

# **Indoor Air Quality Report**

*Performed at:*

**Chace Street Elementary School  
538 Chace Street  
Somerset, MA 02726**

*Prepared for:*

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

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**APPENDIX A - DIRECT-READING ENVIRONMENTAL MEASUREMENTS DURING INITIAL SURVEY**

**APPEDIX B - MOLD ANALYSIS DATA**

## **1.0 INTRODUCTION**

As requested by the Town of Somerset, MAC Services, LLC (MAC) completed an Indoor Air Quality (IAQ) evaluation of the Chace Street Elementary School located at 538 Chace Street in Somerset, MA.

Mr. Joseph Cooney, representing MAC Services, LLC, performed the evaluation on August 18th, 2020 with Mold air samples completed on August 20th. 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 (H<sub>2</sub>S), 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 (CO<sub>2</sub>) and Naphthalene (smells like mothballs). Data was collected randomly throughout all 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 space subject to the IAQ evaluation at 538 Chace Street in Somerset, MA appears to be in excellent condition. The Chace Street Elementary School consists of a one-story building that is approximately 35,000 square feet in total area. The facility is used to educate students in Kindergarten through Fifth Grade and was built in the 1960's.

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" and 9" x 9" 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 were shut off to stop the circulation of air during the sampling.

There was no building exterior integrity breakdown observed. There were some isolated areas of visible signs of mold. There were no obvious odors detected. There were no areas of plumbing breakdown observed.

The Heating and ventilation system is made up of Uni-vent units throughout all rooms. There is no Air Conditioning.

### **3.1 Occupied space**

All areas subject to sampling appeared to be unoccupied.

## **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 Sixty-Eight (68) samples obtained from Twenty-Three, (23) 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 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 (H<sub>2</sub>S)**

Hydrogen sulfide is the chemical compound H<sub>2</sub>S. 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 H<sub>2</sub>S 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 (CO<sub>2</sub>). 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 (CO<sub>2</sub>).

### **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 1 hour and 33 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 77 and 79 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 was detected during the visual inspection.

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 11
- Room 15
- Room 9
- Room 12
- Room 7
- Band
- Room 6
- Cafeteria
- Kitchen
- Outside
- Room 24
- Room 25
- Room 5
- Room 2
- Room 1 Art and Music
- Room 23 Speech
- Teachers Dining Room
- Room 21
- Library and Media Center
- Room 19
- Gymnasium
- Room 16

## 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 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 detect evidence of mold growth and / or water damage in the following areas:

- Room 24 and 25 exterior door.
- Bathroom near Cafetorium.
- Ceiling tile in Teacher's Lounge
- Water stain under sink in Room 18

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

- Room 12 next to sink
- Bathroom off Kitchen (slightly elevated)
- Room 7 next to sink
- Room 18 next to sink

- Girls Bathroom off 'Mohawk' hallway (slightly elevated)
- Room 24 next to exterior door.

All other areas sampled appeared to be within the Industry Standard acceptable levels.

**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 Chace 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 Girl's Bathroom and Bathroom off the Kitchen 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.
- For Room 24, the areas showing water damage should be removed and the exposed wall cavity treated with an EPA registered fungicide.
- 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 as well as 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. Almost all readings were below the level of detection.

Inspection of the Heating and Ventilation filtration system showed all filters at an acceptable level of cleanliness considering the time since the last change. There was no documentation available for filter maintenance. Reportedly all documentation was similar to the South Elementary school as it was handwritten and kept attached to the inside of the Uni-vent unit doors must recently they were discarded. Changes have been made three times per year during Christmas break, Spring break and Summer break.

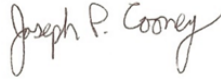


## **7.0 IAQ RECOMMENDATIONS**

Continue to maintain the building Heating and ventilatioin 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 filer 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 Chace school.

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

This report submitted by:



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