LIMITED MOLD AND MOISTURE ASSESSMENTS

ALEXANDRIA CITY HIGH SCHOOL - MINNIE HOWARD CAMPUS

3801 WEST BRADDOCK ROAD
ALEXANDRIA, VIRGINIA 22302

ECS PROJECT NO. 47:11652-I

FOR: ALEXANDRIA CITY PUBLIC SCHOOLS

OCTOBER 5, 2021

October 5, 2021

Mr. John Contreras
Alexandria City Public Schools
1340 Braddock Place
Suite 620
Alexandria, Virginia 22314

ECS Project No. 47:11652-I

Reference: Limited Mold and Moisture Assessments, Alexandria City High School - Minnie Howard Campus, 3801 West Braddock Road, Alexandria, Virginia

Dear Mr. Contreras:

ECS Mid-Atlantic, LLC (ECS) is pleased to provide Alexandria City Public Schools with the results of the Limited Mold and Moisture Assessments performed at Alexandria City High School - Minnie Howard Campus located at 3801 West Braddock Road in Alexandria, Virginia. This report summarizes our observations, analytical results, findings, and recommendations related to the work performed. The work described in this report was performed by ECS in general accordance with the Scope of Services described in ECS Proposal Number 47:18471-EPR and the terms and conditions of the agreement authorizing those services.

ECS appreciates this opportunity to provide Alexandria City Public Schools with our services. If we can be of further assistance to you, please do not hesitate to contact us.

Sincerely,

ECS Mid-Atlantic, LLC

Bobby L. Rhett
Project Manager
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703-471-8400

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TABLE OF CONTENTS

PAGE

1.0 PROJECT DESCRIPTION 1

2.0 PURPOSE 1

3.0 METHODOLOGY 1

4.0 RESULTS 2

4.1 Mold and Moisture 2

4.1.1 Direct Surface Fungi Samples 3

4.1.2 Temperature and Humidity 4

4.1.3 Spore-Trap Air Samples 5

5.0 CONCLUSIONS AND RECOMMENDATIONS 6

6.0 LIMITATIONS 7

TABLE OF APPENDICES

Appendix I: Site Photographs

Appendix II: Air Sample Results

Appendix III: Laboratory Report(s)

Appendix IV: Mold Reference and Guidance Documents

1.0 PROJECT DESCRIPTION

The building located at 3801 West Braddock Road in Alexandria, Virginia is a one- and two-story school building known as the Alexandria City High School - Minnie Howard Campus. Based on the information available, ECS understands that building occupants have reported concerns of visible suspected mold-affected building materials in Classroom 117. Alexandria City Public Schools (ACPS) has requested ECS to conduct limited mold and moisture testing to evaluate these concerns. ECS performed an initial site visit on August 18, 2021. Following the initial assessment, mold remediation was performed by a licensed mold remediation contractor. ECS was requested to perform post-remediation assessment to document the conditions following remediation. ECS performed a post remediation site visit on September 1, 2021.

2.0 PURPOSE

The purpose of the Limited Mold and Moisture Assessments was to conduct visual observations and testing for mold and moisture to identify evidence of moisture-affected building materials or selective amplification of mold within tested areas of the subject building. The scope of services was limited to the north wall of Classroom 117 and the immediate adjacent areas.

3.0 METHODOLOGY

ECS performed the authorized Scope of Services in general accordance with our proposal, standard industry practice(s) and methods specified by guidelines and industry standards for the identification of mold and moisture-affected building materials.

Mold and Moisture

The assessments included a non-invasive visual and olfactory survey for evidence of mold and moisture within the subject property. The assessments focused on the client-selected area indicated by Alexandria City Public Schools. The ECS site personnel observed readily accessible areas and selected building materials to evaluate visible suspect fungal growth and/or moisture impacted materials. A reasonable effort was made to identify water and mold impacted areas; however, this does not imply a guarantee that all possible reservoirs of mold were identified because mold or water-impacted building materials may be hidden by walls, flooring, partitions, etc.

ECS conducted screening of selected areas with a thermal imaging (TI) camera to assess thermal characteristics of building materials that may indicate potential moisture intrusion concerns. Potentially moisture-affected areas identified by the TI screening were subsequently tested using a Delmhorst Model BD-2100 moisture meter to evaluate moisture content. Based on the Delmhorst moisture meter settings, moisture levels greater than 1.0% are considered elevated for drywall or other gypsum materials, and greater than 17% is elevated for wood-based materials. This was not a comprehensive moisture mapping survey of all building materials within the areas surveyed but rather a non-invasive survey of moisture in select areas of specific building materials which may be impacted by moisture.

Ambient temperature, relative humidity, and dewpoint temperature were measured during the survey using a Thermo-Scientific Incorporated (TSI) Model 6545 indoor air quality meter. The purpose of these measurements was to identify elevated interior humidity levels, which could potentially support indoor mold growth or indicate ongoing moisture problems.

Fungal spore air samples were collected by means of a high volume pump and Air-O-Cell® cassettes. Surface samples for fungal spores were collected using sterile pre-packaged/pre-moistened swabs manufactured by Healthlink to sample a suspect surface or material. Surface sampling is a semi-quantitative test and is only indicative of the conditions at the location sampled. Surface samples are primarily meant to identify the presence and type of mold spores on the sampled surfaces.

Samples were transported to Aerobiology Laboratory Associates located in Dulles, Virginia for analysis. Aerobiology Laboratory Associates is accredited by the Environmental Microbiology Laboratory Accreditation Program, administered by the American Industrial Hygiene Association. Air samples were reported to the genus or group level according to the laboratory standard quantification procedures.

It is important to note that fungal spore samples represent a snapshot in time of a constantly changing microbiome. Environmental conditions such as temperature and humidity may influence sample results. The goal of the sampling performed was not to establish precise numerical concentrations over time, but rather to generally identify the dominant fungi in the sampled locations.

4.0 RESULTS

The following is a summary of laboratory results, measurements, findings and observations.

4.1 Mold and Moisture

August 18, 2021 Site Visit:

ECS performed the initial site visit after school hours on August 18, 2021 assisted by John Finnigan of ACPS. Classroom 117 was occupied by the teacher at the time of the survey. The school was otherwise generally vacant with the exception of custodial staff. For the purposes of this report, the wall with the entrance door to Classroom 117 is referred to as the south wall and the exterior wall is referred to as the north wall. Classroom 117 consisted of a previously sub-divided room with the west wall constructed with gypsum board ("drywall"), and the south, east, and north wall constructed of concrete masonry unit (CMU) block or brick. The north wall was constructed with a half-wall of masonry finished with plaster below the windows. Dense fiberboard ("masonite") panels had been attached to the plaster wall below the windows.

ECS observed two small (approximately six inch square) patches of visible suspected mold on the visible face of the masonite panels. One patch was at the approximate center of the wall below the windows (sample W-01), and the second patch was at the west side of the room along the cove base (sample W-02). Thermal imaging of the exterior wall reveialed thermal patterns consistent with moisture in two areas of the north wall, each below a seam between the exterior windows. However, the moisture measurements in the affected areas did not identify elevated moisture. ECS notes that

the Delmhorst meter does not have a calibrated scale for masonite, so moisture measurements represent a wood-moisture equivalent (WME). The WME measurements collected from the masonite were less than 15%.

On the back face of the masonite in Room 117, against the plaster, several patches of mold were visible. ECS estimated approximately 20 to 40 square feet of visible suspected mold was observed. Mr. Finnigan of ACPS indicated that he intended to have the mold remediated by a professional abatement contractor as soon as possible.

ECS did not observe suspected mold in the adjacent classroom or in accessible areas of the office on the west side of Room 117. ECS noted that the wall construction in the adjacent classroom was not identical, and consisted of masonite attached with adhesive to CMU block, with no plaster on the masonry. ECS observed the exterior of the building, and noted deteriorated window caulk and mortar joints around the windows of Room 117. ECS also noted that the exterior ground at Classroom 117 changed from positively sloped concrete to landscaped soil. These factors could be related to the moisture identified in Classroom 117.

September 1, 2021 Site Visit:

ECS performed a follow-up site visit on September 1, 2021 assisted by John Finnigan of ACPS. Classroom 117 was unoccupied at the time of the survey. The school was generally vacant with the exception of custodial staff. The masonite panels and underlying plaster had been completely removed from the wall below the height of the windows. The brick and concrete masonry unit (CMU) block wall was exposed and did not appear to be affected by moisture at the time of the survey.

Thermal imaging of the exterior wall did not reveal thermal patterns consistent with moisture. Moisture measurements in the remaining wood materials (window framing) did not identify elevated moisture. The measurements collected from the wood framing were less than 15%.

Below is a summary of the sampling data collected as part of the assessments.

4.1.1 Direct Surface Fungi Samples

Surface samples were collected from the visible staining on the exposed surface of the masonite panels in Classroom 117 during the initial site visit. Sample locations were selected from areas suspected to have fungal spore concentrations present due to water staining on building materials, visible mold growth, or other observations made by ECS indicative of possible fungal spore growth. The following table summarizes the results of sample analysis.

Direct Surface Fungi Samples

Sample Number	Date Collected	Sample Location	Spore Types Identified
W-01	8/18/21	Room 117, north wall, center	**Moderate ascospores** **Moderate colorless spores** **Moderate hyphal elements**
W-02	8/18/21	Room 117, north wall, west side	**Moderate ascospores** **Few colorless spores** **Numerous hyphal elements**

Notes: **Bold = Organisms and/or concentrations of concern.**

The laboratory reports the direct microscopic examination results in accordance with the following density rating:

Occasional= 1-5 per slide

Few = More than 5 per slide but less than 1 per 5 fields

Moderate = At least 1 per 5 fields, average up to 2 per field

Numerous = Average 3-4 per field minimum

"Slide" refers to a prepared specimen on a microscope slide, and "field" refers to the microscope field of view, approximately 1/1,000 of a slide.

Hyphae are the vegetative growth of fungal organisms. Conidiophores or fruiting bodies are the reproductive structures on some fungi that generate spores.

Note: There are no regulations or industry standards for surface concentrations. AIHA and ACGIH guidance does not support numerical classification, and focuses on the type of organisms identified. ECS weighs the results based on site observations and other factors that influence the significance of the results.

The results of the samples collected from the masonite panels identified multiple types of fungal spores and moderate to numerous hyphae, which indicates selective indoor mold colonization on the sampled surface. While the laboratory was unable to identify to the genus level the types of mold present due to morphological similarity between various genera of mold, based on sampling experience, the most commonly identified ascospore from samples of building materials is *Chaetomium* species, and the most commonly identified colorless spore on building materials is *Aureobasidium* species. Both of these organisms tend to develop in areas of high water activity over an extended period of time.

There are currently no accepted regulatory standards or guidelines with respect to acceptable fungal levels inside buildings. Surface samples are generally qualitative in that they reflect the type and quantity of mold present only at the sampled location at the time the sample was collected.

4.1.2 Temperature and Humidity

During the post-remediation assessment on September 1, 2021, ECS collected measurements of temperature, relative humidity, and dew point.

The key to understanding humidity is that warmer air can contain greater quantities of moisture than cooler air. Relative humidity is defined as the ratio of the amount of moisture contained in the air to the maximum amount of moisture the air can contain at that temperature. The dew point is defined as the temperature at which the amount of moisture in the air reaches saturation. The dew point is a more accurate indication of the actual amount of moisture in the air, because it is independent of temperature. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) has published a standard for ventilated buildings. *ANSI/ASHRAE Standard 62.1-2019, Ventilation for Acceptable Air Quality* specifies that indoor humidity should be maintained below 60 degrees Fahrenheit (°F) dew point temperature to the extent possible. The EPA recommends that indoor relative humidity be maintained below 60%, ideally 30-50%, to prevent mold growth. The *OSHA Technical Manual,* Section III, Chapter 2 for Indoor Air Quality Investigations specifies a thermal comfort range of 68°F to 76°F and a relative humidity range of 20% to 60% to maximize comfort for all occupants.

The following table summarizes the indoor air temperature and relative humidity readings collected by ECS.

Temperature, Relative Humidity, and Dew Point

Location	Date Collected	Temperature (°F)	Relative Humidity (%)	Dew Point (°F)
Room 117	9/1/21	73.1	71.4	63.3
Room 118	9/1/21	71.2	71.8	61.6
Outdoors	9/1/21	84.0	83.9	78.6

The weather at the time of the site visit was cloudy with passing showers. The indoor relative humidity levels were elevated, likely due to outdoor humidity drawn in through the ventilation system and building envelope. The indoor dew point levels ranged from 61.6°F to 63.3°F, and were well below the outdoor dew point of 78.6°F. Although the building systems were unable to achieve the recommended levels, the difference between the indoor and outdoor humidity suggests that the building envelope and conditioning were effective in significantly reducing humidity during the unfavorable weather conditions at the time of the survey.

4.1.3 Spore-Trap Air Samples

During the post-remediation assessment on September 1, 2021, fungal spore-trap air samples were collected from Room 117, an adjacent classroom, and outdoors. The adjacent and outdoor samples were collected for comparison. The following table summarizes the results of sample analysis reported in spore counts per cubic meter of air.

Spore-Trap Sample Results

Sample Number	Date Collected	Sample Location	Total Fungal Spore Concentration (count/ cubic meter)
A-01	9/1/21	Room 117	226
A-02	9/1/21	Room 118	134
A-OUT1	9/1/21	Outdoors, pre	85,311
A-OUT2	9/1/21	Outdoors, post	79,844

The laboratory results indicated that the fungal spore concentrations indoors were well below the outdoor fungal spore concentrations. The spore types identified indoors were consistent with the outdoor spore types. The results did not indicate the likely presence of indoor mold sources.

There are currently no accepted regulatory standards or guidelines with respect to acceptable fungal levels inside buildings. It is important to note that spore trap measurements can fluctuate rapidly and the readings reported should not be used as a definitive indication that mold and or health hazards related to mold are present or absent.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our understanding of the purpose of the Limited Mold and Moisture Assessments, the results of laboratory analysis, and our findings and observations, ECS presents the following recommendations.

Mold and Moisture

Based on our understanding of the purpose of the Limited Mold and Moisture Assessments, the results of laboratory analysis, and our findings and observations, ECS concludes that the remediation actions performed at Alexandria City High School - Minnie Howard Campus were successful in restoring Classroom 117 to at least the condition of similar unaffected areas.

The presumed original source of moisture (exterior caulk and mortar failure) is reported to have been resolved. The indoor humidity levels did not suggest indoor sources of moisture at the time of the testing. Indoor fungal spore concentrations in Classrooms 117 and 118 at the conclusion of remediation were well below outdoor concentrations. No significant differences between indoor and outdoor spore types were identified. Photographs of the observed conditions are attached, along with the laboratory results.

There are currently no accepted regulatory standards or guidelines with respect to acceptable fungal levels inside buildings. It is important to note that spore trap measurements can fluctuate rapidly and the results reported should not be used as a definitive indication that mold and or health hazards related to mold are present or absent.

The post-remediation survey did not identify ongoing mold or moisture concerns in Classroom 117. ECS recommends ongoing maintenance and prompt response to any future mold or moisture concerns.

- ECS recommends that interior humidity levels be maintained below 60-65%.
- ECS recommends that any future indoor moisture leaks or evidence of mold is promptly assessed and corrected.

Because of the nature of the environment, complete elimination of all microbial organisms within a building cannot be expected and is not the goal of remediation. The goal of remediation is to restore the affected materials to at least the condition of unaffected materials. It is important to note that the reported mold levels are only reflective of conditions at the time of this test. Mold populations can vary over time, depending upon a number of conditions, including environmental factors such as temperature and relative humidity. If mold growth reappears, or if the occupants experience prolonged allergic-type health complaints, they should seek further investigation of the problem.

Note: The purpose of this survey was to evaluate areas where moisture intrusion or suspected visible mold growth has occurred and provide findings and recommendations for remedial work efforts. Identification and recommendations for correction of sources of moisture should be performed by a qualified engineer.

6.0 LIMITATIONS

The conclusions and recommendations presented within this report are based upon a reasonable level of assessment within normal bounds and standards of professional practice for a site in this particular geographic setting. ECS is not responsible or liable for the discovery and elimination of hazards that may potentially cause damage, accidents, or injuries.

This survey is not intended to represent an exhaustive research of every potential hazard or condition that may exist, nor does it claim to represent indoor conditions or events that arise after the survey. ECS was not requested to assess the potential presence of hazardous materials, and ECS assumes no responsibility for actions taken to address mold or moisture that inadvertently disturb hazardous materials. This report has been prepared in accordance with generally accepted environmental practices. Our conclusions and findings are based, in part, upon information provided to us by others and our site observations. We have not verified the completeness or accuracy of the information provided by others. The scope of services performed was limited to those requested by the Client and does not constitute a full microbial assessment of the site or a comprehensive moisture survey of the site. The data provided in this study is only indicative of conditions sampled at the immediate time of the study.

This report does not warrant against future operations or conditions, nor does it warrant against extant, or future, conditions of a type or at a location not investigated. Because of the nature of this type of work and the difficulties involved in conducting remediation work, ECS cannot guarantee that the methods or recommendations described in this report will eliminate all potential indoor air quality issues. Since performance of the remediation work is also beyond ECS scope of services, ECS also cannot be held responsible for the execution of the remediation work. The reported microbial

levels are only reflective of conditions at the time of this test and that microbial populations can vary over time, depending upon a number of conditions, including environmental factors (i.e., temperature and relative humidity). The work performed in conjunction with this assessment and the data developed is intended as a description of available information at the dates and locations given.

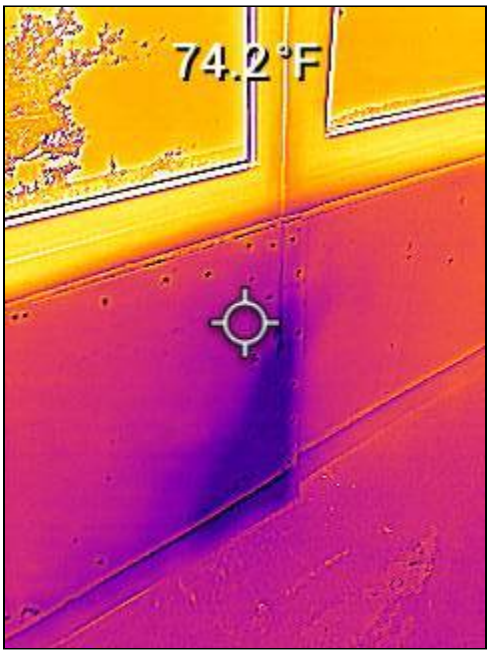
The observations, conclusions, and recommendations pertaining to environmental conditions at the subject site are necessarily limited to conditions observed, and/or materials reviewed at the time this study was undertaken. No warranty, expressed or implied, is made with regard to the conclusions and recommendations presented within this report. This report is provided for the exclusive use of the client. This report is not intended to be used or relied upon in connection with other projects or by other unidentified third parties without the written consent of ECS and the client.

Our recommendations are in part based on federal, state, and local regulations and guidelines. ECS does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies, any conditions at the site that may present a potential danger to public health, safety, or the environment. Under this scope of services, ECS assumes no responsibility regarding any response actions initiated as a result of these findings. General compliance with regulations and response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements.

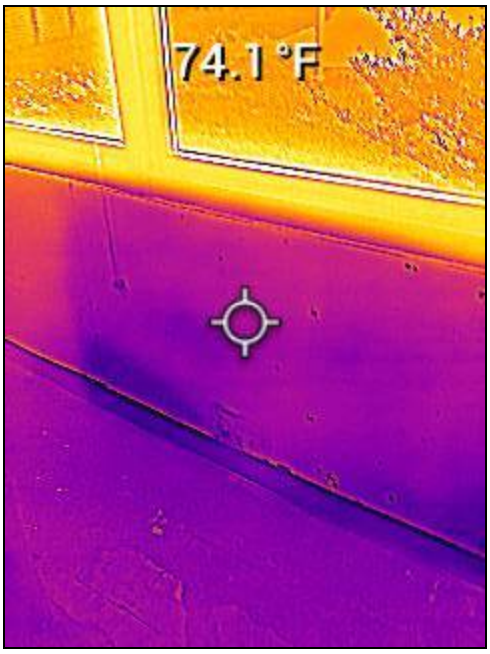
Appendix I: Site Photographs



1 - August 18, 2021 - View of suspected mold on paneling at the center of the north wall in Room 117



2 - August 18, 2021 - Thermal view of the north wall of Room 117 below a joint in the windows



3 - August 18, 2021 - Thermal view of the north wall of Room 117 below a joint in the windows



4 - August 18, 2021 - View of suspected mold behind the paneling on the north wall in Room 117



5 - August 18, 2021 - View of northwest corner of Room 117



6 - August 18, 2021 - View of interior courtyard adjacent to Room 117



7 - August 18, 2021 - View of exterior wall of Room 117



8 - August 18, 2021 - View of deteriorating caulk on exterior windows of Room 117



9 - August 18, 2021 - View of deteriorating caulk and mortar on exterior windows of Room 117



10 - September 1, 2021 - View of Room 117



11 - September 1, 2021 - View of the exterior wall of Room 117 68



12 - September 1, 2021 - View of the exterior wall of Room 117



13 - September 1, 2021 - View of the exterior wall of Room 117 45

Appendix II: Air Sample Results

Alexantria City High School, Minnie Howard Campus
3801 West Braddock Road, Alexandria, Virginia
Site Visit: September 1, 2021
ECS Project No. 47:11652-I

Fungal Spore Trap Air Sample Results

Sample Number	Sample Location	Organisms Identified: Ascospores	Basidiospores	Cladosporium	Curvularia	Hyphae Fragments	Penicillium/ Aspergillus	Smuts/Periconia/ Myxomycetes	Unknown/Other	Total*
A-01	Room 117	40	80	53	13		40			226
A-02	Room 118	27	27	40			27	13		134
A-OUT1	Outdoors, pre	19,627	63,872	960	13	67	360	53	359	85,311
A-OUT2	Outdoors, post	20,693	57,485	973	40	107	307	80	159	79,844

All results are in spores per cubic meter (spores/m3)
Blank = None detected **Bold Red** = organisms of concern detected in greater concentrations indoors than outdooors
*Note: Total counts may not match laboratory reports due to rounding.

Appendix III: Laboratory Report(s)

Aerobiology Laboratory Associates, Incorporated
A Pace Analytical® Laboratory

43760 Trade Center Place
Suite 100
Sterling, Virginia 20166
(877) 648-9150
www.aerobiology.net

Certificate of Analysis
AIHA-LAP EMLAP# 102977

ECS Mid Atlantic, LLC
14026 Thunderbolt Place
Chantilly, Virginia 20151
Attn: Bobby Rhett
Project: **47-11652-1 (BR) Minnic Howard**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 08/18/2021
Date Received: 08/19/2021
Date Analyzed: 08/19/2021
Date Reported: 08/20/2021
Project ID: 21032215

Client Sample #: W-01
Lab Sample #: 21032215-001
Sample Location: Room 117, North Wall, Center
Test: 1051, Surface, Swab - Qualitative Direct Microscopic Exam SOP 3.7: 24hr TAT

Results:	Observation
Moderate ascospores seen	1 per 5 fields
Moderate Colorless spores seen	1 per 5 fields
Moderate hyphal elements seen	1 per 5 fields

Debris Rating: 2

Client Sample #: W-02
Lab Sample #: 21032215-002
Sample Location: Room 117, North Wall, West Side
Test: 1051, Surface, Swab - Qualitative Direct Microscopic Exam SOP 3.7: 24hr TAT

Results:	Observation
Moderate ascospores seen	1 per 5 fields
Few Colorless spores seen	5 per cover slip
Numerous hyphal elements seen	3-4 per field (minimum)

Debris Rating: 2

Aerobiology Laboratory Associates, Incorporated
A Pace Analytical® Laboratory

43760 Trade Center Place
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Sterling, Virginia 20166
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ECS Mid Atlantic, LLC
14026 Thunderbolt Place
Chantilly, Virginia 20151
Attn: Bobby Rhett
Project: **47-11652-1 (BR) Minnic Howard**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 08/18/2021
Date Received: 08/19/2021
Date Analyzed: 08/19/2021
Date Reported: 08/20/2021
Project ID: 21032215

Footnotes and Additional Report Information

Debris Rating Table

1	Minimal (<5%) particulate present	Reported values are minimally affected by particulate load.
2	5% to 25% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
3	26% to 75% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
4	75% to 90% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
5	Greater than 90% of the trace occluded with particulate	Quantification not possible due to large negative bias. A new sample should be collected at a shorter time interval or other measures taken to reduce particulate load.

Aerobiology Laboratory Associates, Inc. shall be responsible for all the information provided in the report, except when information is provided by the customer. Data provided by a customer can affect the validity of results and shall be clearly identified. Results apply to the samples as received. Aerobiology Laboratory Associates, Inc. is not responsible for the sampling activity, such as air and water volume, area, and mass unit. The report shall not be reproduced except in full without the approval of the laboratory to ensure that parts of a report are not taken out of context. Data interpretation of this report will be the client responsibility based on their sampling.

1. Penicillium/Aspergillus group spores are characterized by their small size, round to ovoid shape, being unicellular, and usually colorless to lightly pigmented. There are numerous genera of fungi whose spore morphology is similar to that of the Penicillium/Aspergillus type. Two common examples would be Paecilomyces and Acremonium. Although the majority of spores placed in this group are Penicillium, Aspergillus, or a combination of both. Keep in mind that these are not the only two possibilities.

2. Ascospores are sexually produced fungal spores formed within an ascus. An ascus is a sac-like structure designed to discharge the ascospores into the environment, e.g. Ascobolus.

3. Basidiospores are typically blown indoors from outdoors and rarely have an indoor source. However, in certain situations a high basidiospore count indoors may be indicative of a wood decay problem or wet soil.

4. The colorless group contains colorless spores which were unidentifiable to a specific genus. Examples of this group include Acremonium, Aphanocladium, Beauveria, Chrysosporium, Engyodontium microconidia, yeast, some arthrospores, as well as many others.

5. Hyphae are the vegetative mode of fungi. Hyphal elements are fragments of individual Hyphae. They can break apart and become airborne much like spores and are potentially allergenic. A mass of hyphal elements is termed the mycelium. Hyphae in high concentration may be indicative of colonization.

6. Dash (-) in this report, under raw count column means 'not detected (ND)'; otherwise 'not applicable' (NA).

7. The positive-hole correction factor is a statistical tool which calculates a probable count from the raw count, taking into consideration that multiple particles can impact on the same hole; for this reason the sum of the calculated counts may be less than the positive hole corrected total.

8. Due to rounding totals may not equal 100%.

9. Analytical Sensitivity for each spores is different for Non-viable sample when the spores are read at different percentage. Analytical Sensitivity is calculated as spr/m^3 divided by raw count. spr/m^3 = raw counts x (100/ % read) x (1000/Sample volume). If Analytical Sensitivity is 13 spr/m^3 at 100% read, Analytical Sensitivity at 50% read would be 27 spr/m^3, which is 2 times higher. Analytical Sensitivity provided on the report is based on an assumed 100% of the trace being analyzed.

10. Minimum Reporting Limits (MRL) for BULKS, DUSTS, SWABS, and WATER samples are a calculation based on the sample size and the dilution plate on which the organism was counted. Results are a compilation of counts taken from multiple dilutions and multiple medias. This means that every genus of fungi or bacteria recovered can be counted on the plate on which it is best represented.

11. If the final quantitative result is corrected for contamination based on the blank, the blank correction is stated in the sample comments section of the report.

12. The results in this report are related to this project and these samples only.

13. For samples with an air volume of < 100L, the number of significant figures in the result should be considered (2) two. For samples with air volumes between 100-999L, the number of significant figures in the result should considered (3) three. For example, a sample with a result of 55,443 spr/m^3 from a 75L sample using significant figures should be considered 55,000. The same result of 55,443 from a 150L sample using significant figures should be considered 55,400 spr/m^3.

14. If the In/Out ratio is greater than 100 times it is indicated >100/1, rather than showing the real value.

Terminology Used in Direct Exam Reporting

Conidiophores are a type of modified hyphae from which spores are born. When seen on a surface sample in moderate to numerous concentrations they may be indicative of fungal growth.

Suzanne S. Blevins, B.S., SM (ASCP)
Laboratory Director

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Aerobiology Laboratory Associates, Incorporated — Expertise Since 1997

ECS

21 032215

21032215

ELITE Program

AZ, CA, CO, FL, GA, IL, VA, NJ

NVLAP

AZ, CA, CO, VA

VA - 102977 AZ - 210229
CA - 218951 CO - 192683
NJ - 102747 GA - 163063
FL - 228303 IL - 232279

Aerobiology Client	ECS Mid-Atlantic, LLC		
Field Contact	Bobby Rhett	Collected By/Date: B. Rhett 8/18	Relinquished By/Date: B. Rhett 8/18/2021
Reporting Address	14026 Thunderbolt Place, Suite 100 Chantilly, VA 20151	Relinquished By/Date:	Received By/Date: SM 8/19/21 9:30 am
Billing Address	14026 Thunderbolt Place, Suite 100 Chantilly, VA 20151	Sampler Type: Andersen____ SAS____	SampleAire____ AeroTrap____ Other____ BioCulture____
Phone/Fax	703-471-8400	PO#/Job#: 47-11552-1 (BR)	
Reporting Email (s)	brhett@ecslimited.com	Project Name: Minnie Howard	
Routine ☐	24 hour ☒	same day ☐	4-hour ☐ 5 day (PLM) ☐
SAMPLING LOCATION ZIP CODE		Notes:	
		CC Info:	

	Sample No.	Test Code	Sample Location	Total Volume/Area
1	W-01	1051	Room 117, North wall, center	N/A
2	W-02	1051	Room 117, north wall, West side	N/A
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

1054	Direct, Non-viable Spore Trap	1015	Culture - WATER Legionella
1051	Direct, Qualitative- **Swab/Tape**	1017	Culture - SWAB Legionella
1050	Direct, Qualitative- **Bulk**	1010	WATER - Potable - E. coli/total coliforms
1005	AIR Culture - Bacterial Count w/ ID's	1012	SWAB - E. coli/total coliforms
1030	AIR Culture - Fungal Count w/ ID's	1028	SWAB - Sewage Screen (E. coli/Entero/fecal coliforms)
1006	SWAB Culture - Bacterial Count w/ ID's	2056	WATER - Heterotrophic Plate Count
1031	SWAB Culture - Fungal Count w/ ID's	3001	ASBESTOS - Point count
1008	BULK Culture - Bacterial Count w/ ID's	3002	ASBESTOS - PLM Analysis
1033	BULK Culture - Fungal Count w/ ID's	3003	ASBESTOS - Particle characterization
1007	WATER Culture - Bacterial Count w/ID's	3004	ASBESTOS - PCM Analysis

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Certificate of Analysis
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43760 Trade Center Place
Suite 100
Sterling, VA 20166
8776489150

ECS Mid Atlantic, LLC
14026 Thunderbolt Place
Chantilly VA, 20151
Attn: Bobby Rhett
Project: **47-11652-I Minnie Howard**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 9/1/2021
Date Received: 9/2/2021
Date Analyzed: 9/7/2021
Date Reported: 9/8/2021
Project ID: 21038932

1054 Spore Trap Analysis: SOP 3.8

Client Sample #	A-01				A-OUT			
Sample Location	Room 117				Outdoors			
Sample Volume (L)	75				75			
Lab Sample #	21038932-001				21038932-003			
Spore Identification	RawCt	spr/m^3	%Ttl	I/O	RawCt	spr/m^3	%Ttl	I/O
ascospores	3	40	18	1/491	92	19,627	23	-
basidiospores	6	80	35	1/798	80	63,872	75	-
Cercospora	-	-	-	-	1	13	<1	-
Cladosporium	4	53	24	1/18	72	960	1	-
Colorless	-	-	-	-	20	267	<1	-
Curvularia	1	13	6	1/1	1	13	<1	-
Drechslera/Bipolaris group	-	-	-	-	1	13	<1	-
Helicosporium/Helicomyces	-	-	-	-	1	13	<1	-
hyphal elements	-	-	-	-	5	67	<1	-
Penicillium/Aspergillus group	3	40	18	1/9	27	360	<1	-
Pestalotiopsis	-	-	-	-	3	40	<1	-
Smuts,Periconia,Myxomycetes	-	-	-	-	4	53	<1	-
Torula	-	-	-	-	1	13	<1	-
	Debris Rating **2**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **13** spr/m^3				Analytical Sensitivity: **13** spr/m^3			
Comments								
Total *See Footnotes	17	227	~100%	1/376	308	85,312	~100%	-

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Project: **47-11652-I Minnie Howard**
Condition of Sample(s) Upon Receipt: Acceptable

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Date Reported: 9/8/2021
Project ID: 21038932

Client Sample #	A-02				A-OUT			
Sample Location	Room 118				Outdoors			
Sample Volume (L)	75				75			
Lab Sample #	21038932-002				21038932-003			
Spore Identification	RawCt	spr/m^3	%Ttl	I/O	RawCt	spr/m^3	%Ttl	I/O
ascospores	2	27	20	1/736	92	19,627	23	-
basidiospores	2	27	20	1/2395	80	63,872	75	-
Cercospora	-	-	-	-	1	13	<1	-
Cladosporium	3	40	30	1/24	72	960	1	-
Colorless	-	-	-	-	20	267	<1	-
Curvularia	-	-	-	-	1	13	<1	-
Drechslera/Bipolaris group	-	-	-	-	1	13	<1	-
Helicosporium/Helicomyces	-	-	-	-	1	13	<1	-
hyphal elements	-	-	-	-	5	67	<1	-
Penicillium/Aspergillus group	2	27	20	1/14	27	360	<1	-
Pestalotiopsis	-	-	-	-	3	40	<1	-
Smuts,Periconia,Myxomycetes	1	13	10	1/4	4	53	<1	-
Torula	-	-	-	-	1	13	<1	-
	Debris Rating **2**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **13** spr/m^3				Analytical Sensitivity: **13** spr/m^3			
Comments								
Total *See Footnotes	10	133	~100%	1/640	308	85,312	~100%	-

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Attn: Bobby Rhett
Project: **47-11652-I Minnie Howard**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 9/1/2021
Date Received: 9/2/2021
Date Analyzed: 9/7/2021
Date Reported: 9/8/2021
Project ID: 21038932

Client Sample #	A-OUT2				A-OUT			
Sample Location	Outdoors				Outdoors			
Sample Volume (L)	75				75			
Lab Sample #	21038932-004				21038932-003			
Spore Identification	RawCt	spr/m^3	%Ttl	I/O	RawCt	spr/m^3	%Ttl	I/O
ascospores	97	20,693	26	1/1	92	19,627	23	-
basidiospores	72	57,485	72	1/1	80	63,872	75	-
Cercospora	-	-	-	-	1	13	<1	-
Cladosporium	73	973	1	1/1	72	960	1	-
Colorless	8	107	<1	1/3	20	267	<1	-
Curvularia	3	40	<1	3/1	1	13	<1	-
Drechslera/Bipolaris group	1	13	<1	1/1	1	13	<1	-
Epicoccum	1	13	<1	-	-	-	-	-
Helicosporium/Helicomyces	-	-	-	-	1	13	<1	-
hyphal elements	8	107	<1	2/1	5	67	<1	-
Penicillium/Aspergillus group	23	307	<1	1/1	27	360	<1	-
Pestalotiopsis	1	13	<1	1/3	3	40	<1	-
Rusts	1	13	<1	-	-	-	-	-
Smuts,Periconia,Myxomycetes	6	80	<1	2/1	4	53	<1	-
Torula	-	-	-	-	1	13	<1	-
	Debris Rating **2**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **13** spr/m^3				Analytical Sensitivity: **13** spr/m^3			
Comments								
Total *See Footnotes	294	79,845	~100%	1/1	308	85,312	~100%	-

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ECS Mid Atlantic, LLC
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Chantilly VA, 20151
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Project: **47-11652-I Minnie Howard**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected:	9/1/2021
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Date Reported:	9/8/2021
Project ID:	21038932

Signature Page

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1. The results in this report are related to this project and these samples only.
2. Results in this report are intended for the Aerobiology Laboratory Associates, Inc. client listed above and cannot be discussed with anyone outside of that given company without written authorization.
3. Minimum Reporting Limits (MRL) for BULKS, DUSTS, SWABS, and WATER samples are a calculation based on 1 raw count, the sample size and the dilution plate on which organism was counted. Results are a compilation of counts taken from multiple dilutions and multiple medias.
4. Raw count is the total number of colonies identified on a given sample, without any calculations performed based on air volume, surface area, water volume, or weight.
5. Total count is a calculated value based on the type of sample submitted, the raw count, and the calculation related to the volume, weight or surface area.

Suzanne Blevins
Laboratory Director

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Date Received:	9/2/2021
Date Analyzed:	9/7/2021
Date Reported:	9/8/2021
Project ID:	21038932

Footnotes and Additional Report Information

Debris Rating Table

1	Minimal (<5%) particulate present	Reported values are minimally affected by particulate load.
2	5% to 25% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
3	26% to 75% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
4	75% to 90% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
5	Greater than 90% of the trace occluded with particulate	Quantification not possible due to large negative bias. A new sample should be collected at a shorter time interval or other measures taken to reduce particulate load.

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1. Penicillium/Aspergillus group spores are characterized by their small size, round to ovoid shape, being unicellular, and usually colorless to lightly pigmented. There are numerous genera of fungi whose spore morphology is similar to that of the Penicillium/Aspergillus type. Two common examples would be Paecilomyces and Acremonium. Although the majority of spores placed in this group are Penicillium, Aspergillus, or a combination of both. Keep in mind that these are not the only two possibilities.

2. Ascospores are sexually produced fungal spores formed within an ascus. An ascus is a sac-like structure designed to discharge the ascospores into the environment, e.g. Ascobolus.

3. Basidiospores are typically blown indoors from outdoors and rarely have an indoor source. However, in certain situations a high basidiospore count indoors may be indicative of a wood decay problem or wet soil.

4. The colorless group contains colorless spores which were unidentifiable to a specific genus. Examples of this group include Acremonium, Aphanocladium, Beauveria, Chrysosporium, Engyodontium microconidia, yeast, some arthrospores, as well as many others.

5. Hyphae are the vegetative mode of fungi. Hyphal elements are fragments of individual Hyphae. They can break apart and become airborne much like spores and are potentially allergenic. A mass of hyphal elements is termed the mycelium. Hyphae in high concentration may be indicative of colonization.

6. Dash (-) in this report, under raw count column means 'not detected (ND)'; otherwise 'not applicable' (NA).

7. The positive-hole correction factor is a statistical tool which calculates a probable count from the raw count, taking into consideration that multiple particles can impact on the same hole; for this reason the sum of the calculated counts may be less than the positive hole corrected total.

8. Due to rounding totals may not equal 100%.

9. Analytical Sensitivity for each spores is different for Non-viable sample when the spores are read at different percentage. Analytical Sensitivity is calculated as spr/m ^{3} divided by raw count. spr/m ^{3} = raw counts x (100/ % read) x (1000/Sample volume). If Analytical Sensitivity is 13 spr/m ^{3} at 100% read, Analytical Sensitivity at 50% read would be 27 spr/m ^{3}, which is 2 times higher. Analytical Sensitivity provided on the report is based on an assumed 100% of the trace being analyzed.

10. Minimum Reporting Limits (MRL) for BULKS, DUSTS, SWABS, and WATER samples are a calculation based on the sample size and the dilution plate on which the organism was counted. Results are a compilation of counts taken from multiple dilutions and multiple medias. This means that every genus of fungi or bacteria recovered can be counted on the plate on which it is best represented.

11. If the final quantitative result is corrected for contamination based on the blank, the blank correction is stated in the sample comments section of the report.

12. The results in this report are related to this project and these samples only.

13. For samples with an air volume of < 100L, the number of significant figures in the result should be considered (2) two. For samples with air volumes between 100-999L, the number of significant figures in the result should considered (3) three. For example, a sample with a result of 55,443 spr/m^3 from a 75L sample using significant figures should be considered 55,000. The same result of 55,443 from a 150L sample using significant figures should be considered 55,400 spr/m ^{3}.

14. If the In/Out ratio is greater than 100 times it is indicated >100/1, rather than showing the real value.

Terminology Used in Direct Exam Reporting

Conidiophores are a type of modified hyphae from which spores are born. When seen on a surface sample in moderate to numerous concentrations they may be indicative of fungal growth.

Suzanne Blevins
Laboratory Director

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ELITE Program

AZ, CA. CO, FL, GA, IL, VA, NJ

NVLAP

AZ, CA, CO, VA

VA - 102977 AZ - 210229
CA - 218951 CO - 192683
NJ - 102747 GA - 163063
FL - 228303 IL - 232279

Aerobiology Client	ECS Mid-Atlantic, LLC		
Field Contact	Bobby Rhett	Collected By/Date: B. Rhett 9/1	Relinquished By/Date: B. Rhett 9/2/21
Reporting Address	14026 Thunderbolt Place, Suite 100 Chantilly, VA 20151	Relinquished By/Date:	Received By/Date: SF 9/2/21
Billing Address	14026 Thunderbolt Place, Suite 100 Chantilly, VA 20151	Sampler Type: Andersen____ SAS____	SampleAire____ AeroTrap____ Other____ BioCulture____
Phone/Fax	703-471-8400	PO#/Job#: 47-11652-I	
Reporting Email (s)	brhett@ecslimited.com	Project Name: Minnie Howard	
Routine ☑	24 hour ☐ same day ☐ 4-hour ☐ 5 day (PLM) ☐	Notes:	
SAMPLING LOCATION ZIP CODE		CC Info:	

	Sample No.	Test Code	Sample Location	Total Volume/Area
1	A-01	1054	Room 117	75 L.
2	A-02	↓	Room 118	↓
3	A-OUT		Outdoors	
4	A-OUT2	↓	Outdoors	↓
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

1054	Direct, Non-viable Spore Trap	1015	Culture - WATER Legionella
1051	Direct, Qualitative- **Swab/Tape**	1017	Culture - SWAB Legionella
1050	Direct, Qualitative- **Bulk**	1010	WATER - Potable - E. coli/total coliforms
1005	AIR Culture - Bacterial Count w/ ID's	1012	SWAB - E. coli/total coliforms
1030	AIR Culture - Fungal Count w/ ID's	1028	SWAB - Sewage Screen (E. coli/Entero/fecal coliforms)
1006	SWAB Culture - Bacterial Count w/ ID's	2056	WATER - Heterotrophic Plate Count
1031	SWAB Culture - Fungal Count w/ ID's	3001	ASBESTOS - Point count
1008	BULK Culture - Bacterial Count w/ ID's	3002	ASBESTOS - PLM Analysis
1033	BULK Culture - Fungal Count w/ ID's	3003	ASBESTOS - Particle characterization
1007	WATER Culture - Bacterial Count w/ID's	3004	ASBESTOS - PCM Analysis

Appendix IV: Mold Reference and Guidance Documents

REFERENCE AND GUIDANCE DOCUMENTS

A Brief Guide to Mold in the Workplace, Occupational Safety Health Administration (OSHA), SHIB 03-10-10, updated 11-08-13

ANSI/IICRC S520 Standard and Reference Guide for Professional Mold Remediation, Institute of Inspection, Cleaning, and Restoration Certification, 2015.

ANSI/IICRC S500 Standard and Reference Guide for Professional Water Damage Restoration, Institute of Inspection, Cleaning, and Restoration Certification, 2015.

Bioaerosols: Assessment and Controls, American Conference of Governmental Industrial Hygienists, 1999.

Building Air Quality: A Guide for Building Owners and Facility Managers, EPA, EPA 402-F-91-102, December 1991

Centers for Disease Control and Prevention (CDC), https://www.cdc.gov/mold/faqs.htm

Department of Energy and the Environment (DOEE), Mold Assessment and Remediation Licensure Regulations.

EPA – Mold Resources, https://www.epa.gov/mold

Guidelines on Assessment and Remediation of Fungi in Indoor Environments, New York City Department of Health and Mental Hygiene, November 2008.

Mold Moisture and Your Home, EPA, EPA-402-K-02-003, September 2012

Mold Remediation in Schools and Commercial Buildings, EPA, EPA 402-K-01-001, September 2008