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May 28, 2019

Prince George's County Public Schools
13300 Old Marlboro Pike
Upper Marlboro, Maryland 20772
Attention: Mr. Alex Baylor

RE: Indoor Air Quality Screening, Woodmore Elementary School
IFB: 022-19
ATI Project Number: ATI19-666

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) screening at Woodmore Elementary School. The IAQ screening was conducted on May 16, 2019. Its key findings are enclosed in the Executive Summary on page three, and the official laboratory report for total fungal spore trap sampling is enclosed in Appendix A.

Thank you for the opportunity to provide Industrial Hygiene services for Prince George's County Public Schools. If you have any questions regarding this report, please contact us at (202) 643-4283.

Sincerely,
ATI, INC.

Courtney E. McCall
Project Manager

Sarath Seneviratne
CIH, CSP, CHMM

Indoor Air Quality Screening Report

Prince George's County Public Schools
Woodmore Elementary School
12500 Woodmore Road
Mitchellville, Maryland 20721

Prepared for:

Prince George's County Public Schools
13300 Old Marlboro Pike
Upper Marlboro, Maryland 20772

May 28, 2019

Submitted by:

The logo for ATI (Air Technology, Inc.) features the lowercase letters 'ati' in a bold, blue, serif font. The letters are set against a light blue rectangular background.

ATI Job # 19-666

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Abbreviations and Acronyms

AHU	Air-Handling Unit
AIHA	American Industrial Hygiene Association
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASTM	American Society for Testing and Materials
CO	Carbon Monoxide
CO₂	Carbon Dioxide
EMLAP	Environmental Microbiology Laboratory Accreditation Program
HVAC	Heating, Ventilating, And Air-Conditioning
IAQ	Indoor Air Quality
NIST	National Institute for Standards and Technology
NVLAP	National Voluntary Laboratory Accreditation Program
Rev.	Revision
RH	Relative Humidity

Abbreviations involving scientific volume and measurements involving media or water sampling

Counts/m³	Mold spores per cubic meter of air
LPM	Liters Per Minute
NTE	Not to exceed
°F	degree Fahrenheit
PPM	Parts Per Million

1. Executive Summary and Key Findings

ATI conducted a proactive Indoor Air Quality (IAQ) screening on May 16, 2019, at Woodmore Elementary School, located at 12500 Woodmore Road, Mitchellville, MD 20769.

The screening included a visual assessment of randomly selected classrooms and other frequently occupied spaces, such as the library, the main office, and classrooms, for potential IAQ contributors and pathways. As part of the screening, ATI collected direct reading measurements for comfort parameters, including temperature, relative humidity, carbon dioxide, and carbon monoxide. Also, ATI collected total fungal air samples on spore trap cassettes for microbiological analysis.

The following is a summary of the key findings from this screening:

1. Temperature measurements were within ASHRAE guidelines for summer temperatures, between 73°F and 79°F.
2. Relative humidity measurements were within ASHRAE guidelines, <65%.
3. One tested location, Room 11, exceeded the recommended ASHRAE limit for carbon dioxide, which was 1,097 parts per million (PPM).
4. Carbon monoxide was not detected throughout the tested spaces.
5. Generally, indoor concentrations of mold compared favorably to those detected outdoors. *Aspergillus/Penicillium* levels in the Main Office, Library, and Room 11 were elevated beyond outdoor concentrations, but do not pose a cause for concern. However, Room 2 warrants additional testing and/or air scrubbing as *Aspergillus/Penicillium* was detected at 3,600 counts/m³.

2. Assessment Methods

Mr. Brian Chapman and Ms. Mikal Frater of ATI, Inc., conducted a visual assessment and air sampling on May 16, 2019. Sampled rooms were randomly selected and accounted for approximately 10% of classrooms or a minimum of five samples. Visual observations were made at the time the samples were collected. ATI references the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) *Standard 62.1 – 2016* and *ASHRAE Standard 55 – 2017* when providing IAQ services to clients. ASHRAE is an industry leader on energy efficiency and indoor air quality.

All measurements and air samples were collected between three-six feet from floor elevation, which represents the breathing zone, and away from air-supply and return diffusers. Real-time direct readings for temperature, relative humidity, carbon dioxide (CO₂), and carbon monoxide (CO), were obtained with a calibrated TSI Q-Trak 7575-X Meter and attached 982 Probe.

Total fungal air samples were collected with a Buck BioAire High-Volume Sampling Pump on Zefon Air-O-Cell spore-trap cassettes at a flow rate of 15 liters per minute for five minutes, for a sample volume of 75 liters. The samples were analyzed by direct microscopic examination (identifies and counts both viable and non-viable spores, which is then considered “total fungal”), via the American Society for Testing and Materials (ASTM) Standard D7391-09 by EMSL Analytical, Inc., (EMSL) located in Beltsville, MD.

EMSL participates in the National Institute of Standards and Technology’s (NIST’s) National Voluntary Laboratory Accreditation Program (NVLAP) for general laboratory performance and management and the American Industrial Hygiene Association (AIHA) Environmental Microbial Laboratory Accreditation Program (EMLAP, Certificate Number 102891).

Instrument calibration records are included in Appendix B of this report.

3. Visual Observations

Table 1: Visual Observations and Sampling Locations

Sample Location	Observations
Outside	<ul style="list-style-type: none"> • Sunny skies, partly cloudy. • Light winds. • No vehicle/foot traffic. • Samples taken in middle of parking lot. • One occupant in sampling area.
Main Office	<ul style="list-style-type: none"> • Printer/fax machine about eight feet from sampling area. • Light foot traffic. • Four occupants in area during sampling. Not in immediate sampling area. • One air diffuser, one air return. • Filter sticking out from bottom of wall unit. Filter changed on 5/9 (labeled). • Space is approximately 575 ft.²
Library	<ul style="list-style-type: none"> • Thirteen occupants in area during sampling. • Three wall units. Four air returns, two air diffusers. • History of leak. Entire carpet along window wall and adjacent office. • No stains were seen, but carpet has been removed in some areas. Wall unit has been removed in corner of room. • Carpet is buckling – fall hazard. • After previous leak, books had to be discarded due to mold growth. • Leak from broken wall unit some months ago (December 2018). Carpets were soaked and left to dry. Never taken up or replaced (according to staff). • Space is approximately 1,355 ft.² • Samples taken between wall units, near teacher’s desk.
Room 30	<ul style="list-style-type: none"> • Fish tank in back of classroom. • Friedrich A/C unit in room. • Two occupants in room during sampling. • Bathroom within classroom. • Ventilation grid along baseboard of cabinet along window wall. • Space is approximately 1,080 ft.²
Room 11	<ul style="list-style-type: none"> • Twenty-six occupants in room during sampling. • Friedrich A/C unit in room. • Wall unit with trace dirt load in filters. • Two individual oscillating fans – OFF during sampling. • Overall stuffy air in room. Poor circulation.

Sample Location	Observations
	<ul style="list-style-type: none"> Space is approximately 955 ft.²
Room 2	<ul style="list-style-type: none"> One occupant in area during sampling. Bathroom in classroom. Emergency exit in room – outside air access. Overall stuffy air. Poor air circulation. Cleaning products around classroom. Space is approximately 955 ft.²

4. Thermal Environmental Conditions for Human Occupancy

ASHRAE Standard 55-2017, *Thermal Environmental Conditions for Human Occupancy*, addresses thermal comfort in an office environment, which means that an employee wearing a normal amount of clothing feels neither too cold nor too warm. This standard discusses thermal comfort within the context of air temperature, humidity, and air movement and provides recommended ranges for temperature and humidity that are intended to satisfy most building occupants. The recommended ASHRAE ranges are referenced below by each comfort parameter.

4.1 Temperature

The ASHRAE standard establishes a winter comfort range of between 68°F and 75°F and a summer range of between 73°F and 79°F. The temperature measurements obtained during the May 16, 2019, screening is summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 73.6 - 76.1°F, within the ASHRAE summer comfort range.

Table 2: Temperature Measurements

Sample Location	May 16, 2019 °F			ASHRAE Standard °F
	Min	Max	Average	
Outside	68.5	69.8	69.15	N/A
Indoors				
Main Office	76.1	76.1	76.1	73 – 79
Library	74.8	74.8	74.8	73 – 79
Room 30	73.6	73.6	73.6	73 – 79
Room 11	73.9	74.1	74.0	73 – 79
Room 2	75.1	75.8	75.45	73 – 79

4.2 Relative Humidity

Relative humidity is a key factor for mold growth. Mold has the potential of growing on suitable surfaces with humidity levels above 65%. ASHRAE *Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality*, recommends a maximum indoor relative humidity of 65% to prevent condensation of moisture on surfaces. Relative humidity below 30% may result in drying of the mucous membranes and skin. Relative humidity measurements are summarized in Table 3. As indicated by the data in the table, relative humidity measurements averaged between 49.0% and 56.5%, below the ASHRAE maximum recommendation of 65% relative humidity.

Table 3: Relative Humidity Measurements

Sample Location	May 16, 2019 (%)			ASHRAE Standard (% RH)
	Min	Max	Average	
Outside	51.8	58.5	55.15	N/A
Inside				
Main Office	55.3	55.5	55.4	< 65
Library	54.4	54.4	54.4	< 65
Room 30	56.5	56.5	56.5	< 65
Room 11	56.1	56.1	56.1	< 65
Room 2	48.6	49.4	49.0	< 65

4.3 Carbon Dioxide

Carbon dioxide measurements within an occupied building are a standard method used to gauge the efficiency of ventilation systems. Carbon dioxide is a by-product of human respiration and does not pose an acute health hazard alone. Elevated concentrations may suggest that insufficient fresh air is being supplied to an occupied space and/or that the ventilation system does not provide a sufficient rate of air exchange.

Research has indicated that buildings with adequately operating ventilation systems are able to remove odors generated by activities in an indoor office environment efficiently. ASHRAE *Standard 62.1-2016* states that comfort (odor) criteria with respect to human bioeffluents are likely to be satisfied if the ventilation results indoor carbon dioxide concentrations are less than 700 parts per million (ppm) above the outdoor air concentration.

Carbon dioxide measurements are summarized in Table 4. On the day of the screening, the average outdoor carbon dioxide concentration obtained was 397 ppm, which calculates to a maximum indoor concentration of 1,097 ppm (700 + 397). The carbon dioxide levels inside the school ranged from the minimum detected, 556 ppm to 1,781 ppm, the maximum detected, with one location exceeding the maximum recommended concentration of 1,097 ppm, Room 11.

Table 4: Carbon Dioxide Measurements

Sample Location	May 16, 2019 Concentration (parts per million)			ASHRAE Standard (ppm) NTE
	Min	Max	Average	
Outside	395	399	397	N/A
Inside				
Main Office	765	767	766	1,097
Library	556	556	556	1,097
Room 30	991	993	992	1,097
Room 11	1,749	1,781	1,765	1,097
Room 2	690	731	710.5	1,097

4.4 Carbon Monoxide

Carbon monoxide is a colorless and odorless gas produced by the incomplete combustion of carbon containing fuels. Oil, gasoline, diesel fuels, wood, coke, and coal are the major sources of carbon monoxide. ASHRAE recommends that carbon monoxide not exceed nine ppm indoors. As indicated by the data in Table 5, carbon monoxide was not detected throughout the tested rooms.

Table 5: Carbon Monoxide Measurements

Sample Location	May 16, 2019 Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Outside	0	0	0	N/A
Inside				
Main Office	0	0	0	< 9
Library	0	0	0	< 9
Room 30	0	0	0	< 9
Room 11	0	0	0	< 9
Room 2	0	0	0	< 9

5. Total Fungal Air Sampling Results

Mold needs a food source, moisture, proper temperature and humidity, and at times, a source of light, to grow in an environment. Air infiltration through building entrances and exits, open windows and loading docks, and foot traffic into buildings, including the HVAC system all serve as primary pathways that can carry fungi indoors. Water leaks and humid conditions inside of buildings provide the moisture that fosters mold growth.

The May 16, 2019, mold screening sampled air using spore trap cassettes in randomly selected classrooms and other areas throughout the facility. These cassettes collect both viable spores, those capable of producing more fungal colonies, and non-viable spores, which cannot reproduce. Based upon recognized industry practices, indoor mold concentrations are compared with those detected outdoors, which are also known as ambient or baseline samples.

In normal circumstances, the diversity of spores identified indoors and outdoors should be similar with some exceptions. The high concentration of one or two species of fungal spores identified indoors and the absence of the same species outdoors can indicate a moisture problem with the potential to degrade the air quality. Fungi species present indoors are typically found at levels ranging from approximately 10-50% of their levels in the outdoor air, reflecting the filtering by the building's HVAC system.

The official laboratory report with spore trap samples collected on May 16, 2019, is presented in Appendix A.

In most cases, quantities of spores detected indoors were lower than those detected outdoors, which is favorable. Some spores, such as *Myxomycetes* and *Epicoccum*, were detected indoors only but at very low concentrations. Basidiospores comprised the highest spore concentration within the samples but did not exceed the quantity detected outdoors. Basidiospores are common outdoor fungi with the potential to enter building spaces through main entrances, opened windows, or via building envelopes. They may pose allergy-like symptoms but are not a fungi to be associated with water damaged building materials within the Mid-Atlantic region.

Aspergillus/Penicillium, a fungus known to cause health conditions for persons with allergies and lung disorders, was detected in four indoor areas: Main Office, Library, Room 11 and Room 2. However, only Room 2 had an elevated concentration of it, at 3,600 counts/m³.

6. Summary of Findings

ASHRAE comfort parameters including temperature, relative humidity, and carbon monoxide were within recommended ranges in all tested areas. Carbon dioxide levels were within ASHRAE guidelines, aside from Classroom 11.


Indoor concentrations of mold compared favorably to those detected outdoors. *Aspergillus/Penicillium* levels in the Main Office, Library, and Room 11 were elevated beyond outdoor concentrations, but do not pose a cause for concern. However, Room 2 warrants additional testing and/or air scrubbing as *Aspergillus/Penicillium* was detected at 3,600 counts/m³.

We appreciate the opportunity to provide these IAQ testing services for you. If you have any questions, please contact us at (202) 643-4283.

Sincerely,
ATI, INC.



Courtney E. McCall
Project Manager



Sarath Seneviratne
CIH, CSP, CHMM

**Appendix A:
Laboratory Report and Chain of Custody**



EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
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<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061909657
Customer ID: ATII25A
Customer PO:
Project ID:

Attn: Brian Chapman
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
Project: 19-666- PGPCS - Woodmore ES

Phone: (202) 368-1376
Fax:
Collected: 05/16/2019
Received: 05/16/2019
Analyzed: 05/22/2019

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

Lab Sample Number: Client Sample ID: Volume (L): Sample Location	061909657-0001 19-666-01 75 Outside Parking Lot			061909657-0002 16-666-02 Field Blank			061909657-0003 16-666-03 75 Main Office		
Spore Types	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	58	2500	26.8	-	-	-	3	100	3.6
Aspergillus/Penicillium	-	-	-	-	-	-	5	200	7.1
Basidiospores	126	5500	58.9	-	-	-	55	2400	85.4
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	30	1300	13.9	-	-	-	2	90	3.2
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	1*	10*	0.4
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	1*	10*	0.4
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Polythrincium	1	40	0.4	-	-	-	-	-	-
Total Fungi	215	9340	100	-	No Trace	-	67	2810	100
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	1	40	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	44	-	-	0	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	0*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	-	-	-	2	-
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.


Jeffrey Lau, 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. Carle Place, NY AIHA-LAP, LLC—EMLAP Accredited #102344

Initial report from: 05/23/2019 14:18:56

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



EMSL Analytical, Inc.

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Project: 19-666- PGPCS - Woodmore ES

Phone: (202) 368-1376
Fax:
Collected: 05/16/2019
Received: 05/16/2019
Analyzed: 05/22/2019

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

Lab Sample Number:	061909657-0004			061909657-0005			061909657-0006		
Client Sample ID:	16-666-04			16-666-05			16-666-06		
Volume (L):	75			75			75		
Sample Location	Library			Room 30			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)	1*	10*	0.2	-	-	-	1	40	1.1
Ascospores	18	790	16.1	10	440	7.4	7	300	8.4
Aspergillus/Penicillium	2	90	1.8	-	-	-	3	100	2.8
Basidiospores	85	3700	75.4	124	5410	91.2	70	3100	86.6
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	6	300	6.1	1	40	0.7	1*	10*	0.3
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	1*	10*	0.2	2*	30*	0.5	1*	10*	0.3
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	1*	10*	0.2	-	-	-	1*	10*	0.3
Pithomyces++	-	-	-	1*	10*	0.2	1*	10*	0.3
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Polythrincium	-	-	-	-	-	-	-	-	-
Total Fungi	114	4910	100	138	5930	100	85	3580	100
Hyphal Fragment	1	40	-	1	40	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	44	-	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	2	-	-	3	-	-	3	-
Fibrous Particulate (1-4)	-	2	-	-	2	-	-	2	-
Background (1-5)	-	2	-	-	2	-	-	3	-

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


Jeffrey Lau, 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. Carle Place, NY AIHA-LAP, LLC--EMLAP Accredited #102344

Initial report from: 05/23/2019 14:18:56

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Received: 05/16/2019
Analyzed: 05/22/2019

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

Lab Sample Number:	061909657-0007		
Client Sample ID:	16-666-07		
Volume (L):	75		
Sample Location	Room 2		
Spore Types	Raw Count	Count/m³	% of Total
Alternaria (Ulocladium)	-	-	-
Ascospores	1	40	0.9
Aspergillus/Penicillium	82	3600	77.1
Basidiospores	19	830	17.8
Bipolaris++	-	-	-
Chaetomium	-	-	-
Cladosporium	4	200	4.3
Curvularia	-	-	-
Epicoccum	-	-	-
Fusarium	-	-	-
Ganoderma	-	-	-
Myxomycetes++	-	-	-
Pithomyces++	-	-	-
Rust	-	-	-
Scopulariopsis/Microascus	-	-	-
Stachybotrys/Memnoniella	-	-	-
Unidentifiable Spores	-	-	-
Zygomycetes	-	-	-
Polythrincium	-	-	-
Total Fungi	106	4670	100
Hyphal Fragment	1	40	-
Insect Fragment	-	-	-
Pollen	-	-	-
Analyt. Sensitivity 600x	-	44	-
Analyt. Sensitivity 300x	-	13*	-
Skin Fragments (1-4)	-	1	-
Fibrous Particulate (1-4)	-	1	-
Background (1-5)	-	2	-

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


Jeffrey Lau, 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.

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Microbiology Chain of Custody

EMSL Order Number (Lab Use Only):

061909657

EMSL ANALYTICAL, INC.
 200 ROUTE 130 NORTH
 CINNAMINSON, NJ 08077
 PHONE: (800) 220-3675
 FAX: (856) 786-0262

Company Name: ATI, Inc		EMSL-Bill to: <input type="checkbox"/> Same <input type="checkbox"/> Different If Bill to is Different note instructions in Comments	
Street: 4221 Rumsey Road, Suite 250		Third Party Billing requires written authorization from third party.	
City: Lanham	State/Province: MD	Zip/Postal Code: 20706	Country:
Report To (Name): Brian Chapman / Mikal Frater		Telephone #: 202-558-7489	
Email Address: Brian@atiin.com & Mikal@atiinc.com		Fax #:	Purchase Order:
Project Name/Number: 19-666- PGCPs - Woodmore ES		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email	
U.S. State Samples Taken:		Project Zip Code:	
Sterile, Sodium Thiosulfate Preserved Bottle Used: <input type="checkbox"/> Biocide Used in Source (specify): <input type="checkbox"/>		Connecticut Samples: <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Residential	
Public Water Supply Samples: <input type="checkbox"/> Note: All results may automatically be reported to DOH if required by state.			
Turnaround Time (TAT) Options - Please Check			
<input type="checkbox"/> 3 Hour	<input type="checkbox"/> 6 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 48 Hour
<input type="checkbox"/> 72 Hour	<input type="checkbox"/> 96 Hour	<input checked="" type="checkbox"/> 1 Week	<input type="checkbox"/> 2 Week

Microbiology Test Codes			
M001 Air-O-Cell	M174 MoldSnap	M012 Pseudomonas aeruginosa (PIA***)	M115 Sewage Screen - Water (PIA***)
M030 Micro 5	M032 Allergenco-D	M024 Pseudomonas aeruginosa (MFT*)	M116 Sewage Screen - Water (MPN**)
M041 Fungal Direct Examination		M015 Heterotrophic Plate Count	M117 Sewage Screen - Swab (PIA***)
M169 Pollen ID & Enumeration		M017 Total Coliform & E. coli (Collert PIA***)	M013 Sewage Screen - Swab (MFT*)
M280 Dust Characterization Level-1		M018 Total Coliform & E. coli (MFT*)	M133 Methicillin-resistant Staph. aureus (MRSA)
M281 Dust Characterization Level-2		M114 Total Coliform & E. coli Enumeration (Collert MPN**)	M031 Rapid-growing non-TB Mycobacteria Detection & Enumeration
M005 Viable Fungi- Air Samples (Genus ID & Count)		M019 Fecal Coliform (MFT*)	M014 Endotoxin Analysis
M006 Viable Fungi- Air Samples (Includes Penicillium, Aspergillus, Cladosporium, Stachybotrys Species ID & Count)		M020 Fecal Streptococcus (MFT*)	M044 Group Allergen (Cat, Dog, Cockroach, Dust Mite)
M007 Culturable fungi - Surface Samples (Genus ID & Count)		M029 Enterococci (MFT*)	Other See Analytical Price Guide
M008 Culturable fungi - Surface Samples (Includes Penicillium, Aspergillus, Cladosporium, Stachybotrys Species ID & Count)		M129 Enterococci (Enterolert PIA***)	Legionella Analysis Please use EMSL Legionella COC
M009 Bacteria Culture Gram Stain & Count		M180 Real Time qPCR-ERMI 36 Panel	
M010 Bacteria Count & ID - 3 Most Prominent		M025 Sewage Screen -Water (MFT*)	
M011 Bacteria Count & ID - 5 Most Prominent			

*MFT= Membrane Filtration Technique
 **MPN= Most Probable Number
 ***PIA= Presence/Absence

Name of Sampler: Mikal Frater Signature of Sampler: *Mikal Frater*

Sample #	Sample Location/Description	Sample Type	Potable/ NonPotable (Only for Waters)	Test Code	Volume/ Area	Date/Time Collected	Temperature (°C) (Lab Use Only)
Example A1	Kitchen Sink/Tap	Water	<input checked="" type="checkbox"/> P <input type="checkbox"/> NP	M017	100 mL	9/1/13 4:00 PM	
19-666-01	Outside Parking Lot	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 - 10:34	
19-666-02	Field Blank	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 -	
19-666-03	Main Office	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 - 10:52	
19-666-04	Library	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 - 11:01	
19-666-05	Room 30	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 - 11:12	

Client Sample # (s): - 7 Total # of Samples: 7 Samples Received Chilled? Yes No (Lab Use Only)

Relinquished (Client): *L. Bennett work in* Date: ~~5-16-19~~ Time: *3:57pm*

Received (Lab): *L. Bennett work in* Date: *5/16/19* Time: *3:57pm*

Comments/Special Instructions:

MAY 22 AM 9:44

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this chain of custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

Controlled Document - COC-34 Micro R8 11/14/2017

Handwritten signature and date: 5/22/19



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Microbiology Chain of Custody

EMSL Order Number (Lab Use Only):

061909657

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-0262

Additional pages of the chain of custody are only necessary if needed for additional sample information.

Sample #	Sample Location/Description	Sample Type	Potable/ NonPotable (Only for Waters)	Test Code	Volume/ Area	Date/Time Collected	Temperature (°C) (Lab Use Only)
19-666-06	Room 11	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 - 11:24	
19-666-07	Room 2	Air	<input type="checkbox"/> P <input type="checkbox"/> NP	M001	75L	05-16-19 - 11:33	
			<input type="checkbox"/> P <input type="checkbox"/> NP	(W)			
			<input type="checkbox"/> P <input type="checkbox"/> NP				
			<input type="checkbox"/> P <input type="checkbox"/> NP				
			<input type="checkbox"/> P <input type="checkbox"/> NP				
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			<input type="checkbox"/> P <input type="checkbox"/> NP				
			<input type="checkbox"/> P <input type="checkbox"/> NP				
Comments/Special Instructions:							

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this chain of custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

[Signature] 5/22/19

**Appendix B:
Instrument Calibration Records**



CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

ENVIRONMENT CONDITIONS			MODEL	982
TEMPERATURE	75.0 (23.9)	°F (°C)	SERIAL NUMBER	P17100006
RELATIVE HUMIDITY	45	%RH		
BAROMETRIC PRESSURE	28.83 (976.3)	inHg (hPa)		

<input type="checkbox"/> AS LEFT	<input type="checkbox"/> IN TOLERANCE
<input checked="" type="checkbox"/> AS FOUND	<input checked="" type="checkbox"/> OUT OF TOLERANCE

- CALIBRATION VERIFICATION RESULTS -

GAS CO ₂ AS FOUND				SYSTEM G-101				Unit: ppm
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE	
1	0	0	0-50	4	3033.5	* 2860.4	2942.5-3124.5	
2	523.8	* 470.7	473.8-573.8	5	5060	* 4739.5	4908.2-5211.8	
3	1025	* 960.5	975-1075					

GAS CO AS FOUND				SYSTEM G-101				Unit: ppm
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE	
1	36	* 0	33-39	2	101.3	* 0	98.2-104.3	

TEMPERATURE AS FOUND				SYSTEM T-101				Unit: °F (°C)
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE	
1	32.0 (0.0)	32.4 (0.2)	31.0-33.0 (-0.6-0.6)	2	140.0 (60.0)	140.8 (60.4)	139.0-141.0 (59.4-60.6)	

HUMIDITY AS FOUND				SYSTEM H-102				Unit: %RH
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE	
1	10.0	9.8	7.0-13.0	4	70.0	72.5	67.0-73.0	
2	30.0	30.6	27.0-33.0	5	90.02	* 93.27	87.02-93.02	
3	49.9	51.6	46.9-52.9					

**Indicates Out-of-Tolerance Condition*

TSI does hereby certify that the above described instrument conforms to the original manufacturer's specification (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to the United States National Institute of Standards and Technology (NIST) or has been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. TSI's calibration system is registered to ISO-9001:2015.

Measurement Variable	System ID	Last Cal.	Cal. Due	Measurement Variable	System ID	Last Cal.	Cal. Due
5000 CO ₂	T-0926	02-15-18	12-18-20	200 CO	CC506122	01-24-18	01-25-26
N ₂	t78516	04-17-18	04-03-23	Air	108551y	04-23-18	03-09-20
Flow	E003298	10-25-17	10-31-18	Flow	E004631	10-25-17	10-31-18
Flow	E003980	05-28-18	03-31-19	Flow	E003525	01-10-18	01-31-19
2000 C ₄ H ₈	EB0053919	10-20-17	10-20-21	100 C ₄ H ₈	EB0078607	09-28-16	09-28-20
Temperature	E003986	02-14-18	08-31-18	Temperature	E003987	02-14-18	08-31-18
Humidity	E003539	02-22-18	08-31-18				

VERIFIED

May 25, 2018

DATE

Doc. ID CERT_GEN_WCC



CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
 Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

ENVIRONMENT CONDITIONS			MODEL	982
TEMPERATURE	75.9 (24.4)	°F (°C)		
RELATIVE HUMIDITY	46	%RH		
BAROMETRIC PRESSURE	28.81 (975.6)	inHg (hPa)	SERIAL NUMBER	P17100006

<input checked="" type="checkbox"/> AS LEFT	<input checked="" type="checkbox"/> IN TOLERANCE
<input type="checkbox"/> AS FOUND	<input type="checkbox"/> OUT OF TOLERANCE

- CALIBRATION VERIFICATION RESULTS -

TEMPERATURE VERIFICATION				SYSTEM T-101			Unit: °F (°C)
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	32.0 (0.0)	32.4 (0.2)	31.0-33.0 (-0.6-0.6)	2	140.0 (60.0)	140.8 (60.4)	139.0-141.0 (59.4-60.6)

HUMIDITY VERIFICATION				SYSTEM H-102			Unit: %RH
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	9.6	7.8-12.2	4	70.0	69.7	67.8-72.2
2	30.0	29.7	27.8-32.2	5	90.0	89.3	87.8-92.2
3	50.0	49.9	47.8-52.2				

CO2 GAS VERIFICATION				SYSTEM G-101			Unit: ppm
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	0	0	0-50	4	3031	3043	2940-3122
2	518	510	468-568	5	5000	4988	4850-5150
3	1020	1030	970-1070				

CO GAS VERIFICATION				SYSTEM G-101			Unit: ppm
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	36	36	33-39	2	101	100	98-104

TSI does hereby certify that the above described instrument conforms to the original manufacturer's specification (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to the United States National Institute of Standards and Technology (NIST) or has been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. TSI's calibration system is registered to ISO-9001:2015.

Measurement Variable	System ID	Last Cal.	Cal. Due	Measurement Variable	System ID	Last Cal.	Cal. Due
Temperature	E003986	02-14-18	08-31-18	Temperature	E003987	02-14-18	08-31-18
Humidity	E003539	02-22-18	08-31-18	5000 CO2	c5732043	04-16-18	10-04-20
200 CO	CC506122	01-24-18	01-25-26	N2	t78516	04-17-18	04-03-23
Air	108551y	04-23-18	03-09-20	Flow	E003298	10-25-17	10-31-18
Flow	E004631	10-25-17	10-31-18	Flow	E003980	03-28-18	03-31-19
Flow	E003525	01-10-18	01-31-19	2000 C4H8	EB0053919	10-20-17	10-20-21
100 C4H8	EB0078607	09-28-16	09-28-20				

Chimona

CALIBRATED

May 29, 2018

DATE

Certificate of Calibration

() Buck™ BioAire Pump Calibration Rotameter

() Buck™ BioSlide Pump Calibration Rotameter

Serial number: R13767

Date Calibrated: 5-29-18

Calibration Due Date: 5-29-19

Flow Calibration

This is to certify that the rotameter listed above has been calibrated using a Buck Primary calibrator listed below which is calibrated according to A.P. Buck, Inc. calibration procedure APB-1, Ver. 6.2 and is traceable to the National Institute of Standards & Technology (N.I.S.T). A.P. Buck guarantees the accuracy of the rotameter to be within $\pm 5\%$ of the actual flow rate.

AMBIENT CONDITIONS: Temperature $74 \pm 3^{\circ}$ F Relative Humidity $50 \pm 10\%$

Description	MFR.	Model	Serial #
Primary Calibrator	A.P. Buck Inc.	M30B	<input type="checkbox"/> A40020 <input checked="" type="checkbox"/> A40021

QA Approval By: 

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A.P. BUCK, INC.
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Orlando, FL 32809
Phone: 407-851-8602
Fax: 407-851-8910

BUCK
A.P. BUCK, INC.