IAQ, and Mold Assessment
Hobomock Elementary School, Pembroke
Massachusetts

Sample date: October 10, 2023

Report date: October 30, 2023

Prepared by:

Work Environment Assessment, LLC

Michael Sireci, MSc, CMA, AI

ACKNOWLEGEMENTS

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Renee Bock, President, Pembroke Teachers Association (WTA)
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Aaron Obey, Superintendent of Pembroke Public Schools
Michael Murphy, Principal Hobomock Elementary School

Also, the various faculty and staff that provide information and advice during the MTA Consultants visit.

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I. Introduction

Work Environment Assessments LLC, on behalf of the Massachusetts Teachers Association, conducted an indoor air quality and mold inspection on October 10, 2023, of the Hobomock Elementary School, 81 Learning Lane, Pembroke, Massachusetts for the Pembroke Teachers Association. Hobomock Elementary School enrolls approximately 400 students in grades K-6, was opened in the 1970 and was renovated in 2003. Asbestos floor tiles have been abated. It was reported that the roof was replaced last year. The building has a brick facade, concrete block walls with interior finish materials throughout. The classrooms contain acoustical ceiling tile and 12"X12" vinyl floor tile.

II. Background

Due to high levels of humidity, moisture, and mold growth, Stanley Cleaner Company recently cleaned all fabric materials, desks, and chairs, and disposed of several types of porous materials including particle boards and paper products. Duct work was cleaned in several rooms including rooms 225 and 230. HEPA filters were provided in six rooms. The roof top air handlers were also cleaned and filters changed.

It was reported that the building has a high water table and the floor tiles often get moist and are slippery in the fall, the mastic fails, and the floor tiles are replaced. It was also reported that in the warmer season, pipes sweat and leak on the ceiling tiles and stains them. Rugs are cleaned twice a year. There are several air scrubbers in the building and two large portable industrial type dehumidifiers that discharge water into the sewer drains.

During the assessment, fans were running, the dehumidifiers were on, and the AC was on in the library and front office. Work Environment Assessments sampled seven spaces and took an outside control sample for mold. Six classrooms represent approximately 18% of the total classrooms. The building was not occupied, and the HVAC system was fully operational.

III. Executive Summary of Findings for Air and Surface Sampling

a. Surface Measurements: Surface samples detect mold spores that have settled out over time on surfaces. Seven surface samples were taken at sites on both hard and porous

services. Mold growth was detected at 5 sites. Heavy Mold growth was detected on the window blinds in room 225, on the rug in the teacher's lounge, and on the window blinds in room 245. Moderate mold growth was detected on a concrete wall in the first and second grade hallway and on a shelf in room 280 (see appendix 3).

b. Air Measurements: Several factors are taken into consideration when analyzing lab reports for air samples. WEA looks at the totality of the data and draws conclusions. The most scientifically accepted method of determining if mold is growing inside with amplification in structure is to compare inside species' spores/m^3 to the same outside species spores/m^3. Total spore counts are also considered independently when determining the extent of mold growth. WEA and other professionals use 500 spores/m^3 as an action level (see chapter VI) .

According to the Eurofins EMLab Mold Score Trap report, rooms 245 and the Teachers' Lounge indicated a moderate likelihood of indoor fungal growth (see appendix 3). In four locations species of mold detected on the inside exceed spores/m^3 found outside. The levels of spores in the air when viewed independently, were also elevated in three rooms. Total Spores detected in the five rooms sampled ranged from 390 spores/m^3 to 1,700 spores/m^3 (see appendix 3).

IV. Recommendations

a. Establish a strong Health and Safety Committee that includes building occupants, Association leaders and decision makers from management. Utilize the Work Environment Assessment and the MTA Health and Safety Organizer to support the activities of the H&S Committee. The H&S Committee and Facilities Department can design a digital reporting system to communicate with PTA members, facilities, building administration and health and safety committee members about occupants environmental and health concerns. Tools such as School Dude may be adapted to provide a communication vehicle. The Health and Safety Committee can thereafter access reports and review complaints and follow up responses to instructor's concerns.

b. Sanitize rooms where surface mold growth was detected on surfaces including rooms 225, 245 280, and the first and second grade hallway. Consider removing the rug in the teachers' lounge and sanitize the room. Follow the IICRC 520 Guidelines for heavy and intermediate mold growth. Follow guidelines when cleaning porous materials including the rugs in the Teachers' lounge. Discard moldy paper products. Use an EPA registered fungicide. Clean all furniture both on the accessible top sides, but more importantly underneath all desks, wood chairs, book shelves etc. Notify building occupants of the anticipated date of the remediation and disclose any remediation chemistries utilized in the event individual occupants are allergic or might have a physical reaction if exposed. Make accommodations for those individuals. Post remediation verification (PRV) sampling

should take place with at least one air sample and one surface sample taken from each space and room after it is sanitized.

c. The Institute of Inspection Cleaning and Restoration Certification (IICRC) S520 Standard provides the procedures to be followed and the precautions to be taken when performing mold remediation in residential, commercial, and industrial buildings. The ANSI/IICRC S520 is based on reliable remediation and restoration principals, research and practicable experience. IICRC-520 guidelines' are summarized and may be purchased at https://webstore.ansi.org/standards/iicrc/iicrcs5202008. The EPA Mold Remediation in Schools and Commercial Buildings also provides guidance and may be found at: Mold Remediation in Schools and Commercial Buildings (pdf) (1.59 MB).
d. Monitor, assess, and investigate all sources of moisture intrusion into the building, stained ceiling tiles and high levels of relative humidity. Map out signs of moisture and install methods, technologies, and equipment to reduce relative humidity in the building and potential sources of mold growth. If a ceiling tile is stained, not only replace it, but find and seal the source of moisture. Utilizing central HVAC dehumidification, air conditioning, portable de-humidifiers, and air cleaners if needed. Insulate copper tubing above the plenum. Run dehumidifiers and air purifiers at least an hour before the building is occupied and an hour after the space is not used. Run the system over vacation periods when the building isn't occupied. Check the building regularly especially during periods of high humidity. To avoid interior mold growth in the future, any moisture intrusion must be corrected by repairing immediately and drying out any resulting affected areas within 48 hours.
e. Monitor humidity throughout the year, even during vacation periods, especially from May to October. Do not leave the building closed off without adequate air filtration or circulation. Maintain humidity levels below 60% RH, good housekeeping, good building maintenance practices, as well as elimination of moisture and/or the quick response to flood events are key to minimizing the potential for mold growth indoors. Consider purchasing industrial type dehumidification systems.
f. Increase circulation by eliminating any areas of clutter. If you don't use the material causing clutter then take it out of the building, if you do use it, it needs to be clean and stored in containers.
g. During the rainy season, assess the concrete slab for elevated levels of humidity and moisture. See the Appendix 1 protocols and technologies in the Appendices of this report.
h. Consider testing the air and surfaces for the presence of mold spores in the plenum above the drop ceiling. Test in representative locations in the building. At least 20% of the rooms and spaces should be sampled in order to achieve a representative sample.
i. The Pembroke Teachers Association and the District should consider taking air flow measurements of the HVAC system to determine if air flows are consistent with keeping the building dry and the Harvard School of Public Health and the AIHA guidelines of 4 to 6 Air Changes per Hour (ACH) for the prevention of viruses. To reach 4-6 ACH, supplement the

HVAC system with Portable Air Purifiers (AP). Place the air purifiers appropriately in the space. If 4 to 6 ACH can be attained with an AP, keep the windows closed. Air flow measurements of the HVAC system were not taken as a part of this assessment and the efficiency of the HVAC system is a critical factor in ensuring a dry building, occupant's health, reduced particulates, mold and viruses especially during a COVID-19 pandemic. https://schools.forhealth.org/wp-content/uploads/sites/19/2020/08/Harvard-Healthy-Buildings-program-How-to-assess-classroom-ventilation-08-28-2020.

j. Install or continue to use MERV 13 filters in all unit ventilators and any central air handlers if possible. Determine if the systems can withstand the pressure drop due to increased filtration. Disable any HVAC demand control ventilation devices. Run the HVAC system at least one hour before and after the school day begins to purge the space.

V. Environmental Measurements and Health Effects

The results of the air and surface samples laboratory analyses are summarized in Table 1and 2 below. Photos of some surface sample sites are in Appendix 2 and the EMLab Mold report can be found in Appendix 3

a. Mold Air Samples and Table 1

There are currently no guidelines or standards promulgated by a government agency or widely recognized scientific organization for the interpretation of surface or airborne mold spore levels. Molds live in the soil, on plants, and on dead and decaying matter. Molds generate tiny spores when they reproduce. When mold spores land on a damp spot, they may begin growing and digest carbon material they land on.

Mold air samples were collected using an air-sampling pump and a direct read total particulate air-sampling device. This spore trap device uses an inertial impaction principal. It is designed for the collection and analysis of airborne particulates, including bio-aerosols. It collects non-viable particulate and inorganic particles. The high-volume vacuum pump with flow meter was calibrated before sampling with a rotameter. The air sampling method involves drawing 15 liters/minute of air through a sterile sampling cassette for five (5) to eight (8) minutes on the inside and 10 minutes on the outside. After sampling, the cassette is sealed and transferred to a microbiology laboratory under a chain of custody protocol for microscopic analysis. Eurofins EP&K Built Environmental Testing analyzed the samples. They are a third-party licensed laboratory. They are accredited by the American Industrial Hygiene Association (AIHA).

Methods WEA uses to interpret air sample findings and determine if mold is growing inside, and amplification in structure takes several factors into consideration. One factor is

to evaluate the indoor levels and species and compare it to the outdoor levels and species. For air samples, if there is a higher count of spores per cubic meter (spores/m^3) present inside, and/or different species not found outdoors, then growth and amplification may likely be occurring, and further evaluation and perhaps sanitization or remediation is recommended.

In addition, inside total spore counts are also considered independently when determining the extent of mold growth. Many professionals consider <500 spores/m3 normal and "no action needed", 500 – 999 spores/m3 as Intermediate Range and "remediation required" and >1000 as a High Range and a "remediation required" (see Guidance Documents).

Under those guidelines, rooms 280 and 245 are in the intermediate range and the Teachers' Lounge is in the High Range.

Also, mold species have different characteristics. For instance, many professionals believe a count of 48spores/m^3 of Stachypotrys or Chaetomium spores in the air would be high because these species are not usually air borne.

AMold Score in Table 1 is a rating assigned by EMLab rated from 100 to 300 (see appendix 3). A rating less than 150 is low and indicates a low probability of spores originating inside. A rating greater than 250 is high and indicates a high probability that the spores originated from inside, presumably from indoor mold growth. A rating between 150 and 250 indicates a moderate probability of indoor fungal growth. The Scores assigned by EMLab to the air samples were all low (less than 150).

Finally, individuals with a weak immune systems or disease such as asthma may have serious health effects to low levels of mold exposure where other individuals with strong immune systems may not. Healthy individuals, after prolonged exposure to mold, may become sensitized and be negatively affected even to low exposure levels to mold.

Table 1. Air Test - Mold Spore Trap Analysis Summary

Location	Outside and Inside spores/m^3	Total spores/m^3
Outside door of hallway opposite room 225	Ascospores (330), Basidiospores (1,200), Cladosporium (730), Epicoccum (7), Penicillium/Aspergillus types (230), Smuts, Periconia, Myxomycetes (37)	**2,500**

Room 280 (office)	Ascospores (7), Basidiospores (15), Cladosporium (15), Curvularian (7), Other brown (7), Penicillium/Aspergillus types (350), Smuts, Periconia, Myxomycetes (230)	**630**
Room 245	Ascospores (7), Basidiospores (15), Penicillium/Aspergillus types (930) Smuts, Periconia, Myxomycetes (59)	**1000**
Room 263	Ascospores (30), Basidiospores (89), Cladosporium (37), Other brown (15), Penicillium/Aspergillus types (37), Pithomyces (7), Rusts (7), Smuts, Periconia, Myxomycetes (170)	**390**
Music Room	Ascospores (22), Basidiospores (30), Cladosporium (22), Curvularia (7), Other Brown (7), Penicillium/Aspergillus types (15), Rusts (7), Smuts Periconia, Myxomycetes (160)	**270**
Teachers' Lounge	Ascospores (59), Basidiospores (140), Cladosporium (52) Curvularian (7), Other brown (30), Penicillium/Aspergillus types (1,300), Rusts (7), Smuts, Periconia, Myxomycetes (100)	**1,700**

***Species highlighted in red indicate elevated spores and/or species with spores/m ^{3} detected at a higher level (>*1.5) inside than outside.**

b. Mold Surface Growth Ratings and Table 2

Surface samples may give a longer term perspective of settled mold spores at the site of testing than room air sampled over a 5 to 10 minute duration. The EPA recommends taking surface samples as a post remediation technique. This method is relevant after the cleaning done in house and by Stanley Cleaner Company. One may generalize that at other sites similar mold spores levels may have settled some with hyphae (growing).

In the **General Impressions** section of the EMLab report samples designed as **Normal trappings** are when the mix of spore types is present with the same general distribution as is usually found outdoors. Samples designated as **Mold Growth** indicates mold and/or hyphae was detected. The distinction in the table below is highlighted in red.

When interpreting surface sample findings, mold growth is ranked into five categories, from <1+ to 4+. <1+ is evidence of **very light growth,** observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in less than **10%** of the microscopic fields examined; 1+ is evidence of **light mold growth** indicated by spores of one type seen with underlying mycelial and/or sporulating structures found in **10 to 25%** of the microscopic fields examined. 2+ is evidence of **moderate growth,** observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in le **26 to 50%** of the microscopic fields examined; 3+ is evidence of **heavy mold growth** indicated by spores of one type seen with underlying mycelial and/or sporulating structures found in **51 to 75%** of the microscopic fields examined, 4+ is evidence of **very heavy mold growth** indicated by spores of one type seen with underlying mycelial and/or sporulating structures found confluent in the **majority** of the microscopic fields examined. .

Hyphae are composed of hypha, which are long filamentous branches found in fungi and bacteria. Hyphae are important structures required for growth in species, and together are referred to as mycelium. **Hyphae are indicative of active mold growth**.

Table 2. Surface Samples and Direct Microscopic Examination Summary

Location	Species	Mold Analysis
Room 225 Blinds	Cladosporium species (spores, hyphae, conidiophores) 3+	**Heavy Mold Growth**
Room 280 Paper on shelf	Cladosporium species (spores, hyphae, conidiophores) 2+ Penicillium/Aspergillus group (spores) 1+	**Mold Growth**
Room 263 Base of Door	None	**Normal Trappings**
Music Room	None	**Normal Trappings**
Teachers' Lounge Rug	Penicillium species (spores, hyphae) 3+	**Heavy Mold Growth**
1st and 2nd grade hallway	Penicillium species (spores, hyphae) 2+ Cladosporium species (spores, hyphae 1+	**Mold Growth**
Room 245 Blinds	Cladosporium species (spores, hyphae, conidiophores) 3+	**Heavy Mold Growth**

c. Mold Health Effects

The strength of an individual's immune system can affect her/his ability to tolerate the effects of mold on the body. Individuals with a compromised respiratory system or diseases such as asthma may be adversely affected before an individual with the ability to fight off the adverse effects. An investigation of the individual's health conditions who occupies a contaminated room is important. This is one reason there are no widely accepted standards but guidelines.

Exposure to molds has been linked to symptoms such as headaches, nasal irritation, dizziness, fatigue, and nausea. Molds can trigger asthma attacks and allergic reactions. Since everyone's immune system is unique, an individual's exposure response to mold will vary. The following are symptoms of mold exposure to some species detected at Hobomock Elementary School.

The symptoms described below should not be considered all-inclusive or viewed as providing medical advice or implied as a warranty to the health of persons. This is a limited investigation. Seek a physician's advice if an individual is experiencing symptoms, having ill health effects, or have medical questions. See the disclaimer clause at the end of this report.

Penicillium: May cause hypersensitivity pneumonitis asthma and allergic alveolitis in susceptible individuals. Penicillium infections are most exhibited in immunosuppressed individuals. Airborne penicillium was shown to be significantly associated with lower respiratory infections in children.

Aspergillus: Species causes serious disease in some humans and animals. Fumigatus, the most common species, primarily pulmonary infections and can become a rapidly necrotizing pneumonia with a potential to disseminate.

Cladosporium: This mold is allergenic and can lead to sinusitis and pulmonary infections. According to Mayo Clinic, its various strains are some of the most allergenic molds.

Brown Mold: Brown hairy mold, or Stemonitis, has a brown furry appearance. Although it is not typically as toxic as black mold, but it can still affect the health of people who have weak immune systems, respiratory problems and allergies.

Smuts: Smut spores can cause a variety of health issues if inhaled in excessive amounts. Inhalation of smut spores has been associated with asthma, bronchitis, hay fever, and hypersensitivity pneumonitis. Smut spores have been known to cause allergic reactions in humans albeit rarely.

VI. Disclaimer

This document was designed to follow current known industry, academic, and government guidelines for interpretation of air flows, microbial, and chemical contaminant, and analysis. Since interpretation of mold analysis reports is a scientific work in progress, it may as such, change over time. Work Environment Assessments the companies' consultants, and the Massachusetts Teachers Association make no express or implied warranties of the property or health of persons from only the samples analyzed. A comprehensive sampling of all environments and environmental conditions is not included in this report. The conclusions and recommendations are based on the conditions observed on October 10, 2023. It is assumed that the circumstances on that day are representative of the average indoor environmental conditions of the building while the Hobomock Elementary School is in operation. The client and all others reviewing this document are hereby notified that due to the variability of fungal analysis and mold growth, laboratory samples, and other indoor air quality measurements, and interpretations thereof, can be subjected to change over time. Work Environment Assessments LLC, the companies' consultants, and the Massachusetts Teachers Association reserve the right to properly dispose of all samples after sampling.

VII. Guidance Documents for Mold Contamination and Remediation

NORMI Professional Practices Manual Revision 10/18/2015 This Professional Practices Manual is designed to be used in conjunction with training provided to mold professionals. The manual provides guidance for assessors and remediators in best practices protocols and methods.

IIRC R520 Standards and the IICRC Reference Guide for Professional Mold Remediation Third Edition. IIRC 520 and the supplementary information provides the procedures to be followed and the precautions to be taken when performing mold remediation in residential, commercial, and industrial buildings.

NORMI Certificate of Sanitization is a Five Step Mold Sanitization Protocol using NORMI approved products and is designed to remove light visible mold contamination more than 15 sq. ft. This sanitization protocol cannot be used on heavily visible mold contaminated buildings.

US EPA 2008. Mold Remediation in Schools and Commercial Buildings. US Environmental Protection Agency, Office of Air Radiation, Indoor Environments Division, Washington, C.C. EPA 402-K-01-001. http://www.epa.gov/mold/mold-remediation-schools-and-commercial - buildings-guide.

American Industrial Hygiene Association. The Industrial Hygienist Guide to IAQ Investigations/1993.

Enzcycle Lab, LLC Interpretation of Test Results http://www.consumermoldguide.org/docs/Interpretation%20of%20Results%20-%20Air%20and%20Direct%20v1_11.2013.pdf. This document provides guidance when reading and interpreting mold report findings.

American Conference of Governmental Industrial Hygienists (Air Sampling Instruments for Evaluation of Atmospheric Contaminants 1995) recommended the following guidelines: 100 cfu or less per cubic meter of air indicates low risk. 100 cfu to 1000 cfu per cubic meter of air indicates intermediate risk >1000 cfu per cubic meter indicates high risk.
http://www.consumermoldguide.org/docs/Interpretation%20of%20Results%20-%20Air%20and%20Direct%20v1_11.2013.pdf#:~:text=The%20publication%2C%20American%20Conference%20of%20Governmental%20Industrial%20Hygienists,per%20cubic%20meter%20of%20air%20indicates%20intermediate%20risk.
Health Effects of Molds https://www.environix.com/mold/learning/types-of-mold.

Eurofins/EMLab P&K species definitions https://www.emlab.com.

Indoor Air Quality Assessment, Department of Public Health, Bureau of Environmental Health, March 2019/.

Diminishing the Risk of COVID-19 through Ventilation

The current overriding concern is the protection of students, faculty, and staff during the developing COVID-19 pandemic. Since institutional viral infections (flu, COVID and others) transmit mainly by aerosols emitted in the exhalations of infected persons, ventilation is the key long term engineering control that would diminish the spread of airborne infection. The key, long-term, institutional strategy to permanently diminish the risk of any virus transmission indoors should be to improve the air quality through ventilation, by maintaining ACH (based on Outside Air) on the range of 4-6 ACH. This strategy, combined with CDC recommended "layers of protection," includes vaccination, masking, distancing, and testing. These layers must be deployed simultaneously and in parallel with ventilation – a key layer of protection. All of them are necessary to decrease risk of airborne disease.

The most effective institutional means of airborne contamination control—from a primary prevention point of view—is a functioning HVAC providing adequate ventilation. It is a primary prevention strategy that prevents disease – not only from the current COVID-19 virus pandemic-- but also from any contaminants including future viral epidemics and any toxic airborne substances generated in the Engineering Laboratories (especially Plastic Engineering Laboratories). In the case of COVID-19, virus particles are emitted with the liquid droplets created when people cough, sneeze, sing, talk, and even just breathe through our noses. SARS-CoV-2, the virus that causes COVID-19, is thought to spread mainly from

person-to-person through respiratory droplets and much smaller aerosol particulates emitted during human respiration. The large visible mist and droplets settle to the surface quickly and are unlikely to be drawn up into the ventilation system. But smaller ones, especially those under ten microns in diameter, can float in the air for extended periods of time. The longer the small droplets remain in the air, the more the water in them evaporates, leaving only small mucous droplets containing the virus particles that can be inhaled to the inner lung (virus size < 0.125 microns in diameter). These dehydrated particles of virus and dry secretions can be in the range of 0.3 to 1.0 microns.

Some of these particles have been documented to have remained airborne for longer than two hours. One study showed the particles were capable of infecting people after sixteen hours (Fears AC, et al. Persistence of Severe Acute Respiratory Syndrome Coronavirus 2 in Aerosol Suspension. Emerging Infectious Diseases. Volume 26, Number 9, September 2020. https://wwwnc.cdc.gov/eid/article/26/9/20-1806_article?deliveryName=USCDC_331-DM35835).

Furthermore, another recent study showed that droplets of the critical size (0.3-1.0 microns) are transmitted through an air handling system "into the connected 'downstream' rooms," and that "significant concentrations of the smaller respiratory droplets persist for hours in the connected rooms." (Vlachokostas A, et al. Experimental evaluation of respiratory droplet spread to rooms connected by a central ventilation system. Indoor Air 2021;00:1–10. doi: 10.1111/ina.12940).

Filtration for Decreasing Risk of Viral Infections and Toxic Exposures

Two scientific and technical institutes have published guidance for control of virus carrying aerosols in indoor environments through filtration, the T. Chan Harvard School of Public Health (HSPH) and the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE). ASHRAE and HSPH recommend installing MERV 13 filters. The fraction of particles removed from air passing through a filter is termed "filter efficiency" and is provided by the Minimum Efficiency Reporting Value (MERV). MERVs ranges from 1 to 16, with the higher the MERV the higher the efficiency. MERV >13 (or ISO equivalent) is efficient at capturing airborne viruses and is recommended by HSPH and ASHRAE. Increased filter efficiency results in increased pressure drop through the filter. It is possible, then, that the HVAC systems could have difficulties to accommodate filter upgrades without negative impacts to pressure differentials and/or air flow rates.

One study showed the particles were capable of infecting people after 16 hours. (Fears AC. Et al. Persistence of Severe Acute Respiratory Syndrome Coronavirus 2 in Aerosol Suspension. EID. Volume 26, Number 9 – September 2020. https://wwwnc.cdc.gov/eid/article/26/9/20-1806_article?deliveryName=USCDC_331-DM35835).

Ventilation in Schools: The Harvard School of Public Health (HSPH) recommends a target of 5 ACH and characterizes ACH targets as follows: Ideal (5 ACH), Excellent (5-6 ACH), Good (4-6 ACH) Bare Minimum (3-4 ACH) and Low (3 ACH) Harvard School of Public Health, 5

Step Guide to Checking Ventilation Rates in Classrooms, https://schools.forhealth.org/ventilation-guide/ 8/28/20, p. 27.

Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis

https://www.science.org/doi/10.1126/sciadv.abd4049?stream=future&utm_campaign=newsletter_axiosfutureofwork&utm_medium=email&utm_source=newsletter.

VIII. Appendices

a. Drying Out a Wet Concrete Slab by Michael Sireci MSc

Gutters and Downspouts: Install gutters or a drainage system on the roof and make sure water discharge pipes direct rain water away from the building. Around the perimeter of the building grade rain water away from the building. Use gutter extensions. Consider applying an asphalt surface around the perimeter of the building graded away from the building.

Moisture Readings: Professionals should provide testing for moisture to determine intervention strategies. There are a variety of technologies used to test a concrete slab for interventions. A common method is a calcium chloride test (ASTM 1869). This test indicates what moisture is coming out of the slab only at the surface. Tramex makes a meter that provides moisture readings at ¾" below the surface. The more extensive method of testing concrete for moisture is the use of situ probes (ASTM F2170). Situ probes are inserted through small drilled holes into the slab to provide deeper relative humidity readings. There are specific protocols for positioning the probes. A good source of information on testing moisture in concrete slabs is Howard Kanare's book, *Concrete Floors and Moisture*, available from the Portland Cement Association.

Sump pumps: A professional analysis of the moisture under the slab will help determine where sump pumps should be located. Due to the large flow-rates being pumped, the physical size and weight of the pumps being installed becomes a major consideration. In order to facilitate ease of maintenance, the pumps provided are typically one of two different types: floor mounted or submergible. Floor mounted self-priming pumps are the most common. They are popular with design engineers and facilities management because the entire pump assembly rests above the wet well in a clean dry accessible location. If a location is chosen that requires that the floor space above the wet well be used for other purposes, submersible pumps may be the best option. Submersible pumps rest at the bottom of the wet well on guide rails. High flow rates typically require large pumps with 3-phase motors and starters. The relatively low-cost variable-speed control systems technology solves a number of common operational problems typically associated with large-scale project applications. The advantage of using variable speed controls includes reducing wet-well sizes, reducing the effects of large flow-surges, reducing the size of emergency stand-by generator systems, and reducing electrical-costs associated with large-capacity pumping. More information can be found at Waterproof Magazine at: https://www.waterproofmag.com/2010/06/commercial-sump-pump-systems.

Perimeter Drains: The installation of a perimeter drain can move water from the roof to a drainage system so water goes directly to the storm drain and away from the foundation. There are a variety of methods used to build a perimeter drain. The principal is to dig a trench around the slab, lay in stone, and a perforated pipe. Sometimes sock slides are used over the pipe or cloth and wrapped around the pipe, then back filled with a porous material. Run the pipe out to a drain at a lower elevation. There can be direct connections

between the roof water and the landscape drainage system. Water from a perimeter drain and downspouts can go directly into the storm drains and away from the foundation. Then into the water collection site.

Epoxy Coatings: One approach to seal out moisture from an occupied space is the application of an epoxy coating. A professional can help determine the effectiveness of this strategy.

b. Photographs:

Room 263 base of door:

Ceiling: 1st and 2nd grade hallway

Bowed ceiling tile outside room 12:

Foor hallway outside nurses office:

c. Eurofins Lab Reports

eurofins | Built Environment Testing

Report for:

Mr. Michael Sireci, Masters Work Environment
Work Environment Assessments, LLC
98 Blueberry Lane
Concord, MA 01742

Regarding: Eurofins EPK Built Environment Testing, LLC
Project: Hobomock Elementary, Pembrook; Public School
EML ID: 3417781

Approved by:

Business Unit Manager
Balu Krishnan

Dates of Analysis:
Direct microscopic exam (Qualitative): 10-16-2023

Service SOPs: Direct microscopic exam (Qualitative) (EM-MY-S-1039)
AIHA-LAP, LLC accredited service, Lab ID #173067

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received and tested.

Eurofins EPK Built Environment Testing, LLC ("the Company"), a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.
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Eurofins EPK Built Environment Testing, LLC
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Client: Work Environment Assessments, LLC
C/O: Mr. Michael Sireci, Masters Work Environment
Re: Hobomock Elementary, Pembrook; Public School

Date of Sampling: 10-10-2023
Date of Receipt: 10-12-2023
Date of Report: 10-16-2023

DIRECT MICROSCOPIC EXAMINATION REPORT

Background Debris and/or Description	Miscellaneous Spores Present*	MOLD GROWTH: Molds seen with underlying mycelial and/or sporulating structures†	Other Comments††	General Impression
Lab ID-Version‡: 16629858-1, Analysis Date: 10/16/2023: Swab sample #1: RM 12 Blinds				
Light	Very few	3+ *Cladosporium* species (spores, hyphae, conidiophores)	None	Mold growth
Lab ID-Version: 16629859-1, Analysis Date: 10/16/2023: Swab sample #2: RM 280 Paper on Shelf				
Scant	Very few	2+ *Cladosporium* species (spores, hyphae, conidiophores) 1+ *Penicillium/Aspergillus* group (spores)	None	Mold growth
Lab ID-Version: 16629860-1, Analysis Date: 10/16/2023: Swab sample #3: RM 263 base of door				
Light	Very few	None	None	Normal trapping
Lab ID-Version: 16629861-1, Analysis Date: 10/16/2023: Swab sample #4: Music Room Rug				
Light	Very few	None	None	Normal trapping
Lab ID-Version: 16629862-1, Analysis Date: 10/16/2023: Swab sample #5: Teachers Lounge 1 rug				
Light	Very few	3+ *Penicillium/Aspergillus* group (spores, hyphae)	None	Mold growth
Lab ID-Version: 16629863-1, Analysis Date: 10/16/2023: Swab sample #6: 1st & 2nd Grade Hallway				
Scant	Very few	2+ *Penicillium/Aspergillus* group (spores, hyphae) 1+ *Cladosporium* species (spores, hyphae)	None	Mold growth
Lab ID-Version: 16629864-1, Analysis Date: 10/16/2023: Swab sample #7: RM 245 Blinds				
Light	Very few	3+ *Cladosporium* species (spores, hyphae, conidiophores)	None	Mold growth

* Indicative of normal conditions, i.e. seen on surfaces everywhere. Includes basidiospores (mushroom spores), myxomycetes, plant pathogens such as ascospores, rusts and smuts, and a mix of saprophytic genera with no particular spore type predominating. Distribution of spore types seen mirrors that usually seen outdoors.

† Quantities of molds seen growing are listed in the MOLD GROWTH column and are graded <1+ to 4+, with 4+ denoting the highest numbers.

†† Some comments may refer to the following: Most surfaces collect a mix of spores which are normally present in the outdoor environment. At times it is possible to note a skewing of the distribution of spore types, and also to note "marker" genera which may indicate indoor mold growth. Marker genera are those spore types which are present normally in very small numbers, but which multiply indoors when conditions are favorable for growth.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
The limit of detection is < 1+ when mold growth is detected.

For additional information necessary for the interpretation of the results, all readers are advised to refer to the document "Direct Exam Details Page" which is available on our website at:
www.emlab.com/services/mold-testing/direct-microscopic-exam-qualitative/

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Client: Work Environment Assessments, LLC
C/O: Mr. Michael Sireci, Masters Work Environment
Re: Hobomock Elementary, Pembrook; Public School

Date of Sampling: 10-10-2023
Date of Receipt: 10-12-2023
Date of Report: 10-16-2023

Mold/Fungal Growth Rating Details

Growth Rating	Quantities of molds indicating growth are listed in the MOLD/FUNGAL GROWTH section. Judgement is used in determining the amount of growth present in the sample. For example, if only one portion of the sample has evidence of heavy growth, then it will receive a rating of heavy growth even though, strictly speaking, on a percentage basis of the entire sample, the amount of growth is low.	
	Swab/Tape/Dust/Wipe sample	Bulk Sample
< 1+ (Very Light Growth)	Evidence of very light growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in less than 10% of the microscopic fields examined.	Areas of very light growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
1+ (Light Growth)	Evidence of light growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in 10 to 25% of the microscopic fields examined.	Areas of light growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
2+ (Moderate Growth)	Evidence of moderate growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in 26 to 50% of the microscopic fields examined.	Areas of moderate growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
3+ (Heavy Growth)	Evidence of heavy growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in 51 to 75% of the microscopic fields examined.	Areas of heavy growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
4+ (Very Heavy Growth)	Evidence of very heavy growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found to be nearly confluent in the majority of the microscopic fields examined.	Areas of very heavy growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.

Miscellaneous Spores

Slides/specimens are examined for the presence of mold spores and pollen, noting the quantities and distribution of spore types found. A designation of 'normal trapping' is made when a mix of spore types is present with the same general distribution as is usually found outdoors. In other words, the biological component of the sample surface is like that found everywhere. Types of spores present would include basidiospores (mushroom spores), myxomycetes (slime molds), plant pathogens such as ascospores, rusts and smuts, and a mix of saprophytic genera with no particular spore type predominating. Many of these spore types would not be found growing indoors on building materials since many plant pathogens require living plants for growth, and mushrooms require compost, leaf duff of various types, or associations with roots of certain trees, etc. Due to these factors, when a mix of spores seen include these types as well as pollen, the rational source is the outside air, rather than indoor mold growth. The numbers of miscellaneous spores seen are graded and described as shown below as none, very few, few, variety, and wide variety.

None	Very Few	Few	Variety	Wide Variety
No spores detected	Very few spores detected	A few spores detected	Many spores containing a variety of different genera detected	Many spores containing a wide variety of different genera detected

eurofins | Built Environment Testing

Report for:

Mr. Michael Sireci, Masters Work Environment
Work Environment Assessments, LLC
98 Blueberry Lane
Concord, MA 01742

Regarding: Eurofins EPK Built Environment Testing, LLC
Project: Hobomock Elementary, Pembrook; Public School
EML ID: 3417781

Approved by:

Business Unit Manager
Balu Krishnan

Dates of Analysis:
Spore trap analysis: 10-16-2023

Service SOPs: Spore trap analysis (EB-MY-S-1038)
AIHA-LAP, LLC accredited service, Lab ID #173067

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received and tested. Information supplied by the client which can affect the validity of results: sample air volume.

Eurofins EPK Built Environment Testing, LLC ("the Company"), a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.
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Client: Work Environment Assessments, LLC
C/O: Mr. Michael Sireci, Masters Work Environment
Re: Hobomock Elementary, Pembrook; Public School

Date of Sampling: 10-10-2023
Date of Receipt: 10-12-2023
Date of Report: 10-16-2023

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	4204: Outside (Rm. 12 Hallway)		4210: RM 280 Office		4226: RM 245	
Comments (see below)	None		None		None	
Lab ID-Version‡:	16629865-1		16629866-1		16629867-1	
Analysis Date:	10/16/2023		10/16/2023		10/16/2023	
	raw ct.	spores/m3	raw ct.	spores/m3	raw ct.	spores/m3
Alternaria						
Arthrinium						
Ascospores	11	330	1	7	1	7
Aureobasidium						
Basidiospores	41	1,200	2	15	2	15
Bipolaris/Drechslera group						
Botrytis						
Chaetomium						
Cladosporium	99	730	2	15		
Curvularia			1	7		
Epicoccum	1	7				
Fusarium						
Myrothecium						
Nigrospora						
Other brown			1	7		
Other colorless						
Penicillium/Aspergillus types†	31	230	47	350	126	930
Pithomyces						
Rusts						
Smuts, Periconia, Myxomycetes	5	37	31	230	8	59
Stachybotrys						
Stemphylium						
Torula						
Ulocladium						
Zygomycetes						
Background debris (1-4+)††	1+		2+		1+	
Sample volume (liters)	135		135		135	
§ TOTAL SPORES/m3		2,500		630		1,000

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.
† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
†† Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.

The analytical sensitivity is the spores/m^3 divided by the raw count, expressed in spores/m^3, per spore and per sample.

For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
§ Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

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Re: Hobomock Elementary, Pembrook; Public School

Date of Sampling: 10-10-2023
Date of Receipt: 10-12-2023
Date of Report: 10-16-2023

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	1843: RM 263		4218: Music Room		4207: Teachers Lounge 1	
Comments (see below)	None		None		None	
Lab ID-Version‡:	16629868-1		16629869-1		16629870-1	
Analysis Date:	10/16/2023		10/16/2023		10/16/2023	
	raw ct.	spores/m3	raw ct.	spores/m3	raw ct.	spores/m3
Alternaria						
Arthrinium						
Ascospores	4	30	3	22	8	59
Aureobasidium						
Basidiospores	12	89	4	30	19	140
Bipolaris/Drechslera group						
Botrytis						
Chaetomium						
Cladosporium	5	37	3	22	7	52
Curvularia			1	7	1	7
Epicoccum						
Fusarium						
Myrothecium						
Nigrospora						
Other brown	2	15	1	7	4	30
Other colorless						
Penicillium/Aspergillus types†	5	37	2	15	171	1,300
Pithomyces	1	7				
Rusts	1	7	1	7	1	7
Smuts, Periconia, Myxomycetes	23	170	21	160	14	100
Stachybotrys						
Stemphylium						
Torula						
Ulocladium						
Zygomycetes						
Background debris (1-4+)††	1+		2+		1+	
Sample volume (liters)	135		135		135	
§ TOTAL SPORES/m3		390		270		1,700

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.
† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
††Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.

The analytical sensitivity is the spores/m^3 divided by the raw count, expressed in spores/m^3, per spore and per sample.

For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
§ Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

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C/O: Mr. Michael Sireci, Masters Work Environment
Re: Hobomock Elementary, Pembrook; Public School

Date of Sampling: 10-10-2023
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MoldSCORE™: Spore Trap Report

Outdoor Sample: 4204 Outside (Rm. 12 Hallway)

Fungi Identified	Outdoor sample spores/m3 <100 1K 10K >100K	Raw count	Spores/ m3
Generally able to grow indoors*			
Alternaria		ND	< 7
Bipolaris/Drechslera group		ND	< 7
Chaetomium		ND	< 7
Cladosporium		99	730
Curvularia		ND	< 7
Epicoccum		1	7
Nigrospora		ND	< 7
Penicillium/Aspergillus types†		31	230
Stachybotrys		ND	< 7
Torula		ND	< 7
Seldom found growing indoors**			
Ascospores		11	330
Basidiospores		41	1,200
Rusts		ND	< 7
Smuts, Periconia, Myxomycetes		5	37
Total			**2,548**

Location: 4210 RM 280 Office

Fungi Identified	Indoor sample spores/m3 <100 1K 10K >100K	Raw count	Spores/ m3	MoldSCORE‡ 100 200 300 Score
Generally able to grow indoors*				
Alternaria		ND	< 7	100
Bipolaris/Drechslera group		ND	< 7	100
Chaetomium		ND	< 7	100
Cladosporium		2	15	100
Curvularia		1	7	103
Nigrospora		ND	< 7	100
Other brown		1	7	103
Penicillium/Aspergillus types†		47	350	146
Stachybotrys		ND	< 7	100
Torula		ND	< 7	100
Seldom found growing indoors**				
Ascospores		1	7	100
Basidiospores		2	15	100
Rusts		ND	< 7	100
Smuts, Periconia, Myxomycetes		31	230	144
Total			**630**	**Final MoldSCORE** **148**

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C/O: Mr. Michael Sireci, Masters Work Environment
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MoldSCORE™: Spore Trap Report

Location: 4226 RM 245

Fungi Identified	Indoor sample spores/m3 <100 1K 10K >100K	Raw count	Spores/ m3	MoldSCORE‡ 100 200 300	Score
Generally able to grow indoors*					
Alternaria		ND	< 7		100
Bipolaris/Drechslera group		ND	< 7		100
Chaetomium		ND	< 7		100
Cladosporium		ND	< 7		100
Curvularia		ND	< 7		100
Nigrospora		ND	< 7		100
Penicillium/Aspergillus types†		126	930		220
Stachybotrys		ND	< 7		100
Torula		ND	< 7		100
Seldom found growing indoors**					
Ascospores		1	7		100
Basidiospores		2	15		100
Rusts		ND	< 7		100
Smuts, Periconia, Myxomycetes		8	59		109
Total			**1,015**	**Final MoldSCORE**	**220**

Location: 1843 RM 263

Fungi Identified	Indoor sample spores/m3 <100 1K 10K >100K	Raw count	Spores/ m3	MoldSCORE‡ 100 200 300	Score
Generally able to grow indoors*					
Alternaria		ND	< 7		100
Bipolaris/Drechslera group		ND	< 7		100
Chaetomium		ND	< 7		100
Cladosporium		5	37		100
Curvularia		ND	< 7		100
Nigrospora		ND	< 7		100
Other brown		2	15		106
Penicillium/Aspergillus types†		5	37		100
Pithomyces		1	7		103
Stachybotrys		ND	< 7		100
Torula		ND	< 7		100
Seldom found growing indoors**					
Ascospores		4	30		100
Basidiospores		12	89		100
Rusts		1	7		103
Smuts, Periconia, Myxomycetes		23	170		132
Total			**393**	**Final MoldSCORE**	**140**

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MoldSCORE™: Spore Trap Report

Location: 4218 Music Room

Fungi Identified	Indoor sample spores/m3 <100 1K 10K >100K	Raw count	Spores/ m3	MoldSCORE‡ 100 200 300	Score
Generally able to grow indoors*					
Alternaria		ND	< 7		100
Bipolaris/Drechslera group		ND	< 7		100
Chaetomium		ND	< 7		100
Cladosporium		3	22		100
Curvularia		1	7		103
Nigrospora		ND	< 7		100
Other brown		1	7		103
Penicillium/Aspergillus types†		2	15		100
Stachybotrys		ND	< 7		100
Torula		ND	< 7		100
Seldom found growing indoors**					
Ascospores		3	22		100
Basidiospores		4	30		100
Rusts		1	7		103
Smuts, Periconia, Myxomycetes		21	160		131
Total			**267**	**Final MoldSCORE**	**136**

Location: 4207 Teachers Lounge 1

Fungi Identified	Indoor sample spores/m3 <100 1K 10K >100K	Raw count	Spores/ m3	MoldSCORE‡ 100 200 300	Score
Generally able to grow indoors*					
Alternaria		ND	< 7		100
Bipolaris/Drechslera group		ND	< 7		100
Chaetomium		ND	< 7		100
Cladosporium		7	52		100
Curvularia		1	7		103
Nigrospora		ND	< 7		100
Other brown		4	30		112
Penicillium/Aspergillus types†		171	1,300		250
Stachybotrys		ND	< 7		100
Torula		ND	< 7		100
Seldom found growing indoors**					
Ascospores		8	59		100
Basidiospores		19	140		100
Rusts		1	7		103
Smuts, Periconia, Myxomycetes		14	100		115
Total			**1,667**	**Final MoldSCORE**	**250**

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MoldSCORE™: Spore Trap Report

* The spores in this category are generally capable of growing on wet building materials in addition to growing outdoors. Building related growth is dependent upon the fungal type, moisture level, type of material, and other factors. *Cladosporium* is one of the predominant spore types worldwide and is frequently present in high numbers. *Penicillium/Aspergillus* species colonize both outdoor and indoor wet surfaces rapidly and are very easily dispersed. Other genera are usually present in lesser numbers.

** These fungi are generally not found growing on wet building materials. For example, the rusts and smuts are obligate plant pathogens. However, in each group there are notable exceptions. For example, agents of wood decay are members of the basidiomycetes and high counts of a single morphological type of basidiospore on an inside sample should be considered significant.

†The spores of Aspergillus and Penicillium (and others such as Acremonium, Paecilomyces) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods.

‡Rated on a scale from 100 to 300. A rating less than 150 is low and indicates a low probability of spores originating inside. A rating greater than 250 is high and indicates a high probability that the spores originated from inside, presumably from indoor mold growth. A rating between 150 and 250 indicates a moderate likelihood of indoor fungal growth. MoldSCORE is NOT intended for wall cavity samples. It is intended for ambient air samples in residences. Using the analysis on other samples (like wall cavity samples) will lead to misleading results.