

**Report
For
Indoor Air Quality Testing
At The
David Mindess School
Ashland, MA**

Study Date:
August 26, 2024

Project #224 684.00

STUDY CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS

12 Brewster Road
Framingham, Massachusetts

August 29, 2024

Mr. Jonathan Murray
Ashland Public Schools
87 West Union Street
Ashland, MA 01720

Reference: **Indoor Air Quality Testing**
David Mindess School, Ashland, MA

Dear Mr. Murray:

Thank you for the opportunity for Universal Environmental Consultants (UEC) to provide professional services.

Enclosed please find the report for Indoor Air Quality testing at the David Mindess School, Ashland, MA conducted on Monday, August 26, 2024.

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

Very truly yours,

Universal Environmental Consultants



Ammar M. Dieb
President

UEC:\224 684.00\David Mindess School Report.DOC

Enclosure

Scope:

UEC was contracted to perform an Indoor Air Quality testing at the David Mindess School, Ashland, MA. Testing was performed on Monday, August 26, 2024.

Methodology:

Testing for Total Volatile Organic Compounds (**TVOCs**) was performed using Q-Trak XP monitor manufactured by TSI Incorporated. This is a state-of-the-art instrument capable of detecting **TVOCs** in the ppb (parts per billion) and $\mu\text{g}/\text{m}^3$ (micrograms per cubic meter) ranges. The instrument is a direct reading instrument and provides continuous results over an extended time. The unit is calibrated prior to use and serviced by an independent vendor annually.

Volatile organic compounds are a broad class of chemicals with diverse applications which are frequently emitted by new carpets, furniture, pressboards, varnishes, adhesives, and high gloss finishes. Other common products which may emit VOCs include construction materials, paints, paint strippers, other solvents, wood preservatives, aerosol sprays, cleansers, disinfectants, hand sanitizer, moth repellents, air fresheners, stored fuels, automotive products, hobby supplies, and dry-cleaned clothing. Elevated levels of VOCs are a common Indoor Air Quality problem, especially in newly constructed, recently renovated, or currently being renovated buildings.

Carbon monoxide (**CO**), Carbon Dioxide (**CO₂**), Temperature (**°F**), and Relative Humidity (**%RH**) were measured using a Q-Trak XP monitor manufactured by TSI Incorporated. The unit is calibrated prior to use and serviced by an independent vendor annually.

Airborne particulate matter (**PM**) levels for **PM₁₀** and **PM_{2.5}** were tested using a Q-Trak XP monitor manufactured by TSI Incorporated. This is a state-of-the-art instrument capable of simultaneously detecting **PM₁₀** and **PM_{2.5}** in the microgram per cubic meter ($\mu\text{g}/\text{m}^3$) range. The instrument is a direct reading monitor and provides sampling readings at 1 second intervals over the duration of each test. The instrument was zeroed prior to testing and is serviced annually by the manufacturer or an independent vendor.

Real time **PM** Measurement is a useful comparative measure of indoor and outdoor dust levels as well as identifying indoor sources of **PM**.

Samples were collected for approximately 5 minutes at each test location. No TWA (8-hour time weighted average) or other types or methods of sampling were included in the scope of work.

Results:

TEMPERATURE, RELATIVE HUMIDITY, CARBON MONOXIDE, CARBON DIOXIDE & TOTAL VOLATILE ORGANIC COMPOUNDS by PID

Location	W	D	#	T	RH	CO	CO ₂	TVOC µg/m ³
Outside	-	-	-	78.4	65.5	459	0.0	0.0
Main Office	C	O	2	76.6	59.7	631	0.0	0.0
Office 156	C	O	0	75.5	58.9	587	0.0	0.0
Copy Room 185	C	O	0	74.8	59.6	558	0.0	0.0
Counseling 174	C	O	0	74.8	61.0	554	0.0	0.0
Counseling 175	C	O	0	74.8	60.9	566	0.0	0.0
Counseling 176	C	O	0	74.8	60.6	578	0.0	0.0
Counseling Conference 177	C	O	0	75.0	58.8	598	0.0	0.0
Principal 179	C	O	0	75.0	60.2	541	0.0	0.0
Assistant Principal 181	C	O	0	74.8	62.6	484	0.0	0.0
Extended Day Office 160	C	O	0	74.5	63.6	528	0.0	0.0
Staff Room 167	C	O	0	74.3	60.8	670	0.0	0.0
OT/PT 165	C	O	0	74.1	64.3	575	0.0	0.0
Wellness 162	C	O	0	74.1	67.4	661	0.0	0.0
Art Room 131	C	O	0	73.9	69.8	556	0.0	0.0
Office 153	C	O	0	73.8	69.8	513	0.0	0.0
Office 129	C	O	0	74.1	70.5	621	0.0	0.0
Office 132	C	O	0	73.9	70.1	560	0.0	0.0
Classroom 134	C	O	0	73.8	70.7	504	0.0	0.0
Office 138	C	O	0	73.5	70.8	742	0.0	0.0
Classroom 142	C	O	0	73.4	70.5	551	0.0	0.0
Classroom 145	C	O	1	74.3	68.7	590	0.0	0.0
Classroom 149	C	O	1	74.1	69.3	507	0.0	0.0
Classroom 150	C	O	1	73.9	70.0	661	0.0	0.0
Classroom 151	C	O	1	73.8	69.3	528	0.0	0.0
Classroom 152	C	O	1	73.9	69.6	516	0.0	0.0
Classroom 154	C	O	1	74.1	68.8	576	0.0	0.0
Common Area 145-154	C	O	0	73.9	69.9	584	0.0	0.0
Classroom 139	C	C	0	73.4	70.5	537	0.0	0.0
Classroom 141	C	O	0	73.0	70.4	532	0.0	0.0
Classroom 137	C	O	0	73.0	71.1	539	0.0	0.0
Classroom 135	C	O	0	73.0	71.3	473	0.0	0.0
Classroom 123	C	O	0	73.2	71.4	479	0.0	0.0
Classroom 127	C	O	0	73.2	71.0	536	0.0	0.0
Classroom 122	C	O	0	73.2	70.9	478	0.0	0.0
Classroom 125	C	O	0	73.4	70.9	537	0.0	0.0
Classroom 121	C	O	0	73.4	70.5	473	0.0	0.0
Classroom 124	C	O	0	73.2	71.1	517	0.0	0.0

Location	W	D	#	T	RH	CO	CO ₂	TVOC µg/m ³
Classroom 120	C	O	0	73.4	70.7	550	0.0	0.0
Music Room 116	C	O	0	73.6	71.2	468	0.0	0.0
Band Room 115	C	O	0	73.8	70.5	549	0.0	0.0
Practice Room 115B	C	O	0	73.8	70.5	527	0.0	0.0
Practice Room 115C	C	O	0	73.9	70.6	368	0.0	0.0
Gymnasium	C	O	0	73.6	68.5	675	0.0	0.0
Media Center 200	C	O	0	74.3	68.0	608	0.0	0.0
Steam Project Room 202	C	O	0	74.7	67.8	643	0.0	0.0
Office 206	C	O	0	74.8	68.5	504	0.0	0.0
Office 207	C	O	0	74.8	68.6	507	0.0	0.0
Art Room 222	C	O	0	74.8	68.7	512	0.0	0.0
Book Room 241	C	O	0	74.7	68.0	357	0.0	0.0
Classroom 239	C	O	0	74.5	68.8	553	0.0	0.0
Classroom 248	C	O	0	74.3	68.5	515	0.0	0.0
Classroom 249	C	O	0	74.1	69.0	520	0.0	0.0
Classroom 245	C	O	0	73.9	69.5	509	0.0	0.0
Classroom 250	C	O	1	74.3	68.4	584	0.0	0.0
Classroom 246	C	O	0	73.8	69.5	513	0.0	0.0
Classroom 251	C	O	0	73.8	69.2	517	0.0	0.0
Classroom 247	C	O	0	73.8	69.8	602	0.0	0.0
Tech Integration 224	C	O	0	74.5	69.1	504	0.0	0.0
Classroom 221	C	O	0	74.3	69.0	469	0.0	0.0
Classroom 214	C	O	0	73.9	69.4	495	0.0	0.0
Classroom 225	C	O	0	74.3	69.8	490	0.0	0.0
Classroom 230	C	O	0	73.9	69.8	479	0.0	0.0
Classroom 235	C	O	0	73.8	69.8	524	0.0	0.0
Classroom 231	C	O	0	73.9	69.3	506	0.0	0.0
Classroom 234	C	O	0	73.8	69.5	492	0.0	0.0
Classroom 233	C	O	0	73.6	69.6	501	0.0	0.0
Classroom 232	C	O	0	73.8	68.4	504	0.0	0.0
Classroom 213	C	O	0	73.9	70.4	461	0.0	0.0
Classroom 212	C	O	0	73.9	69.2	492	0.0	0.0
Classroom 217	C	O	0	73.6	68.8	484	0.0	0.0
Classroom 216	C	O	0	73.6	67.7	487	0.0	0.0
Classroom 211	C	O	0	73.8	69.7	466	0.0	0.0
Classroom 215	C	O	0	74.1	70.3	450	0.0	0.0
Cafeteria	C	O	>75	74.7	67.5	668	0.0	0.0

PM₁₀, PM_{2.5} and PM₁

Location	PM 10 (mg/m³)	PM 2.5 (mg/m³)	PM1 (mg/m³)
Main Office	0.0	0.0	0.0
Office 156	0.0	0.0	0.0
Copy Room 185	0.0	0.0	0.0
Counseling 174	0.0	0.0	0.0
Counseling 175	0.0	0.0	0.0
Counseling 176	0.0	0.0	0.0
Counseling Conference 177	0.002	0.001	0.0
Principal 179	0.002	0.001	0.0
Assistant Principal 181	0.0	0.0	0.0
Extended Day Office 160	0.0	0.0	0.0
Staff Room 167	0.0	0.0	0.0
OT/PT 165	0.0	0.002	0.001
Wellness 162	0.0	0.0	0.0
Art Room 131	0.0	0.0	0.0
Office 153	0.0	0.0	0.0
Office 129	0.0	0.0	0.0
Office 132	0.0	0.0	0.0
Classroom 134	0.0	0.0	0.0
Office 138	0.0	0.0	0.0
Classroom 142	0.0	0.0	0.0
Classroom 145	0.0	0.0	0.0
Classroom 149	0.0	0.0	0.0
Classroom 150	0.0	0.002	0.001
Classroom 151	0.0	0.0	0.0
Classroom 152	0.0	0.0	0.0
Classroom 154	0.0	0.0	0.0
Common Area 145-154	0.0	0.0	0.0
Classroom 139	0.0	0.0	0.0
Classroom 141	0.0	0.0	0.0
Classroom 137	0.0	0.0	0.0
Classroom 135	0.0	0.0	0.0
Classroom 123	0.002	0.002	0.001
Classroom 127	0.002	0.002	0.001
Classroom 122	0.002	0.002	0.001
Classroom 125	0.0	0.002	0.001
Classroom 121	0.0	0.002	0.001
Classroom 124	0.0	0.0	0.0
Classroom 120	0.0	0.0	0.0
Music Room 116	0.0	0.0	0.0
Band Room 115	0.0	0.0	0.0

Location	PM 10 (mg/m ³)	PM 2.5 (mg/m ³)	PM1 (mg/m ³)
Practice Room 115B	0.0	0.0	0.0
Practice Room 115C	0.0	0.0	0.0
Gymnasium	0.0	0.0	0.0
Media Center 200	0.0	0.0	0.0
Steam Project Room 202	0.0	0.0	0.0
Office 206	0.0	0.0	0.0
Office 207	0.0	0.0	0.0
Art Room 222	0.0	0.0	0.0
Book Room 241	0.0	0.0	0.0
Classroom 239	0.002	0.001	0.001
Classroom 248	0.0	0.0	0.0
Classroom 249	0.0	0.0	0.0
Classroom 245	0.0	0.0	0.0
Classroom 250	0.0	0.0	0.0
Classroom 246	0.0	0.0	0.0
Classroom 251	0.0	0.0	0.0
Classroom 247	0.0	0.002	0.0
Tech Integration 224	0.0	0.002	0.0
Classroom 221	0.0	0.002	0.001
Classroom 214	0.0	0.0	0.0
Classroom 225	0.0	0.0	0.0
Classroom 230	0.0	0.0	0.0
Classroom 235	0.0	0.0	0.002
Classroom 231	0.0	0.0	0.0
Classroom 234	0.002	0.001	0.0
Classroom 233	0.002	0.001	0.001
Classroom 232	0.0	0.0	0.0
Classroom 213	0.0	0.0	0.0
Classroom 212	0.0	0.0	0.0
Classroom 217	0.0	0.0	0.0
Classroom 216	0.0	0.0	0.0
Classroom 211	0.0	0.0	0.0
Classroom 215	0.0	0.0	0.0
Cafeteria	0.0	0.0	0.0

Legend:

µg/m³ - micrograms per cubic meter, ppm - parts per million, ppb - parts per billion

CO OSHA PEL is 30 ppm, ACGIH TLV is 25 ppm.

CO₂ - OSHA PEL is 5000 ppm, Mass DOH Guideline is 800 ppm

TVOC – UEC suggested guideline of 100 ppb: Seifert “Target Guideline Value” of 0.3 mg/m³

ND - Not Detected

W/D: Windows and Doors (Open/Closed)

#: Number of Occupants

Observations and Interpretation of Results:

Temperature and Relative Humidity (T & RH)

The outside **T** and **RH** were approximately 78.4°F and 65.5%. Massachusetts Department of Public Health (MDPH) recommends that indoor **T** be maintained in a range of 70 - 78 °F and 40 to 60 % for indoor **RH** to provide for the comfort of building occupants.

Interior **T** and **RH** were 73.0°F – 76.6°F and 58.8% – 71.4% during the test period. Interior **T** tests were within the MDPH recommended **T** range of 70-78 °F. Interior **RH** tests were mostly higher than the MDPH recommended **RH** range of 40 to 60 %.

TVOCs

No **TVOCs** were detected during testing.

Carbon Monoxide

No **CO** was detected during testing.

Carbon Dioxide

CO₂ levels were within the acceptable range. For comparative purposes, fresh outdoor air has approximately 460 ppm of **CO₂**. All areas were well below the OSHA/NIOSH limit of 5000 ppm, and mostly below the MDPH guideline of 800 ppm for publicly occupied buildings. MDPH recommends an optimal level of below 600 ppm. Exposure to elevated levels of **CO₂** for prolonged periods could cause building occupants to become lethargic and generally uncomfortable. **CO₂** levels will rise over the course of the day especially in those areas which have a high occupancy. **CO₂ at these levels is a comfort as opposed to a health issue.**

Airborne Particulate Matter (Dust):

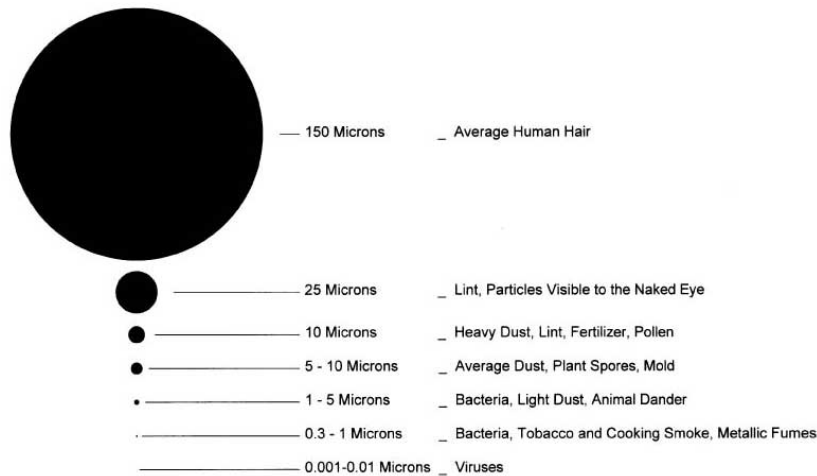
Dust monitoring is one aspect of air quality that an industrial hygienist can use to determine the amount of dust particles present in the workplace, cities, or communities over a given period.

The Particulate Matter (PM) monitoring focused on measuring a range of particulate sizes in the air that are equal to or less than 10 micrometers (PM10) and equal to or less than 2.5 micrometers (PM2.5) in diameter (course dust and fine dust respectively), i.e., PM capable of penetrating the outer defenses of the respiratory tract, such as the mouth and nose, and can pass into the lungs based on PM size. PM air pollutants include but are not limited to soot, smoke, salts, metals, acids and soil and road dust. These pollutants are typically monitored along work site fence lines, industrial complexes, during wildfires, and high traffic areas (vehicle exhaust).

EPA's health-based National Ambient Air Quality Standard (NAAQS) for PM10 is 150-µg/m³ and for PM2.5 is 35-µg/m³ (measured as a 24-hours period concentration) for outdoor (ambient) air. The OSHA Permissible Exposure Limit (PEL) for occupational exposure for respirable dust is 5-mg/m³ (5,000-µg/m³) for a time-weighted average (8 hour) exposure. While the EPA NAAQS is an outdoor, ambient air standard, it is a useful reference guide for acceptable air quality in general with limits far below OSHA worker compliance requirement levels.

The TSI Q-Trak XP monitor used in this survey can measure PM simultaneously as PM10, PM2.5, and PM1, i.e., particles in the size range categories of 10, 2.5, and 1 micrometer diameter.

Figure 1.1-Visual Particle Size Comparison Chart.



Levels of PM10 recorded in areas tested during the survey were **0 to 2- $\mu\text{g}/\text{m}^3$ or 0.0 to 0.002- mg/m^3** . EPA's health-based National Ambient Air Quality Standard (NAAQS) recommended level for PM10 is **150- $\mu\text{g}/\text{m}^3$ or 0.150- mg/m^3** . All areas tested during the survey were below the EPA recommended level.

Levels of PM2.5 recorded in areas tested during the survey ranged from **0 to 1- $\mu\text{g}/\text{m}^3$ or 0.0 to 0.001- mg/m^3** . EPA's health-based National Ambient Air Quality Standard (NAAQS) recommended level for PM2.5 is **35- $\mu\text{g}/\text{m}^3$ or 0.035- mg/m^3** . All areas tested during the survey were below the EPA recommended level.

Direct reading PM monitors are not a reference method for OSHA compliance Respirable Dust testing. However, the direct reading instrument is useful in providing accurate order of magnitude evaluation of Respirable Dust levels.

Samples were collected for approximately 5 minutes at each test location and results/levels are not based on TWA (8-hour time weighted average).

Conclusions and Recommendations:

Interior **RH** tests were higher than the MDPH recommended **RH** range of 40 to 60 %. All other IAQ parameters tested were within the acceptable ranges.

Limitations and Conditions:

This report has been completed based on visual and physical observations made and information available at the time of the site visits. This report is intended to be used as a summary of available information on existing conditions with conclusions based on a reasonable and knowledgeable review of evidence found in accordance with normally accepted industry standards, state, and federal protocols, and within the scope and budget established by the client. Any additional data obtained by further review must be reviewed by UEC and the conclusions presented herein may be modified accordingly.

This report and attachments, prepared for the exclusive use of Owner for use in an environmental evaluation of the subject site, are an integral part of the inspections and opinions should not be formulated without reading the report in its entirety. No part of this report may be altered, used, copied, or relied upon without prior written permission from UEC, except that this report may be conveyed in its entirety to parties associated with Owner for this subject study.

REFERENCES:

1. ACGIH, Threshold Limit values and Biological Exposure Indices, 2007.
2. AIHA, 2700 Prospect Ave., Fairfax, VA. IAQ Paper #130 June 23, 1999.
3. Seifert, B. Regulation Indoor Air. In: Indoor Air '90, Proceedings of the 5th International Conference on Indoor Air Quality and Climate, Volume V, p. 35. Toronto 1990.
4. American Society of Heating, Refrigeration and Air-conditioning Engineers' ANSI/ASHRAE 55-1992 "**Thermal Environmental Conditions for Human Occupancy.**"
5. BOCA, 1993. The BOCA National Mechanical Code 1993 8th edition Building Officials and Code Administrators International., Inc., Country Club Hills, Ill
6. SBBRS, 1997. Mechanical Ventilation, State Board of Building Regulations and Standards Code of Massachusetts Regulations 780 CMR 1209.0
7. Field Guide for the Determination of Biological Contaminants in Environmental Samples. (2005)
8. Bearg, David W. Indoor Air Quality and HVAC Systems (1993) Pages 76, 77 and others