Indoor Air Quality Report

Performed at:

South Elementary School
700 Read Street
Somerset, MA 02726

Prepared for:

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

Prepared by:

MAC Services, LLC
21 Mill Pond Drive
Rochester, MA 02770
Joseph Cooney
Brendon Cooney

DATE: August 27, 2020

CONTENTS

1.0 INTRODUCTION

As requested by the Town of Somerset, MAC Services, LLC (MAC) completed an Indoor Air Quality (IAQ) evaluation of the South Elementary School located at 700 Read Street in Somerset, MA.

Mr. Joseph Cooney, representing MAC Services, LLC, performed the evaluation on August 18th, 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 to discuss changes made since the original evaluation.

- Conducted a visual inspection of the specified interior areas to detect any suspect discoloration of building materials.

- Measured Relative Humidity and Temperature.

- Utilized instantaneous reading equipment to obtain data measuring oxygen levels (O), carbon monoxide (CO), dust particulate, 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 in the specified areas of the building as well as outdoors. Appendix A presents these Direct Reading Environmental Measurements.

- Conducted a Mold Determination Survey.

2.0 FACILITY DESCRIPTION

The South Elementary School is a single-story building constructed approximately 70 years ago. The building is approximately 25,000 square feet in total area and is used to educate students in grades One through Five.

The building construction is made up of primarily hard plaster and CMU block walls with ceramic tile used throughout the bathrooms. The ceilings were made up of a tile grid system in some areas while rooms such as the bathrooms were hard plaster. The floors are mostly 12" x 12" vinyl flooring tile along with terrazzo in most common areas. All materials appear to be homogenous throughout.

3.0 OBSERVATIONS AND DISCUSSION

During the survey the individual rooms were kept isolated by closing the doors. The Uni-vent units in each room was shut down prior to sampling.

There was no building exterior integrity breakdown observed. No visible signs of mold were noted in any of the areas where sampling took place except for the Teachers' Lounge where there were some stained ceiling tiles. There were no obvious odors detected. There were no areas of plumbing breakdown observed.

The weather outdoors was mostly sunny, humid, and warm with the temperature approximately 88 Degrees (F) and Humidity level at 59% at the time of Survey activity on 8/18/20.

3.1 Occupied space

All areas subject to sampling were unoccupied during sampling.

4.0 DIRECT READING ENVIRONMENTAL MEASUREMENTS

MAC performed direct-reading environmental measurements, utilizing a Multi-Rae Five Gas Meter and DustTrak II (Air Particulate). 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 as well as air particulates. Measurements were collected over a period of two days during the regular day time work shift and obtained in three (3) separate rounds of collection taken from the same locations each round. There were a total of one hundred and forty-two (124) sample collection stations throughout the interior.

Appendix A presents direct reading environmental measurements obtained during data collection survey on 8/18/20 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 between 20.7 and 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 65%.

4.7 Temperature (T)

MAC measured for T in all the targeted areas over a time period of approximately 1 hour and 18 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 occupants age, clothing worn and activity level.

MAC measured the indoor Temperatures to be consistently between 72 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. 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:

- Cafetorium (center of area)
- Boiler Room
- Crawl space off Boiler room
- Kitchen
- Teachers Bathroom
- Room 5
- Room 7
- Room 13 next to sink
- Room 11
- Boys Bathroom
- Cafetorium near stage
- Library Building

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 insure that no microbiological colonies exist. Colonies may be hidden and 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 not detect any evidence of mold growth. However, while the analytical results appeared to be within the Industry Standard acceptable levels for most areas sampled, the exceptions were the results in Room 13, the Boiler room and the crawl space off the Boiler Room as well as the Boy's Bathroom off the front hallway. All of these areas had elevated counts of Aspergillus / Penicillium. Room 5 and 11 had slightly elevated results for Aspergillus / Penicillium. All samples in the classrooms were obtained next to the sinks or windowsills.

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% will also assist in controlling mold spore activity.

Specific recommendations for the South Elementary School are as follows:

- For the sink cabinets in the classrooms listed with elevated levels, remove all visible discoloration from the wood surface then treat with an EPA registered fungicide.

- For the Boy's Bathroom and Boiler Room areas where the floors and walls are all non-porous surfaces, treat all wall and floor surfaces with an EPA registered fungicide, scrub, wipe down and then treat a second time allowing the solution to dry on surface.

- All work should be completed using Industry Standard protocol for Mold Remediation related to Worker Protection and work area engineering controls. Post Remediation 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 Indoor Air Quality (IAQ) 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 Uni-vent unit filters are reportedly changed Three times per year. Most filters were recently changed and looked appropriately clean, Three were found to be in place since the last change and were excessively dirty. The filter change and cleaning records were found inside the Uni-vent unit doors. Records were found to be incomplete but did indicate, generally, there were Three changes per year.

7.0 IAQ RECOMMENDATIONS

Continue to maintain the building HVAC filtration system and document the maintenance activities as they take place. MAC recommends increasing the filter changes to every Three months. The filter change dates should be recorded, kept in a digital file and checked for completion after each change period.

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

This report submitted by: Joseph P. Cooney

Joseph Cooney
Senior Environmental Project Manage