Indoor Air Quality Report

Performed at:

Somerset Middle School
1141 Brayton Avenue
Somerset, MA 02726

Prepared for:

Somerset School Department
625 County Street
Somerset, MA 02726
Attention: Carlos Campos

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1.0 INTRODUCTION

As requested by the Town of Somerset School Department, MAC Services, LLC (MAC) completed an Indoor Air Quality (IAQ) evaluation of the Somerset Middle School located at 1141 Brayton Avenue in Somerset, MA.

Mr. Joseph Cooney, representing MAC Services, LLC, performed the evaluation on August 19th, 2020. Mr. Cooney is a Senior Environmental Technician with over 12 years of experience in the Environmental Consulting Industry and has completed dozens of Indoor Air Quality assessments in a diverse range of environments including Child Care Facilities, manufacturing facilities, and large retail buildings, as well as residential buildings. Mr. Cooney was assisted by Field Technician's Brendon Cooney and Brent Rezendes. In conducting this evaluation, MAC performed the following tasks:

- Conducted interview with facility personnel.
- Conducted a visual inspection of the specified interior areas to detect any suspect discoloration of building materials.
- Conducted a visual inspection of the Heating and Ventilation air filtration system.
- Measured Relative Humidity and Temperature.
- Utilized instantaneous reading equipment to obtain data measuring oxygen levels (O), carbon monoxide (CO), hydrogen sulfide (H2S), Lower Explosive Limit (LEL- methane gases) and over 170 Volatile Organic Compounds (VOC) including but not limited to Formaldehyde, Ethyl Benzene, Tetrachloroethylene, Trichloroethylene, Vinyl Chloride, Carbon Dioxide (CO2) and Naphthalene (smells like mothballs). Data was collected randomly throughout all areas of the building as well as outdoors. Three separate rounds of data were obtained from the randomly selected sample locations. The sample locations represented approximately 50% of all rooms. Appendix A presents these Direct Reading Environmental Measurements.
- Conducted a Mold Determination Survey.

2.0 FACILITY DESCRIPTION

The space subject to the IAQ evaluation at 1141 Brayton Avenue in Somerset, MA is made up of Two separate sections that were constructed at different times. One section is approximately 60 years old while the second section (Grade 6) is slightly newer. The Somerset Middle School consists of a one-story building that is approximately 132,000 square feet in total area. The facility is used to educate students in grades 6 through 8.

The building construction is made up of walls that are a combination of gypsum board with skim coat plaster as well as hard plaster walls in the original section. Some walls are made of CU block as well. Ceilings are a combination of suspended 2' x 2' ceiling tile and hard plaster in some areas. The floors are mostly VCT with some areas having carpet cover such as the Library. Many materials appear to be homogenous throughout. Ceramic tile is used in the bathrooms.

The Heating and ventilation system is made up of Uni-vent units, roof top units over the Gym, pull down units in the hallways and an Air Handler unit in the boiler room. There is no Air Conditioning.

3.0 OBSERVATIONS AND DISCUSSION

During the survey the individual rooms were kept isolated by closing the doors. The ventilation system continued to function.

There was no obvious building exterior integrity breakdown observed. There were some visible signs of mold in isolated areas. There was some odor detected in the Library. There is reportedly a history of leaking pipes and areas of leaking roof sections throughout the original building section as well as 'sweaty' floors in some sections during an extended period of high humidity days.

Visual inspection of the Heating and ventilation units resulted with the following observations:

- Records of changes were found in most of the doors to the individual units but were inconsistent. Some going back to 1998 but detail varied greatly.
- Most filter cleanliness levels appeared to be acceptable. Exceptions were the units in the boiler room, Auditorium, Custodian office unit and the unit in Fan Room #2.
- Filter in the wall unit located in the corridor near the Gym was inserted improperly.
- Based on records observed it appears filter changes are made generally 2 to 3 times per year.

The weather outdoors was sunny and warm with the temperature approximately 85 Degrees (F) and Humidity level at approximately 56 % at the time of Survey activity on 8/19/20.

3.1 Occupied space

All areas subject to sampling appeared to be unoccupied in general.

4.0 DIRECT READING ENVIRONMENTAL MEASUREMENTS

MAC performed direct-reading environmental measurements, utilizing a Multi-Rae Five Gas Meter. Measurements were taken outdoors and at numerous indoor locations. MAC measured oxygen levels as well as hydrogen sulfide, LEL (methane gases), carbon monoxide and multiple volatile organic compounds. Measurements were collected over a period of a single day during the regular daytime school hours and obtained in three, (3), separate rounds of collection taken from the same locations each round. There were a total of One-Hundred and Fourteen (114) samples obtained from Thirty-Eight, (38), collection stations throughout the interior.

Appendix 'A' presents direct reading environmental measurements obtained during data collection survey on 8/19/20 in the specified areas.

4.1 Oxygen

NIOSH (National Institute for Occupational Safety and Health) defines an oxygen deficient atmosphere containing oxygen levels less than 19.5% and an oxygen-enriched atmosphere as containing more than 23.5%.

Individuals exposed to an atmosphere of less than 19.5% oxygen would exhibit decreased ability to work strenuously, impair coordination and may induce symptoms in persons with coronary, pulmonary, or circulatory problems.

MAC measured the Oxygen levels to be consistently at 20.9%.

4.2 Carbon Monoxide (CO)

Carbon monoxide is an odorless, colorless toxic gas produced by the incomplete combustion of solid, liquid and gaseous fuels. Elevated indoor carbon monoxide concentrations may be a result of combustion sources indoors or the introduction of combustion products from outdoors into the indoor air. In the absence of indoor sources, indoor carbon monoxide concentrations are usually less than, or equal to outdoor concentrations. ASHRAE Standard 62-1999 recommends an upper limit for carbon monoxide of 9 ppm as a 24-hour average, and 35 ppm as a 1-hour average.

MAC measured the concentrations of all samples obtained of CO to be well below all upper limit thresholds.

4.3 Hydrogen Sulfide (H2S)

Hydrogen sulfide is the chemical compound H2S. This colorless, toxic and flammable gas is responsible for the foul odor of rotten eggs and flatulence. It often results from the bacterial breakdown of sulfates in organic matter in the absence of oxygen, such as in swamps and sewers (anaerobic digestion). Hydrogen Sulfide is a highly toxic and flammable gas. Being heavier than air, it tends to accumulate at the bottom of poorly ventilated spaces. Although very pungent at first, it quickly deadens the sense of smell. The OSHA recommended permissible exposure limit (PEL) for hydrogen sulfide is 20 ppm.

MAC measured the concentrations of all H2S samples obtained to be within acceptable levels.

4.4 Lower Explosive Limit (LEL)

The Lower Explosive Limit of a gas or vapor, is the limiting concentration (in air) that is needed for the gas to ignite and explode. There are two explosive limits for any gas or vapor, the lower explosive limit and the upper explosive limit (UEL). At concentrations in air below the LEL there is not enough fuel to continue an explosion; at concentrations above the UEL the fuel (gas or vapor) has displaced so much air that there is not enough oxygen to begin a reaction. Concentrations of explosive gases are often reported in terms of percent of lower explosive limit (% LEL). The EPA recommends the action level to be greater than 10%.

MAC measured the LEL % concentrations to be well below the EPA recommended action level.

4.5 Volatile Organic Compounds (VOC)

MAC measured for multiple VOC's. There were minimal concentrations of any listed VOC's. The list is extensive and can be furnished upon request. Included in this list is Carbon Dioxide (CO2). VOC's are components which, at room temperature, may be released from materials or products in the form of gases. The EPA calls for concentrations of less than 100 PPM (parts per million) for the Criteria Air Pollutants as a guidance.

MAC measured the VOC concentrations to be well below the recommended acceptable levels. Included in the VOC measurements was Carbon Dioxide (CO2).

4.6 Relative Humidity (RH)

MAC measured for RH in all the targeted areas.

ASHRAE Standard 62.1-2016 recommends that RH levels be maintained to be less than 65% to lessen the likelihood of mold growth while ASHRAE Standard 55-2013 recommends that RH in a occupied space be generally maintained to be less than 80% as it corresponds with acceptable T levels.

MAC measured the indoor RH to be generally less than 60%.

4.7 Temperature (T)

MAC measured for T in all the targeted areas over a time period of approximately 2 hour and 15 minutes.

ASHRAE Standard 55-2013 recommends that for Thermal Environmental conditions for human occupancy comfort purposes, temperature could be from 67 to 82 degrees (F). This range depends on a number of variables including the occupant's age, clothing worn and activity level.

MAC measured the indoor Temperatures to be consistently between 70 and 75 degrees (F).

5.0 MOLD ASSESSMENT

5.1 Scope of Work

MAC conducted a mold determination survey including a visual inspection and air sampling for the purpose of determining if elevated levels of mold spore activity exist within the specific areas sampled. A sampling strategy was arrived at by targeting areas most likely to have mold growth based on experience. Those areas are generally where plumbing exists, at windows, and basement levels as well as wherever there may be suspect discoloration on ceilings, walls and floors that were detected during the visual inspection. Information gathered during the personnel interview is also factored in to determine sample location strategy.

The results of Fungal air samples are determined by utilizing a comparative analysis with current conditions outdoors at the time of indoor sampling using Industry Standard guidelines for acceptable levels of mold spore activity. In addition to the outdoor sample, additional samples were collected in the following locations:

- Room 30
- Room 17
- Room 15
- Room 13A
- Room 12
- Room 11
- Room 9
- Gymnasium
- Room 62

- Room 58
- Room 56
- Room 53
- Room 48
- Room 46
- Music Room
- Art Room
- Outside
- Garage
- Room 36
- Room 34
- Room 32
- Tech Room B
- Library Office
- Library
- Custodian Office
- Nurse Office
- Former Main Office/Current Conference Room
- Room 8/Principals Office
- Room 6
- Room 4
- South Coast 2 Room
- Tech Computer Lab 43
- Auditorium
- Tech Lab 41
- Lecture Room
- Teacher Dining
- Cafeteria
- Guidance Office

5.2 Discussion

Fungal bio-aerosol monitoring is the sampling of spores from the air onto a media slide. Utilizing a microscope, the spores are then identified at least to genus and counted. Comparisons with outside levels and types indicate whether pathogenic species have been or have become predominate and at what concentration in a particular area.

All mold samples were analyzed by H2O EnviroComp, an EMPAT (Environmental Microbiology Proficiency Analytical Testing) proficient Laboratory located in West Dennis, MA. This evaluation is limited in scope and reflects the levels of fungal contaminants on the day of sampling. Airborne levels of fungal spores will vary naturally and conditions may change in the future which could promote the growth of mold or create other air quality concerns in the interior environment. The industry standard acceptable level of spore counts for most species of mold is generally (1,000 s/cu m). The acceptable level is more stringent for some species of more harmful species such as Chaetomium, (600 s/ cu m) and Stachybotrys (400 s/cu m).

In addition to the threat mold poses against the structural integrity and value of a property, bacterial / fungal magnification or enhancement within a building can lead to a number of health issues. Associated health risks can include respiratory as well as pulmonary symptoms. Some

molds produce mycotoxins which can lead to effects on the neurological system. All types of mold are harmful to health to some degree so deciding on action to be taken should not depend on the type of mold rather the overall concentration level of specific mold spores.

The absence of spores and visible colonies does not always ensure that no microbiological colonies exist. Colonies may be hidden with spores released sporadically based on environmental conditions, in particular, humidity levels.

The effects of mold spores depend on a number of variables including the pre-existing health of the occupants, the sensitivity level and age of the inhabitants of the space, as well as the type of mold contaminants and concentration levels of mold spore counts. MAC services utilizes several sources of Industry guidelines when interpreting air sample analytical data, including the EPA (Environmental Protection Agency) and IICRC (Institute of Inspections Cleaning and Restoration Certification) organizations.

5.3 Conclusion

The visual inspection did detect evidence of mold growth in the following areas:

- Library West end on the ceiling tile.
- Corridor at the Nurse's office entrance.
- Windowsill at room 17.

The analytical results showed elevated levels of the Aspergillus / Penicillium type mold in the following areas:

- Room 34
- Room 17
- Library ***(extremely elevated)***
- Nurse's office
- Corridor at entrance to Nurse's office
- Corridor in Guidance Department next to bathroom
- Room 10
- Room 60
- Room 57
- Room 47 ***(extremely elevated)***

All other areas sampled appeared to be within the Industry Standard acceptable levels. There were several samples with slightly elevated levels that could be attributed to elevated levels nearby in proximity. Not all rooms were sampled.

Note: Please see the attached Laboratory Analytical Report in Appendix B

5.4 Recommendation

To avoid mold growth in the future, any water intrusion must be remedied by repairing immediately and drying out any resulting affected areas within 48 hours. Maintaining humidity levels below 65% and regular maintenance of ventilation system filters will also assist in controlling mold spore activity.

Specific recommendations for the Middle School are as follows:

- Access to the Library and room 47 should be kept to emergency use only until the levels of spore activity are reduced to acceptable levels. Further investigation should be completed to define a mold remediation scope of work, however, at a minimum the visibly contaminated ceiling tiles should be removed and disposed of. The carpet should be lifted and tested for mold growth underneath. There could Possibly be pipe leaks in the walls.

- For all other areas listed with elevated levels of spore activity, further investigation should be completed to determine the source of the high counts of spores. Possibility's include under the sinks, pipe leaks behind walls and ceilings or possibly under the floor tile due to high moisture due to 'sweaty' conditions created during high humidity outside.

- All work should be completed using Industry Standard protocol for Mold Remediation related to Worker Protection and work area engineering controls. Post Remediation visual inspection and air sampling is recommended. Only an Insured and Licensed Contractor for Mold Remediation should be used to complete the work.

6.0 IAQ CONCLUSIONS

MAC's conclusions and recommendations are based on visual inspections and scientific data obtained and presented in this report.

With regards to all non-mold assessment measurements, there is no scientific evidence apparent that would indicate an unhealthy environment exists as it relates to the Indoor Air Quality (IAQ) measurables in the areas referenced in this document at the time sampling was conducted. All measurements acquired were well within acceptable limits of guideline levels provided by OSHA, NIOSH and ASHRAE. Most readings obtained where below the limit of detection.

The Heating and Ventilation filter system maintenance and cleaning along with associated record keeping are inconsistent and unreliable. Most filters were recently changed and looked appropriately clean; however, some were excessively dirty resulting in ineffectiveness. It was unclear what was changed and when.

7.0 IAQ RECOMMENDATIONS

Continue to maintain the building Heating and ventilation filtration system and document the maintenance activities as they take place. MAC recommends increasing the filter changes to every Three months and always vacuum the filter area do not blow it out. The filter change dates should be recorded, kept in a digital file and checked for completion after each change period using a summary list of all existing units to ensure none are unintentionally missed. One person should be responsible of ensuring all maintenance is being completed and properly recorded for the Middle school.

Any water intrusion events should be remedied within 48 hours of occurrence.

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