

# **Indoor Air Quality (IAQ) Study & Sampling**

**McGee Middle School**

**Berlin, Connecticut**

**January 14, 2010**

## **Town of Berlin**

**Berlin, CT**

**January 25, 2010**



**FUSS & O'NEILL**

*Disciplines to Deliver*

**Fuss & O'Neill EnviroScience, LLC**

**146 Hartford Road**

**Manchester, CT 06040**

# 1 Introduction and Background

The Town of Berlin received complaints from parents and some employees regarding the air quality at McGee Middle School, particularly in the newer section of the building. A Fuss & O'Neill EnviroScience (EnviroScience) representative attended a meeting with the school officials and performed a preliminary investigation including measuring air quality parameters (CO, CO<sub>2</sub>, temperature & relative humidity) with very limited sampling for mold on October 12, 2007. While the school addressed EnviroScience recommendations, the complaints persisted. To address these concerns, the school has decided to conduct monthly air quality study including targeted sampling for mold and dust from January, 2010 through June, 2010 before a scheduled construction project starts in June, 2010. Mr. John Pajor, Superintendent of Public Building for the Town of Berlin, contacted EnviroScience to conduct this study to allay the concerns. Mr. Pajor identified the rooms to be tested (4 in the newer section and 2 in the older section).

EnviroScience's Environmental Technician II, John Coletti, conducted the first round of study and sampling on January 14, 2010.

## 2 Scope of Testing and Methodology

Test parameters included measurement of temperature, relative humidity (RH), carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) as well as sampling for dust particulate and bio-aerosols (mold/fungi spores).

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### 2.1 Temperature and Relative Humidity

Temperature and relative humidity levels are indicators of thermal comfort. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) recommends that wintertime indoor temperature be maintained between 68°F and 74°F and summertime indoor temperature be maintained between 73°F and 79°F. ASHRAE also recommends that humidity be maintained in the range of 30% to 60%. Humidity below this range may cause stress through the drying of mucous membranes and skin. Humidity above this range may promote the growth of fungi with resultant contamination of the building and/or ventilation system.

According to its Standard 55-1992, Thermal Environmental Conditions for Human Occupancy, ASHRAE has defined the operative temperature (68°F to 79°F) as that temperature range at which at least 80% of the sedentary or near sedentary occupants will find the environment thermally acceptable.

Temperature and relative humidity readings were obtained using a portable direct-reading TSI IAQ-Calc meter (Model 8762). Two (2) sets of readings were taken in target rooms inside the building as well for outdoor ambient air.

## 4 Interpretation of Bio-aerosol Results

Molds are ubiquitous in the environment. As such, there are no regulatory standards regarding exposures to mold spores. Airborne mold concentrations may change according to spatial and temporal variations. Reference sources agree that the concentrations should be as low as possible for pathogenic mold species such as *Aspergillus* and *Stachybotrys*.

Without standards and guidelines, the current approach to interpretation of results of mold samples relies on comparison of indoor vs. outdoor results and complaint vs. non-complaint area results. In general, indoor airborne mold counts should be lower than those found outside and airborne mold counts in non-complaint areas should be lower than those in complaint areas. In addition, the genus/species found indoors should be similar to those identified in the samples collected from outside the house/building. However, this may not always be consistent. Occupied buildings with many entrances and operable windows may have indoor mold airborne concentrations higher than or as high as those from outdoors. Also, the concentrations of outdoor mold genus/species are likely to be lower on a cold or rainy day compared to the expected concentrations on a warm, sunny day when the spores may be abundant. A situation may be considered unusual when the airborne mold concentrations in the indoor/complaint area are significantly higher than those found outside/non-complaint area. Interpretation of these results requires considerable professional judgment.

The total concentration of fungal species in all the indoor samples exceeded the total concentration of fungal species in the sample collected from outside the building. However, comparing indoor fungal concentration vis-à-vis outdoor fungal concentration is not valid during winter time as the fungal species tend to be dormant outdoor because of cold.

The total concentration of fungal species as well the concentration of *Aspergillus/Penicillium* in Room 103 was significantly higher than those concentrations in other samples. No visible fungal growth was observed in Room 103; however a detail inspection for possible sources of mold growth in this room should be conducted.

## 5 Conclusions and Recommendations

Based on our measurements, our physical walkthrough inspection and sample results, EnviroScience concludes and recommends the following:

1. The temperature readings were within ASHRAE recommended comfort range for wintertime condition but the relative humidity readings were lower than the ASHRAE recommended range. Low humidity may cause dry and itchy skin but is not a significant health issue.

Note that in the absence of an air handling system with mechanical humidification, variation in relative humidity inside the building is expected to be proportional with the seasonal variation of humidity in outside ambient air.

2. No carbon monoxide was detected in the areas tested. Concentrations of carbon dioxide were within the ASHRAE-recommended "Action Level" of 1,000 parts-per-

million (PPM) except in Rooms 116 and 120 where it marginally exceeded the Action level. We recommend delivering additional makeup air to these rooms.

3. Concentrations of dust particulate in all the samples were well below the OSHA PEL of 10.0 mg/m<sup>3</sup> although OSHA PEL values cannot be directly compared with these results.
4. Types and concentrations of fungal species in the indoor samples were not out of ordinary. However, the total concentration of fungal species as well the concentration of *Aspergillus/Penicillium* in Room 103 was significantly higher than those concentrations in other samples. Although no visible fungal growth was observed in Room 103, a detail inspection for possible sources of mold growth in this room should be conducted.

Based on the readings and the sample results, the overall indoor air quality in McGee Middle School was found to be acceptable.

