ESI Environmental Solutions, Inc.

www.esi4u.com (410)-867-6262

Discovery Environmental Inspection Report

Project Contact Information

Alex Baylor Environmental Specialists Environmental Safety Office 13306 Old Marlboro Pike Upper Marlboro, MD 20772 301-952-6760 alex.baylor@pgcps.org	Kettering Elementary School 57,651 Ft^2	Zack Butcher Certified Indoor Environmentalist Environmental Solutions, Inc. 6114 Drum Point Rd Deale, MD 20751 410-867-6262 zack@esi4u.com

Property Location

11000 Layton Street, Upper Marlboro, MD 20772

Date of Inspection: 4/9/2019

Prepared By: Zack Butcher

Certified Indoor Environmentalist (CIE)

Dear Mr. Baylor,

The results of the inspection and testing performed at Kettering Elementary School are concluded, and the findings are enclosed. I want to thank you for allowing ESI the opportunity to service your indoor environmental needs. Included in this report are the observations, lab results, and recommendations from ESI's 04/09/2019 inspection and testing.

Background Information

The Prince Georges County Public School Environmental Team has taken a proactive approach in cleaning the above-mentioned school to ensure there are no health or environmental risks related to microbial and biological hazards. Historically elevated levels of humidity, condensation from pipes, periodic steam leaks, and outdated HVAC systems, may have contributed to water damage ceiling tiles and colonization of mold spores in various area of the school.

Purpose

ESI was engaged to inspect the school in a random sufficient manner. Classrooms, administration offices, and common area building materials and contents, will be visually inspected for water damage and microbial growth.

In each location inspected, the indoor air quality will be tested for elevated levels of carbon dioxide and carbon monoxide, in addition to measuring the relative humidity and temperature. Microbial hazards in the breathable air space will also be tested.

Based upon the visual assessment, instrument readings, and lab results, ESI will determine if additional remediation in required.

Observations and Instrument Readings

The following table is designed for this project. Some of the fields may not be filled in due to not being applicable during the time of the inspection. You will notice either a 'YES' or 'NO' in the table. 'YES' indicates that mold and/or water damage was detected and 'NO' indicates it was not. If 'YES' is noted, remediation recommendation will be included for the area inspected.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.	
Room 11	2434319	N/A	45.1	78.6	833	0.00	6,900	
Inspected								
Ceiling Tiles	Walls	Teachers Desk	Children's Desk	Tables	Cabinets Shelving	Convector	HVAC Diffusors	Windows
2x4	CMU +VOG	1	6	4	8	1	0	2
NO	NO	NO	NO	NO	YES	NO	N/A	NO

Inspected

- There was evidence of water damage in the sink cabinet.
- The indoor air quality should not pose health or environmental concerns, as the total fungal ecology was 480 spores/M³ of breathable air space.

Recommendations

- HEPA vacuum, then damp-wipe the sink cabinetry with an anti-microbial agent to remove water staining and suspected microbial contamination.
- Ensure there are no active leaks from the sink.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.	
Room 16	2434320	N/A	45.0	78.6	647	0.00	10,200	
Inspected								
Ceiling Tiles	Walls	Teachers Desk	Children's Desk	Tables	Cabinets Shelving	Convector	HVAC Diffusors	Windows
2x4	CMU	2	0	9	3	1	0	2
NO	NO	NO	N/A	NO	N/A	NO	N/A	NO

Observation Notes

- There was visible suspected microbial growth on the toe kick of the sink cabinet.
- The indoor air quality should not pose health or environmental concerns, as the total fungal ecology was 240 spores/M³ of breathable air space.

Recommendations

- HEPA vacuum, then damp-wipe the sink cabinetry with an anti-microbial agent to remove water staining and suspected microbial contamination.
- Ensure there are no active leaks from the sink.

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.	
Room 26	2434321	N/A	43.4	78.8	866	0.00	9,000	
Inspected								
Ceiling Tiles	Walls	Teachers Desk	Children's Desk	Tables	Cabinets Shelving	Convector	HVAC Diffusors	Windows
2x4	CMU	1	0	8	1	0	4	2
NO	NO	NO	N/A	NO	NO	N/A	YES	NO
Observation Notes								
• There was dust and debris on the diffusers and ceiling tiles near the diffusers. • The indoor air quality should not pose health or environmental concerns, as the total fungal ecology was 80 spores/M³ of breathable air space.								
Recommendations								
• Remove, discard, and replace the ceiling tiles with accumulated dust and debris on them. • Clean diffusers with an antimicrobial to remove dust and discolorations.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.	
Room 5	2434322	N/A	44.1	78.4	770	0.00	7,600	
Inspected								
Ceiling Tiles	Walls	Teachers Desk	Children's Desk	Tables	Cabinets Shelving	Convector	HVAC Diffusors	Windows
2x4	CMU + Wallboard	1	30	3	4	1	0	2
NO	NO	NO	NO	NO	NO	NO	N/A	NO
Observation Notes								
• The windows were open during the inspection and testing. • The indoor air quality should not pose health or environmental concerns, as the total fungal ecology was 1,000 spores/M³ of breathable air space.								
Recommendations								
None								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.	
Room 17	2434323	N/A	52.8	75.5	1,170	0.01	9,800	
Inspected								
Ceiling Tiles	Walls	Teachers Desk	Children's Desk	Tables	Cabinets Shelving	Convector	HVAC Diffusors	Windows/ Doors
2x4	CMU	0	0	0	1	1	0	1 window 1 door
NO	NO	N/A	N/A	N/A	NO	NO	N/A	NO
Observation Notes								
• The door was open. • The Carbon Dioxide (CO2) level in this room was slightly elevated at 1,170 ppm (parts per million). • The indoor air quality should not pose health or environmental concerns, as the total fungal ecology was 1,000 spores/M³ of breathable air space.								
Recommendations								
• To reduce Carbon Dioxide (CO2) levels, increase air exchange within this classroom. Ventilating or circulating the air with a fan will also reduce Carbon Dioxide (CO2) levels.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.	
Room 1	2434573	N/A	49.8	77.1	871	0.00	7,900	
Inspected								
Ceiling Tiles	Walls	Teachers Desk	Children's Desk	Tables	Cabinets Shelving	Convector	HVAC Diffusors	Windows
2x4	CMU	1	0	3	6	1	0	2
NO	NO	NO	N/A	NO	YES	NO	N/A	NO
Observation Notes								
• There was evidence of previous water activity and visible suspected microbial growth in the sink cabinet. • The indoor air quality should not pose health or environmental concerns, as the total fungal ecology was 760 spores/M³ of breathable air space.								
Recommendations								
• HEPA vacuum, then damp-wipe the sink cabinetry with an anti-microbial agent to remove water staining and suspected microbial contamination. • Ensure there are no active leaks from the sink.								

Location	IAQ Sample #	Swab	R/H	Temp	CO2	Co	Cubic feet of air.
Outside	2434318		41.7	77.7			
Observation Notes							
• The total fungal ecology in the outdoor control sample was 2,400 spores/M³ of breathable air space.							

Interpretation of Lab Results

In the enclosed Air Cassette Analysis report, you will notice Fungal Identification, which is the genera detected in the breathable airspace inside, and outside. The Raw count is the actual number of spores counted on the slide, and the Count/m3 are the spores per cubic meter of air. The other particles are non-living particles such as dander, mycelial fragments, pollens, etc.

For humans to be exposed indoors, fungal spores, fragments, or metabolites must be released into the air and inhaled, physically contacted (dermal exposure), or ingested. Whether symptoms develop in people exposed to fungi depends on the nature of the fungal material (e.g., allergenic, toxic, or infectious), the amount of exposure, and the susceptibility of exposed persons.

Susceptibility varies with genetic predisposition (e.g., allergic reactions do not always occur in all individuals), age, state of health, and concurrent exposures.

Air Sampling Lab Results

SanAir Technologies Laboratory

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

Project Number: 11000 Layton Street
P.O. Number: JZB
Project Name: Kettering Elementary School
Collected Date: 4/9/2019
Received Date: 4/10/2019 9:45:00 AM

SanAir ID Number
19016838
FINAL REPORT
4/12/2019 11:22:59 AM

Analyst: Acharya, Uttam

Air Cassette Analysis

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

SanAir ID Number	19016838-001			19016838-002			19016838-003			19016838-004		
Analysis Using STL	107C			107C			107C			107C		
Sample Number	2434318			2434319			2434320			2434321		
Sample Identification	Control - Outside			Room 11			Room 16			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/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	1	40	n/a	23	920	n/a	11	440	n/a	10	400	n/a
Fibers										1	40	n/a
Mycelial Fragments												
Pollen	3	120	n/a									
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Ascospores	2	80	3									
Aspergillus/Penicillium				1	40	8	1	40	17	1	40	50
Basidiospores	7	280	12									
Cladosporium species	51	2040	85	11	440	92	4	160	67	1	40	50
Fusarium species												
Smuts/Myxomycetes							1	40	17			
TOTAL	**60**	**2400**		**12**	**480**		**6**	**240**		**2**	**80**	

Signature: Uttam Acharya Date: 4/12/2019 Reviewed: Johnathan Wilson Date: 4/12/2019

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SanAir ID Number	19016838-005			19016838-006			19016838-007			
Analysis Using STL	107C			107C			107C			
Sample Number	2434322			2434323			2434573			
Sample Identification	Room 5			Room 17			Room 1			
Sample Type	Air Cassette - Micro-5			Air Cassette - Micro-5			Air Cassette - Micro-5			
Volume	25 Liters			25 Liters			25 Liters			
Analytical Sensitivity	40 Count/M³			40 Count/M³			40 Count/M³			
Background Density	1+			2			2			
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	
Dander	24	960	n/a	96	3840	n/a	54	2160	n/a	
Fibers				4	160	n/a	2	80	n/a	
Mycelial Fragments				1	40	n/a				
Pollen	1	40	n/a							
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	
Ascospores	1	40	4	2	80	8				
Aspergillus/Penicillium				1	40	4	3	120	16	
Basidiospores	20	800	80	5	200	20	6	240	32	
Cladosporium species	3	120	12	15	600	60	10	400	53	
Fusarium species				1	40	4				
Smuts/Myxomycetes	1	40	4	1	40	4				
TOTAL	**25**	**1000**		**25**	**1000**		**19**	**760**		

Signature: Uttam Acharya Date: 4/12/2019 Reviewed: Johnathan Wilson Date: 4/12/2019

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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.

Pollen - Produced by trees, flowers, weeds and grasses. The level of pollen production can depend on water availability, precipitation, temperature, and light. Pollen is usually dispersed by either insects or the wind.
Health Effects: Mostly effects the respiratory tract with hay fever symptoms but has also been shown to trigger asthma in some people.

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.

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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.

Fusarium species - A common soil fungus and plant pathogen. Fusarium is frequently isolated from plants and grains. It is often found in humidifiers and requires wet conditions to grow.
Health Effects: A type I allergen. Frequently involved in eye, skin and nail infections. Fusarium is the most common cause of mycotic keratitis and has been isolated from patients with a variety of infections. Some species produce mycotoxin. Food safety issues are related to some species of this genus.
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.

Smuts/Myxomycetes - Smuts and Myxomycetes are parasitic plant pathogens. They are typically grouped together due to their association with plants, the outdoors and because they share similar microscopic morphology.
Health Effects: Can produce type I fungal hypersensitivity reactions.
References: Martin, G.W., C.J. Alexopoulos, and M.L. Farr. The Genera of Myxomycetes. Iowa City, Iowa: University of Iowa Press, 1983.

Conclusions/Recommendations

The samples in this report do not indicate elevated concentrations of aerosolized mold spores detected in the breathable air space of the test locations.

However, several rooms still need attention. This is mainly due to water stained and discolored ceiling tiles, dust and debris on diffusers, water damage and/or suspected microbial growth in sink cabinets, and slightly elevated levels of CO2. Please refer to all the recommendations listed above.

I hope you found our service beneficial. If you have any questions or concerns, please feel free to contact me at 410-867-6262.

Respectfully,

Zack Butcher (CIE)
Environmental Solutions, Inc.

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)**