



# Worcester Public Schools

## Worcester, Massachusetts



Dr. John E. Durkin Administration Building  
20 Irving Street  
Worcester, Massachusetts 01609-2493

### Summary of Burncoat High School Indoor Air Quality Reassessment Summary Conducted By MA Department of Public Health on April 7, 2017

#### Introduction

At the request of Worcester Public Schools, Mike Feeney, Chief Emergency Response/Indoor Air Quality Program, Massachusetts Department of Public Health (MADPH) provided an Indoor Air Quality reassessment on April 7, 2017 for Burncoat High School as a follow up to the assessment conducted on January 12, 2017.

This reassessment included using a variety of handheld monitoring equipment and a visual inspection to determine the condition and operation of the heating, ventilating and air-conditioning (HVAC) system after WPS implemented many recommendations from the original assessment.

#### Window Frame Caulking Conditions

The reassessment did not include a visual inspection of window caulking due to the fact that the first assessment noted no damaged/crumbling caulking in the building. There were a few areas noted in the first report where window caulking encapsulant was not intact, WPS has since reapplied encapsulant caulking in these areas.

#### Ventilation

One of the main concerns from the first DPH assessment was elevated levels of carbon dioxide throughout the building which indicated a lack of fresh air exchange. Following the first site visit WPS Facilities Department has increased the efficiencies of Burncoat's aging HVAC system.

The results of the ventilation reassessment revealed the implemented recommendations have made a significant improvement in air exchange. Carbon dioxide levels were below the recommended level of 800 parts per million (ppm) in the majority of areas surveyed.

Additional sampling results in the reassessment report were similar to results from DPH's first site visit including:

- Carbon monoxide levels were non-detectable in all areas tested
- Temperature was within the MDPH recommended range of 70°F to 78°F in most of the areas visited.
- Particulate matter was below the National Ambient Air Quality (NAAQS) level of 35 µg/m<sup>3</sup> in all areas surveyed in both buildings.
- Relative humidity was lower than the MDPH recommended range of 40% to 60% which is typical during the heating season in the Northeast.

The initial assessment stated that the HVAC design is prone to collect debris and may act to aerosolize particulate matter. DPH observed accumulated debris and obstructed floor vents during the first site visit. The reassessment from DPH stated efforts the WPS Facilities Department have

implemented to resolve these issues including cleaning supply and return vents and educating staff to keep vents free of obstructions.

### **Microbial/Moisture Concerns**

The reassessment report noted observations of water-damaged ceiling tiles and plaster walls/ceilings including the women's locker room. WPS Facilities Department had replaced many stained ceiling tiles that were recommended in the first report and will continue to monitor and replace damaged tiles going forward. Plans for renovating the women's locker room is underway.

### **Other IAQ Concerns**

There were additional IAQ concerns noted in the reassessment report similar to the first assessment including:

- Abandoned water fixtures were identified, MDPH recommends any drains from unused fixtures be capped or sealed to prevent sewer gasses to penetrate occupied spaces.
- Tennis balls sliced open and placed on chair footings to reduce noise. Constant wearing of tennis balls can produce fibers and lead to off-gassing of VOCs. Also tennis balls contain latex which some individuals are highly allergic. WPS is currently researching alternative chair glides to implement district wide.

Other recommendations from the initial DPH assessment that were not noted in the reassessment are below. WPS Facilities Department has made an effort to remediate these issues and will continue to monitor the building to ensure DPH's recommendations are implemented.

- Products that contain low levels of total volatile organic compounds (TVOCs) were identified which may produce eye, nose, throat and/or respiratory irritation to sensitive individuals. Some of these products include hand sanitizers, deodorizers and dry erase materials.
- Wall Mounted air-conditioning units were observed in both buildings, these units contain a filter that should be cleaned prior to use according to the manufacturer's instructions.
- Missing ceiling tiles were observed in areas throughout buildings, which can allow air plenum dust to migrate into occupant spaces.
- In several classrooms, items were observed on windowsills, tabletops and counters, bookcases and desks. A large amount of clutter provides a source for dusts to accumulate and makes it difficult for custodial staff to clean. Also, classrooms were noted to have accumulation of chalk dust or dry erase residue in trays.
- Many missing light covers were identified. Fixtures should be equipped with access covers to prevent injuries from broken glass lamps and the release of mercury or other hazardous compounds.

The complete reassessment report is attached.



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May 17, 2017

Brian E. Allen, Chief Financial and Operations Officer  
Worcester Public Schools  
John Durkin Administration Building, 20 Irving Street  
Worcester, MA 01609

Dear Mr. Allen:

Enclosed is a copy of the report by our Indoor Air Quality (IAQ) Program on their visit to the Burncoat High School, Worcester, MA to conduct an IAQ assessment. Please refer to the recommendations section for advice on how to correct any issues identified by this assessment.

If you have any questions regarding the report or if we can be of further assistance in this matter, please feel free to call us at (617) 624-5757.

Sincerely,

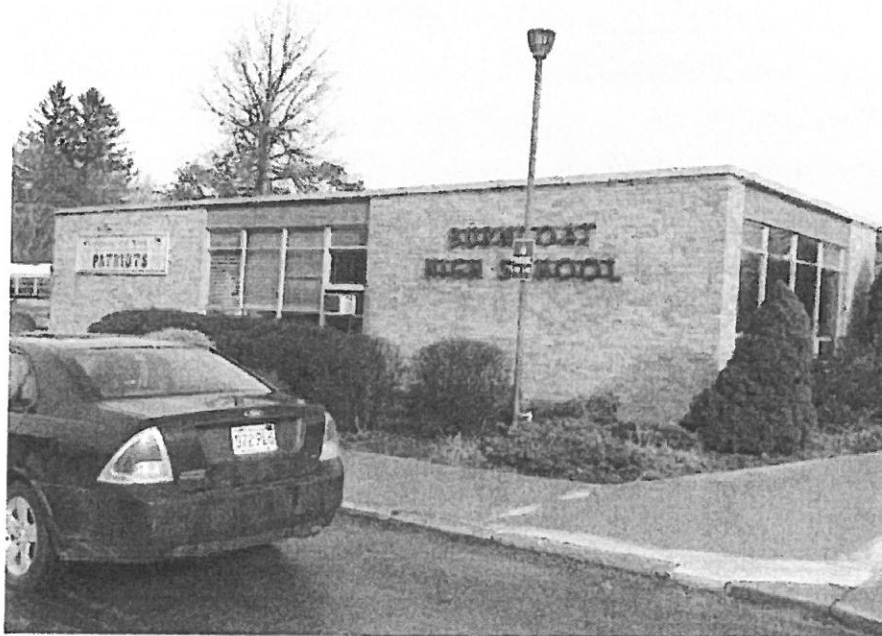
Michael A. Feeney, R.Ph., J.D., C.H.O.  
Director, Indoor Air Quality Program

cc: Jan Sullivan, Acting Director, BEH  
Joshua Watkins, Environmental Coordinator, Worcester Public Schools  
Maureen Binienda, Superintendent, Worcester Public Schools  
William P. Foley, Principal, Burncoat High School  
Michael Sireci, Massachusetts Teacher's Association  
The Honorable Representative James J. O'Day  
The Honorable Senator Harriette L. Chandler

Enclosure(s)

# INDOOR AIR QUALITY REASSESSMENT

**Burncoat High School  
179 Burncoat Street  
Worcester, MA**



Prepared by:  
Massachusetts Department of Public Health  
Bureau of Environmental Health  
Indoor Air Quality Program  
May 2017

## Background/Introduction

<b>Building:</b>	Burncoat High School (BHS)
<b>Address:</b>	179 Burncoat Street, Worcester, MA
<b>Assessment Requested by:</b>	Brian Allen, Chief Financial and Operations Officer, Worcester Public Schools (WPS)
<b>Reason for Request:</b>	Reassess the ventilation
<b>Date of Assessment:</b>	April 7, 2017
<b>Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment:</b>	Mike Feeney, Director, Indoor Air Quality (IAQ) Program, Jason Dustin Environmental Analyst/Inspector IAQ Program
<b>Date of Building Construction:</b>	1964
<b>Building Description:</b>	Two-level brick building consisting of classrooms, auditorium, gymnasium, art rooms, kitchen, cafeteria, library and office space.
<b>Building Population:</b>	The school has approximately 1,064 students and 75 staff
<b>Windows:</b>	Openable

The reason for this visit was to reassess the adequacy of the ventilation system. The first assessment (MDPH, 2017) showed that due to some inactive exhaust systems and a closed fresh air intake vent, there were some areas with elevated carbon dioxide. WPS reportedly implemented many of the recommendations from the first visit and requested the IAQ program to perform further testing to ensure that these ventilation changes were effective.

## Methods

Please refer to the IAQ Manual and appendices for methods, sampling procedures, and interpretation of results (MDPH, 2015).



## General Ventilation

The following is a summary of indoor air testing results (Table 1).

- **Carbon dioxide** measurements were below the MDPH recommended level of 800 parts per million (ppm) in the majority of areas surveyed the day of assessment, indicating adequate fresh air exchange.
- **Temperature** was within the MDPH recommended range of 70°F to 78°F in most of the areas visited.
- **Relative humidity** was below the MDPH recommended range of 40% to 60% in most areas as is typical during the heating season in the Northeast.
- **Carbon monoxide** levels were non-detectable in all areas tested.
- **Particulate matter (PM<sub>2.5</sub>)** concentrations measured were below the National Ambient Air Quality (NAAQS) level of 35 µg/m<sup>3</sup> in all areas surveyed.

## Ventilation

Fresh air in most classrooms is supplied by air handling units (AHUs) located in a mechanical room in the lower level. The AHUs draw air from outdoors through an intake vent on the exterior wall of the building. In most classrooms, return air is drawn through floor vents. Fresh and return air streams are mixed together in a large mixing room in the lower level. Supply air is then filtered, heated, and provided to classrooms via floor-mounted air diffusers.

BHS Facilities staff reported that the louvers for the fresh air intake vent in the mixing room were opened to the proper setting. BHS staff also reported that the exhaust units that were inactive during the previous assessment have been repaired. According to the measurements shown in Table 1, the recommendations that were implemented have made a significant improvement in air exchange. It was reported by BHS Facilities staff that the B Cafeteria ventilation was being worked on at the time of this assessment and may account for the elevated carbon dioxide readings.

There are some isolated areas that lack supply or exhaust ventilation. These areas should utilize open windows and doors until a long term solution can be implemented.

BHS facilities staff reported that floor-mounted supply and return vents were cleaned of accumulated debris and that staff have been educated to avoid blocking the vents with stored

furniture/materials. As mentioned in the prior report, in order to function properly, both supply and return vents must remain free of obstructions.

### **Microbial/Moisture Concerns**

Some areas were noted to have remaining water-damaged ceiling tiles and plaster ceilings/walls. BHS facilities staff reported that plans are underway to renovate the women's locker area and that they will continue to replace historic water-damaged ceiling tiles.

Measures should be taken to ensure water-damaged materials are cleaned, replaced, and/or repaired in a manner consistent with the U.S. Environmental Protection Agency's guidelines (US EPA, 2008). The US EPA and the American Conference of Governmental Industrial Hygienists (ACGIH) recommend that porous materials (e.g., ceiling tiles, gypsum wallboard) be dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2008; ACGIH, 1989). If not dried within this time frame they should be removed/discarded.

### **Other Concerns**

Some occupants reported that abandoned drain traps were a continuing problem in regards to sewer odors. These odors should be reported promptly and the drains should be either properly capped or have water poured into them on a regular basis to avoid future issues.

BHS staff reported that they are researching alternatives to the tennis balls used as chair glides. They plan to implement the alternative glides as soon as they make an appropriate choice.

### **Conclusions/Recommendations**

1. Continue to ensure all water leaks are fixed promptly and remove any water-damaged porous materials (e.g., ceiling tiles) that were not dried properly within 24-48 hours.
2. Ensure that any water-damaged plaster ceilings/walls are repaired and clean any associated debris to avoid irritant effects.
3. Determine whether abandoned plumbing fixtures are to be used or not. Fixtures that are to be used should have water poured into drains on a regular basis to avoid dry drain traps. Fixtures no longer needed should be removed and properly capped.

4. Continue to ensure that all ventilation components throughout the building are properly functioning and operating continuously during occupied hours.
5. Encourage occupants to utilize open windows and doors in areas lacking mechanical ventilation until a long-term solution can be implemented.
6. Continue to implement remaining recommendations from the previous assessment (MDPH, 2017).
7. Consider adopting the US EPA (2000) document, “Tools for Schools”, as an instrument for maintaining a good IAQ environment in the building. This document is available at: <http://www.epa.gov/iaq/schools/index.html>.
8. Refer to resource manual and other related IAQ documents located on the MDPH’s website for further building-wide evaluations and advice on maintaining public buildings. These documents are available at: <http://mass.gov/dph/iaq>.

### **Long-term Recommendation**

1. Consider contracting with an HVAC engineer to design/install mechanical ventilation in those areas which are not equipped with it.



## References

American Conference of Governmental Industrial Hygienists (ACGIH). 1989. Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

MDPH. 2015. Massachusetts Department of Public Health. Indoor Air Quality Manual: Chapters I-III. Available at: <http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/>.

MDPH. 2017. Massachusetts Department of Public Health. Indoor Air Quality Assessment: Worcester Burncoat High School. March 2017. Available at: <http://www.mass.gov/eohhs/docs/dph/environmental/iaq/2017/worcester-burncoat-hs-march-2017.pdf>

US EPA. 2000. Tools for Schools. Office of Air and Radiation, Office of Radiation and Indoor Air, Indoor Environments Division (6609J). EPA 402-K-95-001, Second Edition. <https://www.epa.gov/iaq-schools>.

US EPA. 2008. "Mold Remediation in Schools and Commercial Buildings". Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. September 2008. Available at: <http://www.epa.gov/mold/mold-remediation-schools-and-commercial-buildings-guide>.

Table 1

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m <sup>3</sup> )	Occupants in Room	Remarks
Background	396	1.0	49	46	13	-	Partly cloudy, moderate wind
A12	640	ND	71	38	0	2	
A14	639	ND	70	37	0	2	
A16	637	ND	70	39	0	0	
A18	647	ND	70	37	0	2	
A5	607	ND	72	31	3	2	
A5 Conference	512	ND	73	30	8	3	
A6	611	ND	72	33	0	5	
A7	661	ND	73	33	5	5	
A7 main	587	ND	72	34	7	4	

µg/m<sup>3</sup> = micrograms per cubic meter

ppm = parts per million

ND = non detect

MT = missing tile

Comfort Guidelines

Carbon Dioxide: < 800 ppm = preferred

> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F

Relative Humidity: 40 - 60%

Location: Burncoat High School

Address: 179 Burncoat St., Worcester, MA

Indoor Air Results

Date: 4/7/2017

Table 1

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m <sup>3</sup> )	Occupants in Room	Remarks
A8	691	ND	73	38	0	4	
A9	614	ND	72	33	8	5	
A9	677	ND	74	32	1	5	
A9-Center	535	ND	73	30	7	1	
A9-Green	491	ND	73	30	7	0	
A9-Michaud	515	ND	72	31	8	0	
B1	584	ND	73	34	9	2	
B10	673	ND	73	31	9	0	
B11	812	ND	75	34	9	24	
B14	719	ND	72	32	7	16	

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B16 Cafe	1434	ND	72	44	22	50	
B19 Suite	717	ND	72	32	8	5	
B2	667	ND	74	35	10	9	
B3	867	ND	73	36	8	19	
B4	754	ND	72	34	9	15	
B5	577	ND	75	30	8	1	
B5A	710	ND	74	36	9	1	
B6	676	ND	73	32	12	11	
B9	711	ND	74	32	9	15	
C1	448	ND	72	29	8	11	Reported mice problem

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C1 supply room	466	ND	72	28	8	2	Drain odors, MT, cleaning complaints
C11 Library	683	ND	74	28	6	25	
C19	553	ND	75	28	6	23	
C19 Storage	516	ND	75	29	6	0	
C1A	390	ND	73	25	7	16	Windows open
C2	511	ND	74	27	2	8	
C4	677	ND	75	30	2	22	
C6	838	ND	76	29	4	21	
C8	750	ND	76	30	7	19	
C9	448	ND	73	27	7	6	

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Cafeteria B	1286	ND	70	46	9	100+	
Cafeteria D	562	ND	71	32	3	100+	
Clinician	694	ND	77	34	10	1	
-Corles	893	ND	72	34	11	0	
D1	468	ND	72	27	4	4	
D10	511	ND	71	30	1	6	
D14	776	ND	72	31	6	26	
D16	382	ND	71	28	6	0	Windows open
D18	-	-	-	-	-	-	Room locked
D2	474	ND	71	30	1	5	

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D20	456	ND	70	30	6	9	
D24	743	ND	71	31	7	22	
D3	505	ND	72	28	1	0	
D4	439	ND	71	28	0	5	
D5	556	ND	71	30	1	0	
D6	578	ND	72	32	0	8	
D8	631	ND	72	40	1	0	
D8A	501	ND	71	29	0	1	
E1	642	ND	75	30	2	13	
E2	571	ND	73	31	2	22	

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E3	519	ND	75	28	2	21	
E4	529	ND	73	29	2	9	
E5	462	ND	76	26	2	5	
E5A	453	ND	71	24	3	0	
E6	495	ND	74	28	2	0	
E8	590	ND	75	27	2	14	
F6	563	ND	75	30	4	16	
F8-10 Auto	461	ND	74	27	13	25	
Gym	737	ND	73	35	8	2	
H10	541	ND	70	35	12	0	

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Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m <sup>3</sup> )	Occupants in Room	Remarks
H14	672	ND	70	33	7	12	
H16	478	ND	69	33	7	6	Windows open
H17	-	-	-	-	-	-	Door locked
H8	535	ND	66	41	3	3	
H9	550	ND	69	38	4	0	
Main Office	646	ND	70	36	11	4	
Police office	551	ND	72	35	10	0	
Principal's Office	567	ND	70	36	11	3	
-rear	745	ND	73	34	8	0	
ROTC class	1077	ND	72	39	13	2	

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ROTC office	1001	ND	71	37	6	2	
Women Teachers	764	ND	72	34	9	0	

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