ati INC
Architecture | Engineering | Construction

9220 Rumsey Road, Suite 100, Columbia, MD 21045
T: 410.992.3424 | F: 410.992.1837

December 28, 2020

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

RE: Indoor Air Quality Assessment, Excel Academy at Matthew Henson Elementary School
IFB: 022-19
ATI Project Number: 20-714

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) assessment at Excel Academy at Matthew Henson Elementary School on December 18, 2020. The assessment 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

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

Indoor Air Quality Assessment Report

Prince George's County Public Schools
Excel Academy at Matthew Henson Elementary School
7910 Scott Road
Landover, MD 20785

Prepared for:

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

December 28, 2020

Submitted by:

ATI Job # 20-714

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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
Rev.	Revision

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

ATI conducted a proactive Indoor Air Quality (IAQ) assessment on December 18, 2020, at Excel Academy at Matthew Henson Elementary School, located at 7910 Scott Road, Landover, MD 20785.

The assessment included a visual assessment of randomly selected classrooms and other frequently occupied spaces, such as the cafeteria, the main office, and classrooms, for potential IAQ contributors and pathways. As part of the assessment, ATI measured common IAQ 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 assessment:

1. Two of the tested spaces had a temperature less than the ASHRAE recommended winter range of 68-75°F.
2. The relative humidity in all tested spaces was less than the ASHRAE guidelines of <65%, yet was also <30% in six tested spaces, which can cause occupant discomfort.
3. Carbon dioxide concentrations in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,104 parts per million (PPM).
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the tested spaces.
5. The fungal spore trap results do not suggest indoor spore amplification in the assessed spaces and are not considered unusual.

2 Assessment Methods

Sama Wanigasundara of ATI, Inc. conducted a visual assessment and air sampling on December 18, 2020. Sampled rooms were randomly selected and accounted for approximately 10% of classrooms or a minimum of five samples. Mr. Wanigasundara documented visual observations at the time he collected the air samples. 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 a typical adult 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. EMSL Analytical, Inc. of Beltsville, MD, analyzed the samples using direct microscopic examination per ASTM D7391-09, which counts both viable and non-viable mold spores and particulates, which combined yields *total fungal* results. EMSL participates in the National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) for general laboratory performance and management, and the American Industrial Hygiene Association (AIHA) for Environmental Microbial Laboratory Accreditation Program (EMLAP). The EMSL laboratory reports are included in Appendix A.

3 Visual Observations

Table 1 lists the areas, conditions, observations, and other pertinent details related to this IAQ assessment. On the date of the sampling event, few occupants were present in the school because of the COVID-19 global pandemic.

Table 1: Visual Observations and Sampling Locations

Sample Location	Observations
Parking Lot – Outdoors	• Scattered clouds, mostly clear skies • Light foot and vehicle traffic observed
Main Office	• No occupants in the area during sampling • No odors, stained ceiling tiles, or visible mold growth observed • Door to corridor OPEN during sampling • Room splits into three adjoining office spaces • One air return in this space • Two air diffusers in the space • No dust accumulation in this space • Space is approximately 324 ft.^{2}
Media Center	• No odors, stained ceiling tiles, or visible mold growth observed • No occupants in area during sampling • No dust accumulation • Two air returns in this space dust accumulation • Four air diffusers in this space • Space is approximately 1993 ft.^{2}
Cafeteria	• No occupants in the area during sampling • No dust accumulation in this space • One lager (8'X4") air return in this space • Ten air diffusers in this space • Space is approximately 3180 ft.^{2}
Room 104	• No odors, stained ceiling tiles, or visible mold growth observed • No occupants in the area during sampling • Wall unit ON during sampling • One air return in this space • No dust accumulation in this space • Space is approximately 1190 ft.^{2}
Room 107	• No occupants in the area during sampling • No odors, stained ceiling tiles, or visible mold growth observed • No dust accumulation in this space • Wall unit ON during sampling • One air return in this space • One air diffuser in this space • Space is approximately 1190 ft.^{2}
Room 120	• No odors, stained ceiling tiles, or visible mold growth observed • Wall unit ON during sampling • No visible air return in this space • One air diffuser in this space • No occupants in area during sampling

Sample Location	Observations
	• Space is approximately 1190 ft.^{2}
Room 124	• No occupants in the area during sampling • No odors, stained ceiling tiles, or visible mold growth observed • No dust accumulation in this space • Wall unit ON during sampling • One air return in this space • One air diffuser in this space • Space is approximately 1190 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 80% of 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 temperatures measured during the December 18, 2020, assessment are summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 66°F and 74°F, with two locations measuring less than the ASHRAE recommended winter range.

Table 2: Temperature

Sample Location	12/18/2020 °F			ASHRAE Standard °F
	Min	Max	Average	
Outdoors	41	42	42	N/A
Indoors				
Main Office	66	66	66	68-75°F
Media Center	69	69	69	68-75°F
Cafeteria	68	68	68	68-75°F
Room 104	70	70	70	68-75°F
Room 107	69	69	69	68-75°F
Room 120	73	74	74	68-75°F
Room 124	64	64	64	68-75°F

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 is summarized in Table 3. As indicated by the data in the table, relative humidity averaged between 21% and 31% with all tested locations reporting less than the ASHRAE maximum recommendation of 65% relative humidity, yet six locations were less than 30% relative humidity.

Table 3: Relative Humidity

Sample Location	12/18/2020 (% RH)			ASHRAE Standard (% RH)
	Min	Max	Average	
Outdoors	36	37	37	N/A
Indoors				
Main Office	31	31	31	< 65
Media Center	26	26	26	< 65
Cafeteria	24	24	24	< 65
Room 104	21	21	21	< 65
Room 107	21	21	21	< 65
Room 120	24	25	25	< 65
Room 124	26	26	26	< 65

4.3 Carbon Dioxide

Carbon dioxide concentrations 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 maintains indoor carbon dioxide concentrations to less than 700 parts per million (ppm) greater than the outdoor air concentration. Typically, outdoor concentrations of carbon dioxide range from 300 ppm to 450 ppm, with the higher range typically found in urban areas during peak rush hour.

Carbon dioxide concentrations are summarized in Table 4. On the day of the assessment, the average outdoor carbon dioxide concentration was 404 ppm, which calculates to a maximum indoor concentration of 1,104 ppm (700 + 404). All tested locations indoors were less than the recommended maximum for the day of the assessment.

Table 4: Carbon Dioxide

Sample Location	12/18/2020 Concentration (parts per million)			ASHRAE Standard (ppm) NTE
	Min	Max	Average	
Outdoors	401	407	404	N/A
Indoors				
Main Office	469	470	470	1,104
Media Center	410	415	412	1,104
Cafeteria	435	437	436	1,104
Room 104	412	415	413	1,104
Room 107	430	432	431	1,104
Room 120	510	518	514	1,104
Room 124	395	399	397	1,104

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 over an eight-hour time-weighted average. ATI measured carbon monoxide concentrations using a TSI Q-Trak model number 7575-X with an attached IAQ probe (model number 982). The instrument's carbon monoxide sensor has an error range of ± 3% of the reading or three (3) ppm, whichever is greater. As indicated by the data in Table 5, carbon monoxide concentrations were less than the Q-Trak's detection limit throughout the school.

Table 5: Carbon Monoxide

Sample Location	12/18/2020 Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Outdoors	<3	<3	<3	N/A
Main Office	<3	<3	<3	< 9
Media Center	<3	<3	<3	< 9
Cafeteria	<3	<3	<3	< 9
Room 104	<3	<3	<3	< 9
Room 107	<3	<3	<3	< 9
Room 120	<3	<3	<3	< 9
Room 124	<3	<3	<3	< 9

5 Total Fungal Air Sampling Results

Mold is carried indoors through building entrances, open windows, loading docks, foot traffic into buildings, and the HVAC system. To thrive indoors, mold requires a food source, proper temperature and humidity to foster its growth.

The December 18, 2020 mold assessment 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 findings indicated that the indoor concentrations were favorable compared to the outdoor concentrations. The total ambient spore concentration was 690 counts/m^3, and total concentrations in each tested space did not exceed the ambient concentration. The highest indoor spore concentration was 400 counts/m^3 of basidiospores in Room 104. Basidiospores are commonly associated with outdoor origin, so any basidiospores detected indoors were likely introduced into the space via unfiltered outdoor air. Basidiospores are commonly detected indoors, are known to cause allergies, yet are not associated with water damaged materials in buildings. Low concentrations of *Aspergillus/Penicillium* were detected but did not exceed 200 counts/m^3 in the tested spaces. Trace amounts of *Myxomycetes, Epicoccum, Cladosporium* and ascospores were detected in low concentrations that did not exceed 100 counts/m^3. The mold spore concentrations are typical for an occupied space and do not suggest active or unusual mold presence.

The official laboratory report with spore trap samples collected on December 18, 2020, is presented in Appendix A.

6 Summary of Findings

1. Two of the tested spaces had a temperature less than the ASHRAE recommended winter range of 68-75°F.
2. The relative humidity in all tested spaces was less than the ASHRAE guidelines of <65%, yet was also <30% in six tested spaces, which can cause occupant discomfort.
3. Carbon dioxide concentrations in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,104 parts per million (PPM).
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the tested spaces.
5. The fungal spore trap results do not suggest indoor spore amplification in the assessed spaces and are not considered unusual.

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

Best,
ATI, INC.

Courtney E. McCall
Project Manager

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

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: 192012463
Customer ID: ATII25A
Customer PO:
Project ID:

Attention: Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
Project: MATTHEW HENSON ES 20-714

Phone: (202) 832-1433
Fax:
Collected Date: 12/18/2020
Received Date: 12/18/2020 01:42 PM
Analyzed Date: 12/22/2020

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

Lab Sample Number:	192012463-0001			192012463-0002			192012463-0003		
Client Sample ID:	3163-8820			3163-8814			3163-8816		
Volume (L):	75			75			75		
Sample Location:	OUTSIDE EXT			MAIN OFFICE			MEDIA CENTER		
Spore Types	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	1	40	5.8	1	40	50	-	-	-
Aspergillus/Penicillium	4	200	29	-	-	-	-	-	-
Basidiospores	10	410	59.4	1	40	50	1	40	100
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	3*	40*	5.8	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**18**	**690**	**100**	**2**	**80**	**100**	**1**	**40**	**100**
Hyphal Fragment	1	40	-	-	-	-	-	-	-
Insect Fragment	1	40	-	-	-	-	3	100	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	41	-	-	41	-	-	41	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	1	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

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

Abubakar Barry, Microbiology Laboratory Manager
or other Approved Signatory

Initial report from: 12/22/2020 05:51 PM

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

EMSL Analytical, Inc.

10768 Baltimore Avenue Beltsville, MD 20705

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Phone: (202) 832-1433
Fax:
Collected Date: 12/18/2020
Received Date: 12/18/2020 01:42 PM
Analyzed Date: 12/22/2020

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

Lab Sample Number:	192012463-0004			192012463-0005			192012463-0006		
Client Sample ID:	3163-6114			3163-8811			3163-8857		
Volume (L):	75			75			75		
Sample Location:	CAFETERIA			RM 104			RM 107		
Spore Types	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	1	40	25	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	1	40	8.2	1	40	30.8
Basidiospores	1	40	25	9	400	81.6	2	80	61.5
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	2	80	50	1	40	8.2	-	-	-
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	1*	10*	2	1*	10*	7.7
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**4**	**160**	**100**	**12**	**490**	**100**	**4**	**130**	**100**
Hyphal Fragment	-	-	-	2	80	-	-	-	-
Insect Fragment	-	-	-	3*	40*	-	2	80	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	41	-	-	41	-	-	41	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	1	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

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

Abubakar Barry, Microbiology Laboratory Manager or other Approved Signatory

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Fax:
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Analyzed Date: 12/22/2020

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

Lab Sample Number:	192012463-0007			192012463-0008			192012463-0009		
Client Sample ID:	3106-0617			3106-0605			3163-6109		
Volume (L):	75			75					
Sample Location:	RM 120			RM 124			FIELD BLANK		
Spore Types	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	1	40	20	4	200	66.7	-	-	-
Basidiospores	2	80	40	3	100	33.3	-	-	-
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	2	80	40	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**5**	**200**	**100**	**7**	**300**	**100**	**-**	**No Trace**	**-**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	2	80	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	41	-	-	41	-	-	0	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	0*	-
Skin Fragments (1-4)	-	1	-	-	1	-	-	-	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	-	-
Background (1-5)	-	1	-	-	1	-	-	-	-

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

Abubakar Barry, Microbiology Laboratory Manager or other Approved Signatory

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

OrderID: 192012463

Microbiology Chain of Custody

EMSL Order Number *(Lab Use Only)*: 192012463

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

Company : ATI INC	**EMSL-Bill to:** ■ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 4221 Forbes Blvd Suite 250	*Third Party Billing requires written authorization from third party*
City: Lanham **State/Province:** MD	**Zip/Postal Code:** 20706 **Country:** USA
Report To (Name): Courtney McCall	**Telephone #:** 703-399-5423
Email Address: courtney@atiinc.com, samappriya@atiinc.com	**Fax #:** 202-905-0335 **Purchase Order:**
Project Name/Number: Matthew Henson ES 20-714	**Please Provide Results:** ☐ Fax ■ Email ☐ Fax
U.S. State Samples Taken:	**Connecticut Samples:** ☐ Commercial ☐ Residential

Turnaround Time (TAT) Options* - Please Check

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

**Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide TATs are subject to methodology requirements*

Non Culturable Air Samples (Spore Traps) – Test Codes

• **M001** Air-O-Cell	• **M173** Allegro M2	• **M004** Allergenco	• **M032** Allergenco-D	• **M172** Versa Trap
• **M049** BioSIS	• **M003** Burkard	• **M043** Cyclex	• **M002** Cyclex-d	
• **M030** Micro 5	• **M174** MoldSnap	• **M176** Relle Smart	• **M130** Via-Cell	

Other Microbiology Test Codes

• **M041** Fungal Direct Examination	• **M014** Endotoxin Analysis	• **M029** *Enterococci*
• **M005** Viable Fungi ID and Count	• **M015** Heterotrophic Plate Count	• **M019** Fecal Coliform
• **M006** Viable Fungi ID and Count (Speciation)	• **M180** Real Time Q-PCR-ERMI 36	• **M133** MRSA Analysis
• **M007** Culturable Fungi	• Panel	• **M028** *Cryptococcus neoformans* Detection
• **M008** Culturable Fungi (Speciation)	• **M018** Total Coliform (Membrane Filtration)	• **M120** *Histoplasma capsulatum* Detection
• **M009** Gram Stain Culturable Bacteria	• **M020** Fecal *Streptococcus* (Membrane Filtration)	• **M033-39** Allergen Testing
• **M010** Bacterial Count and ID – 3 Most Prominent	• **M210-215** *Legionella* Detection	• **M044** Group Allergen (Cat, Dog, Cockroach, Dustmites)
• **M011** Bacterial Count and ID – 5 Most Prominent	• **M026** Recreational Water Screen	• **Other** See Analytical Price Guide
• **M013** Sewage Contamination in Buildings	• **M027** Mycotoxin Analysis	

Preservation Method (Water):

Name of Sampler: Don Samappriya Wanigasundara

Signature of Sampler: SW

Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
Example: A1	Kitchen	Air	M001	75L	1/1/12 4:00 PM
3163-8820	Outside Exterior	Air	M001	75L	12/18/20 11:50AM
3163-8814	Main Office	Air	M001	75L	12/18/20 09:45AM
3163-8816	Media Center	Air	M001	75L	12/18/20 10:00AM
3163-6114	Cafeteria	Air	M001	75L	12/18/20 10:20 AM
3163-8811	Room 104	Air	M001	75L	12/18/20 11:40 AM
3163-8857	Room 107	Air	M001	75L	12/018/20 11:20 AM
3106-0617	Room 120	Air	M001	75L	12/18/20 11:10 AM
3106-0605	Room 124	Air	Moo1	75L	12/18/20 10:40 AM
3163-6109	Filed Blank	Air	Moo1	-	12/18/20

Client Sample # (s): - **Total # of Samples:**

Relinquished (Client): SW **Date:** 12/18/2020 **Time:**

Received (Client): L. Yourth Drop box **Date:** **Time:**

Comments: PTC

Appendix B: Instrument Calibration Records

Certificate of Calibration

(✓) Buck™ BioAire Pump Calibration Rotameter

( ) Buck™ BioSlide Pump Calibration Rotameter

Serial number: R14535

Date Calibrated: 12/27/19 **Calibration Due Date:** 12/27/20

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: Moroni Menk

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	75.8 (24.3)	°F (°C)
RELATIVE HUMIDITY	48	%RH
BAROMETRIC PRESSURE	28.72 (972.6)	inHg (hPa)

MODEL	982
SERIAL NUMBER	P17100006

☐ AS LEFT ☐ IN TOLERANCE
☒ AS FOUND ☒ 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	3020.5	* 2874.5	2929.9~3111.1
2	504	460	454~554	5	5037	* 4771.8	4885.9~5188.1
3	1008	964	958~1058				

GAS CO AS FOUND — SYSTEM G-101 — *Unit: ppm*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	35.3	* 30.8	32.3~38.3	2	100.7	* 87.7	97.7~103.7

TEMPERATURE AS FOUND — SYSTEM T-101 — *Unit: °F (°C)*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	32.0 (0.0)	32.6 (0.3)	31.0~33.0 (−0.5~0.6)	2	139.8 (59.9)	140.6 (60.3)	138.8~140.8 (59.4~60.5)

HUMIDITY AS FOUND — SYSTEM H-102 — *Unit: %RH*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	10.5	7.0~13.0	4	70.0	69.6	67.0~73.0
2	30.0	30.4	27.0~33.0	5	90.0	88.9	87.0~93.0
3	50.0	50.4	47.0~53.0				

**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-0660	07-15-20	07-15-28	200 CO	149848	03-24-20	03-24-28
N2	CT308798	06-28-20	06-28-28	Air	T608955	06-17-20	06-17-28
Flow	E003341	09-03-19	09-30-20	Flow	E003980	04-22-20	04-30-21
Flow	E003525	01-06-20	01-31-21	Flow	E003342	09-03-19	09-30-20
2000 C4H8	EB0054467	08-13-19	08-12-22	100 C4H8	CC507339	03-24-20	03-24-28
Temperature	E010657	02-14-20	02-28-21	Temperature	E010658	02-14-20	02-28-21
Temperture	E010655	01-21-20	01-31-21	Humidity	E003539	08-21-20	02-28-21

ChaoVang
VERIFIED

August 31, 2020
DATE

DOC ID CERT_GEN_WCC

TSI P/N 2300157

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Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

ENVIRONMENT CONDITIONS		
TEMPERATURE	71.33 (21.9)	°F (°C)
RELATIVE HUMIDITY	53.9	%RH
BAROMETRIC PRESSURE	28.81 (975.6)	inHg (hPa)

MODEL	982
SERIAL NUMBER	P17100006

☒ AS LEFT ☐ AS FOUND

☒ IN TOLERANCE ☐ 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)	32.6 (0.3)	31.0~33.0 (−0.5~0.6)	2	139.8 (59.9)	140.6 (60.3)	138.8~140.8 (59.4~60.5)

HUMIDITY VERIFICATION — SYSTEM H-102 — *Unit: %RH*

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	10.5	7.0~13.0	4	70.0	69.6	67.0~73.0
2	30.0	30.4	27.0~33.0	5	90.0	88.9	87.0~93.0
3	50.0	50.4	47.0~53.0				

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	0	0	0~50	4	3020	3025	2929~3110
2	504	501	454~554	5	5037	5026	4886~5188
3	1008	1027	958~1058				

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	35	36	32~38	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
Temperature	E010657	02-14-20	02-28-21
Temperture	E010655	01-21-20	01-31-21
5000 CO_2	T-0660	07-15-20	07-15-28
N_2	CT308798	06-28-20	06-28-28
Flow	E003341	09-03-19	09-30-20
Flow	E003525	01-06-20	01-31-21
2000 C4H8	EB0054467	08-13-19	08-12-22

Measurement Variable	System ID	Last Cal.	Cal. Due
Temperature	E010658	02-14-20	02-28-21
Humidity	E003539	08-21-20	02-28-21
200 CO	149848	03-24-20	03-24-28
Air	T608955	06-17-20	06-17-28
Flow	E003980	04-22-20	04-30-21
Flow	E003342	09-03-19	09-30-20
100 C4H8	CC507339	03-24-20	03-24-28

Bao Yang
CALIBRATED

August 31, 2020
DATE

Doc. ID. CERT_GEN_WCC

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ENVIRONMENT CONDITIONS		
TEMPERATURE	71.33 (21.9)	°F (°C)
RELATIVE HUMIDITY	53.9	%RH
BAROMETRIC PRESSURE	28.81 (975.6)	inHg (hPa)

MODEL	7575-X
SERIAL NUMBER	7575X1711004

☒ AS LEFT ☐ AS FOUND

☒ IN TOLERANCE ☐ OUT OF TOLERANCE

– CALIBRATION VERIFICATION RESULTS –

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	70.9 (21.6)	71.1 (21.7)	68.9~72.9 (20.5~22.7)				

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	28.82 (976.0)	28.82 (976.0)	28.24~29.40 (956.3~995.6)				

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	E004626	02-14-20	02-28-21	Pressure	E005254	10-10-19	10-31-20
Pressure	E003982	07-21-20	01-31-21	DC Voltage	E003493	06-17-20	06-30-21

CALIBRATED

August 31, 2020
DATE

Doc. ID: CERT_GEN_WCC

TSI P/N 2300157

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ENVIRONMENT CONDITIONS		
TEMPERATURE	71.24 (21.8)	°F (°C)
RELATIVE HUMIDITY	54.8	%RH
BAROMETRIC PRESSURE	28.74 (973.2)	inHg (hPa)

MODEL	7575-X
SERIAL NUMBER	7575X1711004

☐ 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	70.8 (21.6)	70.5 (21.4)	68.8~72.8 (20.4~22.7)				

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	28.75 (973.6)	28.84 (976.6)	28.17~29.33 (953.9~993.2)				

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	E004626	02-14-20	02-28-21	Pressure	E005254	10-10-19	10-31-20
Pressure	E003982	07-21-20	01-31-21	DC Voltage	E003493	06-17-20	06-30-21

VERIFIED

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