May 19, 2017

Warwick Public Schools
Attn: Mr. Phil Ricchiuti
150 Draper Avenue
Warwick, RI 02889

Re: Indoor Air Quality Survey Fungal Results – Warwick Veterans Junior High School

Dear Mr. Richutti:

Environmental Consulting and Management, Inc. (ECM Inc.) personnel performed an indoor air quality survey on May 13, 2017 within the Warwick Veterans Junior High School located at 2401 West Shore Road, Warwick, RI. The testing was performed as a follow up to a prior indoor air quality survey performed in February and March of 2017. The testing consisted of the use of direct reading instrumentation to analyze levels of temperature, relative humidity, carbon monoxide/dioxide, volatile organic compounds (VOCs), hydrogen sulfide, and oxygen. The survey also included the collection of five (5) non-viable fungal air samples within the school, along with an outdoor sample for comparison purposes. Locations for sampling were chosen by Warwick School Department representatives.

Indoor air quality is affected by a variety of factors including time of day, season, weather, occupancy, housekeeping, HVAC systems, and outside influences such as fungal spores or pollution. Air quality problems can be caused by one or more of these constantly changing factors.

OBSERVATIONS

The classrooms tested appeared to be clean and in fairly good condition. The housekeeping appeared to be adequate with no dust accumulation observed on horizontal surfaces or trash remaining in waste baskets. No odors associated with fungal growth were detected. Several classrooms had houseplants including Room B105 which had 12 houseplants including a dead cactus. The presence of houseplants can contribute to fungal spore counts as many species thrive on soil and decaying plant material. Outdoor weather was cloudy with a slight wind and intermittent light precipitation.

Warwick School Department representatives did not enter any classrooms during the testing process.

METHODOLOGY

Amprobe CO2-100 - Temperature, Relative Humidity, Carbon Dioxide
GX-6000 Smart 6 Sensor Sample Draw Gas Monitor – VOCs, Carbon Monoxide, Hydrogen Sulfide, Oxygen
Buck Bioslides - Non-viable Fungal Air Samples

DIRECT READING RESULTS

Temperature:

The Amprobe CO2-100 found the indoor temperature of between **63.6** and **67.8 degrees** Fahrenheit within the area. The exterior temperature was **51.9 degrees.** The American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) recommend an indoor temperature range of between 68 and 76 degrees Fahrenheit. Indoor temperatures are highly dependent on outdoor conditions, and small variances outside the ASHRAE recommended range does not necessarily indicate an indoor air quality problem.

Relative Humidity:

The Amprobe CO2-100 recorded an interior relative humidity of between **44.5 and 54.9%**. The exterior humidity level was found to be **81.0%.** According to the ASHRAE Standard 55-1981, relative humidity should be maintained between 30% and 60% depending on the season and indoor temperatures. Humidity itself is not usually considered to cause health problems unless it it is found to be at one extreme or the other. Low humidify can lead to irritation of the eyes, nose, and throat of the building occupants. High humidity can provide ideal conditions for the growth of microorganisms and mold, which can in turn cause allergic reactions in building occupants.

Carbon Dioxide:

Carbon dioxide levels within the area were found to be between **397 and 449 ppm (parts per million)**. The outdoor level was **386 ppm**. The ASHRAE guideline recommends that the indoor concentration of carbon dioxide should be less than 700 ppm above the outdoor readings. Carbon dioxide concentrations in occupied spaces usually range from 500 to 1000 ppm. Large concentrations of carbon dioxide can cause air quality concerns. The NIOSH/OSHA exposure limit is 5000 ppm based on an 8 hour exposure period.

Potential Concerns for CO2 Concentration:
250-300 ppm - normal outdoor ambient air
350-1000 ppm – indoor occupied spaces with good air exchange
1000-2000 ppm – complaints of drowsiness and poor air quality
2000-5000 ppm – complaints of headaches, sleepiness, and stale air. Can lead to loss of concentration, increased heart rate, and slight nausea
>5000 ppm – the permissible exposure limit for occupied spaces, toxicity could occur