

September 21, 2020

VIA EMAIL: ernest.sandland@whrsd.org

Mr. Ernest Sandland
Facilities Department
Whitman Hanson Regional School District
600 Franklin Street
Whitman, MA 02382

TRC Project No. 410850

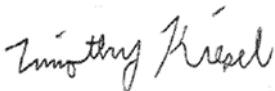
**Subject: Final Report
Indoor Air Quality Evaluation
Whitman Middle School
100 Corthell Avenue
Whitman, MA**

Dear Mr. Sandland:

TRC Solutions (TRC) is pleased to present its final report entitled “*Indoor Air Quality Evaluation*” performed in the Whitman Middle School located at 100 Corthell Avenue in Whitman, Massachusetts.

TRC appreciates the opportunity to be of service. If you have any questions or concerns, please contact me at (781) 337-0016.

Sincerely,



Timothy Kiesel
Project Manager



Gregory Hatch
BSI - Office Practice Leader

Indoor Air Quality Evaluation Report
for

**Whitman Middle School
100 Corthell Avenue
Whitman, MA 02382**

TRC Project No. 410850

September 21, 2020

Prepared for:

**Whitman Hanson Regional School District
Facilities Department
600 Franklin Street
Whitman, MA 02382**

Prepared by:

**TRC Companies, Inc.
814 Broad Street
Weymouth, Massachusetts
781.337.0016**

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- B. IAQ MONITOR CALIBRATION REPORT**
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1.0 INTRODUCTION

Mr. Ernest Sandland of the Whitman-Hanson Regional School District (WHRSD) authorized TRC Companies, Inc. (TRC) to perform an indoor air quality evaluation in several rooms and hallways within the Whitman Middle School building located at 100 Corthell Avenue in Whitman, Massachusetts.

WHRSD requested this evaluation following employee concerns. TRC Industrial Hygienist Timothy Kiesel visited the site to perform the initial evaluation on September 4, 2020. TRC also collected mold in air samples from the front office, main foyer, gym, library, cafeteria, art room, science classroom, classroom 215 and the adjacent hallways on that date. During the evaluation, building access and information was provided by Ms. Kerri Sandler the assistant principal of Whitman Middle School.

Elevated levels of aspergillus/penicillium spores were identified during the initial site visit in the art room. The room was subsequently cleaned. A follow-up visit to the site was done on September 17, 2020 to collect mold air samples in the art room. The subsequent sample results indicated an acceptable level.

Appendix A presents the results of instantaneous direct-reading environmental measurements. Appendix B presents the monitoring instrument's calibration report. Appendix C presents the initial and follow-up laboratory analysis reports for the mold air samples.

2.0 OBSERVATIONS AND DISCUSSION

TRC's evaluation included evaluating representative large rooms, hallways, and unoccupied classrooms. TRC's observations and discussions were based on the following:

- Inspecting for possible microbiological reservoirs or amplifiers and sources of odor, chemical air contaminants, and combustion products within the survey areas and associated with the heating, ventilating and air conditioning (HVAC) system serving those areas.
- Collecting instantaneous, direct-reading measurements for dry bulb temperature, relative humidity, carbon dioxide and carbon monoxide concentrations indoors in the representative areas and outdoors for comparison.
- Collecting mold air samples in the front office, foyer, gym, library, cafeteria, art room, science classroom, classroom 215 and the adjacent hallways, as well as two (2) outdoor samples for comparison.

2.1 OCCUPIED SPACE

The School building consists of a typical School with office space, common areas such as hallways, Cafeteria/Auditorium, Library, Gymnasium and classroom space. The following was noted:

- The classrooms were not occupied at the time of the inspection, but adjacent rooms contained teachers.
- The outdoor temperatures ranged from 83.9 to 84.7 °F on the day of the survey. The HVAC system was operating, and the windows were closed.
- No substantial water leaks or intrusion areas were observed.

2.2 DIRECT-READING ENVIRONMENTAL MEASUREMENTS

TRC performed direct-reading environmental measurements within front office, foyer, gym, library, cafeteria, art room, science classroom, classroom 215 and the adjacent hallways, and in the outdoor air, on September 4, 2020. TRC measured for dry bulb temperature, relative humidity, carbon dioxide and carbon monoxide concentrations using a TSI Q-Trak Indoor Air Quality Monitor. This is a direct-reading instrument.

Appendix A presents direct-reading environmental measurements and Appendix B provides the updated instrument calibration report.

2.2.1 Dry Bulb Temperature and Relative Humidity

On the day of the survey, TRC measured indoor dry bulb temperatures ranging from 69.0 to 74.8°F. The outdoor dry bulb temperature ranged from 83.9 to 84.7 °F. TRC measured indoor relative humidity in the occupied spaces ranging from 70.0 to 84.5%. The outdoor relative humidity ranged from 79.9 to 84.0%.

Occupant thermal comfort is based on a combination of temperature and relative humidity. The American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE) Standard 55-1992, *Thermal Environmental Conditions for Human Occupancy*, and Standard 55a-1995 Amendment, recommends a range and combination of temperature and relative humidity considered as acceptable for general occupant comfort.

The temperatures and relative humidity levels recommended in ASHRAE Standard 55-1992 and Standard 55a-1995 provide for conditions for which 90 percent of occupants will not express discomfort. The range of temperatures and relative humidity prescribed change from summer to winter and assume that occupants dress appropriately for the season. Ranges of temperature include adjustment factors based on occupant activity (metabolic rate) and clothing factor.

For occupants of office space with a metabolic range of 0.8 to 1.2, the recommended comfort ranges for temperature and relative humidity are:

- **Winter**

Temperature - Dry Bulb: 67 to 76 °F at 64 °F Wet Bulb
(85 to 54 Percent Relative Humidity)
and
69 to 76 °F at 36 °F Dew Point
(30 to 23 Percent Relative Humidity)

- **Summer**

Temperature - Dry Bulb: 73 to 79 °F at 68 °F Wet Bulb
(78 to 58 Percent Relative Humidity)
and
74 to 87 °F at 36 °F Dew Point
(28 to 20 Percent Relative Humidity)

If space utilization or clothing factors change, then the temperature range will also change in accordance with:

$$T_{\text{active}} = T_{\text{sedentary}} - 5.4 (1 + \text{Clo}) (\text{Met} - 1.2)$$

Regardless of the metabolic rate calculation from above;
the minimum temperature permitted is 59 °F

ASHRAE Standard 62:2001, *Ventilation for Acceptable Indoor Air Quality*, recommends that, to avoid fungal amplification in building fabrics, relative humidity in occupied spaces should be maintained below 60 percent.

The measured indoor temperatures were found to be within the acceptable range, and the relative humidity readings were typical of summertime conditions, elevated above the recommended 60% maximum level.

2.2.2 Carbon Dioxide

On the day of the survey, TRC measured outdoor carbon dioxide concentrations between 413 to 425 parts per million (ppm). Indoor carbon dioxide concentrations ranged from between 423 to 545 ppm.

ASHRAE Standard 62:2001, *Ventilation for Acceptable Indoor Air Quality*, identifies indoor carbon dioxide concentrations as a surrogate determination of ventilation efficiency. For a building under normal occupancy load and operating in its normal conditioning, a comparison of indoor air and outdoor air carbon dioxide concentrations can be used to indicate relative ventilation efficiency for the occupied spaces. Provided the occupant density does not exceed the recommended levels in ASHRAE Standard 62:2001, when the peak indoor carbon dioxide concentration exceeds the outdoor concentration by more than 700 ppm, the ventilation rate for that space is inadequate for the occupant loading.

An indoor carbon dioxide concentration of 700 ppm above the outdoor concentration is not a significant risk to health; however, other bio-effluents from occupants and pollutants from building components may accumulate to irritant levels or result in discomfort for the occupants due to inadequate ventilation.

Of the indoor measurements collected on September 4, 2020, none of the readings exceeded the recommended maximum 1,125 ppm (700+425), the calculated ASHRAE recommended indoor carbon dioxide concentration at the start of the survey. In summary, all of the readings were found to be at acceptable levels of CO₂.

2.2.3 Carbon Monoxide

Carbon monoxide is an odorless, colorless toxic gas produced by the incomplete combustion of solid, liquid and gaseous fuels. Elevated indoor carbon monoxide concentrations may be a result of combustion sources indoors or the introduction of combustion products from outdoors into the indoor air. In the absence of indoor sources, indoor carbon monoxide concentrations are usually less than, or equal to outdoor concentrations. ASHRAE Standard 62-2001 recommends an upper limit for carbon monoxide of 9 ppm as a 24-hour average, and 35 ppm as a 1-hour average.

The indoor and outdoor carbon monoxide concentrations were less than 1 ppm.

2.3 MICROBIAL AIR SAMPLING

On September 4, 2020, Mr. Timothy Kiesel, Industrial Hygiene Technician from TRC conducted representative mold air sampling throughout the building. TRC collected eleven (11) air samples within the front office, foyer, gym, library, cafeteria, art room, science classroom, classroom 215 and the adjacent hallways, as well as two (2) outdoor samples for comparison. The analytical results showed that the indoor air sample results were within acceptable limits with the exception of the art room.

TRC collected eleven (11) air samples within the front office, foyer, gym, library, cafeteria, art room, science classroom, classroom 215 and the adjacent hallways, as well as two (2) outdoor samples for comparison. Airborne fungal spore samples were collected by drawing air through an Allergenco-D cassette. These cassettes were then sent to Hayes Microbial Consulting, Inc. of Midlothian, Virginia and submitted for analysis, where fungal spores were identified by genera and concentration. Fungal spores are present in normal settings. In general, if the indoor samples are found to have greater diversity of genera, and/or higher amounts of fungal spores than outdoor samples, it can be determined that the subject space may be facilitating microbial growth.

The results of the mold spore analysis of the air samples are presented in the attached Laboratory Report. To interpret the results, a total indoor airborne mold spore concentration for indoor mold genres of less than outdoor levels or less than 2,000 counts per cubic meter of air (cts/m³) is considered low or clean for an indoor environment. For individual mold genera, indoor airborne concentrations below 1,000 cts/m³ are considered low or clean for an indoor environment. The analytical results show that the indoor air sample results are within acceptable limits with the exception of the art room. The analytical results show an elevated count of aspergillus/penicillium spores in the art room.

A follow-up visit to the school art room was done following a cleaning of the art room. Two air samples were collected from the art room and the results were compared to two outdoor samples. Sample results show that the airborne concentrations were within acceptable limits.

3.0 CONCLUSIONS AND RECOMMENDATIONS

TRC's conclusions and recommendations are based on its observations, including visual surveys, sample results and inspections presented in this report.

3.1 CONCLUSIONS

- A. Temperature readings were within normal ranges.
- B. The CO₂ readings were within the recommended comfort levels.
- C. The relative humidity was slightly above the recommended summertime limits and carbon monoxide levels were within the recommended limits. The elevated humidity is typical of summertime conditions. The direct read measurements are attached in Appendix A.
- D. No visible suspect mold or water staining was observed.
- E. Eleven (11) air samples were collected within the front office, foyer, gym, library, cafeteria, art room, science classroom, classroom 215 and the adjacent hallways on September 4, 2020, as well as two (2) outdoor samples for comparison. The initial analytical results show that the indoor concentrations were within acceptable limits with the exception of the art room. Once informed of the initial results, WHRSD retained a cleaning company to clean the room. Following the cleaning activities, a follow-up site visit was done to collect mold air samples from the art room. The follow-up analysis results showed that the airborne mold concentrations were found to be within acceptable limits.

3.2 RECOMMENDATIONS

TRC does not have any further recommendations at this time. Should you have any questions or if things change within the building please give us a call.



This report prepared by:

Tim Kiesel
Project Manager



This report reviewed by:

Gregory Hatch
BSI - Office Practice Leader

Date: September 21, 2020

APPENDIX A

DIRECT-READING ENVIRONMENTAL MEASUREMENTS

**Whitman Middle School
September 4, 2020**

| LOCATION | Time | Temp (°F) | CO (ppm) | CO₂ (ppm) | RH (%) | Comments/ [Number of Occupants] |
|----------------------------------|-----------------------|----------------------|---------------------|---------------------------------|-------------------|--|
| ACCEPTABLE LIMIT | <u>a.m.</u> / p.m. | 69 – 76 | 9 | 1,125 | <78 | |
| Outdoors | 9:35 | 84.7 | 0.0 | 413 | 84.0 | Sunny |
| | 9:40 | 83.9 | 0.0 | 425 | 79.9 | Sunny |
| Front Office | 7:40 | 69.0 | 0.0 | 493 | 70.0 | HVAC on; Windows Closed/[1] |
| Foyer | 7:50 | 71.6 | 0.0 | 459 | 74.3 | HVAC on; Windows Closed/[0] |
| Gym | 8:00 | 72.9 | 0.0 | 423 | 84.5 | HVAC on; Doors Open/[0] |
| Hallway adjacent to Gym | 8:10 | 73.1 | 0.0 | 415 | 80.0 | HVAC on; Windows Closed/[0] |
| Library | 8:20 | 72.1 | 0.0 | 429 | 71.1 | HVAC on; Windows Closed/[0] |
| Cafeteria | 8:30 | 74.6 | 0.0 | 443 | 73.5 | HVAC on; Windows Closed/[0] |
| Hallway adjacent to Cafeteria | 8:40 | 74.8 | 0.0 | 442 | 76.2 | HVAC on; Doors Open/[0] |
| Art Room | 8:50 | 73.9 | 0.0 | 509 | 78.7 | HVAC on; Windows Closed/[1] |
| Science Room | 9:00 | 73.1 | 0.0 | 456 | 80.2 | HVAC on; Windows Closed/[0] |
| Upstairs Hallway | 9:10 | 74.5 | 0.0 | 468 | 81.2 | HVAC on; Windows Closed/[0] |
| Room 215 | 9:20 | 74.9 | 0.0 | 545 | 80.7 | HVAC on; Windows Closed/[0] |
| Downstairs Hallway | 9:30 | 73.8 | 0.0 | 455 | 80.0 | HVAC on; Windows Closed/[0] |

APPENDIX B

IAQ MONITOR CALIBRATION REPORT

APPENDIX C

MOLD AIR SAMPLE ANALYSIS

Analysis Report prepared for

TRC Companies

814 Broad Street
Weymouth, MA 02189

Phone: (781) 337-0016

Whitman Hanson School District
Whitman Middle
100 Corthell Ave.
Whitman, MA 02382

Collected: **September 4, 2020**
Received: **September 8, 2020**
Reported: **September 8, 2020**

We would like to thank you for trusting Hayes Microbial for your analytical needs!
We received 13 samples by FedEx in good condition for this project on September 8th, 2020.

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. This report may not be duplicated, except in full, without the written consent of Hayes Microbial Consulting, LLC..

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 | 3256022 | | | 2 | 325050 | | | 3 | 3256062 | | | 4 | 3256038 | | |
|-------------------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|---|---------|--|--|
| Sample Name | Outdoors | | | Entrance Lobby | | | Gym | | | Library | | | | | | |
| Sample Volume | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | | | | | |
| Reporting Limit | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | | | | | |
| Background | 2 | | | 3 | | | 2 | | | 2 | | | | | | |
| Fragments | ND | | | ND | | | ND | | | ND | | | | | | |
| Organism | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | | | | |
| Alternaria | | | | | | | | | | | | | | | | |
| Ascospores | 140 | 1867 | 11.9% | | | | 80 | 1067 | 18.3% | 4 | 53 | 21.1% | | | | |
| Aspergillus Penicillium | | | | | | | 5 | 67 | 1.1% | | | | | | | |
| Basidiospores | 926 | 12347 | 78.6% | 3 | 40 | 60.0% | 322 | 4293 | 73.5% | | | | | | | |
| Bipolaris Drechslera | | | | | | | | | | | | | | | | |
| Chaetomium | | | | | | | | | | | | | | | | |
| Cladosporium | 110 | 1467 | 9.3% | 1 | 13 | 20.0% | 30 | 400 | 6.8% | 12 | 160 | 63.2% | | | | |
| Curvularia | | | | | | | | | | | | | | | | |
| Epicoccum | | | | | | | | | | | | | | | | |
| Fusarium | | | | | | | | | | | | | | | | |
| Memnoniella | | | | | | | | | | | | | | | | |
| Myxomycetes | | | | 1 | 13 | 20.0% | | | | 2 | 27 | 10.5% | | | | |
| Pithomyces | | | | | | | | | | 1 | 13 | 5.3% | | | | |
| Stachybotrys | | | | | | | | | | | | | | | | |
| Stemphylium | | | | | | | | | | | | | | | | |
| Torula | | | | | | | 1 | 13 | <1% | | | | | | | |
| Ulocladium | | | | | | | | | | | | | | | | |
| Zygomycota | 2 | 27 | <1% | | | | | | | | | | | | | |
| Total | 1178 | 15708 | 100% | 5 | 66 | 100% | 438 | 5840 | 100% | 19 | 253 | 100% | | | | |

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



Collected: **Sep 4, 2020**

Received: **Sep 8, 2020**

Reported: **Sep 8, 2020**

Project Analyst:
 Connor Gailliot, BS

Date:
09 - 08 - 2020

Reviewed By:
 Steve Hayes, BSMT


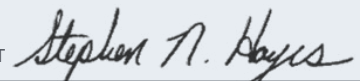
Date:
09 - 08 - 2020

| Sample Number | 5 3256033 | | | 6 3256057 | | | 7 3256042 | | | 8 3256027 | | |
|-------------------------|--------------------------|------------------------|-------------|--------------------------------|------------------------|-------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|
| Sample Name | Cafeteria | | | Hallway Adj to Caf and Door 12 | | | Art Room | | | Science Classroom | | |
| Sample Volume | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | |
| Reporting Limit | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | |
| Background | 2 | | | 2 | | | 2 | | | 2 | | |
| Fragments | ND | | | ND | | | ND | | | ND | | |
| Organism | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total |
| Alternaria | | | | | | | | | | | | |
| Ascospores | 2 | 27 | 11.1% | 10 | 133 | 40.0% | 8 | 107 | 2.1% | | | |
| Aspergillus Penicillium | | | | | | | 316 | 4213 | 81.2% | | | |
| Basidiospores | 16 | 213 | 88.9% | 15 | 200 | 60.0% | 3 | 40 | <1% | 8 | 107 | 100.0% |
| Bipolaris Drechslera | | | | | | | | | | | | |
| Chaetomium | | | | | | | | | | | | |
| Cladosporium | | | | | | | 61 | 813 | 15.7% | | | |
| Curvularia | | | | | | | 1 | 13 | <1% | | | |
| Epicoccum | | | | | | | | | | | | |
| Fusarium | | | | | | | | | | | | |
| Memnoniella | | | | | | | | | | | | |
| Myxomycetes | | | | | | | | | | | | |
| Pithomyces | | | | | | | | | | | | |
| Stachybotrys | | | | | | | | | | | | |
| Stemphylium | | | | | | | | | | | | |
| Torula | | | | | | | | | | | | |
| Ulocladium | | | | | | | | | | | | |
| Zygophiala | | | | | | | | | | | | |
| Total | 18 | 240 | 100% | 25 | 333 | 100% | 389 | 5186 | 100% | 8 | 107 | 100% |

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



Collected: **Sep 4, 2020** Received: **Sep 8, 2020** Reported: **Sep 8, 2020**

Project Analyst: Connor Gailliot, BS  Date: **09 - 08 - 2020** Reviewed By: Steve Hayes, BSMT  Date: **09 - 08 - 2020**

| Sample Number | 9 3256028 | | | 10 3256044 | | | 11 3256043 | | | 12 3256037 | | |
|-------------------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|----------------------------------|------------------------|-------------|--------------------------|------------------------|-------------|
| Sample Name | Upstairs Hallway | | | Room 215 | | | Downstairs Hallway Admin Section | | | Front Office | | |
| Sample Volume | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | |
| Reporting Limit | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | |
| Background | 2 | | | 2 | | | 2 | | | 2 | | |
| Fragments | ND | | | ND | | | 40/m ³ | | | 27/m ³ | | |
| Organism | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total |
| Alternaria | | | | | | | | | | | | |
| Ascospores | 94 | 1253 | 31.1% | 118 | 1573 | 19.8% | 130 | 1733 | 38.8% | 5 | 67 | 41.7% |
| Aspergillus Penicillium | | | | | | | | | | | | |
| Basidiospores | 208 | 2773 | 68.9% | 476 | 6347 | 79.7% | 192 | 2560 | 57.3% | 6 | 80 | 50.0% |
| Bipolaris Drechslera | | | | | | | | | | | | |
| Chaetomium | | | | | | | | | | | | |
| Cladosporium | | | | 3 | 40 | <1% | 11 | 147 | 3.3% | | | |
| Curvularia | | | | | | | | | | | | |
| Epicoccum | | | | | | | 1 | 13 | <1% | | | |
| Fusarium | | | | | | | | | | | | |
| Memnoniella | | | | | | | | | | | | |
| Myxomycetes | | | | | | | | | | 1 | 13 | 8.3% |
| Pithomyces | | | | | | | 1 | 13 | <1% | | | |
| Stachybotrys | | | | | | | | | | | | |
| Stemphylium | | | | | | | | | | | | |
| Torula | | | | | | | | | | | | |
| Ulocladium | | | | | | | | | | | | |
| Zygophiala | | | | | | | | | | | | |
| Total | 302 | 4026 | 100% | 597 | 7960 | 100% | 335 | 4466 | 100% | 12 | 160 | 100% |

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



Collected: **Sep 4, 2020**

Received: **Sep 8, 2020**

Reported: **Sep 8, 2020**

Project Analyst:
 Connor Gailliot, BS

Date:
09 - 08 - 2020

Reviewed By:
 Steve Hayes, BSMT

Date:
09 - 08 - 2020

| | | | | | |
|-------------------------|--------------------------|------------------------------|-------------------|--|--|
| Sample Number | 13 | 3256032 | | | |
| Sample Name | Outdoors | | | | |
| Sample Volume | 75.00 liter | | | | |
| Reporting Limit | 13 spores/m ³ | | | | |
| Background | 2 | | | | |
| Fragments | 27/m ³ | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Organism | Raw Count | Count / m³ | % of Total | | |
| Alternaria | | | | | |
| Ascospores | 198 | 2640 | 22.7% | | |
| Aspergillus Penicillium | 7 | 93 | <1% | | |
| Basidiospores | 644 | 8587 | 73.9% | | |
| Bipolaris Drechslera | | | | | |
| Chaetomium | | | | | |
| Cladosporium | 21 | 280 | 2.4% | | |
| Curvularia | | | | | |
| Epicoccum | | | | | |
| Fusarium | | | | | |
| Memnoniella | | | | | |
| Myxomycetes | 1 | 13 | <1% | | |
| Pithomyces | | | | | |
| Stachybotrys | | | | | |
| Stemphylium | | | | | |
| Torula | | | | | |
| Ulocladium | | | | | |
| Zygomycota | | | | | |
| | | | | | |
| | | | | | |
| Total | 871 | 11613 | 100% | | |

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

| | | | | | | | | | | | |
|---|---|---|-----------------|--|-------------------------------|---|------------------------------------|---|-------------------|--|--|
| 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. | | | | | | | | | | |
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| 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. | | | | | | | | | | |

| | |
|-------------------|--|
| 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 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. |

| | |
|-------------------|---|
| Curvularia | Habitat: They exist in soil and plant debris, and are plant pathogens. |
| | Effects: They are allergenic and a common cause of allergic fungal sinusitis. An occasional cause of human infection, including keratitis, sinusitis, onychomycosis, mycetoma, pneumonia, endocarditis and disseminated infection, primarily in the immunocompromised. |

| | |
|------------------|--|
| Epicoccum | Habitat: It is found in soil and plant litter and is a plant pathogen. It can grow indoors on a variety of substrates, including paper and textiles and is commonly found on wet drywall. |
| | Effects: It is a common allergen. No cases of infection have been reported in humans. |

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.

Pithomyces

Habitat: Common fungus isolated from soil, decaying plant material. Rarely found indoors.

Effects: Allergenic properties are poorly studied. No cases of infection in humans.

Torula

Habitat: Found in soil and on wood and grasses. Occasionally found growing indoors on cellulose containing materials.

Effects: A known allergen. No known cases of human infection.

Zygomycota

Habitat: Rarely found in outdoor air and is a plant pathogen.

Effects: No known health effects.

Analysis Report prepared for

TRC Companies

814 Broad Street
Weymouth, MA 02189

Phone: (781) 337-0016

Whitman Hanson Regional School
Whitman Middle School
100 Cortwell Ave.
Whitman, MA

Collected: **September 17, 2020**
Received: **September 18, 2020**
Reported: **September 18, 2020**

We would like to thank you for trusting Hayes Microbial for your analytical needs!
We received 4 samples by FedEx in good condition for this project on September 18th, 2020.

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. This report may not be duplicated, except in full, without the written consent of Hayes Microbial Consulting, LLC..

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 | 3256030 | 2 | 3256023 | 3 | 3256025 | 4 | 3256026 | | | | |
|-------------------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|--------------------------|------------------------|-------------|
| Sample Name | Outdoors | | | Back of Art Room | | | Front of Art Room | | | Otudoors | | |
| Sample Volume | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | | 75.00 liter | | |
| Reporting Limit | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | | 13 spores/m ³ | | |
| Background | 2 | | | 2 | | | 2 | | | 2 | | |
| Fragments | ND | | | ND | | | ND | | | ND | | |
| Organism | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total | Raw Count | Count / m ³ | % of Total |
| Alternaria | | | | 1 | 13 | 2.2% | | | | 1 | 13 | 2.1% |
| Ascospores | 6 | 80 | 26.1% | | | | | | | 2 | 27 | 4.3% |
| Aspergillus Penicillium | 2 | 27 | 8.7% | 39 | 520 | 86.7% | 23 | 307 | 85.2% | 8 | 107 | 17.0% |
| Basidiospores | 3 | 40 | 13.0% | 1 | 13 | 2.2% | | | | 3 | 40 | 6.4% |
| Bipolaris Drechslera | | | | | | | | | | | | |
| Chaetomium | | | | | | | | | | | | |
| Cladosporium | 4 | 53 | 17.4% | | | | 4 | 53 | 14.8% | 28 | 373 | 59.6% |
| Curvularia | 3 | 40 | 13.0% | | | | | | | 1 | 13 | 2.1% |
| Epicoccum | 2 | 27 | 8.7% | 2 | 27 | 4.4% | | | | | | |
| Fusarium | | | | | | | | | | | | |
| Memnoniella | | | | | | | | | | | | |
| Myxomycetes | 2 | 27 | 8.7% | 1 | 13 | 2.2% | | | | 2 | 27 | 4.3% |
| Pithomyces | 1 | 13 | 4.3% | 1 | 13 | 2.2% | | | | 2 | 27 | 4.3% |
| Stachybotrys | | | | | | | | | | | | |
| Stemphylium | | | | | | | | | | | | |
| Torula | | | | | | | | | | | | |
| Ulocladium | | | | | | | | | | | | |
| Total | 23 | 307 | 100% | 45 | 599 | 100% | 27 | 360 | 100% | 47 | 627 | 100% |

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

Collected: **Sep 17, 2020**

Received: **Sep 18, 2020**

Reported: **Sep 18, 2020**



Project Analyst:
 Shareef Abdelgadir, MS *Shareef Abdelgadir*

Date:
09 - 18 - 2020

Reviewed By:
 Steve Hayes, BSMT *Stephen N. Hayes*

Date:
09 - 18 - 2020

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. | | | | | | | | | | |
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| 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. | | | | | | | | | | |

| | |
|--------------------------------|--|
| Alternaria | Habitat: Commonly found outdoors in soil and decaying plants. Indoors, it is commonly found on window sills and other horizontal surfaces. Effects: A common allergen and has been associated with hypersensitivity pneumonitis. Alternaria is capable of producing toxic metabolites which may be associated with disease in humans or animals. Occasionally an agent of onychomycosis, ulcerated cutaneous infection and chronic sinusitis, principally in the immunocompromised patient. |
| 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 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. |
| Curvularia | Habitat: They exist in soil and plant debris, and are plant pathogens. Effects: They are allergenic and a common cause of allergic fungal sinusitis. An occasional cause of human infection, including keratitis, sinusitis, onychomycosis, mycetoma, pneumonia, endocarditis and disseminated infection, primarily in the immunocompromised. |

Epicoccum

Habitat: It is found in soil and plant litter and is a plant pathogen. It can grow indoors on a variety of substrates, including paper and textiles and is commonly found on wet drywall.

Effects: It is a common allergen. No cases of infection have been reported in humans.

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.

Pithomyces

Habitat: Common fungus isolated from soil, decaying plant material. Rarely found indoors.

Effects: Allergenic properties are poorly studied. No cases of infection in humans.