Windjammer Environmental LLC
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June 5, 2019

Alex Baylor
Environmental Specialist
PGCPS Environmental Safety Office
13306 Old Marlboro Pike
Upper Marlboro, MD 20772
Alex.baylor@pgcps.org

Re: IAQ and Mold Assessment Report
Prince George's County Public Schools
Morningside Elementary School

Dear Mr. Baylor,

Windjammer Environmental LLC (Windjammer) was contracted to conduct a visual assessment, measure indoor air quality (IAQ) parameters and sample for mold in a limited number of areas at the Morningside Elementary School located at 6900 Ames Street, Suitland, MD 20746. This assessment is intended to check on effectiveness of operations activities that are focused on preventing conditions that can lead to the development of an environment which is historically associated with an increase in reports of poor IAQ. This assessment was conducted by Certified Industrial Hygienist (CIH) Damien Hammond SR on May 25, 2019.

This assessment included:

- Measurement of temperature, relative humidity, carbon dioxide (CO_2) and carbon monoxide (CO)
- Collection of nonviable airborne mold samples; and
- Visual assessment of select areas.

Methods

A TSI IAQ-Calc Model 7545 was used to measure temperature, relative humidity, carbon dioxide (CO_2) and carbon monoxide (CO).

Air samples for non-viable airborne fungi were collected on Air-O-Cell cassettes using a Zefon Bio-Pump Plus portable sampler calibrated to collect 15 liters of air per minute (lpm). The sampling period for the all samples was five minutes.

Direct read instrumentation used were calibrated in accordance with the manufacturer's specifications prior to the start of this assessment.

All samples collected were hand delivered to and analyzed by EMSL in Beltsville, MD. EMSL is accredited by the American Industrial Hygiene Association (AIHA) for microbial analysis and participates in the Environmental Microbiology Laboratory Accreditation Program (EMLAP).

Guidance

The Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limits (PELs) are the only enforceable regulatory standards for indoor air quality. However, other organizations such as the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) and the Environmental Protection Agency (EPA) have developed widely accepted consensus standards that can be used to assess the suitability of indoor air quality.

ASHRAE Standards

62.1-2013 and 55-2013 are consensus standards that outline acceptable practices for the design of ventilation systems in commercial and residential structures. Both documents were developed "to specify minimum ventilation rates and indoor air quality that will be acceptable to human occupants and are intended to minimize the potential for adverse health effects." The standards also consider chemical, physical, and biological contaminants and other factors that impact indoor air quality and affect occupant health and comfort.

ASHRAE 55-2013 recommends temperature and relative humidity ranges that are considered suitable for indoor air quality. Recommended ranges are as follows:

- Temperature be maintained between 67 and 82 degrees Fahrenheit (°F)
- Relative humidity to be maintained below 65%

Carbon Dioxide

CO_2 is widely used as a surrogate gas in the assessment of indoor air quality. It is a byproduct of respiration and can be used to determine the effectiveness and/or management of building ventilation systems. Based on ASHRAE recommendations, indoor CO_2 concentrations that are below 1000 parts per million (ppm) or have a differential of less than 700 ppm compared to outside concentrations are considered to be suitable.

For example, if outside CO_2 concentrations are measured at 380 ppm, then indoor CO_2 concentrations measured up to 1080 ppm would be considered suitable.

Carbon Monoxide

OSHA has established a PEL for CO of 35 ppm over a time weighted average (TWA) of 8 hours and a ceiling CO exposure limit of 200 ppm in a five-minute period. ASHARE has adopted the EPA National Ambient Air Quality Standard (NAAQS) for CO of 9 ppm when evaluating indoor air quality. In nonindustrial settings, the NAAQS standard is commonly used to assess the suitability of IAQ.

Nonviable Airborne Fungi (Mold)

There are no set regulatory limits established for acceptable airborne fungi levels. However, indoor levels within schools and offices are generally lower than outdoor levels. The distribution of airborne species of fungi found in indoor air is expected to be similar in proportion to outside distributions. The type and concentrations of the airborne microorganisms can be used to determine if there is a potential hazard to occupants which requires action.

Findings

Indoor Air Quality

Indoor air quality measurements collected were satisfactory with respect to temperature, relative humidity, carbon dioxide (CO_2), and carbon monoxide (CO). Relative humidity was observed to be slightly elevated in the 1st floor Faculty lounge. Recorded indoor air quality results are summarized in the following Table.

Table 1
Indoor Air Quality Measurement Summary
(Measurements Recorded on May 25, 2019)

Measurement Location	Temperature (°F)	Relative Humidity (%)	CO_2 (ppm)	CO (ppm)
Outdoors*	72.4	52.5	439	0.0
Classroom 101*	74.3	64.2	463	0.0
1st Floor Faculty Lounge	74.6	65.8	550	0.0
Classroom 102*	74.0	64.3	479	0.0
1st Floor Multi-Purpose Room	73.5	55.5	650	0.0
1st Floor Media Center	73.1	54.9	530	0.0
Classroom 107	74.4	60.5	605	0.0
Classroom 108*	70.9	59.7	604	0.0
Classroom 201	73.7	55.6	871	0.0
Classroom 206*	73.3	50.3	869	0.0
Classroom 209	72.7	41.9	481	0.0

ppm – parts per million
* - spore-trap sample

Non-viable Airborne Fungi Sampling

Measured total indoor airborne fungi concentrations were determined have a normal ecology and with indoor airborne fungi concentrations lower than measured total outdoor fungi concentrations at this time except for Classroom 101. Classroom 101 was observed to have normal ecology however measured airborne fungi concentrations inside were higher than measured outside concentrations. A complete laboratory analysis report is available for viewing in Attachment A.

Visual Assessment

A walk-through of the hallways and a limited number of classrooms and public areas was carried out. No bathrooms, staff offices, mechanical rooms, kitchen areas or storage areas were visited. The school was in session at the time of the inspection.

The school was free of evidence of current water intrusion or any unexpected odors. Except as noted, floors, walls and ceiling tiles observed were in acceptable condition. The housekeeping was acceptable.

The following areas for further investigation or improvement were noted:

- Classroom 101 – this room had higher airborne fungi concentrations measured indoors than measured concentrations outdoors. This room was observed to be in satisfactory condition with no visibly moisture damaged building materials or apparent fungi point sources. This room had operable windows and a window mounted unit ventilator. It is unclear if the windows were open prior to the assessment but they were closed at the time of assessment
- Classroom 102 – moderate dirt loading was observed in the supply air vent of the unit ventilator
- 1st Floor Faculty lounge – stained ceiling tiles present (less than 1 square foot area)
- Classroom 109 - stained ceiling tiles present (less than 1 square foot area), moderate dirt loading was observed in the supply air vent of the unit ventilator
- Classroom 201 - stained ceiling tiles present (less than 1 square foot area), plants in poor condition present near unit ventilator
- Classroom 202 - stained ceiling tiles present (less than 1 square foot area), moderate dirt loading was observed in the supply air vent of the unit ventilator
- Classroom 212 - moderate dirt loading was observed in the supply air vent of the unit ventilator

Conclusions & Recommendations

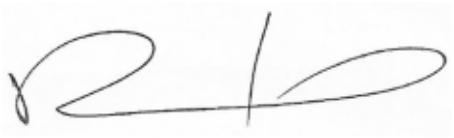
Indoor air quality spore trap measurements collected in areas assessed were less than the levels measured outside the building and with the same predominate spore types found except for Classroom 102. This is an indication that the spores sampled in the rooms assessed are more likely to be originating in the outdoor environment rather than an interior source - reducing the chance of undetected overgrowth or colonization in the building. While there are no standards for airborne levels of mold, this approach of comparing indoor to outdoor, and looking at the species found, is one tool identified by organizations such as the American Industrial Hygiene Association when identifying assessment methods and improvement measurement in indoor air quality. Please note the following considerations for improvement.

- Consider cleaning the unit ventilator in Classroom 102 and resampling the room for airborne fungi concentration.
- Clean the supply air diffusers of unit ventilators in Classrooms 102, 109, 201, 202, and 212
- Identify the cause of any staining on ceiling tiles and fix
- Remove all plants in poor condition
- Consider modifying air handling system schedules to lower humidity in the 1st floor Faculty lounge

At this time, no other recommendations are provided.

Windjammer appreciates the opportunity to provide this indoor air quality assessment. If you have any questions or comments, please feel free to contact us at (888) 270 - 8387.

Best regards,



Damien Hammond SR, MS, CSP, CIH
President

Katherine (Kay) Dietrich, CIH, CSP
Certified Industrial Hygienist

Attachment A: Microbial Laboratory Report (Air)

Windjammer Environmental LLC
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Attachment A

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EMSL Order: 191906143
Customer ID: WJEN42
Customer PO:
Project ID:

Attn: Kay Dietrich
Windjammer Environmental
6710 Oxon Hill Rd
National Harbor, MD 20745

Phone: (301) 351-4213
Fax:
Collected: 05/24/2019
Received: 05/28/2019
Analyzed: 05/31/2019

Project: PGCPS IAQ MORNINGSIDE ES

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

Lab Sample Number:	191906143-0001			191906143-0002			191906143-0003		
Client Sample ID:	190524-1			190524-2			190524-3		
Volume (L):	75			75			75		
Sample Location	OUTSIDE			RM 101			RM 102		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	1*	10*	0	-	-	-	-	-	-
Ascospores	220	9600	26.2	216	9430	22.6	82	3600	25.3
Aspergillus/Penicillium	3	100	0.3	3	100	0.2	3	100	0.7
Basidiospores	556	24300	66.2	710	31000	74.2	233	10200	71.6
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	50	2200	6	27	1200	2.9	6	300	2.1
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	1	40	0.1	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	3	100	0.3	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	1	40	0.1	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Arthrinium	1*	10*	0	-	-	-	-	-	-
Cercospora++	-	-	-	1	40	0.1	-	-	-
Gonatobotryum	-	-	-	-	-	-	-	-	-
Pestalotia/Pestalotiopsis	1	40	0.1	-	-	-	-	-	-
Polythrincium	4	200	0.5	-	-	-	1	40	0.3
Sporidesmium-like	1	40	0.1	-	-	-	-	-	-
Total Fungi	**842**	**36680**	**100**	**957**	**41770**	**100**	**325**	**14240**	**100**
Hyphal Fragment	1	40	-	2	90	-	-	-	-
Insect Fragment	1*	10*	-	-	-	-	-	-	-
Pollen	33	1400	-	4	200	-	-	-	-
Analyt. Sensitivity 600x	-	44	-	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	1	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	1	-	-	1	-

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

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

Stefanie Schneider

Stefanie Schneider, Microbiology Laboratory Manager
or other approved signatory

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. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. 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. Beltsville, MD AIHA-LAP, LLC --EMLAP Accredted #102891

Initial report from: 05/31/2019 11:46:12

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

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

Lab Sample Number:	191906143-0004			191906143-0005		
Client Sample ID:	190524-4			190524-5		
Volume (L):	75			75		
Sample Location	1ST FL. FACULTY			RM 206		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-
Ascospores	67	2900	14	60	2600	25.4
Aspergillus/Penicillium	2	90	0.4	1	40	0.4
Basidiospores	389	17000	82	165	7200	70.5
Bipolaris++	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-
Cladosporium	16	700	3.4	7	300	2.9
Curvularia	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-
Myxomycetes++	2*	30*	0.1	1	40	0.4
Pithomyces++	-	-	-	-	-	-
Rust	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-
Zygomycetes	1*	10*	0	-	-	-
Arthrinium	-	-	-	-	-	-
Cercospora++	-	-	-	-	-	-
Gonatobotryum	-	-	-	1	40	0.4
Pestalotia/Pestalotiopsis	-	-	-	-	-	-
Polythrincium	-	-	-	-	-	-
Sporidesmium-like	-	-	-	-	-	-
Total Fungi	**477**	**20730**	**100**	**235**	**10220**	**100**
Hyphal Fragment	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-
Pollen	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	3	-	-	4	-
Fibrous Particulate (1-4)	-	1	-	-	1	-
Background (1-5)	-	1	-	-	2	-

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

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