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Microbial Assessment Report

Conducted At

Hobomock Elementary School
81 Learning Lanes
Pembroke, MA 02359

March 19, 2024

Prepared For:

Ms. Erin Obey
Superintendent of Schools
Pembroke Public Schools
72 Pilgrim Road
Pembroke, MA 02339

Report Prepared By:

A handwritten signature in black ink that reads "Paul Matuszko".

Paul Matuszko, CIH
Paul Matuszko Environmental Consulting
79 Cedar Street
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PMEC Project #:

24-117



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March 19, 2024

Ms. Erin Obey
Superintendent of Schools
Pembroke Public Schools
72 Pilgrim Road
Pembroke, MA 02339

RE: Microbial (Mold) Sampling Report for
Hobomock Elementary School
81 Learning Lanes, Pembroke, MA
PMEC Project #24-117

Dear Ms. Obey:

Paul Matuszko Environmental Consulting (**PMEC**) is pleased to submit the enclosed report for the microbial sampling and limited inspection conducted at the Hobomock Elementary School, 81 Learning Lanes, Pembroke, Massachusetts. PMEC conducted the assessment within the school on February 28 and March 12, 2024. Air and surface samples were collected for laboratory analysis. Additionally, selected areas and surfaces within room 240, 140, and four roof top units were inspected for microbial sources.

This limited microbial inspection report has been prepared for the exclusive use of The Pembroke Public Schools.

Certification:

PMEC certifies that the results and findings provided herein for the Hobomock Elementary School building have been reviewed for accuracy, content, regulatory compliance and quality of presentation.

Should you have any questions regarding this report, please do not hesitate to contact me at (617) 893-4476. Thank you for providing PMEC with the opportunity to provide our services to the Pembroke Public Schools for this project.

Respectfully submitted;

Paul Matuszko, CIH, CIEC
Project Manager/Asbestos Inspector





TABLE OF CONTENTS

| Section | Title | Page |
|----------------|---|-------------|
| 1.0 | Introduction..... | 1 |
| 2.0 | Scope of Work..... | 1 |
| 3.0 | Existing Conditions..... | 1 |
| 4.0 | Air Quality Measurements..... | 2 |
| 5.0 | Moisture Measurements..... | 3 |
| 6.0 | Mold Sampling and Analysis Methods..... | 3 |
| 7.0 | Laboratory Analysis Results..... | 4 |
| 8.0 | Discussion of Analysis Results..... | 6 |
| 9.0 | Background Mold Information..... | 7 |
| 10.0 | Conclusions..... | 7 |
| 11.0 | Recommendations | 8 |
| 12.0 | Limitations..... | 8 |

Attachment A – Sampling Location Floor Plans (2 pages)

Attachment B – Sample Photo page (1 page)

Attachment C - Hayes Microbial Laboratory Analytical Results (pages 1-9)



**Microbial
Assessment Report
At
Hobomock Elementary School
81 Learning Lanes
Pembroke, MA**

1.0 Introduction

- A. Paul Matuszko Environmental Consulting (**PMEC**) is pleased to submit this report for the microbial sampling conducted at the Hobomock Elementary School, 81 Learning Lanes, Pembroke, Massachusetts. PMEC was retained by the Pembroke Public Schools to conduct sampling and supplemental inspection of designated areas within the school building. The microbial sampling was initially conducted by PMEC Project Manager, Paul Matuszko, CIH on February 28 with follow up sampling on March 12, 2024. The air sampling was conducted to determine existing spore levels in response to previous sampling and on-going cleaning response actions. A summary of the sampling locations and methods, analysis methods and results are outlined within the report.
- B. PMEC conducted a visual inspection of representative surfaces in classroom 240 (under perimeter bench), within classroom 140 (above ceilings and within perimeter wall cavity), and within select roof top air handling units (AHUs or RTUs). PMEC was assisted by Pembroke Schools maintenance/custodial personnel in accessing areas for inspection. The assessment was conducted for conditions that may allow for microbial growth. Measurements were collected for baseline mold (microbial/fungal) analysis in specific areas as requested by the client. Additionally, measurements for surface moisture levels and baseline indoor temperature and humidity levels were collected. The following report summarizes the findings of the assessment, analysis results, and general recommendations.

2.0 Scope of Work

- A. The indoor air quality (IAQ) assessment was conducted in accordance with the following tasks:
1. General inspection of the representative areas for visible water damaged materials and mold growth. The areas inspected included inside classroom 140 perimeter wall cavity, within classroom 240 perimeter bench, and within four roof top (AHU) units.
 2. Conduct bioaerosol (microbial) spore trap air sampling for airborne mold (fungal) analysis in designated locations as determined by the client. Eighteen (18) total air samples collected during the two sampling site visits.
 3. Conduct surface (tape lift) sampling of designated surfaces suspected of containing microbial growth. Nine (9) total surface samples were collected during the two site sampling visits.
 4. Prepare a detailed report detailing the findings of the assessment and sampling data to include recommendations for the improvement of IAQ.

3.0 Existing Conditions

- A. Sampling on March 12, 2024, was conducted in classrooms, music room and library prior to and at the start of the school day. Most samples were collected prior to 8:00 am when the roof top units start operation. However, RTU #2 operates full time (24/7) over the 200 classroom wing.

- B. Individual HEPA filtered fan units have been placed in classrooms and music room where elevated airborne mold spore levels were identified from the February 28, 2024 sampling event. The HEPA fan units operate overnight and on weekends. The fan units are shut off when school is in session and the classrooms are occupied.
- C. PMEC inspected surfaces within the classroom 240 back left perimeter bench unit. The bare concrete floor slab and wood joist supports were generally dry with no evidence of visible mold and previous water leaks. However, the benchtop wood underside contained suspect mold growth (whitish surface staining). Surface tape lift sampling confirmed the presence of microbial growth (*Aspergillus/penicillium* and *stachybotrys* species).
- D. PMEC also inspected representative surfaces within classroom 140. The ceiling plenum spaces were dry with no suspect mold growth. A perimeter wallboard section was opened for interior wall cavity inspection. No suspect mold growth or water damage was identified within the wall cavity. PMEC noted that air infiltrates the wall cavity at air gaps around an electrical outlet at the foundation block wall. Air from the brick veneer passes through the foundation wall into the wall cavity behind the newer sheetrock wallboard. This condition is assumed to be present where wall outlets and other air gaps (prior to the 1999 renovation) exist in the original block walls. Accumulated settled dust within the back left ceiling supply diffuser vent was identified. The settled dust was sampled and found to contain mold (*Cladosporium*).
- E. Select roof top units, RTU #7, RTU#1, ACU#1, and RTU#2, were inspected for the presence of mold growth. RTU#2 interior surfaces were cleaned last October and is generally clean with no debris build up. RTU#7, RTU#1 and ACU #1 each contained loose debris, grease/grime buildup, blocked screens, etc. Additionally, duct liners (interior insulation) on supply duct work leading down into the building contained frayed edges, damaged insulation, miscellaneous debris, and suspect mold growth. This condition was present on RTU #1, ACU#1, and a limited quantity on RTU#2. A surface tape list sample in ACU #1 confirmed the presence of mold growth (*Cladosporium*).
- F. No visible suspect mold growth was identified within the exposed surfaces of each room accessed. Select ceiling tiles contain previous dried, brown water staining. No current water leaks or water infiltration were identified in the building.

4.0 Air Quality Measurements

- A. A direct reading, thermohygrometer (Fluke Model 971) was used to collect representative temperature and relative humidity (ratio of water vapor in air) measurements. Recommended season levels are:
- Temperature (Temp.): Recommended Winter Range: 63-72 °F
(degrees Fahrenheit °F) Recommended Summer: 68-78 °F
 - Relative Humidity (RH%) Recommended Range: between 30%-60%
- B. The measurement results on the assessment date are provided in Table 1 below:

| Table 1 Baseline Air Quality Measurements | | |
|--|-------------|---------------------|
| Location | Temperature | Relative Humidity % |
| Classroom #240 | 63.6 °F | 30.1% |
| Classroom #225 | 63.4 °F | 32.2% |
| Classroom #135 | 64.7 °F | 21.9% |
| Classroom #125 | 66.9 °F | 25.3% |

| Table 1 - continued Baseline Air Quality Measurements | | |
|--|-------------|---------------------|
| Location | Temperature | Relative Humidity % |
| Music Room | 66.9 °F | 29.6% |
| Teacher's Lounge | 68.7 °F | 23.8% |
| Classroom 140 | 68.7 °F | 16.9% |
| Library | 70.1 °F | 22.2% |
| Outside front entrance | <42.0 °F | ~19% |

- The indoor measurements indicate typical conditions for a late winter, clear, sunny day. Indoor relative humidity levels were noticeably lower than previous sampling dates.

5.0 Moisture Measurements

- A. A GE Protimeter SurveyMaster moisture meter was used to measure exposed non-conductive building surfaces and materials for elevated moisture content levels using a percent (%) scale. In the “search” mode, the meter gives the moisture condition beneath the surface of the material. The meter is used to establish if the material is in a dry (<15%), borderline (15%-20%) or damp (>20%) state. On the assessment date, PMEC observed the following readings:

- Back perimeter lower sheetrock wallboard (various rooms) – Lower perimeter sheetrock wallboard in representative classrooms were dry at 8-12% moisture level. No current or previous water staining was evident.
- Classroom 240 – under bench top – Bare concrete floor measured at 16-20% (slightly damp). Wood supports under the benches were dry at 10-12%. Note: the operating heating system assist in keeping surfaces warm and dry. During the summer and early fall season with the heating system off, surfaces under the benches may contain higher moisture levels resulting in potential condensation and microbial growth.
- Classroom flooring – Exposed 12” x 12” floor tile at the building perimeter in multiple classrooms was consistently measured to be damp at 22-25%. However, the exposed 12” x 12” floor tile in the middle of the classrooms was measured at 99% (wet). The concrete floor slab will wick moisture under the tile year round. The floor tile and carpeted rooms may act as a vapor barrier to trap moisture and allow for potential mold growth. This condition may increase humidity levels within the building during the summer and fall seasons.
- Carpeted Rooms (Music room, teachers’ lounge and library) – Carpeted surfaces were measured to generally dry at 12-15%.
- Lower block walls – Lower exposed block walls (Music room) were measured to be generally dry at approximately 15%.

6.0 Mold Sampling and Analysis Methods

- A. As part of the assessment, PMEC collected “spore trap” air samples for mold spore analysis using air-o-cell® brand sampling cassettes. A calibrated, battery operated Zefon IAQ 15 sampling pump was used to draw air onto the sample cassette’s adhesive slide. PMEC collected the samples at 15 liters of air per minute (LPM) for a five (5) minute sample duration for a total sample collection volume of 75 liters of air. The airborne aerosols (mold, particulates, pollen, etc.) are trapped on the filter media slide for direct microscopic examination.

- B. Each set of samples were sent via chain of custody by Fed Ex to Hayes Microbial Laboratory (Hayes), located in Midlothian, Virginia. Hayes Laboratory is accredited by the American Industrial Hygiene Association (AIHA) for mold and bacteria identification and analysis (AIHA EMPAT Laboratory Accreditation ID # 188863).
- C. Air sample analysis results are reported as Total Fungi Counts in spores per cubic meter of air (C/m^3). The samples were analyzed for both non-viable and viable fungi (mold) by direct analysis optical microscopy.
- D. Surface (tape lift) samples were collected of select surfaces suspected of containing microbial growth. Samples are analyzed for the presence of microbial species, type, and growth (mycelium). The surface samples are used to determine settled and current mold growth. Clear adhesive microscope slide surface/tape is lightly pressed over a surface to adhere suspect particulate material onto the sticky tape surface. The slide is placed in a clear plastic bag for shipment to the laboratory. Samples are analyzed by direct visible microscopic examination for fungal spore levels and potential growth (mycelium = active growth). A summary of analysis criteria of direct identification analysis is provided in the lab analysis sheets.
- E. A summary of analysis criteria of spore trap and direct identification analysis is provided in the lab analysis sheets. The sample analysis results for March 12, 2024 are provided in Attachment C.

7.0 Laboratory Analysis Results

- A. The results of the March 12, 2024 spore trap air sampling are presented in Table 2 below.

| Table 2 Spore Trap Air Sample Analysis Results March 12, 2024 | | | | |
|--|-------------|--|---|--|
| Sample # | Time | Sample Location | Total Fungi (C/m^3) | Specific Species & levels of note |
| 3590 2815 (01) | ~7:10 am | Classroom 240 - At back right side on rug (note: teacher present in room) | 1,790 C/m^3 | Ascospores – 93 C/m^3 Aspergillus/Penicillium – 1,500 C/m^3 Basidiospores – 27 C/m Cladosporium – 170 C/m^3 |
| 3782 1619 (02) | ~7:15 am | Classroom 225 - At front teacher's desk | 93 C/m^3 | Aspergillus/Penicillium – 80 C/m^3 Basidiospores – 13 C/m |
| 3782 1592 (03) | ~7:30 am | Classroom 135 - Near teacher's desk | 26 C/m^3 | Ascospores – 13 C/m^3 Cladosporium – 13 C/m^3 |
| 3705 3099 (04) | ~7:45 am | Classroom 125 - Near teacher's desk | 27 C/m^3 | Myxomycetes – 27 C/m^3 |
| 3705 3108 (05) | ~7:55 am | Music room – middle of room | 67 C/m^3 | Ascospores – 27 C/m^3 Basidiospores – 13 C/m Cladosporium – 27 C/m^3 |
| 3782 1597 (06) | ~8:05 am | Teacher's Lounge at table (HVAC on, no HEPA fan) | 187 C/m^3 | Ascospores – 27 C/m^3 Aspergillus/Penicillium – 120 C/m^3 Basidiospores – 40 C/m |
| 3782 1624 (07) | ~8:15 am | Classroom 140 - At teacher's desk (HVAC on, HEPA fan on) | 80 C/m^3 | Basidiospores – 27 C/m Cladosporium – 53 C/m^3 |
| 3782 1604 (08) | ~9:10 am | Library - At middle teacher's desk (room occupied, HVAC on, no HEPA fan present)) | 94 C/m^3 | Ascospores – 27 C/m^3 Aspergillus/Penicillium – 40 C/m^3 Basidiospores – 27 C/m |
| 3782 1588 (09) | ~9:25 am | Outside ambient air (outside front entrance) | 177 C/m^3 | Ascospores – 27 C/m^3 Basidiospores – 27 C/m |

Notes: Additional information on species types are provided in the Laboratory Analysis results.
Asp/Pen = abbreviation for Aspergillus/Penicillium microbial species analysis detection

- B. A comparison of the spore trap air sampling results by room and the sampling dates are presented in Table 3 below.

| Table 3 Analysis Results Summary Comparison For Two Sampling Rounds | | | |
|--|---|---|--|
| Location/Room # | <i>February 28, 2024</i> Round #1 * | <i>March 12, 2024</i> Round #2 ** | Comments |
| Classroom # 225 (front) | 4,500 C/m³ - Asp/Pen 840 C/m³ Cladosporium | 80 C/m ³ - Asp/Pen | Asp/Pen and total spore counts sufficiently reduced to acceptable levels |
| | 5,393 C/m³ - Total | 93 C/m ³ - Total | |
| Classroom # 240 (back) | 2,200 C/m³ - Asp/Pen | 1,500 C/m³ - Asp/Pen | Asp/Pen and total spore counts remain elevated at time of sampling. Room occupied during 3/12/24 sampling. |
| | 2,227 C/m³ - Total | 1,790 C/m³ - Total | |
| Music Room | 3,500 C/m³ - Asp/Pen 470 C/m³ Cladosporium | No - Asp/Pen present | Asp/Pen and total spore counts sufficiently reduced to acceptable levels |
| | 3,996 C/m³ - Total | 67 C/m ³ - Total | |
| Faculty Dining Room (Teacher's Lounge) | No - Asp/Pen present | 120 C/m ³ - Asp/Pen | Asp/Pen and total spore counts remain at acceptable levels |
| | 149 C/m ³ - Total | 187 C/m ³ - Total | |
| Classroom # 140 | 2,300 C/m³ - Asp/Pen | No - Asp/Pen present | Asp/Pen and total spore counts sufficiently reduced to acceptable levels |
| | 2,366 C/m³ - Total | 80 C/m ³ - Total | |
| Classroom # 135 | No - Asp/Pen present | No - Asp/Pen present | Asp/Pen and total spore counts remain at acceptable levels |
| | 93 C/m ³ - Total | 26 C/m ³ - Total | |
| Classroom # 125 | 1,500 C/m³ - Asp/Pen | No - Asp/Pen present | Asp/Pen and total spore counts sufficiently reduced to acceptable levels |
| | 1,674 C/m³ - Total | 27 C/m ³ - Total | |
| Classroom # 110 | 240 C/m ³ - Asp/Pen | Not collected | Asp/Pen and total spore counts initially at acceptable levels |
| | 333 C/m ³ - Total | Not collected | |
| Library | Not collected | 40 C/m ³ - Asp/Pen | Asp/Pen and total spore counts at acceptable levels |
| | Not Collected | 94 C/m ³ - Total | |
| Outside front entrance (ambient air) | No Asp/Pen present | No Asp/Pen present | No Asp/Pen identified, total levels are low and typical for season. |
| | 160 C/m ³ - Total | 177 C/m ³ - Total | |

Notes: * - Late afternoon sampling after school in session, rooms mainly unoccupied, no HEPA fans operating.

** - early morning sampling with HVAC unit mainly off and rooms unoccupied. HEPA fans operating in classrooms and music room.

- C. The results of the surface tape lift sample analysis are presented in Table 4 below.

| Table 4 Tape Lift (Bio-Tape) Surface Sampling Analysis Results | | | | |
|---|--|-----------------------------------|--|---|
| Sample # | Sample Location | Species and Spore Estimate | Mycelial estimate (Current Growth potential) | Comment |
| February 28, 2024 Sample Results | | | | |
| 01T (#10) | Faculty Dining Room – Carpeting under table | Cladosporium – moderate level | Trace | Spores present but limited to no active growth. |
| 02T (#11) | Hallway at classroom 135 (at lower wall cove base) | No fungi Detected | None | None present |

| Table 4 - continued Tape Lift (Bio-Tape) Surface Sampling Analysis Results | | | | |
|--|---|---|--------------------------------------|------------------------------------|
| Sample # | Sample Location | Species and Spore Estimate | Mycelial estimate (Growth potential) | Comment |
| March 12, 2024 Sample Results | | | | |
| 01T (#10) | Room 240 – inside perimeter bench on concrete floor | No fungi Detected | None | None present |
| 02T (#11) | Room 240 – inside perimeter bench on plywood underside top | Aspergillus – very heavy Stachybotrys – moderate | Trace | Active microbial growth present |
| 03T (#12) | Room 140 – inside lower perimeter wallboard (sheetrock back side) | No fungi Detected | None | None present |
| 04T (#13) | Room 140 – inside back side ceiling metal supply vent | Cladosporium – heavy | Trace | Surface mold present |
| 05T (#14) | Roof top unit (RTU) #7 - Inside metal duct at top of supply fan (grease/ discoloration present) | Myxomycetes – rare | None detected (ND) | ND |
| 06T (#15) | RTU #1 - Inside left metal duct side (grease/ discoloration present) | No fungi Detected | None | None present |
| 07T (#16) | Roof top unit (ACU) #1 Over library – inside on duct insulation liner leading down supply duct | Cladosporium – heavy (yellow discoloration and damaged liner present) | few | Surface mold present on duct liner |

Note: The laboratory analysis results are provided in the attachments. Bold – species or levels of concern.

8.0 Discussion of Analysis Results

A. Spore trap sample results:

1. February 28, 2024 Results – Analysis results for the 1st round on February 28, 2024 showed consistently high levels of aspergillus/penicillium (Asp/Pen) spore levels in most locations sampled. The total spore levels were found to be generally higher than recommended with elevated Asp/Pen levels present. Sampling was conducted after school was in session, with no occupants present. However, classroom 135 and the teachers' lounge contained no Asp/Pen spores and low total spore levels.
2. March 12, 2024 Results – Sampling was conducted on March 12, 2024 early in the morning prior to or at the start of the school session. Additionally, portable HEPA filtered fan units were operated overnight and shut off at the time of sampling. **The analysis results for the 2nd round showed reduced and acceptable spore levels in most areas sampled.** However, Classroom 240 showed a continued elevated level of Asp/Pen spores present. It should be noted that the classroom teacher was present in the room (moving in and around the room) prior to and during the sampling. In general, the results showed lower or no levels of Asp/Pen and acceptable total spore levels in each of the areas sampled (except for room 240).

B. Tape Lift Surface Results

1. February 28, 2024 Results – The results showed cladosporium mold spores present on the teacher's lounge carpeted floor. The results for the suspect discoloration on the lower hallway wall at the vinyl cove base showed no microbial growth.
2. March 12, 2024 Results – Surface analysis on March 12, 2024 showed a mix of results on the seven (7) samples collected. A summary of the sample results are as follows:
 - Classroom 240 – concrete floor within perimeter wood bench – no microbial growth found.
 - Classroom 240 - Active mold growth present on the underside of the wood bench.
 - Classroom 140 – Inside perimeter wall on interior lower sheetrock wallboard.
 - Classroom 140 – Surface mold found inside metal duct ceiling supply vent.
 - Roof RTU# 7 – on metal duct surface above supply fan – low level of mold growth present.
 - Roof RTU# 1 – on side metal duct surface after fan – no microbial growth found.
 - ACU #1 (roof above library) – Surface mold found on interior supply duct insulation.
(duct liner Insulation worn, frayed, and visibly contaminated)

9.0 Background Mold Information

- A. Currently, there are no standards or regulations to indicate acceptable numerical levels of airborne fungal spores derived from indoor environments. Results are also assessed for specific target species that may induce allergic reactions. Specific species are reviewed for their known potential to cause allergic reactions or as an indicator of potential water damage and moisture issues. In general, indoor mold levels should be equivalent to or lower than outdoor levels or non-complaint areas with similar types and percentages of mold species. Please note that airborne mold spores are present in most indoor environments at low levels.
- B. There are no regulations for acceptable levels of mold in the indoor environment; therefore, exact numerical limits are not supported at this time. Specific fungal species of concern are recommended to have much lower levels in the indoor environment. Existing conditions and symptoms are unique to each season, building and occupant. Airborne mold spore levels may vary greatly by location, time of day and weather conditions. However, health impacts cannot be predicted based on this information; individuals experience varying levels of allergic and non-allergic response to mold. Controlling moisture is critical to the prevention of indoor mold growth issues.

10.0 Conclusions

- A. The March 12, 2024 laboratory analysis results indicate that the airborne mold spore levels in the locations sampled were lower than February 28, 2024 sampling event. The results suggest that the spore levels are sufficiently low and acceptable on the sampling date. However, classrooms 240 was sampled and found to have an elevated level of Asp/Pen spores. HEPA fan units continue to assist in lowering airborne mold spores where utilized.
- B. Surface tape lift sampling results indicate mold growth in select areas including the Classroom 240 bench underside, within the Classroom 140 ceiling supply vent, and on the roof top unit ACU#1 interior duct liner.

- C. The current results and conditions suggest the classrooms and other rooms sampled, except for classroom 240, are generally at a Condition 1 – normal indoor ecology environment per the IICRC guidelines.
- D. The on-going cleaning and HEPA air filtering in the designated classrooms has assisted in lowering airborne spore levels.

11.0 Recommendations

- A. Continue operating portable HEPA fan units in classrooms on an ongoing basis.
- B. Additional investigation and assessment of building surfaces and roof top units should be conducted to further determine potential microbial sources and reservoirs. The School Administration should develop a detailed response action plan that includes focused remediation and HVAC system improvements. This assessment should include further inspection of perimeter bench tops, ceiling diffusers, carpeting/ area rugs for sources of microbial sources.
- C. Additional sampling is not recommended at this time until building surfaces and components are assessed and corrective actions implemented.
- D. A detailed action plan should be developed to determine the proper sequence and schedule in performing recommended response actions. These response actions include a combination of HVAC system and classroom cleaning. Response actions that may be developed, scheduled, and implemented include, but are not limited, to:
 - 1. Remediation and encapsulation of bench top wood undersides.
 - 2. Roof top unit cleaning, operations and maintenance (O&M) servicing, etc.
 - 3. Cleaning and encapsulation of interior duct liners.
 - 4. HVAC system, ceiling diffusers, and duct cleaning.
 - 5. Classroom cleaning and disinfection
 - 6. Steam cleaning and regular HEPA vacuuming of carpeting and area rugs.
 - 7. Revising HVAC system operation schedules and utilizing open window ventilation.

12.0 Limitations

- A. The assessment provided herein is based on the professional judgment of PMEC using approved industry standards and guidelines. Assessment findings are based on the investigator's careful consideration of field observations and interpretation of analysis results in accordance with industry standards, including, but not limited to, IICRC S520 guidelines for Condition 1 – normal fungal ecology, 2008 AIHA (Green Book) publication "Recognition, Evaluation, and Control of Indoor Mold", and the ACGIH 1999 book "Bioaerosols – Assessment and Control".
- B. The analysis results are only representative of the conditions of the date and time of sample collection and are considered a "snapshot in time". PMEC's results listed herein represent the conditions present at the time of inspection and sampling.

ATTACHMENTS

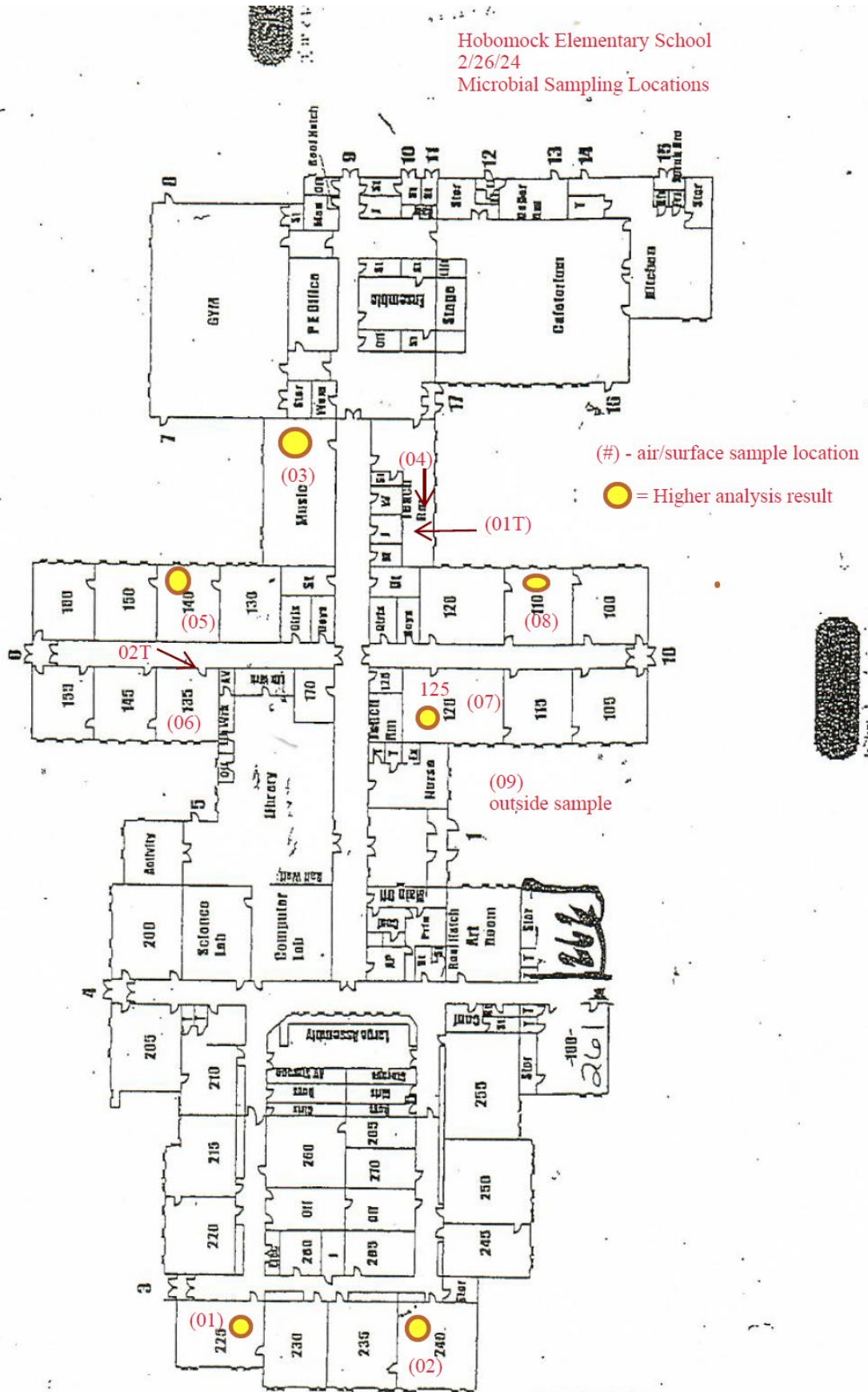
- Attachment A – Sampling Floor Plan (pages 1-2)
- Attachment B – Sample Photograph page (1 page)
- Attachment C – Hayes Microbial – March 12, 2024 Sample Analysis Results (pages 1-9)

Attachment A

Sample Location Floor Plans (2 pages)

1. February 28, 2024 sample locations
2. March 12, 2024 sample locations

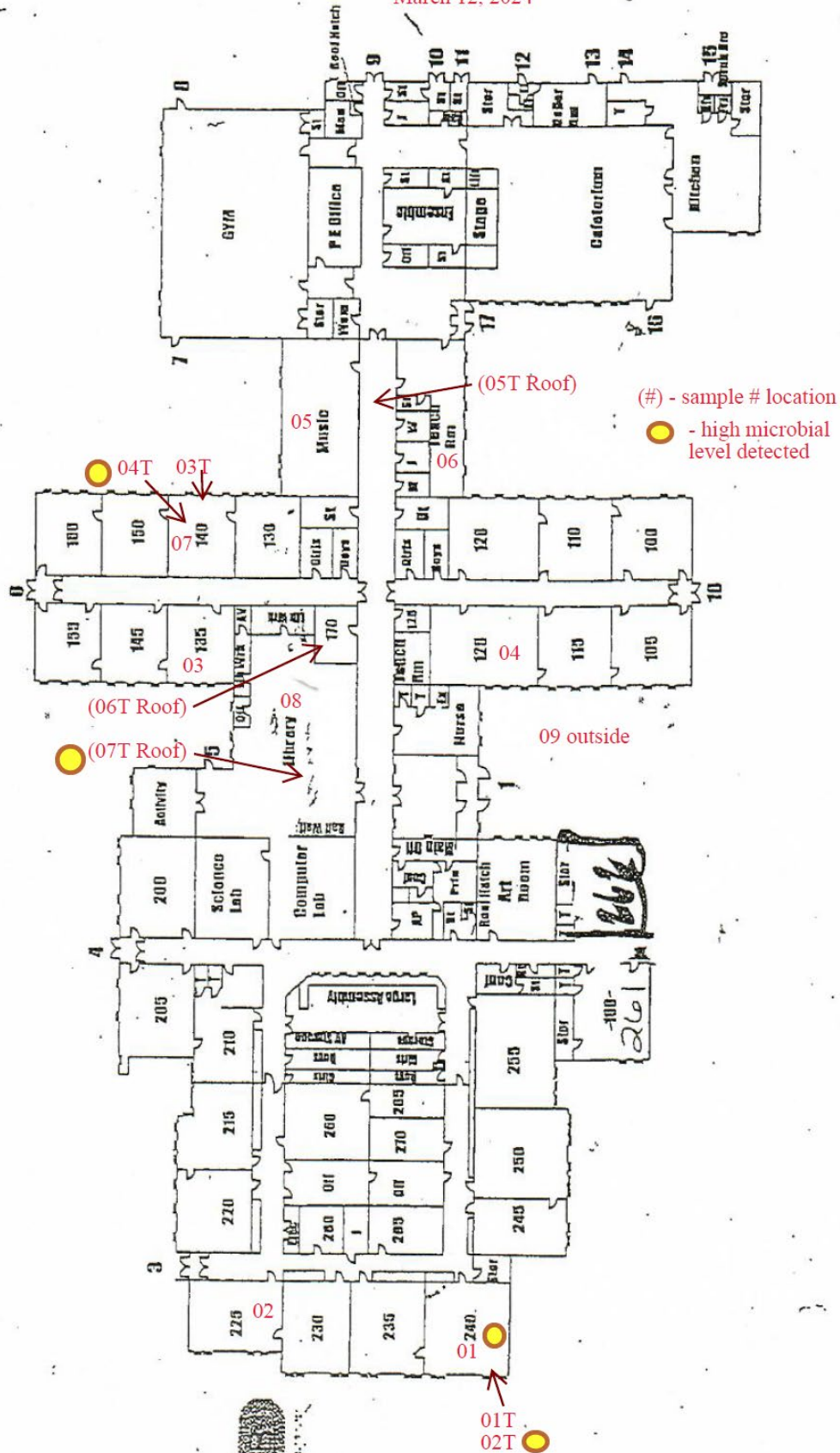
Attachment A – Sampling Floor Plan



PMEC 2/28/24

Attachment A – Sampling Floor Plan

Hobomock Elem. School
Sampling Locations
March 12, 2024



Attachment B

**Sample Photographs
(1 page)**

Attachment B – Sample Photographs

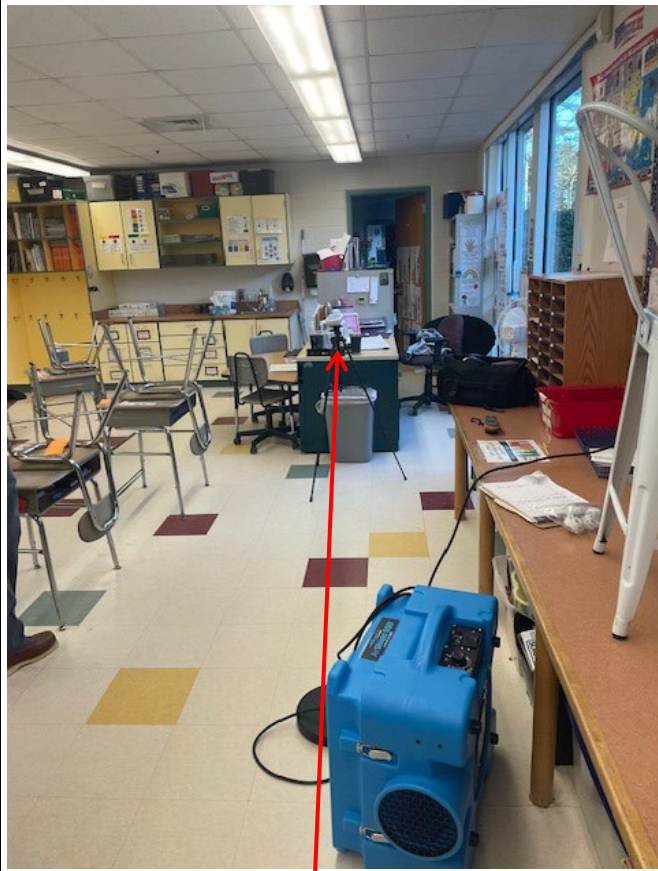


Photo 1: View of typical classroom spore trap air sampling. HEPA filtered fan unit present operated off-hours.

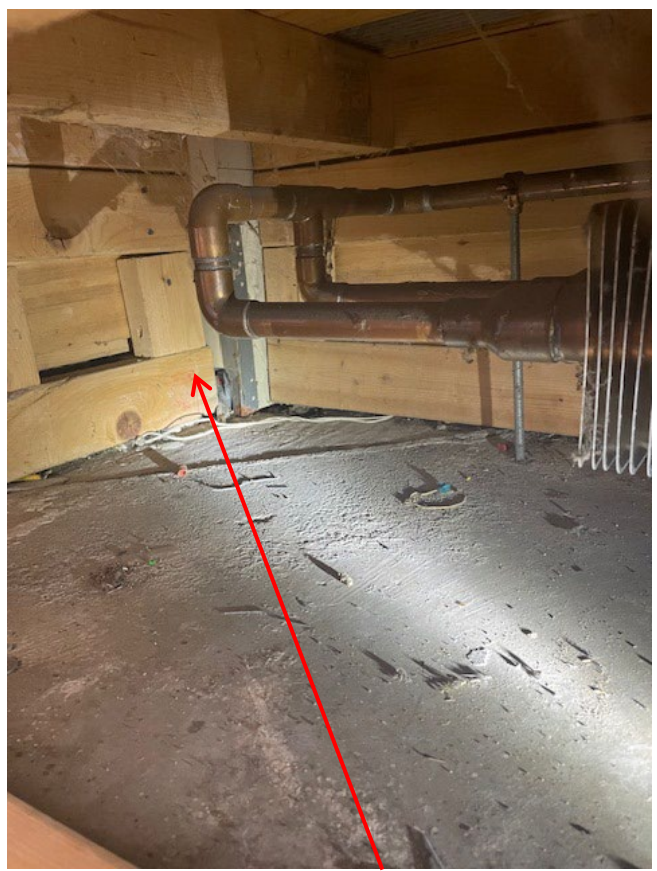


Photo 2: View of Classroom 240 under perimeter bench top at heat piping/radiation unit with bare concrete floor. Wood support joists dry with no visible mold. Suspect mold growth on underside of bench top (not pictured).



Photo 3: View of classroom 140 at perimeter wall. No suspect mold growth within wall cavity. Original block wall outlet allows outside air leakage to enter wall cavity.



Photo 4: View of ACU1 servicing library. Accumulated dirt and suspect mold growth on damaged/frayed interior duct liner at vertical supply duct.

Attachment C

Laboratory Analysis Results

**Hayes Microbial –
March 12, 2024 (pages 1-9)**

Analysis Report prepared for

Paul Matuszko Environmental Consulting

79 Cedar Street
Walpole, MA 02081

Phone: (617) 893-4476

24-117
Hobomock Elementary School
Pembroke Public School
81 Learning Lanes
Pembroke, MA 02339

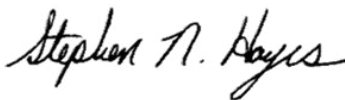
Collected: **March 12, 2024**
Received: **March 13, 2024**
Reported: **March 13, 2024**

We would like to thank you for trusting Hayes Microbial for your analytical needs!
We received 16 samples by FedEx in good condition for this project on March 13th, 2024.

The results in this analysis pertain only to this job, collected on the stated date, and should not be used in the interpretation of any other job. Information supplied by the customer can affect the validity of results. These results apply only to the samples as received. This report may not be duplicated, except in full, without the written consent of Hayes Microbial Consulting, LLC.

All information provided to Hayes Microbial is confidential information relating to our customers and their clients. We will not disclose, copy, or distribute any information verbally or written, except to those designated by the customer(s). We take confidentiality very seriously. No changes to the distribution list will be made without the express consent of the customer.

This laboratory bears no responsibility for sample collection activities, analytical method limitations, or your use of the test results. Interpretation and use of test results are your responsibility. Any reference to health effects or interpretation of mold levels is strictly the opinion of Hayes Microbial. In no event, shall Hayes Microbial or any of its employees be liable for lost profits or any special, incidental or consequential damages arising out of the use of these test results.



Steve Hayes, BSMT(ASCP)
Laboratory Director
Hayes Microbial Consulting, LLC.



EPA Laboratory ID: VA01419



Lab ID: #188863



DPH License: #PH-0198

| | | | | | | | | | | | | |
|-------------------------|---------------|------------|------------|---------------|------------|------------|---------------|------------|------------|---------------|------------|------------|
| Sample Number* | 1 | 3590 2815 | | 2 | 3782 1619 | | 3 | 3782 1592 | | 4 | 3705 3099 | |
| Sample Name* | Classroom 240 | | | Classroom 225 | | | Classroom 135 | | | Classroom 125 | | |
| Sample Volume* | 75 L | | | 75 L | | | 75 L | | | 75 L | | |
| Reporting Limit | 13 spores/m³ | | | 13 spores/m³ | | | 13 spores/m³ | | | 13 spores/m³ | | |
| Background | 2 | | | 2 | | | 2 | | | 2 | | |
| Fragments | ND | | | ND | | | ND | | | ND | | |
| Organism | Raw Count | Count / m³ | % of Total | Raw Count | Count / m³ | % of Total | Raw Count | Count / m³ | % of Total | Raw Count | Count / m³ | % of Total |
| Alternaria | | | | | | | | | | | | |
| Ascospores | 7 | 93 | 5.3% | | | | 1 | 13 | 50.0% | | | |
| Aspergillus Penicillium | 109 | 1500 | 83.2% | 6 | 80 | 85.7% | | | | | | |
| Basidiospores | 2 | 27 | 1.5% | 1 | 13 | 14.3% | | | | | | |
| Bipolaris Drechslera | | | | | | | | | | | | |
| Chaetomium | | | | | | | | | | | | |
| Cladosporium | 13 | 170 | 9.9% | | | | 1 | 13 | 50.0% | | | |
| Curvularia | | | | | | | | | | | | |
| Epicoccum | | | | | | | | | | | | |
| Fusarium | | | | | | | | | | | | |
| Memnoniella | | | | | | | | | | | | |
| Myxomycetes | | | | | | | | | | 2 | 27 | 100.0% |
| Pithomyces | | | | | | | | | | | | |
| Stachybotrys | | | | | | | | | | | | |
| Stemphylium | | | | | | | | | | | | |
| Torula | | | | | | | | | | | | |
| Ulocladium | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Total | 131 | 1790 | 100% | 7 | 93 | 100% | 2 | 26 | 100% | 2 | 27 | 100% |

| | | | | |
|------------------------|-----------------|-------------------------------|------------------------------------|-------------------|
| Water Damage Indicator | Common Allergen | Slightly Higher than Baseline | Significantly Higher than Baseline | Ratio Abnormality |
|------------------------|-----------------|-------------------------------|------------------------------------|-------------------|

* indicates data provided by the customer



| | | | | | | | | | | | | |
|-------------------------|--------------|------------|------------|------------------|------------|------------|---------------|------------|------------|--------------|------------|------------|
| Sample Number* | 5 | 3705 3108 | | 6 | 3782 1597 | | 7 | 3782 1624 | | 8 | 3782 1604 | |
| Sample Name* | Music Room | | | Teacher's Lounge | | | Classroom 140 | | | Library | | |
| Sample Volume* | 75 L | | | 75 L | | | 75 L | | | 75 L | | |
| Reporting Limit | 13 spores/m³ | | | 13 spores/m³ | | | 13 spores/m³ | | | 13 spores/m³ | | |
| Background | 2 | | | 2 | | | 3 | | | 2 | | |
| Fragments | ND | | | ND | | | ND | | | ND | | |
| Organism | Raw Count | Count / m³ | % of Total | Raw Count | Count / m³ | % of Total | Raw Count | Count / m³ | % of Total | Raw Count | Count / m³ | % of Total |
| Alternaria | | | | | | | | | | | | |
| Ascospores | 2 | 27 | 40.0% | 2 | 27 | 14.3% | | | | 2 | 27 | 28.6% |
| Aspergillus Penicillium | | | | 9 | 120 | 64.3% | | | | 3 | 40 | 42.9% |
| Basidiospores | 1 | 13 | 20.0% | 3 | 40 | 21.4% | 2 | 27 | 33.3% | 2 | 27 | 28.6% |
| Bipolaris Drechslera | | | | | | | | | | | | |
| Chaetomium | | | | | | | | | | | | |
| Cladosporium | 2 | 27 | 40.0% | | | | 4 | 53 | 66.7% | | | |
| Curvularia | | | | | | | | | | | | |
| Epicoccum | | | | | | | | | | | | |
| Fusarium | | | | | | | | | | | | |
| Memnoniella | | | | | | | | | | | | |
| Myxomycetes | | | | | | | | | | | | |
| Pithomyces | | | | | | | | | | | | |
| Stachybotrys | | | | | | | | | | | | |
| Stemphylium | | | | | | | | | | | | |
| Torula | | | | | | | | | | | | |
| Ulocladium | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| Total | 5 | 67 | 100% | 14 | 187 | 100% | 6 | 80 | 100% | 7 | 94 | 100% |

| | | | | |
|------------------------|-----------------|-------------------------------|------------------------------------|-------------------|
| Water Damage Indicator | Common Allergen | Slightly Higher than Baseline | Significantly Higher than Baseline | Ratio Abnormality |
|------------------------|-----------------|-------------------------------|------------------------------------|-------------------|

* indicates data provided by the customer

| | | | | | | | |
|-------------------------|---------------------|------------|-------------------------------|------------------------------------|--|-------------------|--|
| Sample Number* | 9 | 3782 1588 | | | | | |
| Sample Name* | Outside Ambient Air | | | | | | |
| Sample Volume* | 75 L | | | | | | |
| Reporting Limit | 13 spores/m³ | | | | | | |
| Background | 2 | | | | | | |
| Fragments | ND | | | | | | |
| Organism | Raw Count | Count / m³ | % of Total | | | | |
| Alternaria | | | | | | | |
| Ascospores | 5 | 67 | 38.5% | | | | |
| Aspergillus Penicillium | | | | | | | |
| Basidiospores | 8 | 110 | 61.5% | | | | |
| Bipolaris Drechslera | | | | | | | |
| Chaetomium | | | | | | | |
| Cladosporium | | | | | | | |
| Curvularia | | | | | | | |
| Epicoccum | | | | | | | |
| Fusarium | | | | | | | |
| Memnoniella | | | | | | | |
| Myxomycetes | | | | | | | |
| Pithomyces | | | | | | | |
| Stachybotrys | | | | | | | |
| Stemphylium | | | | | | | |
| Torula | | | | | | | |
| Ulocladium | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
| Total | 13 | 177 | 100% | | | | |
| Water Damage Indicator | Common Allergen | | Slightly Higher than Baseline | Significantly Higher than Baseline | | Ratio Abnormality | |

* indicates data provided by the customer

Collected: Mar 12, 2024

Received: Mar 13, 2024

Reported: Mar 13, 2024

Revision: 2



Project Analyst:
Connor Gailliot, BS

Date:
03 - 13 - 2024

Reviewed By:
Steve Hayes, BSMT

Date:
03 - 13 - 2024

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Page: 4 of 9

| #10 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
|---|----------------------|-------------------|----------------|-------------------|
| 01T - Room 240 - Perimeter Concrete Floor | | No Fungi Detected | | |
| #11 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
| 02T - Room 240 - Wood Bench Underside | | Aspergillus | Very Heavy | Many |
| | | Stachybotrys | Moderate | Trace |
| #12 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
| 03T - Room 140 - Inside Lower Gypsum Wall | | No Fungi Detected | | |
| #13 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
| 04T - Room 140 - Inside Ceiling Supply Vent | | Cladosporium | Heavy | Trace |
| #14 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
| 05T - RTU7 - Inside Top Metal Duct | | Myxomycetes | Rare | ND |
| #15 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
| 06T - RTU1 - Inside Side Metal Duct | | No Fungi Detected | | |
| #16 | Bio-Tape (1.00 cm2*) | Organism | Spore Estimate | Mycelial Estimate |
| 07T - ACU1 - On Interior Duct Liner | | Cladosporium | Heavy | Few |

* indicates data provided by the customer



Spore Trap Information

| | |
|--|--|
| Reporting Limit | The Reporting Limit is the lowest number of spores that can be detected based on the total volume of the sample collected and the percentage of the slide that is counted. At Hayes Microbial, 100% of the slide is read so the LOD is based solely on the total volume. Raw spore counts that exceed 500 spores will be estimated. |
| Blanks | Results have not been corrected for field or laboratory blanks. |
| Background | <p>The Background is the amount of debris that is present in the sample. This debris consists of skin cells, dirt, dust, pollen, drywall dust and other organic and non-organic matter. As the background density increases, the likelihood of spores, especially small spores such as those of <i>Aspergillus</i> and <i>Penicillium</i> may be obscured. The background is rated on a scale of 1 to 5 and each level is determined as follows:</p> <p>NBD: No background detected due to possible pump or cassette malfunction. Recollect sample. (Field Blanks will display NBD)</p> <p>1 : <5% of field occluded. No spores will be uncountable.</p> <p>2 : 5-25% of field occluded.</p> <p>3 : 25-75% of field occluded.</p> <p>4 : 75-90% of field occluded.</p> <p>5 : >90% of field occluded. Suggested recollection of sample.</p> |
| Fragments | Fragments are small pieces of fungal mycelium or spores. They are not identifiable as to type and when present in very large numbers, may indicate the presence of mold amplification. |
| Control Comparisons | There are no national standards for the numbers of fungal spores that may be present in the indoor environment. As a general rule and guideline that is widely accepted in the indoor air quality field, the numbers and types of spores that are present in the indoor environment should not exceed those that are present outdoors at any given time. There will always be some mold spores present in "normal" indoor environments. The purpose of sampling and counting spores is to help determine whether an abnormal condition exists within the indoor environment and if it does, to help pinpoint the area of contamination. Spore counts should not be used as the sole determining factor of mold contamination. There are many factors that can cause anomalies in the comparison of indoor and outdoor samples due to the dynamic nature of both of those environments. |
| <div>Water Damage Indicator</div> <div>Common Allergen</div> <div>Slightly Higher than Baseline</div> <div>Significantly Higher than Baseline</div> <div>Ratio Abnormality</div> | <p>Blue: These molds are commonly seen in conditions of prolonged water intrusion and usually indicate a problem.</p> <p>Green: Although all molds are potential allergens, these are the most common allergens that may be found indoors.</p> <p>Orange: The spore count is slightly higher than the outside count and may or may not indicate a source of contamination.</p> <p>Red: The spore count is significantly higher than the baseline count and probably indicates a source of contamination.</p> <p>Violet: The types of spores found indoors should be similar to the ones that were identified in the baseline sample. Significant increases (more than 25%) in the ratio of a particular spore type may indicate the presence of abnormal levels of mold, even if the total number of spores of that type is lower in the indoor environment than it was outdoors.</p> |
| Color Coding | Fungi that are present in indoor samples at levels lower than 200 per cubic meter are not color coded on the report, unless they are one of the water damage indicators. |
| Significant Figures | Raw counts and column totals may reflect more than 2 significant figures, but results should only be considered significant to 2 figures. |

Direct Analysis Information

| Spore Estimate | | Percentages |
|----------------|-------------------------|-------------|
| ND | None Detected | 0% |
| Rare | Less than 10 spores | < 1% |
| Light | 10 - 99 spores | 1-10% |
| Moderate | 100 - 999 spores | 11-25% |
| Heavy | 1000 - 9999 spores | 26-50% |
| Very Heavy | 10000 or greater spores | 51-100% |

| Mycelial Estimate | |
|-------------------|--|
| ND | None Detected No active growth at site. |
| Trace | Very small amount of Mycelium Probably no active growth at site. |
| Few | Some Mycelium Possible active growth at site. |
| Many | Large amount of Mycelium Probable active growth at site. |

Organism Descriptions

| | |
|--------------------------------|---|
| Ascospores | Habitat: A large group consisting of more than 3000 species of fungi. Common plant pathogens and outdoor numbers become very high following rain. Most of the genera are indistinguishable by spore trap analysis and are combined on the report. |
| | Effects: Health affects are poorly studied, but many are likely to be allergenic. |
| Aspergillus | Habitat: One of the most common fungi isolated from the environment. Found in soil, decomposing plant material, and indoors on a wide variety of cellulose containing materials. |
| | Effects: Known to be allergenic and many species also produce mycotoxins. They are a common cause of extrinsic asthma and hypersensitivity pneumonitis. Many species are opportunistic pathogens and are known to cause sinus lesions, ear infections, respiratory infections, and invasive systemic disease. |
| Aspergillus Penicillium | Habitat: The most common fungi isolated from the environment. Very common in soil and on decaying plant material. Are able to grow well indoors on a wide variety of substrates. |
| | Effects: This group contains common allergens and many can cause hypersensitivity pneumonitis. They may cause extrinsic asthma, and many are opportunistic pathogens. Many species produce mycotoxins which may be associated with disease in humans and other animals. Toxin production is dependent on the species, the food source, competition with other organisms, and other environmental conditions. |
| Basidiospores | Habitat: A common group of Fungi that includes the mushrooms and bracket fungi. They are saprophytes and plant pathogens. In wet conditions they can cause structural damage to buildings. |
| | Effects: Common allergens and are also associated with hypersensitivity pneumonitis. |
| Cladosporium | Habitat: One of the most common genera worldwide. Found in soil and plant debris and on the leaf surfaces of living plants. The outdoor numbers are lower in the winter and often relatively high in the summer, especially in high humidity. The outdoor numbers often spike in the late afternoon and evening. Indoors, it can be found growing on textiles, wood, sheetrock, moist window sills and in HVAC supply ducts. |
| | Effects: A common allergen, producing more than 10 allergenic antigens and a common cause of hypersensitivity pneumonitis. |
| Myxomycetes | Habitat: Found on decaying plant material and as a plant pathogen. |
| | Effects: Some allergenic properties reported, but generally pose no health concerns to humans. |

Organism Descriptions

| | |
|--------------|---|
| Stachybotrys | <p>Habitat: Commonly found in soil and on decaying plant material. It is cellulolytic, and can be found indoors on wet materials containing cellulose, such as wallboard, ceiling tile, and other paper-based materials. It is found outdoors on decaying plant material although it is rarely detected on outdoor air samples.</p> <p>Effects: Allergenic properties are poorly studied and no cases of infection have been reported in humans. They do however produce potent tricothecene mycotoxins. The toxins produced by this fungus can suppress the immune system affecting the lymphoid tissue and the bone marrow. The mycotoxin is also reported to be a liver and kidney carcinogen.</p> |
|--------------|---|