ESI Environmental Solutions, Inc.
Consulting, Testing and Project Management
6114 Drum Point Rd., Deale, MD 20751 | info@esi4u.com | 410-867-6262 | www.esi4u.com

Thursday, November 29, 2018

Prince Georges County Public Schools
14201 School Lane, Room 130
Upper MarlboroMD20770

Ref: Carole Highland ES

Dear Sam,

The results of the inspection and testing which were performed at **610 Hannon Street, Takoma Park, MD 20912**, are concluded and the findings are enclosed. On 11/13/2018, the Carole Highland ES was inspected for microbial contamination. The samples in this report indicate elevated levels of indoor microbial hazards for five of the ten specific location tested. Please refer to the laboratory analysis report for species, spore count per cubic meter, allergenic, pathogenic or toxic effects.

The enclosed report outlines my observations and recommendations based on the inspection and testing. The report includes personal protection recommendations, environmental controls, remediation recommendations, as well ESI's clearance requirements.
Next Steps:

1. Contact ESI with any questions you may have regarding our findings and recommendations.
2. *Note:* A copy of this report was sent to Alex Baylor per your request.
3. Make sure the remediation team understands the "Clearance Requirements." If they have any questions they may call us directly.
4. Contact ESI when the job is complete, so that we can schedule a Post Remediation Inspection as required.
5. Do not breach the containment for any reason as this may affect the testing.

I hope you found our service beneficial. If you have any questions or concerns, we are only a phone call away.

Respectfully,

Vinny Gigliotti (CIE)
Environmental Solutions, Inc.

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Ph: 410-867-6262 / Fax: 410-867-6333 / 6114 Drum Point Road, Deale, MD 20751
www.esi4u.com / email: info@esi4u.com

Remediation Protocol Report

Project Contact Information

	Prince George's County Public Schools Sam Stefanelli 13300 Old Marlboro Pike, Trailer #5 Upper Marlboro, MD 20772 240-305-0795 sam.stefanelli@pgcps.org	

Property Location

Carole Highlands Elementary School, 1610 Hannon Street Takoma Park, MD 20707

Date of Inspection – 11/13/2018

Prepared By: Vinny Gigliotti

Certified Indoor Environmentalist (CIE)

Background Information

ESI was engaged to perform an inspection and testing within Thomas Stone ES. The purpose of this evaluation was to provide a visual assessment and microbial sampling to assess water damage and verify the presence of mold growth. In addition, ESI will help determine the possible cause and effect of the suspected mold growth.

Based on the observations and lab analysis, ESI has developed this Remediation Protocol outlining corrective action to alleviate possible health and environmental risks.

Executive Summary

You will find our instrument readings for the location inspected. Based upon the general condition of the school and our inspection and testing, we are developing room specific recommendations in addition to general remediation recommendations for the entire school.

One swab sample and ten air samples, including the control sample were collected of microbial and particulate matter to be analyzed by an independent laboratory. The dominate specie found in the testing of the air in most of the classrooms was Aspergillus / Penicillium. The swab culture of the sheetrock in Classroom #24 indicated rare amounts of Chaetomium and Cladosporium species, as well as a light amount of Stachybotrys. This mold was detected behind the base cove and was promptly covered and sealed after the swab culture was collected.

Note: In the observation section the “IAQ Sample #” has been highlighted in the rooms where the air samples came back elevated. The species which were found elevated are highlighted in the corresponding lab report.

Although not every class room or common area of the school was inspected and tested, we are finding a consistency of suspected transitory mold spores under tables and desk, along with an accumulation of dust and debris on the exhaust vents. These areas appear to be areas the custodial staff would not be normally clean on a regular basis. Continuation of good housekeeping, preventative maintenance and a seasonal microbial cleaning of this school, should reduce the ubiquitous mold spores from aggressively colonizing in the future.

Observations of Inspected Areas

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 6	2356188		29.1	71.8	5 5 1	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
None	None	None	No	No	None	No	No	No
						Stains	Debris	
Observation Notes								
During the inspection and testing of classroom 6, there was no visible microbial growth colonizing inside of the cabinetry and or on the books. There was visible water damage to the ceiling tiles towards the rear of the classroom. There are approximately 16 water damaged ceiling tiles. T room was scanned with the thermal imaging scanner and there were no abnormalities detected on the thermal imaging camera. There were no tables or chairs to inspect. The TV stand did not have any visible signs of microbial growth, and they were minimal amounts of dust and debris. The sink faucet is dripping but there's no water damage inside of the vanity. *Aspergillus /Penicillium was the dominate species identified within the breathable airspace at 1,080 spores per cubic meter of air. The spore count is slightly elevated.*								
Special Requirements								
Follow general remediation instructions detailed in the remediation section of this protocol.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 15	2356183		28.3	69.0	409	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	No	No	Yes	No	No	No	No
							Debris	
Observation Notes								
During the inspection of classroom 15, there was a minimal amount of microbial growth under the sink. This can simply be damned wiped to be removed. The entire classroom was scanned with thermal imaging camera, and no abnormalities were detected. The ceiling tiles did not show any signs of water damage or contamination. No visible microbial growth was detected underneath of the desk. Some cabinets were moved away from the walls; no visible microbial growth was found.								
Special Requirements								
Follow general remediation instructions detailed in the remediation section of this protocol.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 7	2266840		68.6	71.8	547	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	U-Shape Tables	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	Yes	No	No	No	No	Yes	No
						Stains	Debris	
Observation Notes								
Classroom 7 had visible microbial growth colonizing underneath of the U-Shape table as you enter the classroom. The other tables and desk did not show any signs of microbial growth. A thermal imaging camera was used to scanned the ceiling tiles and there were no abnormalities. However, there was one ceiling tile in the right-hand corner that had a visible water-stained approximately 4 inches in diameter. The contents were illuminated within the classroom with a UV light and there were no signs of accumulated dust and debris that would contribute to microbial growth. However, the convector under the window had an accumulation of dust and debris on the fins and on the coils. This may be a contributing factor to the elevated levels of mold spores detected in the air. *The lab results for this classroom indicated elevated levels of Aspergillus / Penicillium within the breathable air space at 3,480 spores per cubic meter of air.*								
Remediation Recommendations								
Follow general remediation instructions detailed in the remediation section of this protocol.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 17	2356184		23.7	71.8	433	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	No	No	No	No	No	No	No
Observation Notes								
The standing bookshelf underneath the chalkboard has visible microbial growth on the back side. Then visual inspection found no mold growth underneath any of the classroom tables or chairs. The ceiling tiles were free of water stains.								
Remediation Recommendations								
Follow general remediation instructions detailed in the remediation section of this protocol.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 18	2356191		25.3	71.2	440	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	Non	No	No	No	No	No	No
Observation Notes								
None of the furniture or contents in this room, show signs of visible microbial growth. The ventilation was free and clear of dust and debris. *The lab results for this classroom indicated elevated levels of Aspergillus / Penicillium within the breathable air space at 1,320 spores per cubic meter of air.*								
Remediation Recommendations								
Follow general remediation instructions detailed in the remediation section of this protocol.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 22	Visual		26.1	68.5	423	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	No	No	No	No	No	No	No
				Leaking				
Observation Notes								
Pipes under sink are leaking. None of the furniture or contents in this room, show signs of visible microbial growth. The ventilation was free and clear of dust and debris.								
Remediation Recommendations								
Follow general remediation instructions detailed in the remediation section of this protocol.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other
Classroom 24	2356189	Sheetrock	29.6	67.0	484	000	

Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	Yes	No	Yes	No	No	No	No	No
						Stain		

Observation Notes

The ceiling tiles were scanned with a thermal imaging camera and there were no abnormalities. There was one 8" diameter water stain next to the sprinkler head in the ceiling. However, the water stain was not retaining moisture. During the inspection classroom 24, there was visible microbial growth underneath of the Horseshoe table. There was 8-10" visible microbial growth behind the base cove along the exterior wall next to the convector.

The lab analysis indicated that the mold behind the base cove was Chaetomium, Cladosporium and Stachybotrys species. Minimal amounts of these mold spores were also detected in the air. In addition to slightly elevated levels of Aspergillus / Penicillium at 1,000 spores per cubic meter of air, Stachybotrys was detected at 320 spores per cubic meter of air and levels above 200 could be problematic for individuals with an immune compromised system.

Remediation Recommendations

Follow general remediation instructions detailed in the remediation section of this protocol.

I recommend removing the base cove along the exterior wall under containment and negative air pressure. Once the base Cove is removed the sheetrock should be removed approximately 12 inches high. Then follow the wall cavity instructions below:

Wall Cavity Instructions for class room 24:

1. Remove any nails or screws from structural supports where contaminated materials were removed.
2. Place all removed contaminated building materials in 6 mil contractor trash bags for proper disposal.
3. HEPA vacuum all dust and debris from areas in which contaminated materials have been removed.
4. Repeat HEPA vacuuming of all dust and debris; ensure sill plates, flooring, conduits and pipe chases are completely vacuumed with a bristle brush attachment.
5. Then damp wipe all accessible surfaces with an EPA registered botanical solution such as Benefect or an equivalent.
6. Ensure the moisture content levels in the building materials and exposed structural supports are at acceptable levels, and the relative humidity levels are between 30-50 percent.
7. If the moisture is found to be elevated, then engage dehumidifier(s) and air-mover(s) to reduce the moisture content in the wood structural supports and remaining building materials and also reduce the relative humidity.
8. Completely encapsulate any warranted building materials. Encapsulate with Fiberlock IAQ 6100, which contains an EPA-registered, broad-spectrum fungicide to prevent the growth of mold on the surface of the cured film.

The visible microbial growth underneath of the tables can be cleaned with an antimicrobial such a shock wave I also recommend once these tables are cleaned to encapsulate them with an IAQ 1000 capsule it which is clear. This will restrict and or reduce mold from colonizing in the future under

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other
Common hallway outside room 26	2356185		26.6	68.6	438	000	

Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
NA	NA	NA	No	NA	NA	Yes	No	NA

Observation Notes

Are sample taken outside of classroom 26. Visible signs of mold on ceiling tiles. Ceiling cavity opened outside of room 21 previous water leak noted.

Remediation Recommendations

Follow general remediation instructions detailed in the remediation section of this protocol.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other
Classroom 26	2356186		24.7	68	433	000	

Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	Yes	Non	No	No	No	Yes	Yes	
				Water damage		Stains		

Observation Notes

Under both sinks in the classroom, there was visible water standing on the base cabinetry. They both had a musty odor as well. Supply registers have microbial growth on them as well as some of the ceiling tiles. Back storage room has approximately 10 water-stained ceiling tiles; the main classroom has two water-stained ceiling tiles.

The lab results for this classroom indicated elevated levels of Aspergillus / Penicillium within the breathable air space at 3,600 spores per cubic meter of air.

Remediation Recommendations

Follow general remediation instructions detailed in the remediation section of this protocol.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other	
Classroom 28	Visual		30.4	68.6	421	000		
Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	No	Yes	Yes	No	Yes	No	No

Observation Notes

Classroom 28 has visible microbial growth inside the wall cavity of the bathroom. The building engineer removed the surrounding sheetrock earlier due to a water heater leak in the ceiling. However, additional mold growth was discovered on the backside of the sheetrock. The cabinetry adjoining this wall, appears to be water damaged as well.

The sheetrock under the HVAC system is dry. However, the sheetrock behind the teacher's desk shows signs of previous water damage and should be removed and discarded.

Approximately 7 ceiling tiles need to be removed and discarded, due to water stains.

Remediation Recommendations

Follow general remediation instructions detailed in the remediation section of this protocol.

I highly recommend removing the contaminated sheetrock from the bathroom 48 inches high. The sheetrock under the HVAC system is dry. However, the s behind the teacher's desk show signs of previous water damage and should be removed. After the sheetrock is removed, follow the wall cavity instructions below:

Wall Cavity Instructions for class room 28:

1. Remove any nails or screws from structural supports where contaminated materials were removed.
2. Place all removed contaminated building materials in 6 mil contractor trash bags for proper disposal.
3. HEPA vacuum all dust and debris from areas in which contaminated materials have been removed.
4. Repeat HEPA vacuuming of all dust and debris; ensure sill plates, flooring, conduits and pipe chases are completely vacuumed with a bristle brush attachment.
5. Then damp wipe all accessible surfaces with an EPA registered botanical solution such as Benefect or an equivalent.
6. Ensure the moisture content levels in the building materials and exposed structural supports are at acceptable levels, and the relative humidity levels are between 30-50 percent.
7. If the moisture is found to be elevated, then engage dehumidifier(s) and air-mover(s) to reduce the moisture content in the wood structural supports and remaining building materials and also reduce the relative humidity.
8. Completely encapsulate any warranted building materials. Encapsulate with Fiberlock IAQ 6100, which contains an EPA-registered, broad-spectrum fungicide to prevent the growth of mold on the surface of the cured film.
9. The base cabinetry on the wall needs to be removed, and the backside sanitized.
10. Approximately 7 ceiling tiles need to be removed and discarded due to water stain.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other
Cafeteria	Visual		25.3	68.4	446	000	

Visible Microbial Growth (VMG) Found				
Cafeteria Tables	Walls	Ceiling Tiles	HVAC	Windows
No	No	No	Yes	N/A

Observation Notes

There was visible discoloration around six of the supply registers from the HVAC system. Each of the registers had a dark substance one of the registers had three-dimensional mold growth. U of the cafeteria tables were inspected and there were no signs of visible mold growth colonizing. There were signs of cleaning and or chemical residue under the tables.

Remediation Recommendations

Follow general remediation instructions detailed in the remediation section of this protocol.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Other
Classroom 20	2356190		26.6	71.1	419	000	

Visible Microbial Growth (VMG) Found								
Teachers Desk	Students Desk	Computer Desk	Walls	Sink Cabinetry	Carpet	Ceiling Tiles	HVAC	Windows
No	No	No	No	No	No	No	No	No

Observation Notes

None of the furniture or contents in this room, show signs of visible microbial growth. The ventilation was free and clear of dust and debris.

Remediation Recommendations

Follow general remediation instructions detailed in the remediation section of this protocol.

Non-Viable Air Sampling/Results

Non-viable air samples are collected via Micro-5 or Air-o-Cell bio-aerosol cassettes. After five-minute sampling periods, the impacted samples are sealed and void of all ambient light. The samples are sealed, labeled and delivered to the laboratory within twenty-four hours. The third-party laboratory lab analysis provides qualitative and quantitative results for airborne mold spores.

The attached Spore Trap Analysis does not indicate the presence of elevated airborne mold spores for the Primary Alcove/Lobby, Classroom #5, Media Center – Reading Room, and Classroom #5 test locations. The genera detected share a similar biodiversity as the outdoor control sample. With that said, the genera detected at these minimal levels in the Primary Alcove/Lobby, Classroom #5, Media Center – Reading Room, and Classroom #13 test locations should not pose environmental or exposure risks.

SanAir Technologies Laboratory

Name: Environmental Solutions, Inc
Address: 534-A Deale Road
Deale, MD 20751
Phone: 410-867-6262

Project Number: PGCS
P.O. Number:
Project Name: Carole Highland Elem
Collected Date: 11/13/2018
Received Date: 11/16/2018 11:20:00 AM

SanAir ID Number
18053353
FINAL REPORT
11/19/2018 9:37:11 AM

Analyst: Shepperson, Josh

Air Cassette Analysis

ND = None Detected. Blank spaces indicate no spores detected.

SanAir ID Number	18053353-001			18053353-002			18053353-003			18053353-004		
Analysis Using STL	107C			107C			107C			107C		
Sample Number	2356188			2356840			2356183			2356184		
Sample Identification	Classroom 6			Classroom 7			Classroom 15			Classroom 17		
Sample Type	Air Cassette - Micro-5			Air Cassette - Micro-5			Air Cassette - Micro-5			Air Cassette - Micro-5		
Volume	25 Liters			25 Liters			25 Liters			25 Liters		
Analytical Sensitivity	40 Count/M³			40 Count/M³			40 Count/M³			40 Count/M³		
Background Density	1+			1+			1+			1+		
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Dander	15	600	n/a	9	360	n/a	13	520	n/a	2	80	n/a
Fibers							1	40	n/a	2	80	n/a
Mycelial Fragments												
Stachybotrys Conidiophore												
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Ascospores	1	40	3				1	40	3	2	80	8
Aspergillus/Penicillium	27	1080	73	96	3840	90	17	680	45	17	680	65
Basidiospores	7	280	19	10	400	9	18	720	47	7	280	27
Bipolaris/Drechslera				1	40	< 1						
Chaetomium species												
Cladosporium species	2	80	5				2	80	5			
Stachybotrys species												
TOTAL	**37**	**1480**		**107**	**4280**		**38**	**1520**		**26**	**1040**	

Signature: Date: 11/16/2018 Reviewed: Date: 11/19/2018

1551 Oakbridge Dr. Suite B, Powhatan, VA 23139 | 804.897.1177 | Fax: 804.897.0070 | www.SanAir.com | IAQ@SanAir.com

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Air Cassette Analysis

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SanAir ID Number	18053353-005			18053353-006			18053353-007			18053353-008		
Analysis Using STL	107C			107C			107C			107C		
Sample Number	2356191			2356190			2356189			2356185		
Sample Identification	Classroom 18			Classroom 20			Classroom 24			Common Hallway Outside Room 26		
Sample Type	Air Cassette - Micro-5			Air Cassette - Micro-5			Air Cassette - Micro-5			Air Cassette - Micro-5		
Volume	25 Liters			25 Liters			25 Liters			25 Liters		
Analytical Sensitivity	40 Count/M^3			40 Count/M^3			40 Count/M^3			40 Count/M^3		
Background Density	1+			1+			2			1+		
Other	**Raw Count**	**Count/M^3**	**%**	**Raw Count**	**Count/M^3**	**%**	**Raw Count**	**Count/M^3**	**%**	**Raw Count**	**Count/M^3**	**%**
Dander	18	720	n/a	9	360	n/a	24	960	n/a	9	360	n/a
Fibers	2	80	n/a	2	80	n/a	3	120	n/a			
Mycelial Fragments							1	40	n/a			
Stachybotrys Conidiophore							2	80	n/a			
Fungal Identification	**Raw Count**	**Count/M^3**	**%**	**Raw Count**	**Count/M^3**	**%**	**Raw Count**	**Count/M^3**	**%**	**Raw Count**	**Count/M^3**	**%**
Ascospores							1	40	2	1	40	6
Aspergillus/Penicillium	33	1320	57	6	240	26	25	1000	45			
Basidiospores	16	640	28	14	560	61	9	360	16	13	520	81
Bipolaris/Drechslera												
Chaetomium species							5	200	9			
Cladosporium species	9	360	16	3	120	13	7	280	13	2	80	13
Stachybotrys species							8	320	15			
TOTAL	**58**	**2320**		**23**	**920**		**55**	**2200**		**16**	**640**	

Signature: Date: 11/16/2018 Reviewed: Date: 11/19/2018

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Analyst: Shepperson, Josh

Air Cassette Analysis

ND = None Detected. Blank spaces indicate no spores detected.

SanAir ID Number	18053353-009			18053353-010		
Analysis Using STL	107C			107C		
Sample Number	2356186			2356187		
Sample Identification	Classroom 26			Outside		
Sample Type	Air Cassette - Micro-5			Air Cassette - Micro-5		
Volume	25 Liters			25 Liters		
Analytical Sensitivity	40 Count/M³			40 Count/M³		
Background Density	1+			1+		
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Dander	9	360	n/a	3	120	n/a
Fibers	1	40	n/a	1	40	n/a
Mycelial Fragments				1	40	n/a
Stachybotrys Conidiophore						
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Ascospores	1	40	< 1	2	80	4
Aspergillus/Penicillium	90	3600	82	1	40	2
Basidiospores	13	520	12	49	1960	94
Bipolaris/Drechslera						
Chaetomium species	2	80	2			
Cladosporium species	4	160	4			
Stachybotrys species						
TOTAL	**110**	**4400**		**52**	**2080**	

Signature: Date: 11/16/2018 Reviewed: Date: 11/19/2018

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Direct Identification Lab Results

Results for the direct identification analysis describe the amount of evidence indicating possible fungal growth. The presence of associated mycelial fragments and conidiophores help the analyst to determine which description to use: rare, light, moderate, or heavy. Please refer to the following table for interpretation of direct identification results.

Estimated Amount	Indication of Growth	Evidence of Mycelial Fragments / Conidiophores
Rare	Not Likely	None
Light	Possible	Some, 10 to 25% of Covered
Moderate	Probable	Abundant, 25 to 50% of Covered
Heavy	Significant	Throughout, 50 to 100% of Covered

The Direct Identification Analysis indicates the presence of: Chaetomium, Cladosporium and Stachybotrys species.

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Analyst: Shepperson, Josh

Direct Identification Analysis

SanAir ID: 18053353-011 Sample #:Swab Room 24 Sheetrock Next To Converter

D1 - Direct Identification Analysis on Surface Swab using STL 104

Direct ID of Mold

Fungi	Estimated Amount
Chaetomium species	Rare
Cladosporium species	Rare
Stachybotrys species	Light

Estimated Amount	Indication of Growth	Evidence of Mycelial Fragments/Conidiophores
Rare	Not Likely	None
Light	Possible	Some, 10 to 25% of Tape Covered
Moderate	Probable	Abundant, 25 to 50% of Tape Covered
Heavy	Significant	Throughout, 50 to 100% of Tape Covered

*Refer to additional information page for further details

Signature: Date: 11/16/2018

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Organism Descriptions

The descriptions of the organisms presented are derived from various reference materials. The laboratory report is based on the data derived from the samples submitted and no interpretation of the data, as to potential, or actual, health effects resulting from exposure to the numbers of organisms found, can be made by laboratory personnel. Any interpretation of the potential health effects of the presence of this organism must be made by qualified professional personnel with first hand knowledge of the sample site, and the problems associated with that site.

Dander - Comprised of human and/or animal skin cells. Counts may be higher in carpeted rooms and in rooms with more traffic.
Health Effects: May cause allergies.

Fibers - This category can include clothing, carpet, and insulation fibers.

Mycelial Fragments - A mycelium (plural = mycelia) is the "body" of a fungus. It is a collective term for hyphae (singular = hypha), which are the tubular units of the mycelium usually composed of chitin. The terms hyphae and mycelial fragments are used interchangeably. [This information was referenced from the mycology text "The Fifth Kingdom"]In some cases a fungal identification cannot be obtained due to lack of sporulation. Only the mycelial fragments are present, and cannot be identified without the distinguishing characteristics of the spores or the structures they grow from.
Health Effects: Allergic reactions may occur in the presence of spores (conidia) or mycelial/hyphal fragments.

Stachybotrys Conidiophore - The conidiophore is the asexual reproductive structure from which conidia (or spores) develop.

Ascospores - From the fungal Subphylum Ascomycotina. Ascospores are ubiquitous in nature and are commonly found in the outdoor environment. This class contains the "sac fungi" and yeasts. Some ascospores can be identified by spore morphology, however; some care should be excercised with regard to specific identification. They are identified on tape lifts and non-viable analysis by the fact that they have no attachment scars and are sometimes enclosed in sheaths with or without sacs. Ascomycetes may develop both sexual and asexual stages. Rain and high humidity may help asci to release, and dispurse ascospores, which is why during these weather conditions there is a great increase in counts.
Health Effects: This group contains possible allergens.

Aspergillus/Penicillium - These spores are easily aerosolized. Only through the visualization of reproductive structures can the genera be distinguished. Also included in this group are the spores of the genera Acremonium, Phialophora, Verticillium, Paecilomyces, etc. Small, round spores of this group lack the necessary distinguishing characteristics when seen on non-viable examination.
Health Effects: Can cause a variety of symptoms including allergic reactions. Most symptoms occur if the individual is immunocompromised in some way (HIV, cancer, etc). Both Penicillium and Aspergillus spores share similar morphology on non-viable analysis and therefore are lumped together into the same group.

Basidiospores - From the Subphylum Basidiomycotina which contains the mushrooms, shelf fungi, and a variety of other macrofungi. They are saprophytes, ectomycorrhizal fungi or agents of wood rot, which may destroy the structure wood of buildings. It is extremely difficult to identify a specific genera of mushrooms by using standard culture plate techniques. Some basidiomycete spores can be identified by spore morphology; however, some care should be exercised with regard to specific identification. The release of basidiospores is dependant upon moisture, and they are dispersed by wind.
Health Effects: Many have the potential to produce a variety of toxins. Members of this group may trigger Type I and III fungal hypersensitivity reactions. Rarely reported as opportunistic pathogens.

1551 Oakbridge Dr. Suite B, Powhatan, VA 23139 | 804.897.1177 | Fax: 804.897.0070 | www.SanAir.com | IAQ@SanAir.com

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Name: Environmental Solutions, Inc
Address: 534-A Deale Road
Deale, MD 20751
Phone: 410-867-6262

Project Number: PGCS
P.O. Number:
Project Name: Carole Highland Elem
Collected Date: 11/13/2018
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Organism Descriptions

The descriptions of the organisms presented are derived from various reference materials. The laboratory report is based on the data derived from the samples submitted and no interpretation of the data, as to potential, or actual, health effects resulting from exposure to the numbers of organisms found, can be made by laboratory personnel. Any interpretation of the potential health effects of the presence of this organism must be made by qualified professional personnel with first hand knowledge of the sample site, and the problems associated with that site.

Bipolaris/Drechslera - Found on grasses, grains, various plants, and decaying food. May grow in semi-dry environments. Some species are found in indoor environments. Because of the microscopic similarities between the two genera, they are grouped together on non-viable analyses.
Health Effects: Can occasionally cause corneal infection of the eye. This group of fungi constitutes the most commonly reported causes of allergic fungal sinusitis. They produce type I fungal hypersensitivity in humans.
References: St-Germain, Guy, and Richard Summerbell. Identifying Filamentous Fungi: A Clinical Laboratory Handbook. California: Star Publishing Co., 1996.

Chaetomium species - It is an ascomycete. It is found on a variety of substrates containing cellulose including paper and plant compost. It can be found on the damp or water damaged paper in sheetrock after a long term water damage. Several species have been reported to play a major role in decomposition of cellulose made materials. These fungi are able to dissolve the cellulose fibers in cotton and paper, and thus cause these materials to disintegrate. The process is especially rapid under moist conditions.
Health Effects: Chaetomium can produce type I fungal hypersensitivity and has caused onychomycosis (nail infections).
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Cladosporium species - The most commonly identified outdoor fungus. The outdoor numbers are reduced in the winter and are often high in the summer. Often found indoors in numbers less than outdoor numbers. It is commonly found on the surface of fiberglass duct liner in the interior of supply ducts. A wide variety of plants are food sources for this fungus. It is found on dead plants, woody plants, food, straw, soil, paint and textiles. Often found in dirty refrigerators and especially in reservoirs where condensation is collected, on moist window frames it can easily be seen covering the whole painted area with a velvety olive green layer.
Health Effects: It is a common allergen. It can cause mycosis. Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchiospasms, chronic cases may develop pulmonary emphysema. Illnesses caused by this genus can include phaeohyphomycosis, chromoblastomycosis, hay fever and common allergies.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Stachybotrys species - This organism is rarely found in outdoor samples. It is usually difficult to find in indoor air samples unless it is physically disturbed because the spores are in a gelatinous mass. Grows well on wet media, preferably containing cellulose. It proliferates in the indoor environment with long term water damage, growing on wallpaper, gypsum board, and textiles. As a general rule, air cultures for Stachybotrys yields unpredictable results, mainly due to the fact that this fungus is usually accompanied by other fungi such as Aspergillus and Penicillium that normally are better aerosolized than Stachybotrys. This is a slow growing fungus on media. It does not compete well with other rapidly growing fungi. The black fungi grow on building material with high cellulose content and low nitrogen content. Appropriate media for the growth of this organism will have high cellulose content and low nitrogen content.
Health Effects: It has worldwide distribution and has been reported to cause dermatitis, cough, rhinitis, and headache, although no definitive reports of human infections have been verified. It has the ability to cause type I hypersensitivity. It is a documented mycotoxin producer.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Carbon Monoxide Thresholds

Carbon monoxide sampling is performed using a Pyle PCM005 Carbon Monoxide Meter. Carbon monoxide (CO) is a colorless, odorless, tasteless, and toxic air pollutant, which is produced in the incomplete combustion of carbon-containing fuels, such as gasoline, natural gas, oil, coal, and wood. Please refer to the outline below for exposure to carbon monoxide.

9 ppm	CO Max prolonged exposure (ASHRAE standard)
35 ppm	CO Max exposure for 8-hour work day (OSHA)
800 ppm	CO Death within 2 to 3 hours
12,800 ppm	CO Death within 1 to 3 minutes

Carbon Dioxide Thresholds

Carbon dioxide sampling is performed using an AZ-7755 Carbon Dioxide Detector. Carbon dioxide (CO2) is a heavy colorless gas CO_2 that does not support combustion, dissolves in water to form carbonic acid, is formed especially in animal respiration and in the decay or combustion of animal and vegetable matter, is absorbed from the air by plants in photosynthesis, and is used in the carbonation of beverages. Please refer to the outline below for exposure to carbon dioxide.

250-350 ppm	Normal background concentration in outdoor ambient air
350-1,000 ppm	Concentrations typical of occupied indoor spaces with good air exchange
1,000-2,000 ppm	Complaints of drowsiness and poor air.
2,000-5,000 ppm	Headaches, sleepiness and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
5,000 ppm	Workplace exposure limit (as 8-hour TWA) in most jurisdictions.
> 40,000 ppm	Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma, even death.

Recommended Personal Protection Equipment (PPE)

The following procedures are recommended:

When it is time to begin mold remediation, require that all occupants leave the remediation area, *this means the contained areas and egress areas,* during the actual work performance. The occupants are not to return until the mold remediation is completed. The reason for this precaution is that the very removal of contaminated building materials puts an even greater number of mold spores into the breathable air space, causing potential health harm to the occupants of that space if they were present during mold remediation.

Personnel responsible for remediation should have received training on the proper clean-up methods, personal protection, and potential health hazards for microbiological organisms.

Respiratory protection should be in accordance with the Occupational Safety and Health Association (OSHA) Respiratory Protection Standard (29 CFR 1910.134). In addition, gloves and eye protection should also be used.

All mold remediation workers need to be protected by personal protective gear always when working inside the impacted areas. Personal protective gear should include ALL the following:

1. One-piece facemask to protect worker's eyes from mold spores and to filter out mold spores from being breathed in through nose and mouth with air respirator utilizing air filter cartridges with a minimum NIOSH rating of N-95.
2. Tyvek or comparable one-piece body suit with head cover (hood).
3. Tyvek or comparable booties to cover shoes, sock, and feet.
4. Rubber gloves.
5. Ear plugs.

No food or drink can be present in, or consumed inside, the contained remediation areas. Mold spores can be ingested into the body by food and drink being contaminated by airborne mold spores.

Even though protected by the personal protective gear detailed above, any workers with open wounds or sores should have such wound/sores totally covered with plastic coated bandages/dressing. Mold spores can enter the body through open wounds and sores.

Remediation recommendations for Carole Highland Elementary School are as follows:

Due to the health concerns, before any antimicrobials, detergents or chemicals are introduced into this environment, an SDS detailing such agents must be provided to the client and posted near the entrance of each Classroom and Common Area in which microbial cleaning is being performed.

Contractors and the workforce conducting the services below should **READ AND FOLLOW THE ENTIRE PROTOCOL** to assist them in a successful remediation effort. Owners or authorized personnel must grant ESI permission to discuss the contents of this protocol with anyone other than employed service providers.

Negative Air Pressure Differential:

PLEASE NOTE: It is the responsibility of the remediation contractor to monitor and maintain the negative air pressure. Negative air pressure can be measured using a manometer.

1. Engage a HEPA filtered Air Filtration Device (AFD) in the Classrooms and Common Areas in which microbial cleaning is being performed. The exhaust tube should vent outside through the nearest window or door to create a minimum of 5 Pascals of negative air pressure.

Content Instructions:

All contents and/or furnishings with microbial growth and/or accumulations of dust should be cleaned and sanitized. General microbial cleaning includes the following:

1. When HEPA vacuuming microbial growth and/or accumulations of dust, use a **bristle brush** attachment.
2. When damp-wiping surfaces, use a soft cloth dampened with an EPA registered botanical solution such as Benefect or equivalent. Allow treated surface to dry. Use a new cloth for each piece of furniture and/or item. Do not reuse cloths, which will inevitably spread mold spores.
3. Re-HEPA vacuum surfaces with a clean bristle brush.

FURNITURE	
Item(s)	Suggested Cleaning Procedures
Upholstered teacher's chairs Seat cushions Seat covers	If the furniture has removable cushions, remove each cushion and HEPA vacuum all sides, as well as all surfaces of the furniture. If the cushions are not removable, HEPA vacuum all surfaces, paying careful attention to the frame/mechanisms and all crevices between the cushions and frame. Damp-wipe all surfaces with Benefect or equivalent. Re-HEPA vacuum surfaces with a clean bristle brush.
Wood "U-shaped" tables Steel/wood round tables Steel/wood rectangular tables Wood rocking chairs Steel/wood student desks Steel/high-density polyethylene student chairs	Remove contents to ensure cleaning of all surfaces. HEPA vacuum all surfaces. Pay careful attention to the underside of the tables, desks, and chairs. Damp-wipe all surfaces with Benefect or equivalent.

Bookshelves and metal shelving Cabinets Push-carts	Re-HEPA vacuum surfaces with a clean bristle brush.
ELECTRONICS, ETC.	
Item(s)	Suggested Cleaning Procedures
Televisions Computer monitors Projectors	Unplug. HEPA vacuum the exterior of all electronics. Damp-wipe housing with Benefect or equivalent. Re-HEPA vacuum exterior surfaces with clean bristle brush.
Pull down projector screens Pull down maps	HEPA vacuum surfaces of spring holder and screen/map holder with
Loud speakers	Speaker covers should be HEPA vacuumed then removed to allow access to the speaker itself. Speaker cabinet should be HEPA vacuumed, damp-wiped, then re-HEPA vacuumed. Carefully wet-wipe the speaker itself.
VCR DVD	Unplug. HEPA vacuum, damp-wipe, then re-HEPA vacuum the exterior surfaces.

Ceiling Tile Instructions:

The water damaged acoustic ceiling tiles should be removed and discarded. ESI recommends placing the ceiling tiles into black contractor bags upon removal.

Any additional water damaged ceiling tiles should be removed as needed. Once the acoustic ceiling tiles are removed and the ceiling cavities are exposed, remove any contaminated or water damaged cellulosic materials not noted or detected during the initial inspection. In addition, seal the insulation joints on the plumbing lines to prevent condensation within the ceiling cavities.

Central Air Duct System and HVAC Convector Units - Cleaning and Sanitizing Process:

ESI recommends the ventilation systems be cleaned to remove accumulations of dust and debris. The systems can also be sanitized with an EPA registered botanical solution such as Benefect, or equivalent. This includes the central air duct systems and HVAC convector units.

Air Scrubbing:

***PLEASE NOTE*:** All negative air filtration should be disengaged and air filtration devices (AFDs) should be engaged in circulation mode.

1. Engage a minimum 1,000 CFM HEPA filtered AFD in each Classroom and/or Common Area in which microbial cleaning is being performed to accomplish a minimum of 8-12 air changes per hour.

Final Cleaning of Remediated and Impacted Areas:

1. Prior to final clearance test, cover and seal airtight all the equipment filters and/or remove them from the project no less than four and no more than 72 hours prior to clearance inspection.
2. Fogging of each Classroom and/or Common Area is recommended with an EPA registered botanical solution such as Benefect, or equivalent.

3. Wait approximately 2-3 hours after the fogging for particulates to settle, then damp wipe and towel dry all non-porous horizontal surfaces. This also includes wet-mopping the floor tiles.

Any contractor applying chemicals should follow manufactures dilution instruction and a SDS must be posted. This includes products such as: FOSTERS 40-20, Fiberlock/IAQ products, Benefect, LYSOL, MICROBAN, as well as other disinfectants and deodorizers.

ESI has included further instruction in the Clearance Requirements and Clearance Checklist below, to assist you in a successful remediation attempt, and to reduce the risk of any cross contamination of microbial hazards.

Post Remediation Clearance Requirements

ESI clearance verification requirements are based on experience from hundreds of projects annually and sources, including the AIHA, EPA, NYG, ACGIH and IICRC S500/S520 and on professional judgment on a case by case basis. The following requirements include the remediation and possible affected areas.

Scheduled clearance testing should be coordinated by the contractor or responsible party of the remediation project within 72 hours of completion. The HEPA filtered air scrubbers should be disengaged and sealed at least four hours prior to inspection, preferably not to exceed 72 hours prior. Ensure that the air has been changed at least 8-12 times before scheduling air sampling.

The ventilation systems should be operating properly during the IAQ testing.

Visual Inspection

1. No visible microbial growth shall be evident. (Effective Source Removal)
2. No significant visible dust shall be evident. (Effective HEPA vacuum)
3. No significant odors shall be evident. (MVOCs and VOCs)

Air Sampling

Typical Indoor Mold Spore Concentration - According to the EAA (Environmental Analysis Associates)

Description	Spores/Cubic Meter	Predominant Types
"Clean" building	less than 2,000	Total for all spore types
	less than 1,000	Penicillium, Aspergillus
Possible Indoor Amplification	1,000 - 5,000	Penicillium, Aspergillus, Cladosporium
Indoor Amplification likely	5,000 - 10,000	Penicillium, Aspergillus, Cladosporium
Chronic Indoor Amplification	10,000 - 500,000	Penicillium, Aspergillus, Cladosporium
Inadequate flood cleanup or indoor demolition of surfaces	50,000 - 10,000,000	Penicillium, Aspergillus, Stachybotrys, Cladosporium, Chaetomium, Basiomycetes Tricoderma, Ulocladium, etc.

Everyone breaths in thousands of mold spores daily in all environments. ESI uses the air quality of the outside as a baseline sample to support or test hypotheses of contamination and remediation issues. Above all, the visual and olfactory observations of an indoor environmental professional are paramount and may supersede any questionable sampling results.

“The ultimate criteria for the adequacy of abatement efforts for treating microbial and/or biological contaminations, is the ability of people to occupy or re-occupy the space without health complaints or physical discomfort". (ACGIH 15-5 Judging Remediation Effectiveness)

Clearance Checklist

This checklist is designed for the remediation supervisor to cross check the items related to this job and ensure they are completed prior to scheduling a clearance test. If items are not completed, and the clearance test is scheduled and can/should not be performed, a site visit fee will be invoiced to the client and possibly back charged to the remediation contractor.

	Client Name:		**Contractor:**	
Site Observation				
□ **Visual Pass** □ **Visual Fail** □ **Clear to Close**		Yes	No	**COMMENTS:**
1.	Was the moisture problem fixed?	☐	☐	
2.	Are SDS posted on site?	☐	☐	
3.	Is there any visible microbial growth present in the remediated areas?	☐	☐	
4.	Is the overall jobsite clean and free of any visible dust and debris?	☐	☐	
5.	Is there a presence of MVOC's or other odors?	☐	☐	
6.	Has all furniture and other contents been effective cleaned and sanitized?	☐	☐	
7.	Have all water damaged acoustic ceiling tiles been removed to their approximate measurements as recommended within the remediation protocol?	☐	☐	
8	Was all equipment turned off and all the equipment filters covered/sealed?	☐	☐	
9.	Were HEPA filter air scrubbers on site?	☐	☐	
10.	HVAC: Were all return & supply registers cleaned and sanitized with an anti-microbial solution?	☐	☐	
11.	HVAC: Were the filter(s) replace?	☐	☐	

Industry References

Since the 1993 New York City Department of Health (NYCDOH) document (Assessment and remediation of *Stachybotrys Atra* in Indoor Environments) was produced, several other guidance documents have been written. This report was developed in accordance with and including:

- *Fungal Contamination in Buildings: A Guide to Recognition and Management* (Health Canada, 1995).
- *Control of Moisture Problems Affecting Biological Indoor Air Quality* (Flannigan and Morey, 1996).
- *Bioaerosols: Assessment and Control* (American Conference of Government Industrial Hygienists [ACGIH], 1999).
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environments* (NYCDOH, 2000). [external link]
- *Mold Remediation in Schools and Commercial Buildings* (U.S. EPA, 2001).
- *Report of the Microbial Growth Task Force* (The American Industrial Hygiene Association, 2001).
- *Fungal Contamination: A manual for investigation, remediation and control (BECi) 2005*.
- *29 CFR 1910, Occupational Safety and Health Standards for General Industry, U.S. Department of Labor*
- Institute of Inspection, Cleaning and Restoration Certification Standard IICRC S520 *29 CFR 1926, Occupational Safety and Health Standards for the Construction Industry*, U.S. Department of Labor
- *40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), U.S. Environmental Protection Agency*
- *ACR 2006, Assessment, Cleaning and Restoration of HVAC Systems, National Air Duct Cleaners Association, 2006**
- *ASHRAE Standards 62.1 or 62.2*
- *ASTM D-1653, Standard Test Methods for Water Vapor Transmission of Organic Coating Films*
- *Bioaerosols: Assessment and Control*, American Conference of Governmental Industrial Hygienists, 1999
- *Field Guide for Determination of Biological Contaminants in Environmental Samples, American Industrial Hygiene Association, 2005*
- *A Guide for Mold Remediation in Schools and Commercial Buildings, US Environmental Protection Agency, 2001 Protecting the Built Environment: Cleaning for Health, Michael A. Berry Ph.D., 1993*
- *IICRC S100 Standard and Reference Guide for Professional Carpet Cleaning, Fourth Edition, Institute of Inspection, Cleaning and Restoration Certification, (S100)**
- *IICRC S300 Standard and Reference Guide for Professional Upholstery Cleaning, First Edition, Institute of Inspection, Cleaning and Restoration Certification, (S300)**
- *ANSI/IICRC S500 Standard and Reference Guide for Professional Water Damage Restoration, Third Edition, Institute of Inspection, Cleaning and Restoration Certification, (S500)**

Limitations and Exclusions

All the professional opinions presented in this report are based solely on the scope of work conducted and sources referred to in our report. The data presented by ESI in this report was collected and analyzed using generally accepted industry methods and practices at the time the report was generated. This report represents the conditions, locations and material that were observed at the time the fieldwork was conducted. The scope of work for this project did not include an assessment of other environmental conditions which might exist on the property. No inferences regarding other conditions, locations or materials at a later or earlier time may be made based on the contact of this report. No warranty is made. ESI liability and that of its contractors and subcontractors, arising from any services rendered hereunder, shall not exceed the total fee paid by the client to ESI. This report was prepared for the sole use of our client. The use of this report by anyone other than our client or ESI is strictly prohibited without the expressed written consent of ESI. Portions of this report may not be used independently of the entire report.