4221 Forbes Boulevard · Suite 250
Lanham, Maryland 20706
T: 202.558.7487 | http://atiinc.com/

June 24, 2019

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

RE: Indoor Air Quality Screening, Howard B. Owens Science Center
IFB: 022-19
ATI Project Number: ATI19-688

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) screening at Howard B. Owens Science Center. The IAQ screening was conducted on May 30, 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
Howard B. Owens Science Center
9601 Greenbelt Road
Lanham, Maryland 20706

Prepared for:

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

June 24, 2019

Submitted by:

ati

ATI Job # 19-688

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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
CO_2	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
RH	Relative Humidity

Abbreviations involving scientific volume and measurements involving media or water sampling

Counts/m^3	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 30, 2019, at Howard B. Owens Science Center, located at 9601 Greenbelt Road, Lanham, MD 20706.

The screening included a visual assessment of randomly selected classrooms and other frequently occupied spaces, such as 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. One location fell below the ASHRAE recommended guidelines for summer temperatures, between 73°F and 79°F.
2. Relative humidity measurements were within ASHRAE guidelines, < 65%, with one location just meeting the guideline of 65% relative humidity.
3. All locations were below the recommended ASHRAE limit for carbon dioxide, which was 998 parts per million (PPM).
4. Carbon monoxide was not detected throughout the tested spaces.
5. Indoor spore concentrations were favorable compared to the outdoor concentrations, and no indoor location met or exceeded the total spore concentration detected outdoors, which was 55,040 counts/m^3. Basidiospores and Ascospores had the highest concentrations, although they did not exceed those detected outdoors. Aspergillus/Penicillium, which is known to cause allergies, was detected indoors in three locations but not detected outdoors. Room 201, which had the highest concentration of Aspergillus/Penicillium at 1,000 counts/m^3, had numerous animals and their habitats present in the room during testing, which ATI believes contributed to the concentration of the spores. Room 202 had plants present, which likely contributed to the low concentration of Aspergillus/Penicillium in the room. Low concentrations of other spores were detected indoors but not outdoors, but these low concentrations do not pose a concern.

2. Assessment Methods

Ms. Mikal Frater of ATI, Inc. conducted a visual assessment and air sampling on May 30, 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 (CO_2), 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 Lanham, 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	• Sampling area surrounded by grass and trees. • Partly cloudy skies. • Light traffic – foot and vehicle.
Main Office	• One air return, one air diffuser. • Six plants in room. • Printer/fax about three feet from sampling area. • Four occupants in area during sampling. • Small water stain on ceiling tile near corridor door. • One wall unit – A/C and heat. • Personal humidifier/fan in area – OFF. • Space is approximately 242 ft.^{2}
Room 201	• Four people in room during sampling. • Space is approximately 1,162 ft.^{2} • Door to corridor open. • At least 20 animals and tanks in area (snakes, tortoises, snapping turtles, frogs, an alligator, etc.). Some tanks filled with water, some dry and packed with dirt or straw. • One wall unit supplies A/C and heat – newer model, no brand name.
Room 202	• Five plants along windowsill right behind wall unit. • Wall unit – newer model – no brand name. • Two occupants in sampling area. • Staff complaints of debris blowing from wall unit. Debris and dust can be seen on nearby tabletop. • Space is approximately 721 ft.^{2}
Room 103	• Two air returns, eight air diffusers. • Space is approximately 1,492 ft.^{2}

Sample Location	Observations
	• Unable to tell if black tints in ceiling tile are mold or just color of tiles. • Few light brown water stains on ceiling tiles. • Doors to corridor open. • In few stained spots, small observation of growth. • Stained spots run in one line, could be leak from one pipe. • One occupant in area during sampling.
The Pit	• Space is approximately 861 ft.^{2} • Area smells stale. • Few dark brown stained ceiling tiles near presentation area. • One large diffusers. • No observed growth.

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 30, 2019, screening is summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 70.8 – 78.6°F, with one location, Room 202, falling slightly below the ASHRAE summer comfort range.

Table 2: Temperature Measurements

Sample Location	May 30, 2019 °F			ASHRAE Standard °F
	Min	Max	Average	
Outside	78.9	82.6	80.75	N/A
Indoors				
Main Office	77.6	77.6	77.6	73 – 79
Room 201	75.5	76.5	76.0	73 – 79
Room 202	70.6	71.0	70.8	73 – 79
Room 103	76.3	76.5	76.4	73 – 79
The Pit	78.6	78.6	78.6	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 45.3% and 65.0%, with one location, Room 202, just meeting the ASHRAE maximum recommendation of 65% relative humidity.

Table 3: Relative Humidity Measurements

Sample Location	May 30, 2019 (%)			ASHRAE Standard (% RH)
	Min	Max	Average	
Outside	51.1	56.3	53.7	N/A
Inside				
Main Office	43.3	47.3	45.3	< 65
Room 201	45.6	47.0	46.3	< 65
Room 202	64.9	65.1	65.0	< 65
Room 103	56.6	57.0	56.8	< 65
The Pit	56.2	56.4	56.3	< 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 298 ppm, which calculates to a maximum indoor concentration of 998 ppm (700 + 298). The carbon dioxide levels inside the school ranged from the average minimum detected, 405 ppm to 486.5 ppm, the average maximum detected, below the ASHRAE maximum recommended concentration of 998 ppm.

Table 4: Carbon Dioxide Measurements

Sample Location	May 30, 2019 Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Outside	296	300	298	N/A
Inside				
Main Office	446	472	459	998
Room 201	463	510	486.5	998
Room 202	402	408	405	998
Room 103	430	434	432	998
The Pit	420	420	420	998

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 school.

Table 5: Carbon Monoxide Measurements

Sample Location	May 30, 2019 Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Outside	0	0	0	N/A
Inside				
Main Office	0	0	0	< 9
Room 201	0	0	0	< 9
Room 202	0	0	0	< 9
Room 103	0	0	0	< 9
The Pit	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 30, 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 30, 2019 is presented in Appendix A. The findings indicated that the indoor concentrations were favorable compared to the outdoor concentrations, and no indoor location met or exceeded the total concentration detected outdoors, which was 55,040 counts/m^3.

Basidiospores and Ascospores had the highest concentrations, although they did not exceed those detected outdoors. These two spore types are commonly found indoors. Each are known to cause allergies yet are not associated with water damaged materials in buildings.

Aspergillus/Penicillium, which is known to cause allergies, was detected indoors in three locations: Room 201 at 1,000 counts/m^3, Room 202 at 520 counts/m^3, and Room at 90 counts/m^3, which exceeded the lack of detection outdoors. Room 201, which had the highest readings of Aspergillus/Penicillium, had a variety of about 20 small reptiles and amphibians present in water-filled tanks and dry tanks. Within the animal habitats, ATI observed straw bedding and fresh greens for consumption. Room 202 had five plants present during the sampling event.

Aspergillus/Penicillium can grow on a variety of materials, including in decaying plants and soils, in stored grains, dirt, and on moldy food. Because of the presence of animal habitats and plants in Rooms 201 and 202, ATI believes that they contributed to the Aspergillus/Penicillium concentrations.

Low concentrations of other spores, such as Curvularia, were detected indoors but not outdoors. These low concentrations do not pose a concern.

6. Summary of Findings

One location fell below the ASHRAE recommended guidelines for summer temperatures, between 73°F and 79°F. Relative humidity measurements were just within ASHRAE guidelines, at 65% relative humidity. All tested locations were within the ASHRAE limit for carbon dioxide, which was 998 parts per million (PPM). Carbon monoxide was not detected throughout the tested spaces.

Indoor concentrations were favorable compared to the outdoor concentrations, and no indoor location met or exceeded the total concentration detected outdoors, which was 55,040 counts/m^3. Basidiospores and Ascospores had the highest concentrations, although they did not exceed those detected outdoors. Aspergillus/Penicillium, which is known to cause allergies, was detected indoors in three locations but not detected outdoors. Room 201, which had the highest concentration of Aspergillus/Penicillium at 1,000 counts/m^3, had numerous animals and their habitats present in the room during testing, which ATI believes contributed to the concentration of the spores. Room 202 had plants present, which likely contributed to the low concentration of Aspergillus/Penicillium in the room. Low concentrations of other spores were detected indoors but not outdoors, but these low concentrations do not pose a concern.

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.

10768 Baltimore Avenue Beltsville, MD 20705

Tel/Fax: (301) 937-5700 / (301) 937-5701

http://www.EMSL.com / beltsvillelab@emsl.com

EMSL Order: 191906418
Customer ID: ATII25A
Customer PO:
Project ID:

Attn: Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
Project: 19-688-PGCPS- HB OWENS SCIENCE CENTER

Phone: (202) 832-1433
Fax:
Collected: 05/30/2019
Received: 05/30/2019
Analyzed: 06/06/2019

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

Lab Sample Number:	191906418-0001			191906418-0002			191906418-0003		
Client Sample ID:	19-688-01			19-688-02			19-688-03		
Volume (L):	75						75		
Sample Location	OUTSIDE PARKING LOT			FIELD BLANK			MAIN OFFICE		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	1	40	0.1	-	-	-	-	-	-
Ascospores	142	6200	11.3	-	-	-	5	200	21.3
Aspergillus/Penicillium	-	-	-	-	-	-	-	-	-
Basidiospores	1100	48000	87.2	-	-	-	15	660	70.2
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	14	610	1.1	-	-	-	1	40	4.3
Curvularia	-	-	-	-	-	-	1	40	4.3
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	2	90	0.2	-	-	-	-	-	-
Myxomycetes++	3	100	0.2	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Torula-like	-	-	-	-	-	-	-	-	-
Total Fungi	**1262**	**55040**	**100**	**-**	**No Trace**	**-**	**22**	**940**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	1*	10*	-	-	-	-	3	100	-
Analyt. Sensitivity 600x	-	44	-	-	0	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	0*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	-	-	-	3	-
Fibrous Particulate (1-4)	-	1	-	-	-	-	-	1	-
Background (1-5)	-	2	-	-	-	-	-	1	-

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

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: 06/06/2019 15:55:32

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

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Project: 19-688-PGCPS- HB OWENS SCIENCE CENTER

Phone: (202) 832-1433
Fax:
Collected: 05/30/2019
Received: 05/30/2019
Analyzed: 06/06/2019

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

Lab Sample Number:	191906418-0004			191906418-0005			191906418-0006		
Client Sample ID:	19-688-04			19-688-05			19-688-06		
Volume (L):	75			75			75		
Sample Location	ROOM 201			ROOM 202			ROOM 103		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	12	520	18.2	2	90	11.1	1	40	5.8
Aspergillus/Penicillium	23	1000	35	12	520	64.2	2	90	13
Basidiospores	25	1100	38.5	5	200	24.7	12	520	75.4
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	5	200	7	-	-	-	1	40	5.8
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	1	40	1.4	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Torula-like	-	-	-	-	-	-	-	-	-
Total Fungi	**66**	**2860**	**100**	**19**	**810**	**100**	**16**	**690**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	1*	10*	-
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	-	-	2	-	-	1	-

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

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: 06/06/2019 15:55:32

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Suite 250
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Project: 19-688-PGCPS- HB OWENS SCIENCE CENTER

Phone: (202) 832-1433
Fax:
Collected: 05/30/2019
Received: 05/30/2019
Analyzed: 06/06/2019

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

Lab Sample Number:	**191906418-0007**		
Client Sample ID:	**19-688-07**		
Volume (L):	**75**		
Sample Location	**THE PIT**		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	1	40	7.8
Ascospores	2	90	17.6
Aspergillus/Penicillium	-	-	-
Basidiospores	6	300	58.8
Bipolaris++	-	-	-
Chaetomium	-	-	-
Cladosporium	-	-	-
Curvularia	-	-	-
Epicoccum	-	-	-
Fusarium	-	-	-
Ganoderma	-	-	-
Myxomycetes++	-	-	-
Pithomyces++	1	40	7.8
Rust	-	-	-
Scopulariopsis/Microascus	-	-	-
Stachybotrys/Memnoniella	-	-	-
Unidentifiable Spores	-	-	-
Zygomycetes	-	-	-
Torula-like	1	40	7.8
Total Fungi	**11**	**510**	**100**
Hyphal Fragment	-	-	-
Insect Fragment	-	-	-
Pollen	1*	10*	-
Analyt. Sensitivity 600x	-	44	-
Analyt. Sensitivity 300x	-	13*	-
Skin Fragments (1-4)	-	1	-
Fibrous Particulate (1-4)	-	1	-
Background (1-5)	-	1	-

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

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: 06/06/2019 15:55:32

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

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Microbiology Chain of Custody

EMSL Order Number *(Lab Use Only)*: 191906418

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:** ☐ Same ☐ 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): Courtney McCall / Mikal Frater	**Telephone #:** 202-558-7489
Email Address: Courtney@atiinc.com & Mikal@atiinc com	**Fax #:** **Purchase Order:**
Project Name/Number: 19-688- PGCPS - HB Owens Science Center	**Please Provide Results:** ☐ Fax ■ Email

U.S. State Samples Taken: **Project Zip Code:** **Connecticut Samples:** ■ Commercial ☐ Residential

Sterile, Sodium Thiosulfate Preserved Bottle Used: ☐ **Biocide Used in Source (specify):** ☐

Public Water Supply Samples: ☐ **Note: All results may automatically be reported to DOH if required by state.**

Turnaround Time (TAT) Options - Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ■ 1 Week ☐ 2 Week

Microbiology Test Codes

M001 Air-O-Cell
M174 MoldSnap
M030 Micro 5
M032 Allergenco-D
M041 Fungal Direct Examination
M169 Pollen ID & Enumeration
M280 Dust Characterization Level-1
M281 Dust Characterization Level-2
M005 Viable Fungi- Air Samples (Genus ID & Count)
M006 Viable Fungi- Air Samples (Includes *Penicillium, Aspergillus, Cladosporium, Stachybotrys* Species ID & Count)
M007 Culturable fungi - Surface Samples (Genus ID & Count)
M008 Culturable fungi - Surface Samples (Includes *Penicillium, Aspergillus, Cladosporium, Stachybotrys* Species ID & Count)
M009 Bacteria Culture Gram Stain & Count
M010 Bacteria Count & ID - 3 Most Prominent
M011 Bacteria Count & ID - 5 Most Prominent

M012 *Pseudomonas aeruginosa* (P/A***)
M024 *Pseudomonas aeruginosa* (MFT*)
M015 Heterotrophic Plate Count
M017 Total Coliform & *E. coli* (Colilert P/A***)
M018 Total Coliform & *E. coli* (MFT*)
M114 Total Coliform & *E. coli* Enumeration (Colilert MPN**)
M019 Fecal Coliform (MFT*)
M020 Fecal *Streptococcus* (MFT*)
M029 *Enterococci* (MFT*)
M129 *Enterococci* (Enterolert P/A***)
M180 Real Time qPCR-ERMI 36 Panel
M025 Sewage Screen –Water (MFT*)

M115 Sewage Screen - Water (P/A***)
M116 Sewage Screen - Water (MPN**)
M117 Sewage Screen - Swab (P/A***)
M013 Sewage Screen - Swab (MFT*)
M133 *Methicillin-resistant Staph. aureus* (MRSA)
M031 Rapid-growing non-TB *Mycobacteria* Detection & Enumeration
M014 Endotoxin Analysis
M044 Group Allergen (Cat, Dog, Cockroach, Dust Mite)
Other See Analytical Price Guide
***Legionella* Analysis** Please use EMSL *Legionella* COC

*MFT= Membrane Filtration Technique
**MPN= Most Probable Number
***P/A= 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	☒ P ☐ NP	M017	100 mL	9/1/13 4:00 PM	
19-688-01	Outside Parking Lot	Air	☐ P ☐ NP	M001	75L	05-30-19 - 10:35	
19-688-02	Field Blank	Air	☐ P ☐ NP	M001	75L	05-30-19 -	
19-688-03	Main Office	Air	☐ P ☐ NP	M001	75L	05-30-19 - 10:48	
19-688-04	Room 201	Air	☐ P ☐ NP	M001	75L	05-30-19 - 11:01	
19-688-05	Room 202	Air	☐ P ☐ NP	M001	75L	05-30-19 - 11:22	

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

Relinquished (Client):	**Date:** 5-30-19	**Time:**
Received (Lab): Maui McNamara	**Date:** ~~6/4/19~~ 5/30/19	**Time:** 4:30 PM

Comments/Special Instructions:
walkin

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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

EMSL ANALYTICAL, INC.
LABORATORY•PRODUCTS•TRAINING

Microbiology Chain of Custody

EMSL Order Number *(Lab Use Only)*:

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)
19-688-06	Room 103	Air	☐ P ☐ NP	M001	75L	05-30-19 - 11:36	
19-688-07	The Pit	Air	☐ P ☐ NP	M001	75L	05-30-19 - 11:43	
			☐ P ☐ NP				
			☐ P ☐ NP				
			☐ P ☐ NP				
			☐ P ☐ NP				
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			☐ P ☐ NP				

Comments/Special Instructions:

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Appendix B:
Instrument Calibration Records

Certificate of Calibration

(✓) Buck™ BioAire Pump Calibration Rotameter

( ) Buck™ BioSlide Pump Calibration Rotameter

Serial number: R14057

Date Calibrated: 1/22/19 **Calibration Due Date:** 1/22/20

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 ± 5% of the actual flow rate.

AMBIENT CONDITIONS: Temperature 74±3° F Relative Humidity 50±10%

Description	MFR.	Model	Serial #
Primary Calibrator	A.P. Buck Inc.	M30B	☐ A40020 ☑ A40021

QA Approval By:

A.P. BUCK, INC.
7101 Presidents Drive, Suite 110
Orlando, FL 32809
Phone: 407-851-8602
Fax: 407-851-8910

BUCK
A.P. BUCK, INC.

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		
TEMPERATURE	75.9 (24.4)	°F (°C)
RELATIVE HUMIDITY	34	%RH
BAROMETRIC PRESSURE	29.08 (984.8)	inHg (hPa)

MODEL	982
SERIAL NUMBER	P17100007

☒ AS LEFT ☒ IN TOLERANCE
☐ AS FOUND ☐ 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)	31.6 (−0.2)	31.0~33.0 (−0.6~0.6)	2	140.0 (60.0)	140.4 (60.2)	139.0~141.0 (59.4~60.6)

HUMIDITY VERIFICATION — SYSTEM H-120 — *Unit: %RH*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	9.8	7.8~12.2	4	70.0	70.0	67.8~72.2
2	30.0	30.6	27.8~32.2	5	90.0	89.6	87.8~92.2
3	50.0	50.4	47.8~52.2				

CO_2 GAS VERIFICATION — SYSTEM G-101 — *Unit: ppm*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	0	0	0~50	4	3000	3005	2910~3090
2	500	487	450~550	5	5042	5034	4891~5193
3	1000	1000	950~1050				

CO GAS VERIFICATION — SYSTEM G-101 — *Unit: ppm*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	35	35	32~38	2	100	99	97~103

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
Temperature	E003986	02-12-19	08-31-19
Humidity	E002008	01-25-19	07-31-19
200 CO	CC15018	04-15-19	04-12-22
Air	GT-0540	01-19-19	01-18-22
Flow	E003978	02-26-19	02-29-20
Flow	E003501	09-04-18	09-30-19
100 C4H8	EB0100212	09-29-17	09-29-21

Measurement Variable	System ID	Last Cal.	Cal. Due
Temperature	E003987	02-12-19	08-31-19
5000 CO_2	3341007	12-14-18	12-11-21
N2	UT-102	04-30-19	04-30-24
Flow	E003341	09-14-18	09-30-19
Flow	E003502	02-26-19	02-29-20
2000 C4H8	EB0081455	06-27-18	06-26-21

CALIBRATED

May 23, 2019
DATE

Doc. ID: CERT_GEN_WCC

TSI P/N 2300157

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		
TEMPERATURE	75.5 (24.2)	°F (°C)
RELATIVE HUMIDITY	38	%RH
BAROMETRIC PRESSURE	28.66 (970.5)	inHg (hPa)

MODEL	7575-X
SERIAL NUMBER	7575X1711006

☐ AS LEFT ☒ IN TOLERANCE
☒ AS FOUND ☐ OUT OF TOLERANCE

– CALIBRATION VERIFICATION RESULTS –

THERMO COUPLE — **SYSTEM PRESSURE01-02** — *Unit: °F (°C)*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	73.5 (23.1)	73.1 (22.8)	71.5~75.5 (21.9~24.2)				

BAROMETRIC PRESSURE — **SYSTEM PRESSURE01-02** — *Unit: inHg (hPa)*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	28.67 (970.9)	28.65 (970.2)	28.10~29.24 (951.6~990.2)				

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	E003170	02-21-19	02-29-20	Pressure	E005254	10-29-18	10-31-19
Pressure	E003982	02-07-19	08-31-19	DC Voltage	E003493	08-23-18	08-31-19

Sharol M^cElmury
VERIFIED

May 22, 2019
DATE

Doc ID: CERT_GEN_WCC

TSI P/N 2300157