INDOOR AIR QUALITY REASSESSMENT

Sgt. William H. Carney Memorial Academy
247 Elm Street
New Bedford, Massachusetts

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 Ms. Deborah Brown, Business Manager, New Bedford Public Schools, the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH), Indoor Air Quality (IAQ) Program conducted a reassessment of the Sgt. William H. Carney Memorial Academy (CMA) located at 247 Elm Street, New Bedford Massachusetts. On September 5, 2012, Cory Holmes an Environmental Analyst/Regional Inspector for BEH's Indoor Air Quality (IAQ) Program, made a visit to the CMA to conduct the reassessment. BEH/IAQ staff had previously visited the CMA in July 2012 and issued a report with recommendations based on testing/observations at that time (MDPH, 2012).

The reassessment was limited to areas on the first and second floors that were affected by a fire that occurred in July 2012, prior to reoccupancy. At the time of the reassessment, all remediation/restoration work had been completed including cleaning, painting, and replacement of fire/water-damaged building materials such as walls, flooring and ceilings (Pictures 1 through 4).

Methods

To determine whether lingering combustion products/particulates from fire/smoke in the building had been removed sufficiently, BEH/IAQ staff conducted air sampling for particulate matter with a diameter of 2.5 micrometers (μm) or less (PM2.5), and volatile organic compounds (VOCs). Tests for airborne particle matter with a diameter less than 2.5 micrometers were taken with the TSI, DUSTTRAK™ Aerosol Monitor Model 8520. Air testing for total volatile organic compounds (TVOCs) was conducted using a Thermo Environmental Instruments Inc., Model 580 Series Photo Ionization Detector (PID).

Results

Tests were taken after the completion of remediation/restoration efforts prior to reoccupancy. Results appear in Table 1.

Discussion

IAQ Evaluations

As mentioned previously, BEH/IAQ staff took measurements for particulate matter and TVOCs, which can result in eye and respiratory irritation if exposure occurs. 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 a reference standard used by the US EPA and others to protect the public health from six criteria pollutants, including particulate matter (US EPA, 2006). As recommended by ASHRAE, pollutants in indoor air 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).

Particulate Matter

The US EPA has established NAAQS limits for exposure to particulate matter. Particulate matter includes 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 (μg/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 μg/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 reassessment were measured at 70 μg/m^3, which were above the NAAQS PM2.5 level of 35 μg/m^3 due to traffic and weather conditions. PM2.5 levels measured indoors ranged from 17 to 31 μg/m^3 (Table 1), which were below the NAAQS PM2.5 level of 35 μg/m^3. Frequently, indoor air levels of particulates (including PM2.5) can be at higher levels than those measured outdoors. A number of activities that occur indoors and/or mechanical devices 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, use of stoves and/or microwave ovens in kitchen areas; use of photocopiers, fax machines and computer printing devices; operation of an ordinary vacuum cleaner and heavy foot traffic indoors.

Volatile Organic Compounds (VOCs)

In an effort to determine whether lingering VOCs were present in the building from fire-damaged materials/restoration activities, BEH/IAQ staff conducted VOC screening. Outdoor air samples were also taken for comparison. Outdoor TVOC concentrations were non-detect (ND) (Table 1). No measureable levels of TVOCs were detected inside the building during the reassessment (Table 1).

Conclusions/Recommendations

At the time of the reassessment no elevated levels of PM2.5 or TVOCs were detected indicating that remediation/restoration efforts were successful.

References

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

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

MDPH. 2012. Indoor Air Quality Assessment, Incident Response, Sgt. Wm. H. Carney Memorial Academy, New Bedford, MA. Massachusetts Department of Public Health, Bureau of Environmental Health, Boston, MA. August 2012.

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

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

Picture 1

Replaced univent and building materials in classroom C-109, where fire originated from

Picture 2

Renovated building materials (walls, ceilings, flooring, etc.) in classroom C-109

Picture 3

New windows and paint in classroom C-109

Picture 4

Exterior wall and univent fresh air intakes cleaned of soot/fire/smoke damage

Location: Sgt. Wm. H. Carney Memorial Academy **Indoor Air Results**
Address: 247 Elm Street, New Bedford **Date: 9/5/2012**

Table 1

Location/Room	TVOCs (ppm)	PM2.5 ($\mu g/m^3$)	Remarks
Background	ND	70	Wind/Weather conditions: moderate to heavy intermittent rains with high humidity, winds SW 11-21 mph, gusts up to 34 mph
1st Floor			
C 112	ND	26	
C 109	ND	28	
Family Center	ND	25	
Main office	ND	28	
Principal's Office	ND	29	
Speech	ND	27	
2nd Floor			
C 202-203	ND	24	
C 204-205	ND	26	
Lobby Area	ND	26	

ppm = parts per million ND = non detect $\mu g/m^3$ = micrograms per cubic meter TVOCs = total volatile organic compounds