel inspection was performed using the Alternative Entry Procedure as the tunnel has natural ventilation and recent reports from Operations Department staff revealed no identifiable hazards or obstructions in the tunnel. ERG staff measured atmospheric conditions in the tunnel entrance using a calibrated four-gas meter before entering the tunnel pursuant to the ERG Written Confined Space Program. ERG was assisted by Green For Life Environmental (GFL) during the tunnel inspection.

## 2.0 VISUAL AND OLFACTORY OBSERVATIONS

During the ERG odor evaluation, visual and olfactory observations were made by the inspector. In the case of the tunnel inspection, ERG was assisted by GFL staff with confined space training and experience. A summary of observations in select areas of the building follows:

### Room 12

- A faint, but distinct odor of body odor or animal litter was observed upon entry.
- Wall fans became operational as soon as the light switch was turned on.
- The classroom restroom was fully operational.
- A “do not drink the water” sign was present on the restroom mirror at the sink.
- No water marks or water stains were observed in the room.
- No visible mold was observed on any surface, including tables, chairs, bulletin boards or the carpet.
- The carpet held no observable odor.
- The unit ventilator was operational.
- No odor was observed in the cavity above the ceiling tile.
- The carpet appeared clean and was in very good condition.
- The overall level of dust was low.

### Room 22

- A distinct odor of burning plastic or crayons was observed upon entry.
- Wall fans became operational as soon as the light switch was turned on.
- Two watermarked drop ceiling tiles were observed in the room.
- The top side of the tiles has less than 6 square inches of suspect mold growth.
- An uninsulated pipe connection/clamp was observed above the drop ceiling tile at the location of the watermarked ceiling tile.
- The classroom restroom had been turned into a storage closet. The toilet held water. The water to the sink had been turned off.
- No odors were observed in the restroom.
- A HEPA filter-equipped air filtration device was present in the room. The air intake vents were covered. The investigator removed one of the covers to allow improved air filtration and air circulation.
- Other than the ceiling tile, no visible mold was observed on any surface, including tables, chairs, bulletin boards or the carpet.
- The outlets, ventilator cabinet, and carpet held no observable odor.
- The overall level of dust was low.

## Out-of-doors

- No unusual or objectionable odors were observed.
- Light to moderate vehicular traffic was observed.
- Light pedestrian traffic was observed.
- Skies were cloudy with a light north wind.
- The unit ventilator air intake grilles on the east side of the building were clean and unobstructed.
- Several 2-3-inch-diameter holes were observed in the stucco siding outside Room 22. Several similar-sized holes were observed along the east face of the building. Several appear to have been filled with spray foam.
- The grounds appeared generally well-maintained.

## Tunnel

- A faint, musty odor was observed upon entry in to the tunnel
- A sump crock with water was observed below the tunnel entry hatch.
- The leg of tunnel nearest the tunnel entrance was damp.
- Other legs of tunnel were dry with a pea gravel surface.
- Small crawlspace areas were observed adjacent to the tunnel. One had a box fan (not in operation) at its entrance.
- A small number of light bulbs were present.
- Pipe insulation appeared to be paper-wrapped fiberglass.
- No visible mold was observed on the paper insulation covering.
- The overall level of dust was moderate to high.

## 3.0 RESULTS OF TESTING

All samples were collected by Phillip A. Peterson. During the various days of sampling and evaluation, the building was occupied by as few people as just the investigator to a full complement of staff and students.

A log with sample description information and the results of bioaerosol (air) and other sample data appears in Appendix A and is summarized below:

- Indoor carbon dioxide was measured between 446 and 556 parts per million (ppm) indoors. Carbon dioxide was measured at 373 ppm out-of-doors.
- Oxygen was recorded at 20.9 percent at all indoor and out-of-doors locations.
- Carbon monoxide was not detected indoors or out-of-doors.
- LEL was not detected above the LEL indoors or out-of-doors.
- Hydrogen sulfide was not detected indoors or out-of-doors.
- Indoor temperature was recorded between 68.9 and 70.8 degrees Fahrenheit. Out-of-doors temperature was recorded at 65.4 degrees Fahrenheit.
- Indoor relative humidity was recorded between 48.5 and 53.2 percent. Out-of-doors relative humidity was recorded at 48.5 percent.
- The results of indoor bioaerosol sample analysis indicated total airborne spore concentrations between 140 and 170 structures per cubic meter of air ( $s/m^3$ ). Pollen was not detected indoors, and other particulate was recorded between 600 and 1,700  $s/m^3$ . The out-of-doors sample had a spore concentration of 4,980  $s/m^3$ , pollen was not detected, and other particulate was recorded at 860  $s/m^3$ .
- Testing of the tunnel atmosphere indicated normal oxygen concentrations, no carbon monoxide, no hydrogen sulfide and no combustible gases above the LEL.
- The results of PID screening for VOCs indicated no detectable VOCs in Room 22.
- The analytical results of VOC testing using the sorbent tube and Predict test revealed air quality in the normal range. Total VOCs were in the normal range, Mold VOCs were not detected, and all other VOCs were described as being in the normal range or were not detected. Please see the Predict Lab report in Appendix A for additional details.

Digital photographs appear in Appendix B.

## 4.0 CONCLUSIONS

Test results were indicative of conditions at the time of the investigation and may not represent conditions at other times. No conclusions can be drawn regarding areas of the building which were not inspected. Based upon reports by others, the visual and olfactory observations made by the investigator and the results of sample analysis, the following conclusions were drawn.

### 4.1 DIRECT-READ INSTRUMENT MEASUREMENTS

Carbon dioxide (CO<sub>2</sub>) is a colorless odorless gas that results from normal human respiration. Concentrations were acceptable in the tested areas of the building and were below the limits established by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) in Voluntary Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality. The ASHRAE carbon dioxide recommended limit is 700 ppm above the out-of-doors concentration. The out-of-doors carbon dioxide concentration was 373 ppm, making CO<sub>2</sub> concentrations of 1073 ppm or less acceptable in this case. The data indicates that adequate fresh air ventilation was provided to the tested areas of the building given the rate of occupancy at the time of testing.

Oxygen (O<sub>2</sub>) is a colorless, odorless gas necessary for human life that makes up approximately 20.9% of the atmosphere by volume. Concentrations were within the acceptable range of 19.5 – 23.5% at all sampling locations.

Carbon monoxide (CO) is a simple asphyxiant gas and possible source of headaches. No concentrations were detected indoors or out-of-doors.

LEL is a measure of combustible gas, some of which are possible upper respiratory irritants. Concentrations were not detected in any tested areas indoors or out-of-doors.

Hydrogen sulfide (H<sub>2</sub>S) is a flammable, colorless, gas that smells like rotten eggs and which may cause upper respiratory irritation. No concentrations of hydrogen sulfide were detected indoors or out-of-doors.

Indoor temperature readings were within the ASHRAE (Standard 55)-recommended human comfort temperature range (73-79 degrees Fahrenheit) in all tested locations.

Indoor relative humidity recorded during the inspection was acceptable and was below the limit (65%) recommended by ASHRAE (in voluntary standard 62.1-2007) in all tested areas.

PID screening detected no VOCs.



## 4.2 ANALYTICAL SAMPLE RESULTS

Airborne mold concentrations in “clean” commercial buildings generally total 2,650 s/m<sup>3</sup> or less with spores of the genera *Aspergillus* and/or *Penicillium* making up not more than 750 s/m<sup>3</sup> and spores of the groups Ascospores and Basidiospores together making up not more than 1,000 s/m<sup>3</sup>. The total of all other spores should not exceed 900 s/m<sup>3</sup> (Baxter, Journal of Occupational Environmental Hygiene, January 2005). Those limits are called the Baxter Criteria. Additionally, highly allergenic spores (i.e. – *Pithomyces*, *Stemphyllium*, *Stachybotrys*) should not be present in a statistically significant number (i.e. – a raw count of 10 or more spores). Airborne mold concentrations in Rooms 12 and 22 at the times and locations of sampling were within the limits established as the Baxter Criteria and are indicative of “clean” conditions. Additionally, indoor spore counts were more than 20 times lower than those out-of-doors.

Indoor airborne pollen concentrations in “clean” air-conditioned buildings are generally below 30 s/m<sup>3</sup>. Individuals with pollen allergy may exhibit symptoms when pollen concentrations exceed approximately 50 s/m<sup>3</sup>, especially when grass or highly allergenic ragweed pollen are present. Pollen was not detected in the collected indoor air samples.

Organic fibers such as cellulose (paper fibers) may be present in “clean” buildings in the range of 0 to 10,000 s/m<sup>3</sup>. These fibers are not known to cause illness or allergy at these levels, but might suggest inadequate housekeeping or poor ventilation, among other things. Cellulose concentrations were within the normal range (0 to 10,000 s/m<sup>3</sup>) in the collected air samples.

Inorganic fibers such as mineral wool or fiberglass (fibrous glass) may create dermal irritation when present in concentrations exceeding 1,000 s/m<sup>3</sup>. Fibrous glass was not detected in the collected air samples.

Synthetic fibers include polyester and Dacron and do not generally exceed 1,000 s/m<sup>3</sup>. The presence of elevated synthetic fiber concentrations suggests degrading synthetic fiber surfaces (clothing, carpet, upholstered furniture) and/or the need for improved housekeeping. Synthetic fibers were detected in Rooms 12 and 22 but did not exceed the desired threshold of 1,000 s/m<sup>3</sup>.

Mineral fibers, such as gypsum, generally do not exceed 1,000 s/m<sup>3</sup> and their presence may be indicative of uncontrolled renovation or demolition. Mineral fibers were not detected in the collected air samples.

Opaque particles, including soot, fly ash, binders, copy toner, etc., generally do not exceed 5,000 s/m<sup>3</sup>. When indoor concentrations exceed 10,000 s/m<sup>3</sup>, attempts to identify the source of the particles and reduce their number should be made. The opaque particle concentrations did not exceed the 5,000 s/m<sup>3</sup> threshold in any collected air sample.

Insect fragments, including antennae, legs, wings, etc., should not be observed in “clean” indoor environments. Detectable quantities of insect fragments, including excrement, may cause allergic reactions in sensitive individuals and suggests the existence of current or past infestation or poor housekeeping. Insect fragments were not detected in the collected samples.

This analytical technique cannot differentiate spores of the genus *Aspergillus/Penicillium*, among others, due to their similar morphology. Additionally, some mold, pollen, yeast, bacteria, arthropods, and other airborne constituents may be present but are not identifiable by this technique.

Sorbent tube testing for VOCs using the Predict test revealed normal VOC concentrations.

Water-stained building materials were found in Room 22 with possible mold growth atop two drop ceiling tile.

A faint odor was observed in Room 12 and a distinct foul odor was observed in Room 22. No obvious source of either odor was discovered during this evaluation. Based on the results of testing and inspection, the odors may be considered nuisance odors.

The carpet was observed to be clean and in good condition in both rooms.

The tunnel does not appear to be the source of any building odors and no hazardous atmosphere was identified in the tunnel and tunnel oxygen concentrations were in the normal range. The area above the drop ceiling tile in Room 22 held on observable odor.

Room 12 can be safely occupied.

ERG recommends that Room 22 not be occupied until such time that the source of the odor can be found and eliminated. ERG believes the source of the odor is somewhere in the classroom itself.

The above conclusions are based on the inspection results, observations made at the time of the inspection and information provided by others. Should new or revised information become available, ERG reserves the right to revise the report and modify or change the above conclusions and subsequent recommendations.

## 5.0 RECOMMENDATIONS

Based on the observations made by the investigator, the findings of this evaluation and the conclusions above, the following recommendations are offered:

1. Occupy Room 12 as it is normally occupied.
2. Do not occupy Room 22 until such time that the source of the odor can be identified and eliminated.
3. Remove the watermarked ceiling tile from Room 22. To the extent possible, insulate the connector/clamp to reduce or eliminate condensation. Replace the water-stained and moldy drop ceiling tile with a new tile.
4. Place a formal stopper in the sink drain in the Room 22 classroom restroom -or- periodically pour water down the drain to prevent the trap from drying out. Periodically pour water in the toilet bowl to prevent it from drying out.
5. Repair the holes in the exterior stucco outside Room 22 and along the east wall of the building.
6. Improve training of Operations Department staff so they better understand the operation of the HEPA-filtered air filtration devices.
7. Consider removing the unit ventilator air intake grille outside Room 22 to allow its' inspection and cleaning.
8. If odors remain after completion of the above recommendations, contact ERG and conduct additional evaluation (i.e., additional VOC testing, perform destructive testing).

This evaluation was conducted consistent with sound investigative principles and current industry standards. Information in this report was provided by other than ERG. The accuracy or correctness of that information was not confirmed or verified by ERG. For additional information, please review the attached data or call ERG.



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Phillip A. Peterson  
Senior Project Manager

## APPENDIX A

### Air Sample Data Sheet and Laboratory Data





PROJECT NUMBER 251047 DATE 9/12/2025

PROJECT Cornell Elementary Odor Evaluation

SAMPLED BY Phil Peterson

CLIENT Okemos Public Schools

ANALYZED BY RKI GX-03

**AIR SAMPLE DATA SHEET**

SAMPLE #	DESCRIPTION	TIME ON TIME OFF	SAMPLE TIME (MIN)	FLOW ON FLOW OFF (L/MIN)	AVERAGE FLOW	VOLUME (LITERS)	O <sub>2</sub>	LEL	CO	H <sub>2</sub> S	Other
1	Out-of-doors near Boiler Room door	6:16					20.9	0	0	0	See attached data sheets
2	Boiler Room at tunnel hatch (hatch closed)	6:17					20.9	0	0	0	See attached data sheets
3	Boiler Room below hatch (hatch open) - Top	6:18					20.9	0	0	0	See attached data sheets
4	Tunnel 3' above sump crock - middle	6:19					20.9	0	0	0	See attached data sheets
5	Tunnel immediately above sump tank - bottom	6:20					20.9	0	0	0	See attached data sheets
6	On Alan Schulz - GFL	6:40					20.9	0	0	0	See attached data sheets
7	Post exit tunnel below hatch (hatch open)	6:45					20.9	0	0	0	See attached data sheets
											See attached data sheets
											See attached data sheets
											See attached data sheets

Comments: Boiler room had a very faint smell of natural gas.  
 Tunnel vents present around the school.  
 Prior report from J. Curtis indicated no impingement, engulfment or other hazards in the sections he recently traversed.

SAMPLE T CO - CARBON MONOXIDE  
 O<sub>2</sub> - OXYGEN  
 H<sub>2</sub>S - HYDROGEN SULFIDE  
 LEL - LOWER EXPLOSIVE LIMIT  
 T - TEMPERATURE



PROJECT NUMBER 251047 DATE \_\_\_\_\_

PROJECT Cornell Elementary Odor Evaluation

SAMPLED BY Phil Peterson

CLIENT Okemos Public Schools

ANALYZED BY Enthalapy Labs

**AIR SAMPLE DATA SHEET**

SAMPLE #	TYPE	DESCRIPTION	TIME ON TIME OFF	SAMPLE TIME (MIN)	FLOW ON FLOW OFF (L/MIN)	AVERAGE FLOW	VOLUME (LITERS)	Results
1	Predict	In front of Room 22 Unit ventilator, AE504	6:58	147	0.2	2	29.4	See attached data sheets
			9:25		0.2			
2	Predict	Room 22 - Center of wall near sink, A1299	7:05	145	0.2	2	29	See attached data sheets
			9:30		0.2			

SAMPLE TYPES: CO - CARBON MONOXIDE  
 CO<sub>2</sub> - CARBON DIOXIDE  
 O<sub>2</sub> - OXYGEN  
 H<sub>2</sub>S - HYDROGEN SULFIDE  
 T - TEMPERATURE  
 RH - RELATIVE HUMIDITY  
 FB - FIELD BLANK  
 B - BULK  
 MV - MICROVACUUM  
 V - VARIOUS  
 BA-BIOAEROSOL  
 IH - INDUSTRIAL HYGIENE



# IAQ Bioaerosol Analytical Report

## ERG Project Number: 251047

**Client Name:** Okemos Public Schools  
**Project Name:** Cornell, Rooms 12 and 22

Date of Sample Collection: 9/8/2025 Report Date: 9/8/2025  
 Date of Submittal: 9/6/2025 Analyst: Kaila Schwanitz  
 Date of Analysis: 9/8/2025 Minimum Reporting Limit: 60 s/m<sup>3</sup>

**Sample #**  
**Sample Location**

	5			6			7		
	Room 22 center			Field Blank			Room 12 center		
<b>Spores</b>	structures/ sample	s/m <sup>3</sup>	% trace scanned	structures/ sample	s/m <sup>3</sup>	% trace scanned	structures/ sample	s/m <sup>3</sup>	% trace scanned
<i>Alternaria</i>	ND			ND			ND		
Ascospore	5	70	20.3%	ND			5	70	20.3%
<i>Aspergillus/Penicillium</i>	ND			ND			ND		
Basidiospore	ND			ND			ND		
<i>Botrytis</i>	ND			ND			ND		
<i>Chaetomium</i>	ND			ND			ND		
<i>Cladosporium</i>	ND			ND			10	100	20.3%
<i>Curvularia</i>	ND			ND			ND		
<i>Drechslera/Bipolaris</i>	ND			ND			ND		
<i>Epicoccum</i>	ND			ND			ND		
<i>Erysiphae/Oidium</i>	ND			ND			ND		
<i>Fusarium</i>	ND			ND			ND		
Hyphal Fragments	5	70	20.3%	ND			ND		
<i>Nigrospora</i>	ND			ND			ND		
<i>Periconia/Myxomycete/Smut</i>	ND			ND			ND		
<i>Ulocladium/Pithomyces</i>	ND			ND			ND		
Rhizopus	ND			ND			ND		
<i>Stachybotrys</i>	ND			ND			ND		
<i>Stemphylium</i>	ND			ND			ND		
<i>Torula</i>	ND			ND			ND		
Miscellaneous/Unidentified Spores	ND			ND			ND		
<b>Total</b>	<b>10</b>	<b>140</b>		<b>ND</b>			<b>15</b>	<b>170</b>	

**Pollen**

Grass	ND			ND			ND		
Tree	ND			ND			ND		
Other/Unknown Pollen	ND			ND			ND		
<b>Total</b>	<b>ND</b>			<b>ND</b>			<b>ND</b>		

**Other Particulate**

Cellulose Fibers	10	100	20.3%	ND			ND		
Fibrous Glass	ND			ND			ND		
Synthetic Fibers	69	910	20.3%	5		20.3%	20	300	20.3%
Mineral Fibers	ND			ND			ND		
Opaque Particles	54	710	20.3%	ND			25	300	20.3%
Insect Fragments	ND			ND			ND		
<b>Total</b>	<b>133</b>	<b>1720</b>		<b>5</b>			<b>45</b>	<b>600</b>	
*Debris rating	<b>1</b>			<b>1</b>			<b>1</b>		

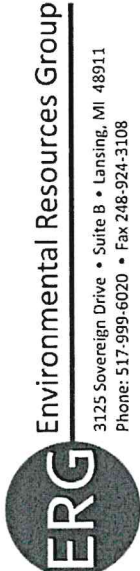
Notes:

All samples prepared and analyzed per the modified ASTM D7391-09.









**Environmental Resources Group**

3125 Sovereign Drive • Suite B • Lansing, MI 48911  
 Phone: 517-999-6020 • Fax 248-924-3108

Client Name: <i>Okeemos Public Schools - Operations</i>			Matrix Code		
Contact Person: <i>Paul @ ERG</i>			S Soil	GW	Ground Water
Project Name/ Number: <i>Cornell E.S. / 251047</i>			A Air	SW	Surface Water
Project Location: <i>Okeemos, MI</i>			O Oil	W	Wastewater
Email Distribution List:			B Bulks	X	Other: Specify
Phone No.:			HOLD SAMPLE		
Purchase Order No.:			PARAMETERS		
Date	Time	Sample #	Client Sample Descriptor	MATRIX (SEE RIGHT CORNER FOR CODE)	# OF CONTAINERS
<i>9/16/07</i>		<i>5</i>	<i>Room 22 center</i>	<i>A</i>	<i>1</i>
		<i>6</i>	<i>FIELD Blank</i>	<i>A</i>	<i>1</i>
		<i>7</i>	<i>Room 12 center</i>	<i>A</i>	<i>1</i>
		<i>9</i>	<i>out-of-doors</i>	<i>A</i>	<i>1</i>
Remarks:					
<i>76.5 Liters (18.3 lpm x 5 min)</i>					
<i>0 Liters (-)</i>					
<i>76.5 Liters (18.3 x 5)</i>					
<i>80.5 Liters (16.1 lpm x 5 min)</i>					
Comments:					
Samples received in acceptable condition <input checked="" type="checkbox"/>					
Sampled/Relinquished By: <i>Phillip Chet</i>		Date/Time	Received By:		
		<i>09/08/05 09:07</i>			
Relinquished By:		Date/Time	Received By:		
Relinquished By:		Date/Time	Received By Laboratory:		
			<i>Paul @ ERG</i>		
Turnaround Time ALL RESULTS WILL BE SENT BY THE END OF THE BUSINESS DAY			LAB USE ONLY		
Same day <input checked="" type="checkbox"/> 1 bus. day 2 bus. days _____ 3 bus. days _____ 4 bus. days _____			ERG project number:		
Other (specify time/date requirement):			Temperature upon receipt at Lab (if applicable):		
Please see back for terms and conditions					

Client Sample ID: Room 22 at Unit Ventilator  
Laboratory ID: 120614-1

**Client:** ERG  
3125 Sovereign Drive Ste 9B  
Lansing, MI 48911  
United States

**Sampled By:** Philip Peterson  
**Project:** Cornell Elementary 251047  
**Location:** Okemos, Michigan

**Report Number:** 120614

**Thank you for using  
IAQ Commercial Survey!**  
If you have questions about your report,  
please contact your service provider who  
performed this test.

**Client Sample ID:** Room 22 at Unit Ventilator  
**Sample Volume (L):** 29.4  
**Date Sampled:** 09/17/2025  
**Sample Type:** TDT AE504  
**Sample Condition:** Acceptable

**Receive Date:** 09/19/2025  
**Approve Date:** 09/19/2025  
**Scan Date:** 09/19/2025  
**Report Date:** 09/23/2025

IAQ Commercial Survey™ is one of the most advanced, trusted air testing products on the market today for identifying chemical sources and active mold growth. Many indoor air quality (IAQ) issues identified by IAQ Commercial Survey can be easily remediated or eliminated. This test is an invaluable tool for improving air quality because it provides important information on potential contamination issues that cannot be detected by a visual inspection alone. Acting upon the information in this report will enable you to dramatically improve the air quality, creating a healthier environment.

### Your Indoor Air Quality Report Summary

Your Indoor Air Quality Report has several sections describing different aspects of your air quality. A summary of this data is provided below, additional information and descriptions are included in the full report.

#### Total Volatile Organic Compounds (TVOC) Level

TVOC is a general indicator of the IAQ (see page 2).

 **Total VOCs** **400 ng/L**

#### Total Mold Volatile Organic Compounds (TMVOC) Level

TMVOC is an assessment of the actively growing mold (see page 3).

 **Total MVOCs** **< 3 ng/L**

#### Contamination Index (CI) Level

The CI shows the types of air-contaminating products and materials that are present in the sampled area (see pages 5 and 6). These levels are estimates based on common products and activities.

##### Building Sources

See page 5 for more detail.

<b>N</b>	Coatings (Paints, Varnishes, etc.)
<b>N</b>	PVC Cement
<b>N</b>	Building Materials-Toluene Based
<b>N</b>	Gasoline
<b>N</b>	Fuel Oil, Diesel Fuel, Kerosene
<b>N</b>	Light Hydrocarbons
<b>N</b>	Light Solvents

##### Occupant Sources

See page 6 for more detail.

<b>N</b>	HFCs and CFCs (Freons™)
<b>N</b>	Personal Care and Cleaning Products
<b>N</b>	Odorants and Fragrances
<b>N</b>	Dry Cleaning Solvents

*Note: Severity levels begin at Normal or Minimal and progress through Moderate, Elevated, High and/or Severe. The color progression from green to red indicates results that are increasingly atypical and suggest potentially higher risk.*

*All Severity classifications are based on empirical data and should not be taken as a pass/fail or conformance to a published specified limit.*

**Normal** **Moderate** **Elevated** **High** **Severe**

Enthalpy Analytical, LLC (MTP), the creator of IAQ Home and Commercial Survey, has been performing air quality assessments to industry and environmental consultants since 1995. Enthalpy Analytical, LLC (MTP) (ID 166272) is accredited by the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC in the Industrial Hygiene accreditation program for GC-MS Field of Testing as documented by the Scope of Accreditation [Certificate](#) and associated Scope. This analysis references methods EPA TO-17 and ISO 16000-6, which fall within the Scope of Accreditation.

## Total Volatile Organic Compound (TVOC) Summary

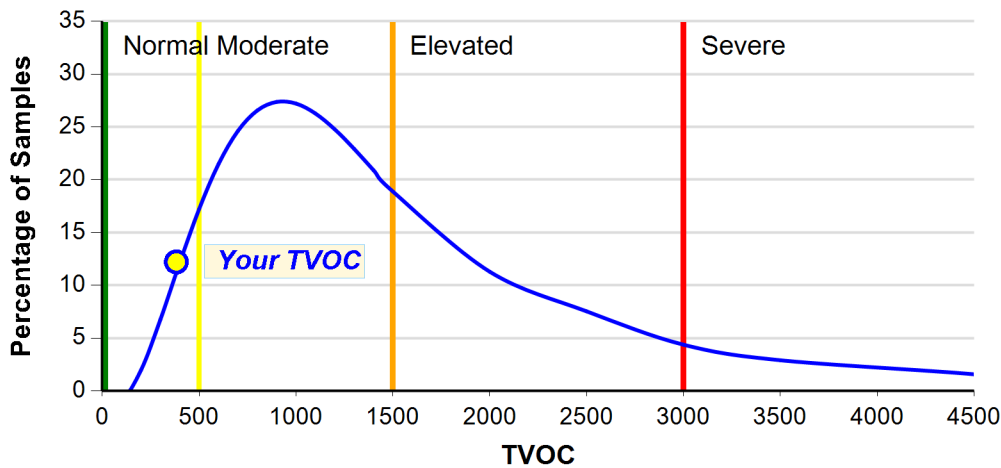
**Your TVOC Level is: 400 ng/L**

IAQ is acceptable for most individuals; chemically sensitive persons may require lower levels.

### Your Indoor Air Quality Level (Highlighted)

Normal < 500 ng/L	Moderate 500 - 1500 ng/L	Elevated 1500 - 3000 ng/L	Severe > 3000 ng/L
----------------------	-----------------------------	------------------------------	-----------------------

**All IAQ Survey TVOC  
Air Quality Indicator**



**The average TVOC is  
1900 ng/L**

This chart represents the TVOC distribution of over 45,000 samples. Over 80% of these samples indicate improvements in IAQ are necessary to achieve the goal of TVOC less than 500 ng/L.

The chart above shows the TVOC levels for all locations tested using IAQ Survey. Results for this air sample are displayed on the chart as a yellow circle. The blue curved line represents the relationship between the percentage of locations (indicated on the vertical y-axis) and the TVOC level (indicated on the horizontal x-axis). The green, yellow, orange, and red vertical bars represent divisions between Normal, Moderate, Elevated, and Severe TVOC levels. As the TVOC value increases, individuals may experience aggravated health problems, and therefore, the need to address VOC issues becomes more critical. However, reductions in VOCs can be made at any level.

No government or organization has specified a TVOC limit for indoor air. However, the U.S. Green Building Council (USGBC) has set 500 ng/L as the recommended TVOC limit.

In general:

- < 500 ng/L IAQ is acceptable for most individuals; however, chemically sensitive persons may require lower levels.
- 500 - 1,500 ng/L some effects on the occupants is possible.
- > 1,500 ng/L IAQ should be improved.

Note: These levels are based on observed health effects and have been determined from a combination of published data and the statistical distribution of TVOC concentrations from the IAQ Survey methodology.

The presence of chemicals in your indoor environment can cause a wide range of problems, from an unpleasant odor to physical symptoms (burning and irritation in the eyes, nose, and throat; headaches; nausea; nervous system effects; severe illness; etc.). Anyone with respiratory issues like asthma or allergies, as well as children, the elderly, and pregnant women are more susceptible to poor indoor air quality than healthy individuals.

Click [here](#) for more information about VOCs.

The Contamination Index (CI) in the next pages of this report will help guide you through determining what types of products or materials could be problematic for your IAQ, and will provide some recommendations to help reduce or eliminate them.

**Total Mold Volatile Organic Compound (TMVOC) Summary**

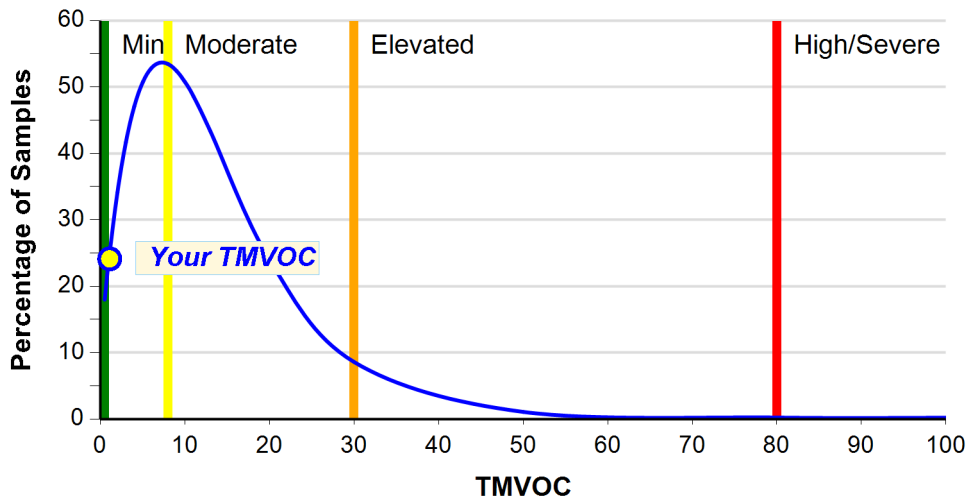
**Your TMVOC Level is: < 3 ng/L**

Actively growing molds may be present, but are at or below levels found in most homes and working environments.

**Your Active Mold Level (Highlighted)**

Minimal < 8 ng/L	Active-Moderate 8 - 30 ng/L	Active-Elevated 30-80 ng/L	Active-High 80 - 150 ng/L	Active-Severe > 150 ng/L
---------------------	--------------------------------	-------------------------------	------------------------------	-----------------------------

**All IAQ Survey TMVOC  
Active Mold Growth Indicator**



**The average TMVOC is 10 ng/L**

This chart represents the TMVOC distribution of over 45,000 samples. Approximately half the samples indicate that some active mold growth is occurring at the time of sample collection.

The chart above shows the TMVOC level for all locations tested using IAQ Survey. Results for this air sample are displayed on the chart as a yellow circle. The blue curved line represents the relationship between the percentage of locations (indicated on the vertical y-axis) and the TMVOC level (indicated on the horizontal x-axis). For example, a TMVOC of 20 ng/L is reported in ~20% of the samples. The green, yellow, orange, and red vertical bars represent divisions between Minimal, Moderate, Elevated, and High/Severe TMVOC levels.

Molds can be found anywhere in the indoor environment as long as there is a source of water or moisture. Molds produce spores, VOCs (during the metabolic or digestive processes of mold), and mycotoxins (typically when the mold is threatened).

This test detects only the VOCs produced by actively growing molds and does not represent spores or mycotoxins. The TMVOC value is the sum of a select set of VOCs emitted by most molds while growing (when mold is in an inactive or dormant state it does not produce many MVOCs).

The presence of moisture is the primary factor in mold growth, controlling moisture and dampness is the only way to consistently control or limit mold growth.

Click [here](#) for more information about molds and mold VOCs.

## Contamination Index™

The Contamination Index™ (CI) shows the types of air-contaminating products and materials that are present in the sampled area. Each CI category shows the approximate contribution of that category to the TVOC level, indicates how your location compares to thousands of other locations, and provides some suggestions about which products and materials might be the source for the VOCs. The CI is divided into two main source groups: Building Sources and Occupant Sources.

1. Building Sources are those that are typically part of the structure of the building and may be more difficult to reduce in the short term. Recent construction or renovation often increases the CI categories in this group to the Elevated, High, or Severe levels. VOCs from these activities often decrease substantially in the month following use or application of these products, especially if the area is flushed with air to dissipate the VOCs off gassed from the new products or materials.

2. Occupant Sources are those that the occupants of the building bring into the building and can usually be more readily identified and remediated. Recent construction or renovation can often contribute to other source categories in addition to Building Sources.

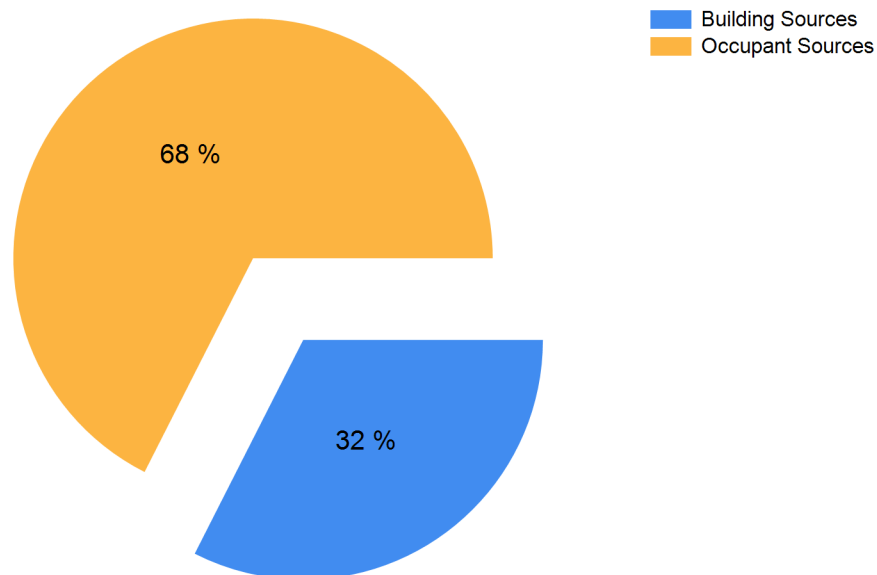
It is possible for a category listed in one source group to belong to another source group. For example, the 'Coatings' category is in the Building Sources group because the largest contribution is typically the paint on the walls, but cans of paint stored in a basement or storage area could be considered part of the Occupant Sources group. Always consider all possible sources for a particular CI category.

The CI categories comprise the most common sources but other products or activities may be present that are not included in the CI. The values assigned to each category are approximations based on typical office and commercial spaces. Locations with additional or atypical sources may require additional investigation to determine the source of certain chemicals that are not accurately represented by the CI.

Since there are potentially many sources of VOCs, buildings can often be re-contaminated even after sources have been removed because new products are constantly being brought into the building. Occupants should take note of this fact, and view IAQ as a continuous improvement process.

The chart below depicts the distribution of the Contamination Index source groups. These source groups are estimates and may not indicate all of the VOCs in your air sample.

**Contamination Index Source Groups**





## Contamination Index™ Building Sources

Use the Contamination Index (CI) below to help you find products and materials in the sampled area that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories are typically part of the structure of the building and may be more difficult to reduce in the short term. Recent construction or renovation will often cause these categories to be elevated. Increased ventilation will help to reduce VOCs from construction or renovation sources. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time.

	Estimated VOC Level (ng/L)		Severity	Source Prediction & Suggestions for VOC Reduction
	Contamination Index Category			
<b>Building Sources</b>	<b>Coatings (Paints, Varnishes, etc.)</b>	51	<b>Normal</b>	Includes interior and exterior paints (including low- or no-VOC paints), varnishes, lacquers, some sealants, and other products that can be classified as a coating over a surface. Typically, VOCs from these products are in the 10 to 14 carbon size range and can linger for several months after application, sometimes longer. Ventilate as much as possible during and after application of any of these products. Dispose of opened but unused products and related supplies if possible or store in areas that will minimize off gassing. Additional sources include fuel oil or diesel fuel.
	<b>PVC Cement</b>	0	<b>Normal</b>	PVC cement is used to join pieces of PVC pipe together, usually for plumbing.
	<b>Building Materials-Toluene Based</b>	0	<b>Normal</b>	Adhesives and glues used in construction and maintenance, arts and crafts; adhesive removers; contact cement; sealants; coatings (paint, polyurethane, lacquer, thinner); automotive products, including parts cleaners. Additional sources include gasoline and other fuels.
	<b>Gasoline</b>	18	<b>Normal</b>	VOCs from gasoline are typically a result of off-gassing from gas containers, small spills, and gas-powered equipment used in facilities maintenance in nearby garage or storage areas. Most vehicles in good operating condition do not emit gasoline vapors due to the tightly sealed gas tank. This category does not include exhaust emissions. Gasoline VOCs can linger on clothing after refueling at a gas station. Gasoline includes chemical compounds that are also included in the Light Solvents category.
	<b>Fuel Oil, Diesel Fuel, Kerosene</b>	0	<b>Normal</b>	Typically found in garages and facilities maintenance areas. These fuels are not very volatile so they will not readily get into the air, but they can linger for a long time and produce a strong, unpleasant odor. This category does not include exhaust emissions. Additional sources include coatings such as paints, varnishes, sealants, waxes, etc.
	<b>Light Hydrocarbons</b>	2	<b>Normal</b>	Building materials; aerosol cans; liquefied petroleum gas (LPG); refrigerant; natural gas; propellant; blowing agent. Includes chemical compounds such as propane, butane, and isobutane.
	<b>Light Solvents</b>	26	<b>Normal</b>	Stoddard solvent; mineral spirits; some coatings (paints, varnish, enamels, etc.); wax remover; adhesives; automotive products; light oils. Typically, VOCs from these products are in the 6 to 9 carbon size range.

**Contamination Index™ Occupant Sources**

Use the Contamination Index (CI) below to help you find products and materials in the sampled area that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories are typically brought into the building by the occupants and can often be readily identified and removed or contained. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time.

Occupant Sources	Contamination Index Category	Estimated VOC Level (ng/L)	Severity	Source Prediction & Suggestions for VOC Reduction
	<b>HFCs and CFCs (Freons™)</b>	2	<b>Normal</b>	Most often used as refrigerants for air conditioners and refrigerator/freezers and propellants for blown-in insulation, cushions, aerosol cans, etc. Many of these chemical compounds are being phased out because of the Montreal Protocol.
<b>Personal Care and Cleaning Products</b>	180	<b>Normal</b>	Personal care products such as soap, deodorant, lotions, perfumes, hair coloring supplies, nail care supplies, oral hygiene products, etc. Cleaning agents such as surface, window, and flooring products, also restroom and antibacterial products. These products contain many VOCs that will dissipate if use is discontinued or reduced.	
<b>Odorants and Fragrances</b>	22	<b>Normal</b>	Air fresheners, scented cleaning products, and scented personal care products.	
<b>Dry Cleaning Solvents</b>	0	<b>Normal</b>	Typical dry-cleaning methods employ the use of carcinogenic chemicals. Dry-cleaning should be allowed to vent outside, without plastics bags, before being placed inside.	



## Significant VOCs

Based upon your specific air analysis, the chemical compounds listed below are significant contributors to the TVOC level reported on page 2 of your IAQ Commercial Survey Report or are indicative of specific types of products or problems. Compounds from a variety of chemical classes are represented here, although only the most common or most notable are specifically listed. These chemical compounds may come from a variety of sources as shown in the Contamination Index section of this report.

Locating and removing the source of the chemical compound is the most effective way to reduce the concentration of that chemical compound. If removing the source is not possible, try to contain it in some way (e.g., placing the source in an air-tight container when not in use). In addition, the ventilation system in some locations may not be optimized so evaluate the ventilation system and make adjustments to increase the amount of fresh air. Filter or purify re-circulated inside air to help reduce the TVOC. Since VOCs may continue to off-gas even when the sources are stored, ventilation and air-purification methods will need to be employed continuously in order to keep the VOC levels low.

The Chemical Abstracts Service (CAS) registry number after the chemical compound name in the table below is a unique identifier for that chemical compound and is often the best means to search for additional information. The two VOC levels in the table below (ng/L and ppb) are different ways of describing the same concentration, in some cases exposure limits or other information may be described using one or both of these concentration units.

Compound	CAS	Estimated VOC Level (ng/L)	Estimated VOC Level (ppb)	Description
Ethanol	64-17-5	180	94	Cleaners, especially antiseptic wipes; personal care; consumable alcohol; some solvents; renewable gasoline component; pharmaceuticals
Methylene Chloride	75-09-2	110	30	Automotive products; degreasing solvent; paint stripper; adhesive remover; aerosol propellant; insecticide
Isopropanol	67-63-0	37	15	Rubbing alcohol; cleaners, especially antiseptic wipes; personal care; solvents; food and beverages; microbial biocides or antimicrobial agents
Limonene	138-86-3 or 5989-27-5	25	5	Limonene (CAS 138-86-3) or d-Limonene (CAS 5989-27-5)Fragrances; paints and coatings; cleaners; solvent; preservative

### Supplemental Information: Odorants

Many chemical compounds have odors associated with them, some pleasant and some unpleasant. These odors can combine to create different odors, making odor identification more difficult. The odor descriptions for the compounds reported in this air sample are listed below as well as some of the more common sources.

Compound	CAS	Conc. (ppb)	Odor Range (ppb)	Odor Description
Ethanol	64-17-5	94	90 - 40,334,000	vinous, alcohol
Isopropanol	67-63-0	15	1,000 - 2,197,000	sharp, rubbing alcohol
Limonene	138-86-3 or 5989-27-5	5	2 - 310	lemon, plastic, citrus, rubber, terpeny
Methylene Chloride	75-09-2	30	1,200 - 440,000	sweet

### Supplemental Information: EPA Hazardous Air Pollutants (HAPs)

Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Listed below are those HAPs that were detected with the IAQ Commercial Survey VOC test. This list does not include all HAPs. The '<' (less than) symbol in the 'Estimated VOC Level' columns indicates the compound is below the reporting limit for this air sample and therefore can be considered absent from the air sample. For more information about HAPs visit the EPA [Air Toxics website](#). The exposure limits listed below can also be found in the [NIOSH Guide to Chemical Hazards](#). The HAPs in the table below may also be listed as Significant VOCs if the concentration of that chemical compound is greater than the threshold level for a Significant VOC.

Compound	CAS	Estimated VOC Level (ng/L)	Estimated VOC Level (ppb)	NIOSH Exposure Limit	Description
Methylene Chloride	75-09-2	110	30	Carcinogen	Automotive products; degreasing solvent; paint stripper; adhesive remover; aerosol propellant; insecticide
Toluene	108-88-3	1	0.3	375,000 ng/L (100,000 ppb)	Gasoline; adhesives (building and arts/crafts); contact cement; solvent; heavy duty cleaner

*These results pertain only to this sample as it was collected and to the items reported.  
 These results have been reviewed and approved by the Laboratory Director or approved representative.*

This analysis was performed by Enthalpy Analytical, LLC (MTP). The results contained in this report are dependent upon a number of factors over which Enthalpy Analytical, LLC (MTP) has no control, which may include, but are not limited to, the sampling technique utilized, the size or source of sample, the ability of the sampler to collect a proper or suitable sample, the compounds which make up the TVOC, and/or the type of mold(s) present. Therefore, the opinions contained in this report may be invalid and cannot be considered or construed as definitive and neither Enthalpy Analytical, LLC (MTP), nor its agents, officers, directors, employees, or successors shall be liable for any claims, actions, causes of action, costs, loss of service, medical or other expenses or any compensation whatsoever which may now or hereafter occur or accrue based upon the information or opinions contained herein.

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Chain of Custody

IAQ Home Survey™

IAQ Commercial Survey™

COC No.

120614

Enthalpy Use Only - Do Not Fill In

CONTACT INFORMATION	
Sampling Professional: <u>Phil Peterson</u>	Phone: <u>517-999-6020</u>
Company: <u>ERG</u>	Email: <u>philip.peterson@erg.com</u>
Billing Address: <u>3125 Sovereign Drive, Suite 9B</u> <u>Lansing, MI 48911</u>	

LOCATION TESTED	
Project Name: <u>Cornell Elementary</u>	Project No. <u>251047</u>
Address: <u>Okeemos, Michigan</u>	

It is important to fill out all information so your results can be correctly calculated and returned to you. Please notify lab when a sample is shipped for any 1 business day (1 BD) rush turnaround request and by checking the box at bottom of page.

\*Required Field - Please Write Legibly

Sample Number Enthalpy Use Only	Tube Number Ex: AA123	Date Collected*	Pump Start Time*	Pump Stop Time*	Temperature	Humidity	Analysis Requested*			Sample Name
							Residential (IAQHS - Basic)	Commercial (IAQCS - Basic)	Other	
1	A299	9/17/25	06:58	9:25	69.4	56.7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Room 22 of unit ventilator
2	A299	9/17/25	07:05	9:30	69.4	56.7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Room 22 center of wall with sink & HOLD *
							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Location, notes, and comments about testing:

Custody

Sample Condition:  OK  
 Box Condition:  OK  
 Carrier: UPS  See Notes  
 See Notes

Turn Around Time (TAT):	Requested Service:
STD: Within 2 business days of receipt for Basic, Predict, Formaldehyde, Within 5 business days for TSC, STD is default. 1 BD: 1 Business Day (2x \$)	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> 1 BD Note: STD is default.

Sent By: <u>Andy C. B.</u>	Date: <u>09/16/25</u>	Time: <u>10:49</u>
Received By: <u>AP</u>	Date: <u>9/18/2025</u>	Time: <u>3:35pm</u>

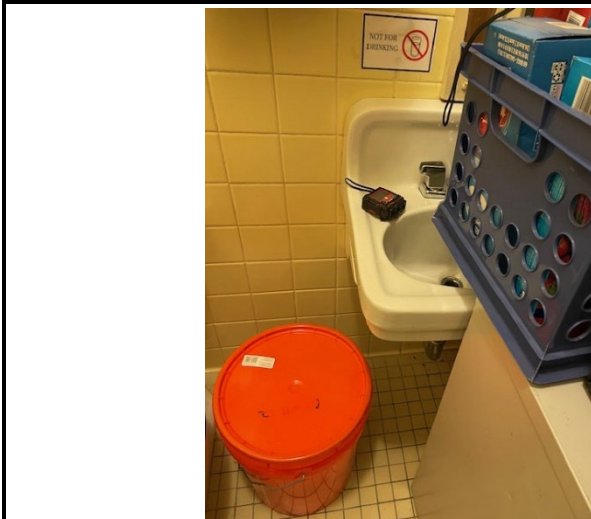
Retention of records is seven years. Records older than seven years will be destroyed without notification. Unless otherwise agreed in writing, these services are provided pursuant to the terms and conditions as set forth at [enthalpy.com/terms-and-conditions](http://enthalpy.com/terms-and-conditions). Enthalpy's acceptance of this order is expressly limited to these terms and conditions.

APPENDIX B  
Digital Photograph Log





1. A variety of direct read instruments were used to assess conditions in Rooms 12 and 22 at Cornell Elementary School. Devices were placed on the operational unit ventilator supply grilles to measure incoming air in both rooms.

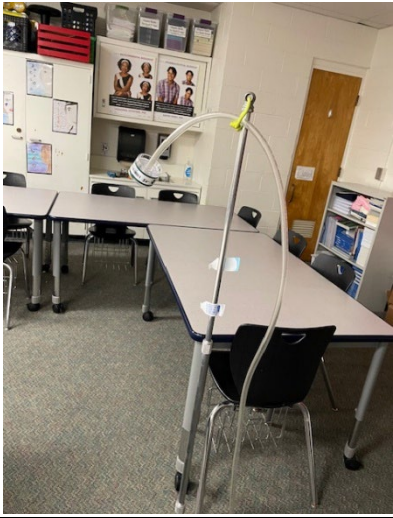




2. The classroom bathroom in Room 22 had become a storage room. The water supply serving the sink had been turned off and water must be added periodically to the sink to keep the P trap full of water.



3. The Room 22 unit ventilator fresh air intake was clean and unobstructed. Dry grass and weeds can be seen below the intake grille.



	<p>4. Mold in air samples, like the sampler shown here, were collected in each room.</p>
	<p>5. Two water marked drop ceiling tile were observed in Room 22.</p>
	<p>6. A water mark and possible mold growth were observed on the top of the water marked drop ceiling tile.</p>



7. The water marks on the ceiling tile in Room 22 occurred directly beneath this coupler/clamp. ERG hypothesized that water from the atmosphere was condensing on metal and dripping on to the ceiling tile.



8. A High Efficiency Particulate Air (HEPA) filter equipped air filtration device was operational in Room 22 at the time of the evaluation.



9. Damage to the exterior stucco was observed outside Room 22 and along the Cornell Road side of the building.