

Indoor Air Quality Report

Performed at:

**South Elementary School
700 Read Street
Somerset, MA 02726**

Prepared for:

**Somerset School Department
580 Whetstone Hill Road
Somerset, MA 02726
Attention: Carlos Campos**

Prepared by:

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CONTENTS

| <u>Section</u> | <u>Page</u> |
|--|--------------------|
| 1.0 INTRODUCTION..... | 1 |
| 2.0 FACILITY DESCRIPTION..... | 1 |
| 3.0 OBSERVATIONS AND DISCUSSION | 2 |
| 3.1 OCCUPIED SPACE | 2 |
| 4.0 DIRECT READING ENVIRONMENTAL MEASUREMENTS | 2 |
| 4.1 OXYGEN | 2 |
| 4.2 CARBON MONOXIDE | 2 |
| 4.3 HYDROGEN SULFIDE | 3 |
| 4.4 LOWER EXPLOSIVE LIMIT (LEL) | 3 |
| 4.5 VOLATILE ORGANIC COMPUNDS | 3 |
| 4.6 RELATIVE HUMIDITY | 3 |
| 4.7 TEMERATURE | 4 |
| 5.0 MOLD ASSESSMENT | 4 |
| 5.1 SCOPE OF WORK | 4 |
| 5.2 DISCUSSION | 4- 5 |
| 5.3 MOLD CONCLUSIONS | 5 |
| 5.4 MOLD RECOMMENDATIONS | 5-6 |
| 6.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS | 6 |

APPENDIX A - DIRECT-READING ENVIRONMENTAL MEASUREMENTS DATA

APPEDIX B - MOLD ANALYSIS DATA

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 South Elementary School located at 700 Read Street in Somerset, MA. This was a follow up inspection from the initial inspection completed in August of 2020 and follow up inspection in January of 2021.

Mr. Joseph Cooney, representing MAC Services, LLC, performed the evaluation on August 2nd, 2021. Mr. Cooney is a Senior Environmental Technician with over 15 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 interior to detect any suspect discoloration of building materials.
- Conducted a visual inspection of the Heating and Ventilation air filtration system and reviewed maintenance records.
- 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). 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

There was no building exterior integrity breakdown observed. There were isolated areas of visible mold on some sink cabinet interiors, some metal desks and some closet doors. There were no obvious odors detected.

The weather outdoors was mostly sunny with the temperature approximately 77 Degrees (F) and Humidity level at approximately 62% at the time of Survey activity on 8/2/21.

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. Measurements were taken outdoors and at numerous indoor locations. MAC measured O (oxygen) levels as well as H₂S (hydrogen sulfide), LEL (methane gases), CO (carbon monoxide) and multiple VOC's (volatile organic compounds). Measurements were collected during the regular class time hours and obtained in Five (5) separate rounds of collection taken from the same locations each round over a period of approximately 90 minutes of time. The sample locations represented approximately 50% of all rooms and were determined by taking into consideration what rooms were not sampled during the survey completed in August of 2020. There were a total of Eighty (80) samples obtained from Twenty (20) collection stations throughout the interior during Four rounds of data collection. During the survey the individual rooms were kept isolated by closing the doors. The uni-vents were shut off during the survey.

Appendix A presents direct reading environmental measurements obtained during data collection survey on 8/2/21 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 none detected (ND).

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 none detected (ND).

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 none detected (ND).

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 none detected (ND). 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 between 55% and 57%.

4.7 Temperature (T)

MAC measured for T in all the targeted areas over a time period of approximately 1 hour and 26 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 75 and 78 degrees (F).

5.0 MOLD ASSESSMENT

5.1 Scope of Work

MAC conducted a mold determination survey including a visual inspection throughout all rooms and representative air sampling for the purpose of determining if elevated levels of mold spore activity exist within the interior of the building. 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. The units were shut off during the survey. In addition to the outdoor sample, additional samples were collected in the following locations:

- Room 2
- Room 10
- Room 11
- Nurse's Office
- Room 8
- Room 4
- Room 7
- Room 5
- Main 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 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 utilize 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

There were isolated areas of visible mold on the sink cabinet doors in multiple rooms including room 10 as well as under metal desks including in the Nurses Office. In addition, there were some closet doors with visible mold. These areas were reviewed with Maintenance personnel.

The analytical results indicated there were slightly elevated counts of aspergillus / penicillium in rooms 10, 7 and 5. Also, elevated counts of aspergillus / penicillium in rooms 2, 11, 4 and the Nurse's Office.

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 60% will also assist in controlling mold spore activity. Recommendations for the specific areas of visible mold and / or elevated air sample results are as follows:

- All areas observed to have visible mold are considered to be Level I per EPA guidelines, meaning they are generally less than 10 square feet and can be cleaned by maintenance staff. An EPA registered fungicide should be used to apply to all visible mold then wiped down. Dispose of cleaning rags as regular trash. Areas should be visibly reinspected until all visible mold has been eliminated. Negative air system work areas are not required.
- There are several sink cabinets that may need more aggressive cleaning methods if the fungicide treatment proves to be inadequate.
- Maintenance personnel need to continue to check all areas such as small enclosed areas with little air circulation to ensure mold growth has not developed. If mold does re-appear use the supplied fungicide to clean immediately.
- Additional Dehumidifiers need to be added to the interior to assist in controlling mold growth during the high humidity months of April through September.

- All cabinet doors should be left open during the summer months to allow for adequate air circulation and humidity control in these isolated areas.

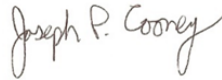
6.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS

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 work 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 including OSHA, NIOSH and ASHRAE.

All HVAC filters were reportedly recently changed. The visual inspection of the filters did reflect the recent change out. The changes are now being recorded digitally by the Head Custodian of each school and kept in a master spreadsheet for all schools with the Director of Facilities. Continue to maintain the building HVAC filtration system and document the maintenance activities as they take place. All filters should be checked approximately every Three months, depending on the visual inspection, the filters should be changed out as needed. All filter changes should be recorded and kept on file digitally.

This report submitted by:



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APPENDIX A

Direct Reading Environmental Measurements from August 2nd, 2021

APPENDIX B

Mold Laboratory Analytical Results