INDOOR AIR QUALITY
FOLLOW-UP ASSESSMENT

Georgetown Middle/High School
11 Winter Street
Georgetown, MA

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

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Background/Introduction

At the request of Carol Jacobs, Superintendent of Georgetown Public Schools (GPS), the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH) provided assistance and consultation regarding indoor air quality concerns at the Georgetown Middle/High School, 11 Winter Street, Georgetown, Massachusetts (the building). The purpose of this visit was to assess the adequacy of repairs made to the heating, ventilating and air conditioning system, as well as to address concerns of musty odors in the band room. A report detailing the previous MDPH assessment conducted in October 2008 includes observations at the time of assessment and recommendations for improving indoor air quality (MDPH, 2009a). On March 12, 2010, a visit to conduct a follow-up assessment was made by Michael Feeney, Director of BEH's Indoor Air Quality (IAQ) Program. Mr. Feeney was accompanied by Sharon Lee, an Environmental Analyst/Inspector within BEH's IAQ Program.

The school is a multi-level brick building originally constructed in 1962. An addition was built in 1969. In 1997, renovations were made to the building. Windows are openable throughout the building.

Methods

Air tests for carbon dioxide, carbon monoxide, temperature and relative humidity were conducted with the TSI, Q-TRAK™ IAQ Monitor, Model 7565. Air tests for airborne particulate matter with a diameter less than 2.5 micrometers were taken with the TSI, DUSTTRAK™ Aerosol Monitor Model 8520. BEH staff also performed a visual inspection of building materials for water damage and/or microbial growth.

Results

The building houses both middle and high school students in grades 6 through 12 with a student population of approximately 800 and a staff of approximately 110. Tests were taken during normal operations and results appear in Table 1.

Discussion

Ventilation

It can be seen from Table 1 that carbon dioxide levels were above 800 parts per million (ppm) in 30 of 71 areas surveyed. These results demonstrate improvement over previous air sampling period in a number of areas. Of note is the reduction of carbon dioxide levels when 2008 results are compared to those of 2010. Overall, carbon dioxide levels were uniformly lower across the building, regardless of differences in the number of room occupants (Table 2); however, a number of areas still warrant further improvement. The reductions observed in some areas are due to reactivation of rooftop exhaust vents, which were reported to be repaired prior to the 2010 reassessment.

Unit ventilators (univents) that supply fresh outside air to classrooms were operating during the reassessment. The operation of univents in combination with the reactivation of rooftop exhaust vents would play a significant role in reducing carbon dioxide levels, improving airflow in the building and resulting in increased comfort for building occupants. However, it is also important to note that several areas were sparsely populated or unoccupied at the time carbon dioxide measurements were taken, which can greatly reduce carbon dioxide levels. Carbon dioxide levels would be expected to be higher with full occupancy.

As discussed in a previous report, some classroom exhaust vents are located at the base of the wall near the classroom's door. The exhaust capabilities of these vents can be diminished when classroom doors are open. In one instance, the vent was drawing air from the hallway due to its proximity to the open door. Doors should be closed to maximize exhaust capabilities.

Mechanical ventilation for common areas such as the auditorium, cafeteria and gymnasiums is provided by rooftop or ceiling-mounted air handling units (AHUs). AHUs distribute fresh air via ceiling-mounted air diffusers and returns stale air back to AHUs via exhaust vents.

To maximize air exchange, the MDPH recommends that both supply and exhaust ventilation operate continuously during periods of occupancy. In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room while removing stale air from the room. It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994). The systems at the building have not been balanced since the exhaust vent fans were repaired.

The Massachusetts Building Code requires that each room have a minimum ventilation rate of 15 cubic feet per minute (cfm) per occupant of fresh outside air or openable windows (SBBRS, 1997; BOCA, 1993). The ventilation must be on at all times the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens, a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week, based on a time-weighted average (OSHA, 1997).

The MDPH uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches. For more information concerning carbon dioxide, consult Appendix A.

Temperature measurements in the building ranged from 65° F to 78° F, which were below the MDPH recommended range in some areas surveyed during the assessment (Table 1). The MDPH recommends that indoor air temperatures be maintained in a range of 70° F to 78° F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply.

The relative humidity in the building ranged from 23 to 37 percent, which was below the MDPH recommended comfort range (Table 1). The MDPH recommends a comfort range of 40 to 60 percent for indoor air relative humidity. Relative humidity levels in the building would be expected to drop during the winter months due to heating. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

Microbial/Moisture Concerns

During the course of this follow-up assessment, a number of issues related to water damage were noted. A musty odor was detected in a band instrument storage room. The musty odor was traced to a variety of instrument cases that are stored in this room. A number of large brass instrument cases were opened and each had a distinct musty odor, indicating likely mold contamination. The instrument cases are constructed of leather, cardboard, glue and a carpet-like lining, which are all porous materials that can support mold colonization. The band room does not have a HVAC system capable of providing temperature and humidity control during hot, humid weather. Without adequate temperature and relative humidity control, materials that are highly susceptible to mold growth will become moistened in hot, humid weather and lead to microbial colonization.

A material installed on exterior walls of the band wing is enhancing humidity levels in the band room. The exterior wall material in this area appears discolored in an asymmetrical pattern (Picture 1). This patterning of the wall system may indicate that rainwater is being held between the exterior wall system and the original cement block exterior wall. In this configuration, moisture is likely to pass into the interior of the band room, resulting in increased relative humidity and moistening of carpets and other materials susceptible to mold colonization. In addition, it appears that this wall system has been chronically damaged by moisture resulting from pipes that drain water from the band room's flat roof onto the exterior wall (Pictures 2 and 3).

The wall covering on the exterior of the band room wing is likely exterior insulating foam system (EIFS). EIFS, commonly known as fake stucco, "is an exterior wall cladding that utilizes rigid insulation boards on the exterior of the wall sheathing with a plaster type exterior skin" (Zwayer, 2007). "An EIFS wall typically consists of several layers of materials sandwiched together into a single panel, which is attached to a substrate mounted on the wall studs" (Figure 1) (FEMA, Unknown). In buildings constructed with a curtain wall, water is intercepted by a drainage plane once it penetrates through the brickwork; the drainage plane allows water to exit the wall system through weep holes (Figure 2). The EIFS system on the band room wing appears to be a barrier wall system. The "barrier EIFS wall systems rely primarily on the base coat portion of the exterior skin to resist water penetration" (Zwayer, 2007). In essence, the rainwater is shed by the exterior "stucco" surface, which functions as drainage plane (Figure 1). However, a number of problems exist with such a system:

> Problems observed with EIFS installations are primarily related to moisture intrusion. EIFS provides protection against moisture infiltration at the base coat; however, *moisture migration through openings for windows, flashings and other items, or holes and cracks in the EIFS itself, have allowed for moisture invasion of EIFS clad buildings*. With barrier EIFS installations, or where weather barriers and flashing are improperly installed in conjunction with wall drainage EIFS installations, moisture has entered the wall system at these locations and caused damage to the wall sheathing and framing (emphasis added) (Zwayer, G.L., 2007).

Since the initial introduction of EIFS, a second type of system, which contains a water drainage system similar to Figure 2 was developed. The EIFS system at the building is not likely a water drainage system due to the following:

- Lack of weep holes exist on the exterior wall; and
- Lack of drainage plane behind the substrate;

Considering these observations, the EIFS system installed on the band room wing of the building is most likely a barrier system which has little or no means to drain water from the wall system.

According to the National Institute of Building Science (NIBS), the following are problems typical of buildings clad with EIFS; these same conditions were also observed at the building:

- Failure to install or properly install sealant joints around windows, doors, pipes, conduits, and other penetrations of the field of the EIFS;
- Failure to flash window and door openings in the field of the EIFS to divert leakage through the window or door to the exterior;
- Failure to properly backwrap edges of EIFS at terminations and penetrations in the field of the EIFS (Picture 4); and
- Water erosion damage that has not been repaired (Picture 3).

Each of these conditions can allow for water to penetrate through the EIFS, causing water damage to carpet and interior walls in the band wing. It is also important to note that significant portions of the main building are also clad with EIFS, which have a similar type of pattern on the wall surface which may indicate water penetration through the installed wall system. While this condition does not appear to currently affect the main building, it should be closely monitored for water penetration.

Relative humidity in excess of 70 percent can provide an environment for mold and fungal growth (ASHRAE, 1989). In the experience of MDPH staff, excessively humid weather can provide enough airborne water vapor to create adequate conditions for mold growth in buildings, particularly in porous materials that are stored under these conditions. The US Environmental Protection Agency (US EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommend that porous materials be dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2001; ACGIH, 1989). If not dried within this time frame, mold growth may occur.

Water-damaged/missing ceiling tiles were noted in a number of areas throughout the building. Water-damaged ceiling tiles can indicate sources of water penetration and provide a source of mold. Ceiling tiles should be replaced after a water leak is discovered and repaired. Once mold has colonized porous materials, they are difficult to clean and should be removed/discarded.

Plants were noted in several classrooms. Plants can be a source of pollen and mold, which can be respiratory irritants for some individuals. Plants should be properly maintained and equipped with drip pans to prevent water damage to porous building materials, which can lead to mold growth. Plants should also be located away from ventilation sources (e.g., air intakes, univent diffusers) to prevent the entrainment and/or aerosolization of dirt, pollen or mold.

Other IAQ Evaluations

Indoor air quality can be negatively influenced by the presence of respiratory irritants, such as products of combustion. The process of combustion produces a number of pollutants. Common combustion emissions include carbon monoxide, carbon dioxide, water vapor and smoke (fine airborne particle material). Of these materials, exposure to carbon monoxide and particulate matter with a diameter of 2.5 micrometers (μm) or less (PM2.5) can produce immediate, acute health effects upon exposure. To determine whether combustion products were present in the indoor environment, BEH staff obtained measurements for carbon monoxide and PM2.5.

Carbon Monoxide

Carbon monoxide is a by-product of incomplete combustion of organic matter (e.g., gasoline, wood and tobacco). Exposure to carbon monoxide can produce immediate and acute health affects. Several air quality standards have been established to address carbon monoxide and prevent symptoms from exposure to these substances. The MDPH established a corrective action level concerning carbon monoxide in ice skating rinks that use fossil-fueled ice resurfacing equipment. If an operator of an indoor ice rink measures a carbon monoxide level over 30 ppm, taken 20 minutes after resurfacing within a rink, that operator must take actions to reduce carbon monoxide levels (MDPH, 1997).

The American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) has adopted the National Ambient Air Quality Standards (NAAQS) as one set of criteria for assessing indoor air quality and monitoring of fresh air introduced by HVAC systems (ASHRAE, 1989). The NAAQS are standards established by the US EPA to protect the public health from six criteria pollutants, including carbon monoxide and particulate matter (US EPA, 2006). As recommended by ASHRAE, pollutant levels of fresh air introduced to a building should not exceed the NAAQS levels (ASHRAE, 1989). The NAAQS were adopted by reference in the Building Officials & Code Administrators (BOCA) National Mechanical Code of 1993 (BOCA, 1993), which is now an HVAC standard included in the Massachusetts State Building Code (SBBRS, 1997). According to the NAAQS, carbon monoxide levels in outdoor air should not exceed 9 ppm in an eight-hour average (US EPA, 2006).

Carbon monoxide should not be present in a typical, indoor environment. If it *is* present, indoor carbon monoxide levels should be less than or equal to outdoor levels. On the day of the assessment, outdoor carbon monoxide concentrations were non-detect (ND) (Table 1). No measurable levels of carbon monoxide were detected in the building at the time of the assessment (Table 1).

Particulate Matter

The US EPA has established NAAQS limits for exposure to particulate matter. Particulate matter is airborne solids that can be irritating to the eyes, nose and throat. The NAAQS originally established exposure limits to particulate matter with a diameter of 10 μm or less (PM10). According to the NAAQS, PM10 levels should not exceed 150 micrograms per cubic meter ($\mu g/m^3$) in a 24-hour average (US EPA, 2006). These standards were adopted by both ASHRAE and BOCA. Since the issuance of the ASHRAE standard and BOCA Code, US EPA established a more protective standard for fine airborne particles. This more stringent PM2.5 standard requires outdoor air particle levels be maintained below 35 $\mu g/m^3$ over a 24-hour average (US EPA, 2006). Although both the ASHRAE standard and BOCA Code adopted the PM10 standard for evaluating air quality, MDPH uses the more protective PM2.5 standard for evaluating airborne particulate matter concentrations in the indoor environment.

Outdoor PM2.5 concentrations the day of the assessment were measured at 5 $\mu g/m^3$. PM2.5 levels measured inside the building were below the NAAQS PM2.5 level of 35 $\mu g/m^3$ in all but two areas. The kiln room and the adjacent art office measured 38 and 39 $\mu g/m^3$ respectively, slightly exceeding the NAAQS PM2.5 level of 35 $\mu g/m^3$ (Table 1). The elevated PM2.5 levels were related to aerosolized clay fumes from the pottery kiln, which was in operation at the time of the PM2.5 testing. It is important to note that the exhaust vent for the kiln was not ducted in this area, which would serve to remove airborne fumes and particulates from the source. Clay fumes can be irritating to the eyes, nose, throat and respiratory system. Frequently, indoor air levels of particulates (including PM2.5) can be at higher levels than those measured outdoors. A number of mechanical devices and/or activities that occur indoors can generate particulate during normal operations. Sources of indoor airborne particulates may include but are not limited to: particles generated during the operation of fan belts in the HVAC system; cooking in the cafeteria stoves and microwave ovens; use of photocopiers, fax machines and computer printing devices; operation of an ordinary vacuum cleaner; and, heavy foot traffic indoors.

Volatile Organic Compounds

Indoor air concentrations can be greatly impacted by the use of products containing volatile organic compounds (VOCs). VOCs are carbon-containing substances that have the ability to evaporate at room temperature. Frequently, exposure to low levels of total VOCs (TVOCs) may produce eye, nose, throat and/or respiratory irritation in some sensitive individuals. For example, chemicals evaporating from a paint can stored at room temperature would most likely contain VOCs. Materials containing VOCs were present in the building.

Of note was the distinct odor of hand disinfectant, which could be readily detected in some classrooms. Hand disinfectant contains ethyl alcohol and fragrances, both of which can be eye and respiratory irritants to some individuals (Betco Corporation, 2007; Birchwood Laboratories, Inc., 2007; B4 Brands by AMA, 2006; Georgia-Pacific Consumer Products, 2007). According to MDPH recommendations concerning H1N1 Flu, protection from flu virus can be achieved by either washing your hands often with soap and water or using alcohol-based hand gel (MDPH, 2009b, Appendix B).

Several classrooms contained dry erase boards and dry erase board markers. Materials such as permanent markers, dry erase markers and dry erase board cleaners may contain VOCs, such as methyl isobutyl ketone, n-butyl acetate and butyl-cellusolve (Sanford, 1999), which can be irritating to the eyes, nose and throat.

Cleaning products were also observed in a number of classrooms (Table 1). Like dry erase materials, cleaning products contain VOCs and other chemicals. These chemicals can be irritating to the eyes, nose and throat and should be kept out of reach of students. Additionally, a Material Safety Data Sheet (MSDS) should be available at a central location for each product in the event of an emergency. Consideration should be given to providing teaching staff with school issued cleaning products to ensure that MSDS information is available for all products used at the school.

Air fresheners and deodorizing materials were observed in some areas (Table 1). Air deodorizers contain chemicals that can be irritating to the eyes, nose and throat of sensitive individuals. Many air fresheners contain 1,4-dichlorobenzene, a VOC which may cause reductions in lung function (NIH, 2006). Furthermore, deodorizing agents do not remove materials causing odors, but rather mask odors that may be present in the area.

Other Conditions

Other conditions that can affect indoor air quality were observed during the assessment. In several classrooms, items were observed on the floor, windowsills, tabletops, counters, bookcases and desks. The large number of items stored in classrooms provides a source for dusts to accumulate. These items (e.g., papers, folders, boxes) make it difficult for custodial staff to clean. Items should be relocated and/or be cleaned periodically to avoid excessive dust build up. In addition, these materials can accumulate on flat surfaces (e.g., desktops, shelving and carpets) in occupied areas and subsequently be re-aerosolized causing further irritation.

Of note was the use of containers that previously contained food products. Exposed food products and use of containers originally intended for foods can attract a variety of pests. The presence of pests inside a building can produce conditions that can degrade indoor air quality. For example, rodent infestation can result in indoor air quality related symptoms due to materials in their wastes. Mouse urine is known to contain a protein that is a known sensitizer (US EPA, 1992). A sensitizer is a material that can produce symptoms in exposed individuals, including nose irritations and skin rashes. Pest attractants should be reduced/eliminated. Proper food storage is an integral component in maintaining indoor air quality. Food should be properly stored and clearly labeled. Reuse of food containers (e.g., for art projects) is not recommended since food residue adhering to the container surface may serve to attract pests

Conclusions/Recommendations

The repairs to exhaust vent fans have increased airflow throughout the building, since carbon dioxide levels appear to be significantly lower in some areas evaluated in this assessment when compared to the previous air sampling; however, a number of areas still warrant further attention. With the repair of that system, the activity that would be most helpful to further increase airflow would be to balance the HVAC system. Also of note is the continued problem regarding musty odors in the band room. The most obvious source of odors appears to be the old instrument cases that are subjected to moist conditions created by poor water drainage from the building envelope as well as hot, humid weather during summer months. In view of the findings at the time of the assessment, the following recommendations are made to improve indoor air quality:

1. Continue with plans to balance the HVAC system. Consider adopting a balancing schedule of every 5 years for all mechanical ventilation systems, as recommended by ventilation industrial standards (SMACNA, 1994).
2. Ensure all exhaust vents are repaired and are operating. Close classroom doors to maximize exhaust capabilities.
3. Install downspouts on pipes that drain the flat roof of the band room to prevent further water damage to the EIFS exterior wall. Consideration should be given to removing the EIFS exterior wall system on the band room. If this is done, the exterior of the cement block should be sealed with an appropriate material. Consideration should be given to consulting a building engineer on the most appropriate method for repairing the band room exterior wall.
4. Monitor main building for signs of water penetration through he building envelope, make repairs as necessary.
5. Consideration should be given to replacing instrument cases that have become mold colonized. One method that may be used in the interim to prevent further exposure would be to wrap each half of an instrument case with an airtight covering of plastic so that the materials that are moldy are sealed.
6. Use openable windows in conjunction with mechanical ventilation to facilitate air exchange. Care should be taken to ensure windows are properly closed at night and weekends to avoid the freezing of pipes and potential flooding.
7. Consider installing mechanical ventilation to the band rooms to control airflow, temperature and relative humidity. At the least, dehumidifiers should be used during hot, humid months.

8. Clean/maintain dehumidifiers as per the manufactures instructions or more frequently if needed.

9. Repair any existing water leaks and replace water-damaged ceiling tiles. Examine the area above these tiles for mold growth. Disinfect areas of water leaks with an appropriate antimicrobial, as needed.

10. Ensure plants are equipped with drip pans. Examine drip pans periodically for mold growth and disinfect with an appropriate antimicrobial, as needed. Move plants away from univents.

11. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. To control for dusts, a high efficiency particulate arrestance (HEPA) filter equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended. Avoid the use of feather dusters. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).

12. Ensure kiln is vented to the outdoors and operating during kiln-firing operations.

13. It is highly recommended that the principles of integrated pest management (IPM) be used to rid the building of pests. A copy of the IPM recommendations can be obtained from the Massachusetts Department of Food and Agriculture (MDFA) website at the following website: http://www.state.ma.us/dfa/pesticides/publications/IPM_kit_for_bldg_mgrs.pdf. Activities that can be used to eliminate pest infestation may include the following activities.

    a. Do not use food as components in student artwork.

b. Rinse out recycled food containers. Seal recycled containers in a tight fitting lid to prevent rodent access.

c. Stored foods in tight fitting containers.

d. Avoid eating at workstations. In areas were food is consumed, periodic vacuuming to remove crumbs are recommended.

e. Regularly clean crumbs and other food residues from ovens, toasters, toaster ovens, microwave ovens coffee pots and other food preparation equipment;

f. Holes as small as ¼" are enough space for rodents to enter an area. Examine each room and the exterior walls of the building for means of rodent egress and seal. If doors do not seal at the bottom, install a weather strip as a barrier to rodents. Reduce harborages (cardboard boxes) where rodents may reside (MDFA, 1996).

14. All cleaning products used at the facility should be approved by the school department with MSDS' available at a central location. Consider providing staff with school department issued cleaners.

15. Refrain from using plug-in air fresheners or other air deodorizers.

16. Relocate or consider reducing the amount of materials stored in classrooms to allow for more thorough cleaning of classrooms. Clean items regularly with a wet cloth or sponge to prevent excessive dust build-up.

17. Consider adopting the US EPA (2000) document, "Tools for Schools", as an instrument for maintaining a good indoor air quality environment in the building. This document is available at: http://www.epa.gov/iaq/schools/index.html.

18. Refer to resource manual and other related indoor air quality 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.

References

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

ASHRAE. 1989. Ventilation for Acceptable Indoor Air Quality. American Society of Heating, Refrigeration and Air Conditioning Engineers. ANSI/ASHRAE 62-1989

B4 Brands by AMA. 2006. Avant Original™ Instant Hand Sanitizer Materials Safety Data Sheet. B4 Brands by AMA., Nixa, MO.

BETCO Corporation. 2007. Clario Foaming Alcohol Instant Hand Sanitizer Material Safety Data Sheet. BETCO Corporation, Toledo, OH.

Birchwood Laboratories, Inc. 2007. Hand Wipe Take Alongs Materials Safety Data Sheet. Birchwood Laboratories, Inc., Eden Prairie, MN.

BOCA. 1993. The BOCA National Mechanical Code/1993. 8th ed. Building Officials and Code Administrators International, Inc., Country Club Hill, IL.

FEMA. Unknown. Protecting Your Business From Wind. Federal Emergency Management Agency, Washington, DC. http://www.fema.gov/pdf/plan/prevent/howto/how2027.pdf

Georgia-Pacific Consumer Products. 2007. Cormatic® High Capacity Instant Hand sanitizer Material Safety Data Sheet. Georgia- Pacific Consumer Products, Atlanta, GA.

MDFA. 1996. Integrated Pest Management Kit for Building Managers. Massachusetts Department of Food and Agriculture, Pesticide Bureau, Boston, MA.

MDPH. 1997. Requirements to Maintain Air Quality in Indoor Skating Rinks (State Sanitary Code, Chapter XI). 105 CMR 675.000. Massachusetts Department of Public Health, Boston, MA.

MDPH. 2009a. Indoor Air Quality Assessment. Georgetown Senior/Middle School, Georgetown, MA. Massachusetts Department of Public Health, Bureau of Environmental Health Assessment, Boston, MA. August 2009.

MDPH. 2009b. Public Health Fact Sheet H1N1 Flu (Swine Flu). Massachusetts Department of Public Health, Boston, MA. http://www.mass.gov/Eeohhs2/docs/dph/cdc/factsheets/swine_flu.pdf

NIH. 2006. Chemical in Many Air Fresheners May Reduce Lung Function. NIH News. National Institute of Health. July 27, 2006. http://www.nih.gov/news/pr/jul2006/niehs-27.htm

OSHA. 1997. Limits for Air Contaminants. Occupational Safety and Health Administration. Code of Federal Regulations. 29 C.F.R 1910.1000 Table Z-1-A.

Sanford. 1999. Material Safety Data Sheet (MSDS No: 198-17). Expo® Dry Erase Markers Bullet, Chisel, and Ultra Fine Tip. Sanford Corporation. Bellwood, IL.

SBBRS. 1997. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations. 780 CMR 1209.0

SMACNA. 1994. HVAC Systems Commissioning Manual. 1st ed. Sheet Metal and Air Conditioning Contractors' National Association, Inc., Chantilly, VA.

US EPA. 1992. Indoor Biological Pollutants. US Environmental Protection Agency, Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, research Triangle Park, NC. EPA 600/8-91/202 January 1992.

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. http://www.epa.gov/iaq/schools/tools4s2.html.

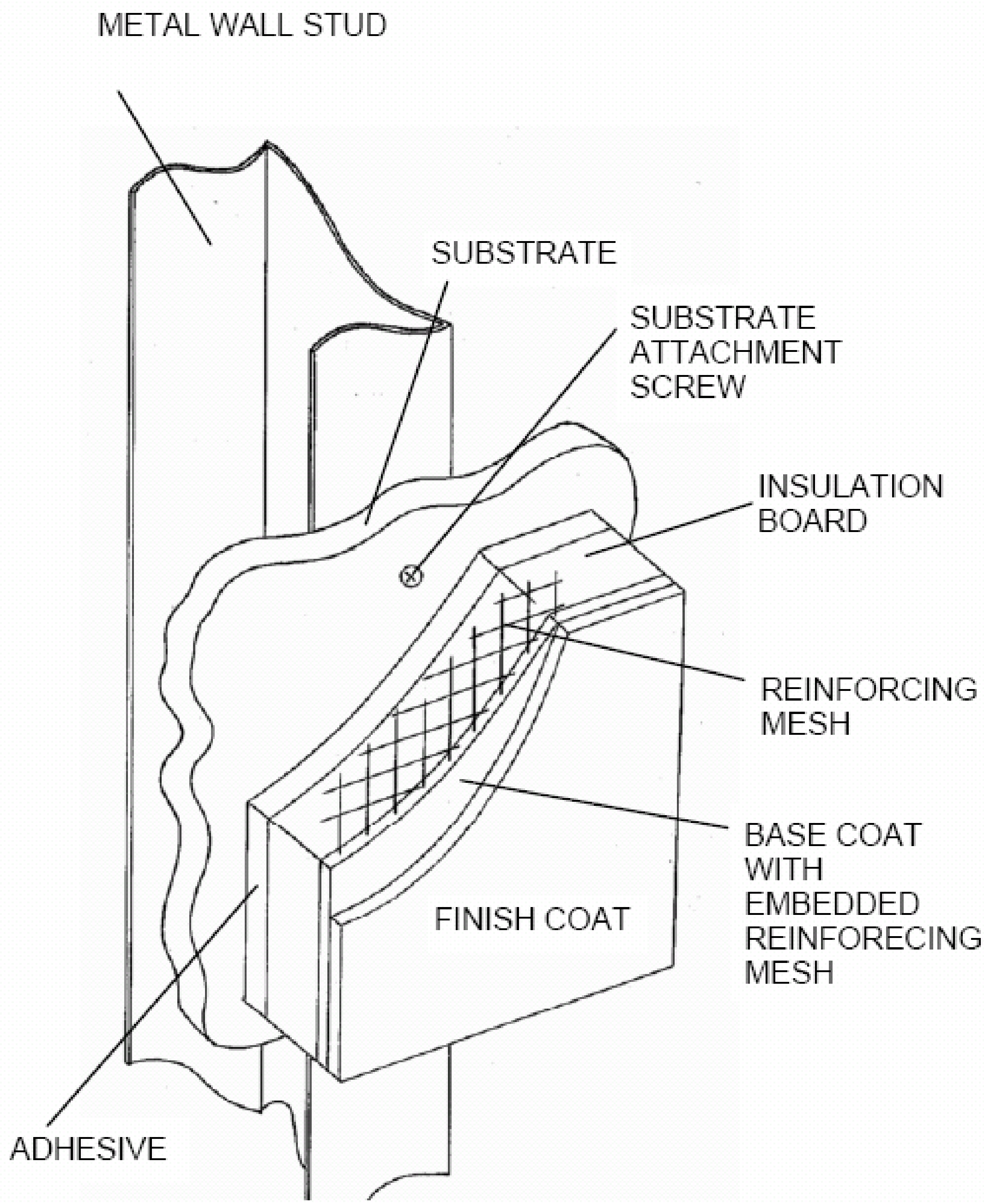
US EPA. 2001. "Mold Remediation in Schools and Commercial Buildings". Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001. Available at: http://www.epa.gov/iaq/molds/mold_remediation.html.

US EPA. 2006. National Ambient Air Quality Standards (NAAQS). US Environmental Protection Agency, Office of Air Quality Planning and Standards, Washington, DC. http://www.epa.gov/air/criteria.html.

Zwayer, G.L. 2007. Exterior Insulation and Finish System (EIFS). National Institute of Building Sciences, Washington, DC. http://www.wbdg.org/design/env_wall_eifs.php

Figure 1

Configuration of an EIFS Wall Panel
(FEMA, Unknown)



CUTAWAY VIEW OF TYPICAL EIFS WALL PANEL AND SUBSTRATE MOUNTED ON A METAL WALL STUD

Picture 1

Asymmetrical Pattern in Exterior Wall System, Which May Indicate Moisture Attempting to Pass/Evaporate Through the Material

Picture 2

Pipe That Drains Water From Band Room Roof

Picture 3

Pipe That Drains Water From Band Room Roof, Note Damage to Exterior Wall

Picture 4

Lack of Back Wrap or Flashing on EIFS Edge

Location: Georgetown Middle/High School **Indoor Air Results**

Address: 11 Winter Street, Georgetown, MA **Table 1** **Date: 3-12-2010**

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 ($\mu g/m^3$)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
background		50	26	387	ND	8				
3150	0	71	28	727	ND	10	Y	Y	Y	DO, Clutter ,Cleaners
3180/media	80	72	32	1212	ND	12	Y	Y	Y	PF
3210	1	72	25	695	ND	8	Y	Y	Y	Fresh air supply blocked, PF, DO, Bowing CT
3220	0	78	24	580	ND	10	Y	Y	Y	PF
3240	25	75	28	1553	ND	9	Y	Y	Y	DO, DEM
3250	14	73	25	908	ND	10	Y	Y	Y	DEM, Cleaners, 3 WD CT
3070	29	71	35	1592	ND	6	N	Y	Y	DEM, Pencil shavings, Wall mounted air-conditioning unit
3060 office	2	73	26	1020	ND	6	N	N	N	DO
3080	20	72	33	1669	ND	7	Y	Yes	Yes	Exhaust vent blocked, Broken window, PF, Cleaners, DO

ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
ND = non detect

CT = ceiling tile
DEM = dry erase materials
DO = door open

PF = personal fan
WD = water-damaged
TB = tennis balls

Comfort Guidelines

Carbon Dioxide: < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%
Particle matter 2.5 < 35 ug/m^3

Location: Georgetown Middle/High School

Address: 11 Winter Street, Georgetown, MA

Indoor Air Results

Date: 3-12-2010

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 (µg/m^3)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
3100	22	73	27	837	ND	12	Yes	Yes	Yes	Exhaust vent blocked, DO
3110	0	72	26	734	ND	5	Yes	Yes	Yes	3 WD CT, Cleaners
3130	1	71	29	886	ND	9	Yes	Yes	Yes	
3260	0	70	25	728	ND	7	Yes	Yes	Yes	DEM, PF
3270	2	71	28	839	ND	7	Yes	Yes	Yes	Air deodorizer
Band Director's office	1	71	26	734	ND	8	Yes	No	No	DO
Band room	5	69	28	824	ND	6	No	Yes	Yes	DO, WD carpet, WD instrument cases
Band practice room 3	0	65	25	802	ND	13	No	Yes	No	3 WD CT, Bowing CT, DO
Band practice room 2	0	66	32	588	ND	9	Yes	Yes	No	Leak, DO, Food containers
Band practice room 1	0	66	30	530	ND	10	Yes	Yes	No	DO

ppm = parts per million
µg/m^3 = micrograms per cubic meter
ND = non detect

CT = ceiling tile
DEM = dry erase materials
DO = door open

PF = personal fan
WD = water-damaged
TB = tennis balls

Comfort Guidelines

Carbon Dioxide: < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%
Particle matter 2.5 < 35 ug/m^3

Location: Georgetown Middle/High School **Indoor Air Results**

Address: 11 Winter Street, Georgetown, MA **Date: 3-12-2010**

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 ($\mu g/m^3$)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
2210	3	73	25	768	ND	9	Yes	Yes	Yes	Exhaust vent off, DO, DEM
2190	14	73	27	760	ND	14	Yes open	Yes	Yes	Broken window, DEM, PF, Orange odor
2170	18	73	27	998	ND	9	Yes	Yes	Yes	Strong perfume odor, Cleaners, DEM
2150	15	72	26	786	ND	11	Yes	Yes	Yes	DEM, DO, Cleaners, Hand sanitizer odor
2140	13	73	27	831	ND	11	Yes	Yes	Yes	DEM
2100	13	73	27	760	ND	7	Yes	Yes	Yes	DO, PF, DEM
2090	18	72	26	810	ND	8	Yes	Yes	Yes	DEM
2070	22	74	31	1397	ND	11	Yes	No?	Yes	PF, Dusty PF blades, Cleaners, Wall mounted air conditioner
2060	2	73	23	515	ND	6	No	No	Yes	22 computers, Wall mounted air conditioner
2040	21	75	26	793	ND	12	Yes Open	Yes	No?	PF, Cleaners, DEM

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PF = personal fan
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Location: Georgetown Middle/High School | Indoor Air Results

Address: 11 Winter Street, Georgetown, MA | Date: 3-12-2010

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 (µg/m^3)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
2030	9	76	25	774	ND	11	Yes Open	Yes	Yes	Cleaners
2010	13	75	26	930	ND	12	Yes	Yes	Yes	DEM, Cleaner
Cafeteria	120	68	31	686	ND	13	Yes	Yes	Yes	DO, 2 WD CT
1330	24	72	29	709	ND	10	No	Yes	Yes	
1331 storage	0	75	29	849	ND	9	No	No	Yes	Washer and dryer
1190	14	71	30	942	ND	11	Yes	Yes	Yes	DEM, DO, Burnt out motor
1170	17	71	29	735	ND	28	Yes	Yes	Yes	Clay
1172 kiln room						38	No	No	Yes	Exhaust vent not ducted, kiln operating
1171 art office	0	70	31	924	ND	39	No	Yes	No	Missing CT
Auditorium	50	68	30	422	ND	8	No	Yes	Yes	

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Particle matter 2.5 < 35 ug/m^3

Location: Georgetown Middle/High School **Indoor Air Results**

Address: 11 Winter Street, Georgetown, MA **Date: 3-12-2010**

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 ($\mu g/m^3$)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
Gymnasium	80	67	37	943	ND	9	No	Yes	Yes	
1320	21	71	28	769	ND	11	No	Yes	Yes	DEM
1270	22	71	33	1113	ND	10	No	Yes	Yes	Chalk dust, Terrarium, DO
1250	18	71	31	910	ND	14	No	Yes	Yes	Plants, DEM, Terrarium, DO
Girls locker room	0	65	32	605	ND	10	No	Yes	Yes	Strong perfume/cologne odor, Fresh air supply off, Exhaust vent off
Main office	3	67	33	630	ND	9	Yes	Yes	No	Air-conditioner
1014 Staff room	0	70	31	690	ND	10	No	Yes	No	DO, Air-conditioner
1011	0	70	29	619	ND	8	Yes	Yes	No	DO, Air-conditioner
1012	1	70	29	598	ND	8	Yes	Yes	Yes	DO, Air-conditioner
Guidance Director	0	70	28	614	ND	9	Yes	Yes	Yes	DO, Air-conditioner

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CT = ceiling tile
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DO = door open

PF = personal fan
WD = water-damaged
TB = tennis balls

Comfort Guidelines

Carbon Dioxide:	< 600 ppm = preferred	Temperature:	70 - 78 °F
	600 - 800 ppm = acceptable	Relative Humidity:	40 - 60%
	> 800 ppm = indicative of ventilation problems	Particle matter 2.5	< 35 ug/m^3

Location: Georgetown Middle/High School | **Indoor Air Results**

Address: 11 Winter Street, Georgetown, MA | **Date: 3-12-2010**

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 ($\mu g/m^3$)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
Guidance	0	71	27	679	ND	9	Yes	Yes?	Yes	9 WD CT, Air-conditioner, DO
1031	2	72	27	898	ND	2	Yes	Yes	Yes	Fresh air supply off, Exhaust vent off, Air-conditioner
3290	23	72	34	1199	ND	6	Yes	Yes	Yes	DO
3050	1	74	27	737	ND	2	Yes	Yes	Yes	2 WD CT, DO
3040	0	73	27	733	ND	2	Yes	Yes	Yes	3 WD CT
3090	23	72	31	861	ND	7	Yes Open	Yes	Yes	Exhaust vent off, 2 WD CT, DO
3140	21	71	29	737	ND	5	No	Yes	Yes	DEM, DO
3160	1	73	27	677	ND	6	No	Yes	Yes	DO
3120	16	72	29	800	ND	7	No			TB, DEM, 2 WD CT
3280	25	72	31	936	ND	7	Yes Open	Yes	Yes	supply off, DO

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Particle matter 2.5 < 35 ug/m^3

Location: Georgetown Middle/High School **Indoor Air Results**

Address: 11 Winter Street, Georgetown, MA **Date: 3-12-2010**

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 ($\mu g/m^3$)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
2250	12	69	36	729	ND	4	Yes	Yes	Yes	DEM
2260	21	72	35	1367	ND	5	Yes	Yes	Yes	Exhaust vent blocked
Media Center	12	72	29	876	ND	4	Yes	Yes	Yes	
2161	17	71	35	1441	ND	2	No	Yes		24 computers, 2 WD CT, DO
2130	21	72	30	605	ND	4	No	Yes	Yes	DEM
Teachers room	3	73	28	566	ND	5	Yes	Yes	Yes	Copier, Soda vending machine
1110	13	74	28	632	ND	1	No	Yes	Yes	24 computers
1290	3	71	30	487	ND	9	No	No	No	DEM, DO
1240	13	74	30	456	ND	7	No	No	No	DEM, 20 computers

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PF = personal fan
WD = water-damaged
TB = tennis balls

Comfort Guidelines

Carbon Dioxide:	< 600 ppm = preferred	Temperature:	70 - 78 °F
	600 - 800 ppm = acceptable	Relative Humidity:	40 - 60%
	> 800 ppm = indicative of ventilation problems	Particle matter 2.5	< 35 ug/m^3

Table 1 (continued)

Location/ Room	Occupants in Room	Temp (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	PM2.5 ($\mu g/m^3$)	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
Darkroom	2	74	31	632	ND	6	No	No	Yes	Exhaust located at center of room
Wood shop	6	73	28	518	ND	7	No	No	Yes	
1152	21	73	29	837	ND	11	No	Yes	Yes	24 computers
Boys locker room	0	65	34	443	ND	10	No	Yes	Yes	Cologne odor

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TB = tennis balls

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Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%
Particle matter 2.5 < 35 ug/m^3

Table 2

Location/ Room	Carbon Dioxide (ppm) 2008	Carbon Dioxide (ppm) 2010	Difference Carbon Dioxide (ppm)	Occupancy Level during Carbon Dioxide Sampling
background	340	387	+47	
3180/media	1292	1212	-80	Pop 2008 = 0 Pop. 2010 = 80
1150 Wood shop	987	518	-469	Pop 2008 = 14 Pop. 2010 = 6
1152	1149	837	-312	Pop 2008 = 0 Pop. 2010 = 21
1170	1101	735	-366	Pop 2008 = 1 Pop. 2010 = 17
1190	1304	942	-362	Pop 2008 = 17 Pop. 2010 = 14
1240	1395	456	-939	Pop 2008 = 20 Pop. 2010 = 13
1250	1299	910	-389	Pop 2008 = 19 Pop. 2010 = 18
1270	1766	1113	-653	Pop 2008 = 1 Pop. 2010 = 22
1290	1421	487	-934	Pop 2008 = 6 Pop. 2010 = 3
1320	1006	769	-237	Pop 2008 = 18 Pop. 2010 = 21
1330	871	709	-162	Pop 2008 = 3 Pop. 2010 = 24
1331 storage	1120	849	-271	Pop 2008 = 0 Pop. 2010 = 0
2010	2942	930	-2012	Pop 2008 = 34 Pop. 2010 = 13
2030	3238	774	-2464	Pop 2008 = 24 Pop. 2010 = 9
2040	1998	793	-1205	Pop 2008 = 18 Pop. 2010 = 21
2060	2675	515	-2160	Pop 2008 = 18 Pop. 2010 = 2
2070	3080	1397	-1683	Pop 2008 = 27 Pop. 2010 = 22
2090	1703	810	-893	Pop 2008 = 23 Pop. 2010 = 18

Table 2 (continued)

Location/ Room	Carbon Dioxide (ppm) 2008	Carbon Dioxide (ppm) 2010	Difference Carbon Dioxide (ppm)	Occupancy Level during Carbon Dioxide Sampling
2100	2776	760	-2016	Pop 2008 = 28 Pop. 2010 = 13
2130	2723	605	-2118	Pop 2008 = 24 Pop. 2010 = 21
2140	1578	831	-747	Pop 2008 = 31 Pop. 2010 = 13
2150	1075	786	-289	Pop 2008 = 3 Pop. 2010 = 152
2170	1015	998	-17	Pop 2008 = 0 Pop. 2010 = 18
2210	1627	768	-859	Pop 2008 = 13 Pop. 2010 = 3
2250	1016	729	-287	Pop 2008 = 19 Pop. 2010 = 12
3070	1526	1592	+66	Pop 2008 = 1 Pop. 2010 = 29
3080	2052	1669	-383	Pop 2008 = 1 Pop. 2010 = 20
3090	1186	861	-325	Pop 2008 = 3 Pop. 2010 = 23
3100	930	837	-93	Pop 2008 = 2 Pop. 2010 = 22
3110	1314	734	-580	Pop 2008 = 1 Pop. 2010 = 0
3120	1749	800	-949	Pop 2008 = 0 Pop. 2010 = 16
3130	1990	886	-1104	Pop 2008 = 25 Pop. 2010 = 1
3140	1484	737	-747	Pop 2008 = 0 Pop. 2010 = 21
3150	1059	727	-332	Pop 2008 = 0 Pop. 2010 = 0
3160	1232	677	-555	Pop 2008 = 31 Pop. 2010 = 1
3210	1642	695	-947	Pop 2008 = 30 Pop. 2010 = 1
3220	1192	580	-612	Pop 2008 = 1 Pop. 2010 = 0

Table 2 (continued)

Location/ Room	Carbon Dioxide (ppm) 2008	Carbon Dioxide (ppm) 2010	Difference Carbon Dioxide (ppm)	Occupancy Level during Carbon Dioxide Sampling
3240	2265	1553	-712	Pop 2008 = 1 Pop. 2010 = 251
3250	2761	904	-1857	Pop 2008 = 24 Pop. 2010 = 14
3260	2391	728	-1663	Pop 2008 = 30 Pop. 2010 = 0
3270	840	839	-1	Pop 2008 = 1 Pop. 2010 = 2
3280	1209	936	-273	Pop 2008 = 0 Pop. 2010 = 25
3290	1476	1199	-277	Pop 2008 = 20 Pop. 2010 = 23
Auditorium	673	422	-251	Pop 2008 = 40+ Pop. 2010 = 50
Band Room	653	824	+171	Pop 2008 = 0 Pop. 2010 = 5
Dark Room	1419	632	-787	Pop 2008 = 0 Pop. 2010 = 2
Library/ Media Center	1440	876	-564	Pop 2008 = 7 Pop. 2010 = 12
Main Gym	968	943	-25	Pop 2008 = 0 Pop. 2010 = 80

Appendix B

PUBLIC HEALTH FACT SHEET	H1N1 Flu (Swine Flu)

Massachusetts Department of Public Health

What is H1N1 flu?

Flu is a disease of the body's breathing system, including the nose, throat and lungs. Flu is short for "influenza." H1N1 flu is caused by a new virus that was first recognized in April of 2009, and was called "swine flu." H1N1 flu quickly spread to many parts of the world and is now a "pandemic," or global outbreak. H1N1 flu is not the same as swine flu, which is a virus that pigs can get. It is not the same as "seasonal" flu which occurs every year, during the winter and early spring. But H1N1 flu causes symptoms that are similar to seasonal flu, is spread like seasonal flu, and can be prevented like seasonal flu.

What are the symptoms of H1N1 flu?

H1N1 flu symptoms are very similar to seasonal flu symptoms. Most common are fever, cough, and sore throat. Symptoms can also include body aches, headache, chills, runny nose and feeling very tired. Some people also have diarrhea and vomiting. Symptoms last from a few days to up to a week or more.

Is H1N1 flu serious?

Illness with H1N1 flu has ranged from mild to severe. While most people sick with H1N1 flu get better without needing medical treatment, severe illness and deaths have occurred in some people. Like seasonal flu, some people are at higher risk of serious health problems when they get the H1N1 flu. This includes pregnant women, infants, and people with medical conditions like asthma, diabetes, heart disease, kidney disease, muscle or nerve conditions that affect their breathing and weakened immune systems.

How does H1N1 flu spread?

The flu virus is in the wet spray (droplets of saliva and mucous) that comes out of the nose and mouth of someone who coughs or sneezes. If you are close enough to a person with the flu (3 - 6 feet) when they cough or sneeze, you can breathe in the virus and get sick. Flu symptoms start 1 - 4 days (usually 2 days) after a person breathes in the virus.

Flu is spread easily from person to person. The virus can also live for a short time on things you touch like doorknobs, phones and toys. After you touch these objects, you can catch the virus when you touch your mouth, nose, or eyes. However, when the wet droplets on these types of objects dry out, the virus can't cause infection. Adults with the H1N1 flu can spread it from about one day before symptoms appear to about one week after. Children can spread the flu even longer after they get sick.

How is H1N1 flu treated?

There are drugs available that your doctor may prescribe to treat H1N1 flu. The drugs work best if started soon after the start of symptoms. Your doctor can determine if you need treatment.

People sick with any type of flu should make sure to drink plenty of fluids, get plenty of rest, eat healthy foods, wash their hands frequently and stay home to avoid spreading the flu to other people. Over the counter pain relievers may help people with the flu feel more comfortable. Children and teens with the flu should never take aspirin, because a rare but serious disease called Reye syndrome can occur.

Is there a vaccine for H1N1 flu?

Yes. A vaccine helps your body to protect itself against a disease. There are two types of H1N1 vaccine available to protect against H1N1 flu. One is a "shot" that is given with a needle, usually in the arm. The other is a "nasal spray" (a spray inhaled through the nose). People 10 years of age and over will need one

Appendix B

dose of vaccine. Most children under the age of 10 will need two doses of H1N1 vaccine, separated by 3- 4 weeks. Getting flu vaccine will **not** give you the flu or any other type of illness. Ask your doctor which type of H1N1 vaccine is best for you and your family.

Who should get H1N1 flu vaccine?

Certain groups should get the H1N1 vaccine when it becomes available: pregnant women; people who live with or provide care for infants under 6 months of age (e.g., parents, siblings, and daycare providers); healthcare and emergency medical services personnel; people age 6 months to 24 years; and people age 25 to 64 years who have medical conditions that put them at higher risk for influenza-related complications. After these groups, it is expected that there will be enough H1N1 flu vaccine for anyone who chooses to get vaccinated. Please note that the groups listed above may change based on vaccine availability. *Note: current studies indicate the risk for infection among persons over 65 years of age is less than the risk for persons in younger age groups.*

How do I know if I have H1N1 flu?

If you have symptoms of flu, it could be seasonal or H1N1 flu. If you think you have the flu, stay home from work and school and avoid contact with others so you do not spread the virus. If you think you might have flu and you need to see your doctor, call ahead and let them know you might have the flu. That way, your doctor's office can take steps to avoid the spread of flu to others. The doctor may recommend that you be tested for influenza.

How do I protect myself from getting sick with H1N1 flu?

- Get vaccinated when the vaccine becomes available, especially if you have a medical condition which makes health complications from the flu more likely.
- Wash your hands often with soap and water or use alcohol based hand gel.
- Cough or sneeze into a tissue or the inside of your elbow if you don't have a tissue. Throw the tissue in the trash and wash your hands.
- Use a regular household cleaner to clean surfaces that might get flu virus on them like door knobs, phones, faucets and toys.
- **Stay home from work and school if you get sick with a flu-like illness and avoid contact with others so the virus does not spread. Stay at home until you have been free from fever for at least 24 hours after your last dose of fever-reducing medication (like Tylenol, Advil or Motrin).** For most people this will mean staying at home for about four days.

How do I take care of someone who is sick with H1N1 flu?

Flu: What You Can Do - Caring for People At Home is a booklet available in nine languages that gives you lots of information to help you care for someone who has the flu in their home. A video is also available in English and Spanish. *Flu: What You Can Do* information can be found at: mass.gov/flu

Where can I get more information?

- Mass 2-1-1 provides flu information for the general public: call 211 or 1-877-211-MASS (6277). Interpreter services available in many languages.
- Call your doctor, nurse or clinic, or your local board of health
- Call the MA Department of Public Health, Immunization Program at: (617) 983-6800 or toll-free at (888) 658-2850
- Massachusetts Department of Public Health website at mass.gov/flu
- Center for Disease Control and Prevention (CDC) at: www.cdc.gov/flu

For flu clinic information, visit the MassPRO Public Flu Clinic Finder website at: http://flu.masspro.org/

Updated November 6, 2009