

MOLD ASSESSMENT

**Sutton Memorial High School
383 Boston Road
Sutton, Massachusetts**



Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health
Indoor Air Quality Program
September 2013

Background/Introduction

At the request of Cheryl Rawinski, Health Agent, Sutton Board of Health (SBOH), the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH) conducted an indoor air quality (IAQ) assessment at the Sutton Memorial High School (SMHS), located at 383 Boston Road, Sutton, Massachusetts. The request was prompted by concerns related to mold. On August 23, 2013, a visit was made to the SMHS by Michael Feeney, Director of BEH's IAQ program. Mr. Feeney was accompanied by Ms. Rawinski, several school officials, Sutton board of health members and school board members. BEH/IAQ staff conducted a limited assessment of the building related to identification of sources of water vapor/moisture and respiratory irritants. The overall function of the heating, ventilating, and air-conditioning (HVAC) system was not assessed during this visit because the building was largely unoccupied.

The SMHS is a complex that was originally constructed in 1949 as a two-story building with an occupied basement. A two-story addition was constructed in 1989. SMHS contains the Sutton Middle School and Sutton High School. The SMHS is not air-conditioned in summer months, with the exception of a few rooms with window-mounted air conditioning units. Windows are openable throughout the building.

School officials reported that a new Sutton Middle/High School is under construction on a parcel adjacent to the SMHS complex, with an original delivery date of January 2013. Due to plans to occupy the new building, the 1949 section of the current building was closed in anticipation of demolition. After pushing the occupancy date of the new school back into the 2013-2014 school year, a decision was made to reopen the old building on a temporary basis. It is intended the SMHS be occupied for four to six weeks while building construction on the new school is completed. Concurrently, it was discovered that carpeting in certain areas of the

building was believed to be water-damaged from an extended heat wave with elevated humidity in the New England area in July of 2013. Sutton school officials reported that the 1949 section of the SMHS had wall-to-wall carpeting installed over asbestos-containing floor tile.

Methods

Air tests for temperature and relative humidity were conducted with the TSI, Q-Trak, IAQ Monitor, Model 7565. Surface temperatures of floors were measured with a ThermoTrace infrared thermometer. Moisture content of carpet was measured using a Tramex Moisture Encounter Plus Non-destructive Moisture Detector. BEH/IAQ staff also performed a visual inspection of building materials for water damage and/or microbial growth.

Results

The SMHS houses over 800 students in grades 6 through 12 and has a staff of approximately 70. The tests were taken during summer break with no occupants. Test results appear in Table 1.

Discussion

Microbial/Moisture Concerns

BEH/IAQ staff conducted a visual inspection of the building and found water-damaged ceiling tiles on the top floors of the building complex. As reported by school officials, these water-damaged ceiling tiles are attributed to a failed roof membrane. In room 205, a plastic

collection device installed above the ceiling was found to have accumulated significant water and had a musty odor (Picture 1).

Also of note was the condition of the foundation walls in basement classrooms of the 1949 building. Cracks and cement damage from water penetration was noted along the wall. Several classrooms in this area had wall-to-wall carpeting, which was likely exposed to moisture. In addition, school officials reported that the carpet in this section of the building was installed over asbestos-containing floor tile. Removal of the carpet in these classrooms would require asbestos abatement of the floor tile in compliance with Massachusetts and federal asbestos laws and regulations. BEH/IAQ staff noted rippled carpet in the cafeteria outside the kitchen, which indicates moisture exposure. During the assessment no visible mold growth/contamination was observed in any areas within the SMHS.

On the day of assessment, the outdoor relative humidity was measured at 68 percent (Table 1). All locations tested had relative humidity measurements lower than outdoors (Table 1). The indoor relative humidity measurements did not indicate that a significant source of water vapor exists within the SMHS on the day of assessment. According to the American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHARE), relative humidity in excess of 70 percent for extended periods of time can provide an environment for mold and fungal growth in building materials (ASHRAE, 1989).

Of note was the condition of flooring in the building. The carpeting was stained and worn. The Institute of Inspection, Cleaning and Restoration Certification (IICRC), recommends that carpeting be cleaned annually (or semi-annually in soiled high traffic areas) (IICRC, 2005). Since the average service time of carpeting in a school environment is approximately eleven years (Bishop, 2002).

Temperatures in the building were measured in a range of 71°F to 80°F (Table 1). The dew point was also measured in the building. Dew point is another way of representing humidity; the dew point is the temperature at which the water vapor in the air will start to condense. If a surface in contact with the air has a temperature at or below the dew point, it will collect condensed moisture¹ and become wet. Dew points in the building ranged from 49°F to 62°F (Table 1), with the lowest values measured in the air-conditioned portions of the building.

BEH/IAQ staff also conducted surface temperature measurement of floors throughout the building in order to determine whether the floors would be prone to generating condensation. If the floors of the building are properly insulated, the temperature of the interior side of floors would be expected to be close to the indoor temperature. Floor temperatures were measured to be in a range of 61° F to 83° F (Table 1), often lower than the corresponding air temperature. All locations had floor temperatures below the corresponding dew point for each area (Table 1), indicating that no condensation would be generated under conditions observed at the time of assessment. However, it is important to note that the floor temperatures measured in the SMHS were sometimes greater than 5° F cooler than the measured air temperature (Table 1), particularly on the first floor, which can indicate that the floor of the building is likely susceptible to generating condensation during hot, humid weather.

A moisture meter was used to detect whether carpeting was moistened by condensation in rooms 102, 104, 106 and 108 due to the location and low floor temperature. No levels of elevated moisture were detected in the carpeting.

The US Environmental Protection Agency (US EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommends that porous materials be dried with

¹ Condensation is the collection of moisture on a surface with a temperature below the dew point. The dew point is a temperature determined by air temperature and relative humidity. For example, at a temperature of 73° F and relative humidity of 57 percent indoors, the dew point for water to collect on a surface is approximately 57° F (IICRC, 2000).

fans and heating within 24 to 48 hours of becoming wet (US EPA, 2001; ACGIH, 1989). If porous materials are not dried within this time frame, mold growth may occur. Water-damaged porous materials cannot be adequately cleaned to remove mold growth. The application of a mildewcide to moldy porous materials is not recommended.

Other Concerns

A number of science classrooms have abandoned sinks. If the drains are not properly sealed, they can serve as a source of water vapor and sewer gas odors in the building. Along the west exterior wall of the building, unit ventilator (univent) fresh air intakes are located within the construction zone for the new school (Picture 2). Unless the univents are properly shielded and have adequate filtration, airborne pollutants from the construction project may be entrained when these univents are activated.

Conclusions/Recommendations

The BEH IAQ Program found that the majority of the SMHS did not appear to have environmental conditions that would preclude use of the building temporarily until the new building is completed. Given the short term occupancy, BEH IAQ Program recommends that the following rooms not be used due to water damage issues that would require significant funding to repair in a building that is scheduled for demolition: rooms 102, 104, 106, 108 and 205. Upon request, the BEH IAQ Program can return to the building when it is fully occupied and mechanical ventilation systems are activated in order to conduct a full IAQ investigation. In view of the findings at the time of the visit, the following recommendations are provided:

1. Remove the carpeting from the entrance near the kitchen in the cafeteria.

2. Remove all water-damaged ceiling tiles. Replace if needed.
3. Ensure that all drains in disused sinks are sealed and the water service is turned off.
4. Take appropriate measures to shield univent fresh air intakes for construction impact. Monitor and replace filters regularly. Set up a notification system for room occupants to reports construction odor/debris entrainment in classrooms.
5. Employ methods outlined in the document “Preventing Mold Growth in Massachusetts Schools during Hot, Humid Weather” ([Appendix A](#)) to prevent further water damage.
6. Consider adopting the US EPA (2000) document, “Tools for Schools”, to maintain a good indoor air quality environment in the building. This document can be downloaded from the Internet at <http://www.epa.gov/iaq/schools/index.html>.
7. Refer to resource manuals and other related indoor air quality documents for further building-wide evaluations and advice on maintaining public buildings. Copies of these materials are located on the MDPH’s website: <http://mass.gov/dph/iaq>.

References

ASHRAE. 1989. ASHRAE Standard: Ventilation for Acceptable Indoor Air Quality. Sections 5.11, 5.12. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Atlanta, GA.

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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.
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US EPA. 2001. "Mold Remediation in Schools and Commercial Buildings". Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001. Available at: http://www.epa.gov/mold/mold_remediation.html.

Picture 1



Plastic with water accumulation in room 205

Picture 2



Univent fresh air supply vents (along exterior wall) in construction zone

Location: Sutton Memorial High School

Address: 383 Boston Road, Sutton, MA

Indoor Air Results

Date: 8/23/2013

Table 1

Location/Room	Dew Point (°F)	Temp (°F)	Relative Humidity (%)	Floor Temperature (°F)	Remarks
Background	57	68	69	-	Partly cloudy, light breeze (9:30 am)
310	62	76	61	80	
308	61	77	58	83	
306	61	78	57	82	
304	60	78	54	79	
302	60	78	54	80	
300	61	78	56	79	11 water-damaged ceiling tiles
301	61	79	55	79	Dry trap
303	62	80	54	80	13 water-damaged ceiling tiles
305	61	70	52	80	
307	60	79	52	79	
Teachers Room	62	80	54	79	
206	61	79	54	78	
204	61	77	54	78	
Guidance L-Z	59	79	51	75	
Guidance A-K	57	78	52	77	
Guidance Office 1	60	78	52	78	
Guidance Office 2	61	78	54	77	

Comfort Guidelines

Temperature: 70 - 78 °F

Relative Humidity: 40 - 60%

Location/Room	Dew Point (°F)	Temp (°F)	Relative Humidity (%)	Floor Temperature (°F)	Remarks
202	60	78	52	77	
200	60	78	54	77	
201	61	79	54	76	
School Adjustment	62	78	57	74	
203	61	78	55	74	
208	57	74	56	67	
210	49	71	46	61	Window-mounted air conditioner - on 1 water-damaged ceiling tile
212	60	74	62	67	Window-mounted air conditioner on
214	60	74	60	74	
205	62	75	63	74	
207	62	77	66	76	
209	62	77	58	74	
Greenhouse	62	77	57	76	
Dean of Students	60	75	60	70	
108	60	75	57	71	Water-damaged carpet
106	60	75	58	70	Water-damaged carpet
104	61	75	61	71	Water-damaged carpet
102	61	75	59	69	Water-damaged carpet

Comfort Guidelines

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Location: Sutton Memorial High School

Address: 383 Boston Road, Sutton, MA

Indoor Air Results

Date: 8/23/2013

Table 1 (continued)

Location/Room	Dew Point (°F)	Temp (°F)	Relative Humidity (%)	Floor Temperature (°F)	Remarks
100	60	75	56	67	
Maintenance	56	74	54	67	
Historical gym	60	75	59	74	
110	60	75	66	69	
108	60	74	61	67	
106	61	74	63	69	
116	62	76	62	74	
118	60	77	57	76	
120	58	77	57	74	Outside door open
122	62	77	68	78	
Cafeteria	60	78	74	74	
Faculty workroom	59	77	52	71	
Boy's locker room	57	76	53	69	
Girl's locker room	57	75	52	68	3 water-damaged ceiling tiles
Gym	61	76	59	72	
Weight room	60	76	57	71	

Comfort Guidelines

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