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VIA EMAIL

Project #01288.011

July 9, 2018

Ms. Heather R. Forgione
Facilities Director
Haverhill Public Schools
4 Summer Street, Room 104
Haverhill MA 01830

RE: Limited Mold Investigation and Testing, Whittier Middle School, 252 Concord St, Haverhill, MA

Dear Ms. Forgione,

At your request, Axiom Partners, Inc. (AXIOM) conducted a walkthrough visual inspection of various halls and classrooms of the referenced school building with you and a Haverhill Building Inspector. This was a result of complaints lodged by a community representative associated with roof leaks and some interior water damage and staining (random suspended ceiling tiles and walls). This investigation included the collection of air and swab samples for the presence of mold/fungi.

Air sampling for airborne mold/fungi was also performed as described herein and one mold surface swab sample was collected on the wall of Room 6 under the chalkboard where there is apparent water staining.

BACKGROUND AND OBSERVATIONS

AXIOM's Senior Industrial Hygienists, Stephen Minassian and David Rooney conducted the sampling in the afternoon of June 28, 2018. The following observations were made:

- No odors associated with mold or mildew were observed;
- Several water-damaged and water-stained ceiling tiles were identified in several areas throughout the school;
- Water staining was observed running down the wall in Room 6 behind and beneath the chalkboard;
- The Haverhill Building Inspector checked many of the water-stained ceiling tiles and none were observed to be wet.

NON-CULTURABLE MOLD (FUNGI) AIR AND SURFACE SWAB SAMPLING

AXIOM collected air samples for direct optical analysis for mold and fungal spores using Allergenco-D air sampling cassettes which are used for the rapid collection and analysis of a wide range of airborne aerosols including fungal spores, pollen, insect parts, skin cell fragments, fibers, and inorganic particulates. The Allergenco-D sampling cassette is designed to draw air through the cassette at a rate of 15 liters per minute (LPM). AXIOM collected four indoor air samples where significantly water-damaged ceiling tiles were observed - one in each classroom associated with the complaints (Rooms 6 and 11), one in the hall at Room 18 and one in the hall near the gymnasium. Complaints were focused in Rooms 6 and 11 as well as near Room 18. An outdoor control sample was taken under the portico on the south side of the building.



AXIOM also collected one surface swab samples from the wall beneath the chalkboard in Room 6. The sample was collected using a sterile sampling swab to wipe a known area for potential mold spores. The swab was immediately placed into a plastic sterile holder and sealed and labeled with a unique sample number.

The air and surface swab samples were hand delivered to EMSL Analytical, Inc. in Woburn, MA. Chain-of-custody forms were used to ensure sample integrity. EMSL is accredited under the American Industrial Hygiene Association (AIHA) for fungal analysis.

The samples were analyzed for non-viable fungi by optical microscopy. The EMSL laboratory reports are attached and the following table provides a summary of the air sampling results.

SUMMARY OF AIRBORNE FUNGI/MOLD SPORE COUNT SAMPLE RESULTS

SAMPLE NUMBER	LOCATION	TOTAL FUNGI (C/m ³)*	PREDOMINANT MOLD SPORE, GENUS
2334371	Outdoor Control, South Side of Building	41,740	Ascospores (4,530) Basidiospores (37,000) Cladosporium (90) Ganoderma (40) Myxomycetes++ (40) Unidentifiable Spores (40)
2334372	Classroom 6	1,190	Ascospores (40) Aspergillus/Penicillium (580) Basidiospores (490) Cladosporium (40) Unidentifiable Spores (40)
2334377	Classroom 11	830	Ascospores (300) Basidiospores (490) Ganoderma (40)
2334365	Hallway at Classroom 18	3,420	Ascospores (620) Basidiospores (2,800) Pollen (40)
2334348	Hallway at Gymnasium Entrance	680	Ascospores (100) Aspergillus/Penicillium (90) Basidiospores (400) Unidentifiable Spores (90)

* C/m³ = spore counts per cubic meter of air

No fungi were identified on the surface swab sample collected from the wall in Classroom 6.

Bioaerosols (fungi/mold) are always present in the environment and it is the excess quantity of microorganisms that can be of concern. By comparing the microbiological profiles of samples collected in areas of concern to those of the control (outdoor) sample, it is often possible to determine if amplification of microorganisms is occurring within a building.

Although there are no definitive levels set by Federal or State regulators for airborne fungi or fungal spores, the World Health Organization (WHO) and the industrial hygiene community have adopted guidelines for assessing non-viable airborne fungi. Non-viable fungi concentrations below 2,000 C/m³ are normally not a concern for indoor environments. Outdoor levels are normally between 500 and 5,000 C/m³ but can easily

exceed 20,000 C/m³ during the spring and summer months in New England. Indoor airborne levels that exceed 5,000 C/m³ are typically considered elevated.

FINDINGS AND RECOMMENDATIONS

It is apparent that the condition of the roof(s) has resulted in multiple water leaks inside the school building over the years. Although the water-damaged suspended ceiling tiles are typically removed and replaced after significant leaks occur, the potential for mold/fungi to proliferate in these conditions will remain until the roof leaks are properly addressed.

Based on our observations and the air and surface swab sampling results described herein, non-viable fungal spores do not appear to be of concern. The types of fungal spores identified, and the quantities present in the indoor air samples are not considered excessive and do not indicate that there is a significant mold problem in these areas.

AXIOM noted that at least two of the water-damaged ceiling tile areas were directly beneath roof drain pipes. Roof penetrations for pipes, ducts, etc. are often locations where leaks tend to occur.

Although the rear section of the boys' locker room that has been closed for some time due to structural concerns was not associated with the complaints in Classrooms 6 and 11, it is apparent that there is excessive moisture and there is a considerable dank, musty odor in that space.


AXIOM recommends the following:

1. Remove and replace all water-stained and/or water-damaged suspended ceiling tiles as soon as possible but before the fall school session begins. And paint water-stained 1" x 1" ceiling tiles in affected classrooms using a mold-resistive product such as *Kills* or *Bin Coat*.
2. Resolve the current roof leak issues as soon as possible and monitor for future leaks. Repairs must be made however, it may be prudent to hire a roofing consultant to determine the extent of water damage and to provide recommendations for more comprehensive repairs or replacement.
3. Engage a properly qualified person to evaluate the structural integrity of the closed section of the boys' locker room and make repairs if necessary. To resolve indoor air quality issues in this space, it should be ventilated but separately from the remainder of the building to avoid transporting mold/fungi to other unaffected interior spaces. Remove any building materials that may be water-damaged and/or mold-damaged and apply an antimicrobial coating to surfaces in this space to inhibit further mold growth. Collect air and swab samples before, during and after this work to document the process and to evaluate the effectiveness of the remediation work.

No other recommendations are offered at this time.

Please do not hesitate to contact us if you have any questions.

Sincerely,



David A. Rooney
Senior Industrial Hygienist



Stephen E. Minassian
Principal/ Project Manager

attachments: EMSL microbial analysis reports



EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801
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<http://www.EMSL.com> / bostonlab@emsl.com

Order ID: 131803806
 Customer ID: AXIO80
 Customer PO:
 Project ID:

Attn: David A. Rooney
 Axiom Partners, Inc.
 One Pleasure Island Road
 Suite 2C
 Wakefield, MA 01880

Phone: (781) 213-9198
Fax: (781) 213-6992
Collected: 06/28/2018
Received: 06/28/2018
Analyzed: 06/29/2018

Proj: 01288.011 / J B Whittier School Haverhill

Test Report: Allergenco-D™ Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	131803806-0001			131803806-0002			131803806-0003		
Client Sample ID:	2334371			2334372			2334377		
Volume (L):	75			75			75		
Sample Location:	Bldg. Exterior			Room #6			Room #11		
Spore Types	Raw Count	Count/m ³	% of Total	Raw Count	Count/m ³	% of Total	Raw Count	Count/m ³	% of Total
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	102	4530	10.9	1	40	3.4	7	300	36.1
Aspergillus/Penicillium	-	-	-	13	580	48.7	-	-	-
Basidiospores	833	37000	88.6	11	490	41.2	11	490	59
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	2	90	0.2	1	40	3.4	-	-	-
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	1	40	0.1	-	-	-	1	40	4.8
Myxomycetes++	1	40	0.1	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	1	40	0.1	1	40	3.4	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	940	41740	100	27	1190	100	19	830	100
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	44	-	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	-	-	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	3	-	-	2	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
 Myxomycetes++ = Myxomycetes/Periconia/Smut

Steve Grise, Laboratory Manager
 or Other Approved Signatory

No discernable field blank was submitted with this group of samples.

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" denotes not detected. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA AIHA-LAP, LLC --EMLAP Accredited #180179

Initial report from: 06/29/2018 14:15:16

For information on the fungi listed in this report please visit the Resources section at www.emsl.com



EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801
Phone/Fax: (781) 933-8411 / (781) 933-8412
<http://www.EMSL.com> / bostonlab@emsl.com

Order ID: 131803806
Customer ID: AXIO80
Customer PO:
Project ID:

Attn: David A. Rooney
Axiom Partners, Inc.
One Pleasure Island Road
Suite 2C
Wakefield, MA 01880

Phone: (781) 213-9198
Fax: (781) 213-6992
Collected: 06/28/2018
Received: 06/28/2018
Analyzed: 06/29/2018

Proj: 01288.011 / J B Whittier School Haverhill

Test Report: Allergenco-D(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	131803806-0004			131803806-0005		
Client Sample ID:	2334365			2334348		
Volume (L):	75			75		
Sample Location:	Hall by Room #18			Hall by Gymnasium		
Spore Types	Raw Count	Count/m ³	% of Total	Raw Count	Count/m ³	% of Total
Alternaria (Ulocladium)	-	-	-	-	-	-
Ascospores	14	620	18.1	3	100	14.7
Aspergillus/Penicillium	-	-	-	2	90	13.2
Basidiospores	62	2800	81.9	8	400	58.8
Bipolaris++	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-
Cladosporium	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-
Rust	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	2	90	13.2
Zygomycetes	-	-	-	-	-	-
Total Fungi	76	3420	100	15	680	100
Hyphal Fragment	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-
Pollen	1	40	-	-	-	-
Analyt. Sensitivity 600x	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-
Background (1-5)	-	2	-	-	3	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

Steve Grise, Laboratory Manager
or Other Approved Signatory

No discernable field blank was submitted with this group of samples.

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" denotes not detected. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

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Analyzed: 06/29/2018

Proj: 01288.011 / J B Whittier School Haverhill

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Swab Samples (EMSL Method MICRO-SOP-200)

Lab Sample Number:	131803806-0006				
Client Sample ID:	SWAB-01				
Sample Location:	Wall Under Chalkboard Room #6				
Spore Types	Category	-	-	-	-
Alternaria (Ulocladium)	-	-	-	-	-
Ascospores	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-
Basidiospores	-	-	-	-	-
Bipolaris++	-	-	-	-	-
Chaetomium	-	-	-	-	-
Cladosporium	-	-	-	-	-
Curvularia	-	-	-	-	-
Epicoccum	-	-	-	-	-
Fusarium	-	-	-	-	-
Ganoderma	-	-	-	-	-
Myxomycetes++	-	-	-	-	-
Pithomyces++	-	-	-	-	-
Rust	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-
Zygomycetes	-	-	-	-	-
Hyphal Fragment	-	-	-	-	-
Insect Fragment	-	-	-	-	-
Pollen	-	-	-	-	-

Sample Comment: 131803806-0006 None Detected

Category: Count/per area analyzed - Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000

- Denotes Not Detected.

Bipolaris++ = Bipolaris/Dreschlera/Exserohilum Myxomycetes++ = Myxomycetes/Periconia/Smut

* = Sample contains fruiting structures and/or hyphae associated with the spores.

Steve Grise, Laboratory Manager
or Other Approved Signatory

No discernable field blank was submitted with this group of samples.

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EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Microbiology Chain of Custody

EMSL Order Number (Lab Use Only):

131803806

EMSL ANALYTICAL, INC.
7 CONSTITUTION WAY
SUITE 107
WOBURN, MA 01801
PHONE: 781-933-8411
FAX: 781-933-8412

Company : AXIOM Partners Inc		EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different If Bill to is Different please note in Comments**			
Street: One Pleasure Island Rd, Suite 2C		Third Party Billing requires written authorization from third party			
City: Wakefield	State/Province: MA	Zip/Postal Code: 01880	Country: USA		
Report To (Name): David A. Rooney		Fax #:			
Telephone #: 603-505-5877		E-mail Address: drooney@axiomenv.com			
Project Name/ Number: J B Whittier School Haverhill					
Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> E-mail		PO#	State Samples Taken:		
Turnaround Time (TAT) Options* - Please Check					
<input type="checkbox"/> 3 Hour	<input type="checkbox"/> 6 Hour	<input type="checkbox"/> 24 Hour	<input checked="" type="checkbox"/> 48 Hour	<input type="checkbox"/> 72 Hour	<input type="checkbox"/> 96 Hour
<input type="checkbox"/> 1 Week	<input type="checkbox"/> 2 Week				
*Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide. TATs are subject to methodology requirements					
Non Culturable Air Samples (Spore Traps)					
<ul style="list-style-type: none"> • M001 Air-O-Cell • M049 BioSIS • M030 Micro 5 	<ul style="list-style-type: none"> • M173 Allegro M2 • M003 Burkard • M174 MoldSnap 	<ul style="list-style-type: none"> • M004 Allergenco • M043 Cyclex • M176 Relle Smart 	<ul style="list-style-type: none"> • M032 Allergenco-D • M002 Cyclex-d • M130 Via-Cell 	<ul style="list-style-type: none"> • M172 Versa Trap 	
Other Microbiology Test Codes					
<ul style="list-style-type: none"> • M041 Fungal Direct Examination • M005 Viable Fungi ID and Count • M006 Viable Fungi ID and Count (Speciation) • M007 Culturable Fungi • M008 Culturable Fungi (Speciation) • M009 Gram Stain Culturable Bacteria • M010 Bacterial Count and ID – 3 Most Prominent • M011 Bacterial Count and ID – 5 Most Prominent • M013 Sewage Contamination in Buildings 	<ul style="list-style-type: none"> • M014 Endotoxin Analysis • M015 Heterotrophic Plate Count • M180 Real Time Q-PCR-ERMI 36 Panel • M018 Total Coliform (Membrane Filtration) • M020 Fecal <i>Streptococcus</i> (Membrane Filtration) • M210-215 <i>Legionella</i> Detection • M026 Recreational Water Screen • M027 Mycotoxin Analysis 	<ul style="list-style-type: none"> • M029 <i>Enterococci</i> • M019 Fecal Coliform • M133 MRSA Analysis • M028 <i>Cryptococcus neoformans</i> Detection • M120 <i>Histoplasma capsulatum</i> Detection • M033-39 Allergen Testing • M044 Group Allergen (Cat, Dog, Cockroach, Dustmites) • Other See Analytical Price Guide 			
Preservation Method (Water):					
Name of Sampler: David A. Rooney			Signature of Sampler:		
Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
2334371	Bldg. Exterior	AIR	M032	75 L	06/28/18 14:43
2334372	Room #6	AIR	M032	75 L	06/28/18 14:51
2334377	Room #11	AIR	M032	75 L	06/28/18 15:02
2334365	Hall by Room #18	AIR	M032	75 L	06/28/18 15:12
2334348	Hall by Gymnasium	AIR	M032	75 L	06/28/18 15:19
SWAB-01	Wall Under Chalkboard Room #6	Swab	M041		06/28/18
Client Sample # (s):		Total # of Samples:		6	
Relinquished (Client):		Date: 6-26-18	Time: 1650		
Received (Client):		Date:	Time:		
Comments:					

REC'D AL 16:50 JUN 28 2018
EMSL-BOSTON