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Lanham, Maryland 20706
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February 25, 2021

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

RE: Indoor Air Quality Assessment, Ernest E. Just Middle School
Purchase Order: 734977
ATI Project Number: 21-602

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) assessment at Ernest E. Just Middle School on January 27, 2021 and a reassessment at the Computer Lab on February 24, 2021. The assessments' 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.

Mikal Frater
Industrial Hygienist

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

Indoor Air Quality Assessment Report

Prince George's County Public Schools
Ernest E. Just Middle School
1300 Campus Way N
Bowie, Maryland 20721

Prepared for:

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

February 25, 2021

Submitted by:

ATI Job # 21-602

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Appendices

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

Spores/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 January 27, 2021, at Ernest E. Just Middle School, located at 1300 Campus Way N in Bowie, Maryland. The Computer Lab Room 302 was reassessed on February 24, 2021 after the initial assessment indicated the Computer lab had *Aspergillus/Penicillium*-like mold spore concentration greater than 1,000 spores/m^3.

The initial assessment included a visual assessment of randomly selected classrooms and other frequently occupied spaces, such as the cafeteria/gym, the main office, and randomly selected classrooms, for potential IAQ contributors and pathways. On February 24, 2021, the Computer Lab was reassessed after unusual spore concentrations were present during the first assessment. Steps were taken between the two assessments to repair water issues and treat the area for fungal growth. As part of these assessments, 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. The average temperature in four tested locations was less than the ASHRAE recommended winter occupancy comfort range of 68-75°F on January 27, 2021. The Computer Lab Room 302 had a temperature within the ASHRAE recommended winter temperature range on February 24, 2021.
2. On January 27, 2021, the average relative humidity in all indoor sampled locations was less than the ASHRAE recommended maximum humidity of 65%, but all indoor tested spaces except one also had a relative humidity less than 30%, which can cause respiratory dryness in occupants. On February 24, 2021, the Computer Lab Room 302 had a relative humidity of 19%, which is less than the ASHRAE recommended humidity and less than 30%.
3. The averaged carbon dioxide concentration in all indoor locations, on both assessment dates, were less than the maximum recommended indoor concentration for the day of each assessment.
4. The average carbon monoxide concentrations in all areas, for both assessments, were less than the EPA and ASHRAE recommended limit of 9 ppm.
5. The *Aspergillus/Penicillium*-like spore concentrations in the Computer Lab Room 320 was greater than 1,000 spores/m^3, which suggests possible indoor spore amplification.
6. The Computer Lab Room 320 was reassessed on February 24, 2021 and the *Aspergillus/Penicillium*-like spore concentration was reduced up to 92%, which was equal to the outdoor *Aspergillus/Penicillium*-like spore concentration. ATI has no other recommendations at this time.

2 Assessment Methods

Mikal Frater, Industrial Hygienist of ATI, Inc. conducted the initial visual assessment and air sampling on January 27, 2021. Sampled rooms were randomly selected and accounted for approximately 10% of classrooms or a minimum of five samples. Ms. Frater documented visual observations at the time she collected the air samples. Nate Burgei, CIH, CSP conducted a follow-up inspection on February 24, 2021 in the Computer Lab Room 302, after the room was evaluated and treated for mold presence. 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 measured with a calibrated TSI Q-Trak 7575-X Meter and attached 982 Probe.

Total fungal air samples were collected with a field calibrated Buck BioAire High-Volume Sampling Pump on Zefon Air-O-Cell spore-trap cassettes at a flow rate of 15 liters per minute for a sample volume of 75 liters or 150 liters, depending on the sampling day. AMA Analytical Services, Inc. of Lanham, MD analyzed the samples using direct microscopic examination per ASTM D7391, which spores both viable and non-viable mold spores and particulates, which combined yields total fungal results. AMA 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 AMA 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	• Partly cloudy skies • Light vehicle traffic observed
Main Office	• Three occupants in the area during sampling • Door to corridor CLOSED, and adjoining offices OPEN during sampling • Trace dust accumulation • Faux plants on windowsill • No visible growth or odors observed • Two air diffusers and two air returns in this space • Light brown stain on ceiling tile near window • Space is approximately 680 ft.^{2}
Cafeteria	• Two large air returns, 20 air diffusers • Light brown stain on ceiling tile in the middle of cafeteria • No odors or visible mold growth observed • Doors to kitchen OPEN during sampling • Air returns appeared clean • Faux plants near stage • Three occupants in area during sampling • Door to parking lot OPEN during sampling
Gym	• No odors, stained ceiling tiles, or visible mold growth observed • Two occupants in the area during sampling • Doors to corridor CLOSED during sampling • Three large air returns, 28 air diffusers • Emergency exit outside access • Noticeably cooler in temperature
Room 144	• Two occupants in the area during sampling • No stained ceiling tiles, visible mold growth, or odor observed • Rooms separated by panels • Trace dust accumulation in this space • One wall unit ON during sampling One air diffuser in this space; two air returns

Sample Location	Observations
	• Space is approximately 1,064 ft.^{2}
Science Room 152	• No odors or visible mold growth observed • Two occupants in this space during sampling • Trace dust accumulation • Door to corridor CLOSED and adjoining rooms OPEN during sampling • Eight air diffusers and four returns in this space • Very light grey stain on ceiling tile near return vent • Space is approximately 1,408 ft.^{2}
Room 322	• Two air returns, one air diffuser in this space • One wall unit ON during sampling • No stained ceiling tile, observed growth, or odor in this space • In hallway outside of classroom – active leak, missing ceiling tiles • Space is approximately 864 ft.^{2}
Room 336	• Eight air diffusers, four air returns in this space • Two occupants in area during sampling • Very small light brown stain on ceiling tile near exhaust vent • No growth or odor observed • Space is approximately 1,232 ft.^{2}
Room 307	• One air return, one air diffuser; one wall unit OFF during sampling • Two occupants in area during sampling • No observed odor or growth • Four stained ceiling tiles along back of room and above window • Trace dust accumulation • Space is approximately 864 ft.^{2}
Computer Lab, Room 320	• Two air returns, one air diffuser • One wall unit ON during sampling • One occupant in area during sampling • Door to corridor CLOSED • One light brown stain on ceiling tile above printer • No growth or odor observed • Door to adjoining rooms OPEN during sampling • Trace dust accumulation • Space is approximately 1,008 ft.^{2}
Sample Location	**February 24, 2021 Reassessment Observations**
Computer Lab, Room 302	• Unoccupied during reassessment • Door to hallway closed, but doors to adjacent classrooms were open • Light dust on the floor and horizontal surfaces • Heat was off, but the heater was warm suggesting it was on auto • Ceiling tiles mostly clean, minor stains near the door to Foreign Language room • The air supply in the Foreign Language room, closest to connecting door had significant water staining, could affect the Computer Lab if it is harboring mold

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 temperature measured during the January 27, 2021, assessment and the February 24, 2021 reassessment are summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 62°F and 73°F on January 27, with four locations less than the ASHRAE recommended winter range. The temperature in the Computer Lab on February 24, 2021 was 72°F.

Table 2: Temperature

Sample Location	1/27/2021 Initial Assessment °F			ASHRAE Standard °F
	Min	Max	Average	
Outdoors	47	51	49	N/A
Indoors				
Main Office	64	66	65	68-75°F
Cafeteria	65	65	65	68-75°F
Gym	61	62	62	68-75°F
Room 144	66	68	67	68-75°F
Science Room 152	71	72	72	68-75°F
Room 322	72	73	73	68-75°F
Room 336	72	72	72	68-75°F
Room 307	70	71	71	68-75°F
Computer Lab, Room 302	73	73	73	68-75°F
2/24/2021 Reassessment Temperature in °F				
Outdoors	65	69	67	N/A
Indoors				
Computer Lab, Room 302	72	72	72	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 less than 30% may result in drying of occupants' mucous membranes and skin. Relative humidity for January 27, 2021 and February 24, 2021 are summarized in Table 3. As indicated by the data in the table, the average relative humidity on January 27, 2021 ranged between 17% and 30% with all tested locations measuring less than the ASHRAE maximum recommendation of 65% relative humidity, and all except one of the tested locations also measuring less than 30% relative humidity.

ATI reassessed the Computer Lab Room 302 that had unusual fungal spore concentrations on February 24, 2021, after remediation actions were completed. ATI also reassessed the relative humidity in the space, and the average relative humidity was 19%, less than the ASHRAE maximum recommendation of 65% relative humidity and less than 30% relative humidity.

Table 3: Relative Humidity

Sample Location	1/27/2021 Initial Assessment (% RH)			ASHRAE Standard (% RH)
	Min	Max	Average	
Outdoors	40	44	42	N/A
Indoors				
Main Office	28	31	30	< 65
Cafeteria	22	23	23	< 65
Gym	26	28	27	< 65
Room 144	27	28	28	< 65
Science Room 152	22	23	23	< 65
Room 322	21	21	21	< 65
Room 336	20	21	21	< 65
Room 307	21	23	22	< 65
Computer Lab, Room 302	16	17	17	< 65
2/24/2021 Reassessment Relative Humidity (%RH)				
Outdoors	18	20	19	N/A
Indoors				
Computer Lab, Room 302	19	19	19	< 65

4.3 Carbon Dioxide

The carbon dioxide concentration in an occupied building is often used as a surrogate contaminant to gauge the ventilation system's efficiency at providing enough fresh air to the space based on the number of individuals in the space. Carbon dioxide is a by-product of human respiration and does not pose an acute health hazard in typical commercial buildings, but a buildup of carbon dioxide from human respiration may suggest that the ventilation system is not providing enough fresh air to overcome the rate of occupant respiration. This can be from lack of outdoor air supplied to the space, or the space is beyond the occupancy limit of the ventilation system design. The logic is that if carbon dioxide can accumulate in the space over a single workday, then other, potentially more hazardous, contaminants may also accumulate in the space. Indoor air quality professionals rely on standards established by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) when evaluating indoor concentrations of carbon dioxide. ASHRAE Standard 62.1-2016 states that comfort (odor) criteria with respect to human bioeffluents are likely to be satisfied if the ventilation maintains an indoor carbon dioxide concentration to less than 700 parts per million (ppm) greater than the outdoor air concentration.

Carbon dioxide concentrations are summarized in Table 4. On the day of the initial assessment, the average outdoor carbon dioxide concentration was 379 ppm, which calculates to a maximum indoor concentration of 1,079 ppm (700 + 379). All tested locations indoors were less than the recommended maximum for the day of the assessment.

ATI reassessed the Computer Lab Room 302 which had unusual fungal spore concentrations on February 16, 2021, after remediation actions were completed. The carbon dioxide concentration measured during the reassessment is included in Table 4. The average outdoor carbon dioxide concentration on February 16, 2021 was 419 ppm, which calculates to a

maximum indoor concentration of 1,119 ppm (700 + 419). All tested locations indoors were less than the recommended maximum for the day of the reassessment.

Table 4: Carbon Dioxide

Sample Location	1/27/2021 Initial Assessment Concentration (parts per million)			ASHRAE Standard (ppm) NTE
	Min	Max	Average	
Outdoors	365	393	379	N/A
Indoors				
Main Office	449	454	452	<1,079
Cafeteria	354	385	370	<1,079
Gym	366	389	378	<1,079
Room 144	382	385	384	<1,079
Science Room 152	401	421	411	<1,079
Room 322	398	413	406	<1,079
Room 336	401	402	402	<1,079
Room 307	392	426	409	<1,079
Computer Lab, Room 302	388	390	389	<1,079
2/24/2021 Reassessment Concentration (parts per million)				
Outdoors	408	429	419	N/A
Indoors				
Computer Lab, Room 302	423	429	426	< 1,119

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 on January 27, 2021 were less than the Q-Trak's detection limit throughout the school.

ATI reassessed the Computer Lab Room 302 which had unusual fungal spore concentrations on February 24, 2021 after remediation actions were completed. The carbon monoxide concentration measured during the reassessment is included in Table 5. The carbon monoxide concentration from the reassessment was also less than the Q-Trak's limit of detection and less than the EPA/ASHRAE recommended maximum of 9 ppm.

Table 5: Carbon Monoxide

Sample Location	1/27/2021 Initial Assessment Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Outdoors	<3	<3	<3	N/A
Inside				
Main Office	<3	<3	<3	< 9

Sample Location	1/27/2021 Initial Assessment Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Cafeteria	<3	<3	<3	< 9
Gym	<3	<3	<3	< 9
Room 144	<3	<3	<3	< 9
Science Room 152	<3	<3	<3	< 9
Room 322	<3	<3	<3	< 9
Room 336	<3	<3	<3	< 9
Room 307	<3	<3	<3	< 9
Computer Lab, Room 302	<3	<3	<3	< 9
2/24/2021 Reassessment Concentration (parts per million)				
Outdoors	<3	<3	<3	N/A
Indoors				
Computer Lab, Room 302	<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 January 27, 2021 initial mold assessment sampled air using spore trap cassettes in randomly selected classrooms and other areas throughout the facility. The February 24, 2021 reassessment focused only on the Computer Lab Room 302 which had a *Aspergillus/Penicillium*-like mold spore concentration greater than 1,000 spores/m^3. 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 results from the January 27, 2021 initial assessment suggest the indoor concentrations were generally favorable compared to the outdoor concentrations, except for the Computer Lab Room 302. The total ambient, outdoor spore concentration was 371 spores/m^3, which is on the lower range of outdoor mold concentrations. The *Aspergillus/Penicillium*-like spore concentration measured in the Computer Lab Room 302 was 1,007 spores/m^3, which suggests that some amount of indoor spore amplification has taken place at some point, either current or in the past. This space was selected to be reassessed on February 24, 2021. The other assessed rooms all had total spore concentrations typical for an indoor, occupied space and do not suggest active mold spore amplification in those spaces.

The Computer Lab Room 302 was reassessed on February 24, 2021 and the total spore concentration and the *Aspergillus/Penicillium*-like spore concentration dropped considerably. The *Aspergillus/Penicillium*-like spore concentration in the Computer Lab was 78 spores/m^3, a reduction of more than 92%, and a total spore concentration of 494 spores/m^3.

Differences in concentrations between both dates of assessment are summarized in Table 6.

Table 6: Aspergillus/Penicillium Concentration Comparison

Sample Location	January 27, 2021 Concentrations (Spores/m³)	February 24, 2021 Concentrations (Spores/m³)	% Change
Computer Room, 302	1,007	78	-92%

The official laboratory report with spore trap samples collected on January 27, 2021, is presented in Appendix A.

6 Summary of Findings

1. The average temperature in four tested locations was less than the ASHRAE recommended winter occupancy comfort range of 68-75°F on January 27, 2021. The Computer Lab Room 302 had a temperature within the ASHRAE recommended winter temperature range on February 24, 2021.
2. On January 27, 2021, the average relative humidity in all indoor sampled locations was less than the ASHRAE recommended maximum humidity of 65%, but all indoor tested spaces except one also had a relative humidity less than 30%, which can cause respiratory dryness in occupants. On February 24, 2021, the Computer Lab Room 302 had a relative humidity of 19%, which is less than the ASHRAE recommended humidity and less than 30%.
3. The averaged carbon dioxide concentration in all indoor locations, on both assessment dates, were less than the maximum recommended indoor concentration for the day of each assessment.
4. The average carbon monoxide concentrations in all areas, for both assessments, were less than the EPA and ASHRAE recommended limit of 9 ppm.
5. The *Aspergillus/Penicillium*-like spore concentrations in the Computer Lab Room 320 was greater than 1,000 spores/m³, which suggests possible indoor spore amplification.
6. The Computer Lab Room 320 was reassessed on February 24, 2021 and the *Aspergillus/Penicillium*-like spore concentration was reduced up to 92%, which was equal to the outdoor *Aspergillus/Penicillium*-like spore concentration. ATI has no other recommendations at this time.

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.

Mikal Frater
Industrial Hygienist

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

Appendix A: Laboratory Report and Chain of Custody

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 285329
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Mikal Frater

Job Name: Ernest E. Just Elementary School IAQ
Job Location: Not Provided
Job Number: 21-602
P.O. Number: Not Provided

Date Submitted: 01/27/2021
Person Submitting: Mikal Frater
Date Analyzed: 02/04/2021
Report Date: 02/04/2021

AMA Sample #	285329-1
Client ID	21-602-1
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	2
Location	Parking Lot

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	2	15	53	106	28.6%
Basidiospores	5	15	53	265	71.4%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	Present	15	53	<53	
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 7 **Total sp/m³:** 371

Comments

AMA Sample #	285329-2
Client ID	21-602-2
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	0
Sample Condition	Acceptable
Debris Loading	0
Location	Field Blank

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores					
Basidiospores					
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 0 **Total sp/m³:** 0

Comments
No Mold Spores Observed

AMA Sample #	285329-3
Client ID	21-602-3
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Main Office

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	4	15	53	212	40%
Basidiospores	3	15	53	159	30%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	1	15	53	53	10%
Curvularia					
Penicillium / Aspergillus	2	15	53	106	20%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 10 **Total sp/m³:** 530

Comments

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 285329
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Mikal Frater

Job Name: Ernest E. Just Elementary School IAQ
Job Location: Not Provided
Job Number: 21-602
P.O. Number: Not Provided

Date Submitted: 01/27/2021
Person Submitting: Mikal Frater
Date Analyzed: 02/04/2021
Report Date: 02/04/2021

AMA Sample #	285329-4
Client ID	21-602-4
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Cafeteria

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	1	15	53	53	6.7%
Basidiospores	6	15	53	318	40%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	2	15	53	106	13.3%
Curvularia					
Penicillium / Aspergillus	6	15	53	318	40%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 15 **Total sp/m^3:** 795

Comments

AMA Sample #	285329-5
Client ID	21-602-5
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Gymnasium

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	1	15	53	53	33.3%
Basidiospores	2	15	53	106	66.7%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 3 **Total sp/m^3:** 159

Comments

AMA Sample #	285329-6
Client ID	21-602-6
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Room 144

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	Present	15	53	<53	
Basidiospores	Present	15	53	<53	
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	5	15	53	265	100%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 5 **Total sp/m^3:** 265

Comments
Very Light Trace

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 285329
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Mikal Frater

Job Name: Ernest E. Just Elementary School IAQ
Job Location: Not Provided
Job Number: 21-602
P.O. Number: Not Provided

Date Submitted: 01/27/2021
Person Submitting: Mikal Frater
Date Analyzed: 02/04/2021
Report Date: 02/04/2021

AMA Sample #	285329-7
Client ID	21-602-7
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Science Room 152

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores					
Basidiospores	2	15	53	106	33.3%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	3	15	53	159	50%
Curvularia					
Penicillium / Aspergillus	1	15	53	53	16.7%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 6 **Total sp/m³:** 318

Comments

AMA Sample #	285329-8
Client ID	21-602-8
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Room 322

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores					
Basidiospores	3	15	53	159	75%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora	1	15	53	53	25%
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 4 **Total sp/m³:** 212

Comments

AMA Sample #	285329-9
Client ID	21-602-9
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Room 336

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	2	15	53	106	66.7%
Basidiospores	1	15	53	53	33.3%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 3 **Total sp/m³:** 159

Comments

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	285329	**Job Name:**	Ernest E. Just Elementary School IAQ	**Date Submitted:**	01/27/2021
Client:	ATI, Inc.	**Job Location:**	Not Provided	**Person Submitting:**	Mikal Frater
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	21-602	**Date Analyzed:**	02/04/2021
		P.O. Number:	Not Provided	**Report Date:**	02/04/2021
Attention:	Mikal Frater				

AMA Sample #	285329-10	**AMA Sample #**	285329-11
Client ID	21-602-10	**Client ID**	21-602-11
Analyst ID	TLW	**Analyst ID**	TLW
Collection Apparatus	Air-O-Cell	**Collection Apparatus**	Air-O-Cell
Sample Volume (L)	75	**Sample Volume (L)**	75
Sample Condition	Acceptable	**Sample Condition**	Acceptable
Debris Loading	1	**Debris Loading**	1
Location	Room 307	**Location**	Computer Lab

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores					
Basidiospores					
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	2	15	53	106	100%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless					
Hyphal Fragments*					
Total Raw Ct:	2		**Total sp/m^3:**	106	

Comments
No visible trace.

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores					
Basidiospores					
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	1	15	53	53	4.8%
Curvularia					
Penicillium / Aspergillus	19	15	53	1007	90.5%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Nigrospora					
Other Colorless	1	15	53	53	4.8%
Hyphal Fragments*					
Total Raw Ct:	21		**Total sp/m^3:**	1113	

Comments

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	285329	**Job Name:**	Ernest E. Just Elementary School IAQ	**Date Submitted:**	01/27/2021
Client:	ATI, Inc.	**Job Location:**	Not Provided	**Person Submitting:**	Mikal Frater
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	21-602	**Date Analyzed:**	02/04/2021
		P.O. Number:	Not Provided	**Report Date:**	02/04/2021
Attention:	Mikal Frater				

Spore Comparison Guide

The criteria for these specifications are outlined, but not limited to those listed, below. Final specifications may differ from the listed criteria for certain samples. AMA Analytical Services, Inc. reserves the right to make changes to these criteria at any time without notice.

Normal ecology	Slightly above normal ecology	Moderately above normal ecology	Substantially above normal ecology

Stachybotrys / Memnoniella, and Chaetomium	**Other Spores* (Control Present)**	**Other Spores* (No Control)**
1-4 Spores: Yellow 5-9 Spores: Orange 10+ Spores: Red	< 10 Spores: Insignificant (no color) <= Control's spore count: Green Between Control and 2x Control: Yellow Between 2x Control and 3x Control: Orange 3x+ Control: Red	< 10 Spores: Insignificant (no color) 10-20 Spores: Yellow 20-50 Spores: Orange 50+ Spores: Red

*No evalutation is provided for the following spore types: Other, Other Colorless, and Unknown Fungi, and Misc

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This report is provided for informational and comparative purposes only and should not be relied upon for any other purpose. Sampling techniques, possible contaminants, unrepresentative samples and other similar or dissimilar factors may affect these results. With the statistical evaluation provided, as with all statistical comparisons and analyses, false-positive and false-negative results can and do occur. AMA Analytical Services, Inc. hereby disclaims any liability for any and all direct, indirect, punitive, incidental, special or consequential damages arising out of the use or interpretation of the data contained in, or any actions taken or omitted in reliance upon, this report.

AMA Analytical Services, Inc.
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CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	285329	**Job Name:**	Ernest E. Just Elementary School IAQ	**Date Submitted:**	01/27/2021
Client:	ATI, Inc.	**Job Location:**	Not Provided	**Person Submitting:**	Mikal Frater
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	21-602	**Date Analyzed:**	02/04/2021
		P.O. Number:	Not Provided	**Report Date:**	02/04/2021
Attention:	Mikal Frater				

General Comments, Disclaimers, and Footnotes

Analytical Method: Sample are analyzed following the instructions and guidelines outlined in ASTM 7391-09.

Sample Condition: Acceptable: The sample was collected and delivered to the our location without disturbing the material on the sampling media.
Unacceptable: 1. The sample trace (TR) has been disturbed. 2. The sample was damaged or otherwise unsuitable for analysis.
0 = No particulate matter detected; 1= >nd-~5% Particulate Loading; 2 = ~5%-25% Particulate Loading; 3 = ~25%- 75% Particulate Loading; 4 = ~75%-90% Particulate Loading; 5 = >90% Particulate Loading

Spore Notes: Based on their small size and very few distinguishing characteristics, Aspergillus and Penicillium cannot be differentiated by non-viable sampling methods. There are other types of spores whose morphology is similar to Aspergillus and Penicillium and cannot be differentiated by non-viable sampling methods. Examples of these similar spores are Acremonium, Paecilomyces, Wallemia, Trichoderma, Scopulariopsis, and Gliocladium.
Smuts, Periconia and Myxomycetes are three different types of genera that have similar morphological characteristics.
Bipolaris/Dreschlera/Helm: Bipolaris / Dreschlera / Helminthosporium are three different types of genera that have smiliar morphological characteristics.
Other Colorless represents all colorless spores that are non-distinctive and unidentifiable.
*Hyphal Fragments: A portion of the mycelium that becomes separated from the remainder of the thallus (vegetative body), each of which has the capacity to grow and form new individuals. Results for hyphal fragments are in fragments/m3 and are not incorporated in the total spore concentration.
The droplet symbol (💧) refers to water-intrusion indicator spores. These fungal spores, when found on indoor air samples, can be an indication of moisture sources and resultant fungal growth that may be problematic.

Quantification: Analytical Sensitivity (A.S.): This is dependent on the volume of air collected, size of the trace, ocular diameter, and the amount of the trace that was analyzed.
The value of "Present" indicated in the Raw Count column represents the presence of this spore type during the preliminary exam at 400x. The Raw Count converts to a whole number if the spore type is encountered again during the 600x-1,000x enumeration. The sp/m3concentration will be reported as less than the analytical sensitivity if "Present" is reported in the Raw Count.
Results are reported to 3 significant figures. sp/m3: Spores per cubic meter.
Uncertainty: for raw count in the range of 0-50 the SR is 0.375, 51-100 SR=0.333, 101-200 SR=0.257, >200 SR=0.245
All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.
Analyst(s): Tristan Ward, Christopher Dell

Technical Director Tristan Ward

MOLD SPORE DESCRIPTIONS

Ascospores

Ascospores are spores formed inside an ascus (asci-plural) or sac-like cell which is contained inside a fruiting body called an ascocarp or an ascoma (ascomata-plural). An ascus typically contains a definite nuimber of ascospores, usually eight. Ascospores are unique in shape, size, and color as to the Genus/species they represent. These spores are specific to fungi classified as Ascomycetes. They are ubiquitous in nature. Many decay organic matter, others are plant or animal pathogens. They can grow indoors on damp materials. Release of ascospores are released by forcible ejection and dispersed by wind, water, animals and other agents. Health Effects: Depending on the Genera, Ascospores may be allergenic.

Basidiospores

Basidiospores are reproductive spores produced by a group of fungi called basidiomycetes. This group includes the mushrooms, shelf fungi and various other macrofungi. Basidipspores serve as the main air (wind) dispersal units for the fungi and their release is dependent upon moisture. The structure of the spore complex can develop in various manners resulting in different appearances. It is often found growing in soil, decaying plant debris, compost piles and fruit rot. Indoors, it can be found on water damaged building materials (chipboard /OSB, plywood, wallpaper, and glue) as well as on food items (dried foods, cheeses, fruits, herbs, spices, cereals). Health effects: Some basidiospores may produce toxins and can act as allergens. They have not been reported to be pathogens.

Cladosporium

Cladosporium is the most common indoor and outdoor mold. The spores are wind dispersed and are often extremely abundant in outdoor air. Many species are commonly found on living and dead plant material. Indoors, they may grow on surfaces with high moisture or high humidity levels such as damp window sills, poorly ventilated bathrooms and soiled refrigerators. It produces powdery or velvety olive-green to brown or black colonies. The conidia (spores) vary depending on the species and are formed in simple or branching chains with multi-attachment points. Health Effects: Cladosporium species are rarely pathogenic to humans, but have been reported to occassionally cause sinusitis and pulmonary infections as well as infections of the skin and toenails. The airborne spores are significant allergens, and in large amounts they may severely affect asthmatics and people with respiratory diseases.

Nigrospora

Nigrospora is a ubiquitous, filamentous, dark colored fungus commonly isolated from soil, decaying plants, and seeds. Indoors, it is considered a laboratory contaminant. Colonies grow rapidly, initially white and woolly, later turning gray with black areas, and eventually turning black (both front and reverse). Its conidia are black, solitary, unicellular, slightly flattened horizontally, and have a thin equatorial germ slit. Health Effects: This mold may be a potential allergen. It is uncertain whether it is pathogenic to humans.

Other Colorless

- “Other Colorless” are all non-distinctive, unidentifiable, colorless spores seen on spore trap samples and include all the genera that do not have distinguishing morphology to belong to any of the other defined categories."

Penicillium/Aspergillus Like

Penicillium and Aspergillus are ubiquitous, filamentous fungi that are found in soil, decaying plant debris, compost piles, and in the air. Indoors, spores are commonly found in house dust, in water-damaged buildings (wallpaper, wallpaper glue, decaying fabrics, moist chipboards, and behind paint) as well as fruit and grains. They are the most common fungal genera, worldwide. Both produce chains of spores that are small, round to oval, colorless or slightly pigmented, and smooth to rough walled. These spores are indistinguishable between the two as well as other genera, such as Gliocladium, Trichoderma, Paecilomyces, and Scopulariopsis. They differ as to their conidiophores or fruiting bodies. While, Aspergillus spores are produced from phialides supported on conidia heads or swollen vesicles, Penicillium spores are produced on finger-like projections. Depending on species, typical colonies of Aspergillus are initially white and later turn to either shades of green, yellow, orange, brown or black. Texture is usually velvety to cottony. Typical colonies of Penicillium, other than Penicillium marneffei (yeast-like at 37oC), grow rapidly, white in color at first, later becoming bluish green with white borders with velvety to powdery textures depending on species. Some species produce radial patterns. Health Effects: Both Aspergillus and Penicillium are potential allergens. Several species of Aspergillus (A. flavus and A. parasiticus) produce aflatoxins or natually occurring mycotoxins that are toxic and carcinogenic. These are found in contaminated foodstuff and are hazardous to consumers. Penicillium has only one known species that is pathogenic to humans (P. marneffei) that causes lethal systemic infection (Penicilliosis) in immunocompromised individuals.

AMA Analytical Services, Inc.
Focused on Results www.amalab.com
AIHA-LAP (#100470) NVLAP (#101143-0) NY ELAP (10920)
4475 Forbes Blvd. • Lanham, MD 20706
(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires) 285329

Mailing/Billing Information:
1. Client Name: ATI. Inc.
2. Address 1: 4221 Forbes Blvd
3. Address 2: Suite 250
4. Address 3: Lanham, MD 20706
5. Phone #: _____ Fax #: _____

Submittal Information:
1. Job Name: Ernest E. Just ES IAQ
2. Job Location: _____
3. Job #: 21-602 P.O. #: _____
4. Contact Person: Mikal Frater Cell: (848) 702-8621
5. Collected by: " Cell: "

Reporting Info (Results provided as soon as technically feasible). If no TAT/Reporting Info is provided, AMA will assign defaults of 5-Day and email/fax to contacts on file.

AFTER HOURS (must be pre-scheduled)	NORMAL BUSINESS HOURS	REPORT TO:
☐ 4 Hours ☐ Immediate Date Due: _____ ☐ 24 Hours Time Due: _____ Comments: _____	☐ 4 Hours ☐ 3 Day ☐ Same Day ■ 5 Day + Date Due: 2/4/21 ☐ Next Day ☐ 2 Day ☐ ~~Results Required By Noon~~	■ Email: mikal@atiinc.com ☐ Email 2: _____ ☐ Verbals: _____

Asbestos Analysis
*PCM Air – Please Indicate Filter Type: _____
- ☐ NIOSH 7400 _____ (QTY)
- ☐ Fiberglass _____ (QTY)

TEM Air* – Please Indicate Filter Type: _____
- ☐ AHERA _____ (QTY)
- ☐ NIOSH 7402 _____ (QTY)
- ☐ Other (specify _____) _____ (QTY)

PLM Bulk
- ☐ EPA 600 – Visual Estimate _____ (QTY) ☐ Pos Stop
- ☐ EPA Point Count _____ (QTY)
- ☐ NY State Friable 198.1 _____ (QTY)
- ☐ Grav. Reduction ELAP 198.6 _____ (QTY)
- ☐ Other (specify _____) _____ (QTY)

MISC
- ☐ Vermiculite
- ☐ Asbestos Soil PLM__(Qual) PLM__(Quan) PLM/TEM__(Qual) PLM/TEM__(Quan)

*It is recommended that blank samples be submitted with all air and surface samples

TEM Bulk
- ☐ ELAP 198.4/Chatfield _____ (QTY)
- ☐ NY State PLM/TEM _____ (QTY)
- ☐ Residual Ash _____ (QTY)

TEM Dust*
- ☐ Qual. (pres/abs) Vacuum/Dust _____ (QTY)
- ☐ Quan. (s/area) Vacuum D5755-95 _____ (QTY)
- ☐ Quan. (s/area)Dust D6480-99 _____ (QTY)

TEM Water
- ☐ Qual. (pres/abs) _____ (QTY)
- ☐ ELAP 198.2/EPA 100.2 _____ (QTY)
- ☐ EPA 100.1 _____ (QTY)

☐ ~~All~~ samples received in good condition unless otherwise noted.
(TEM Water samples _____ °C)

If field data sheets are submitted, there is no need to complete bottom section.

Metals Analysis
- ☐ Pb Paint Chip _____ (QTY)
- ☐ *Pb Dust Wipe (wipe type _____) _____ (QTY)
- ☐ *Pb Air _____ (QTY)
- ☐ Pb Soil/Solid _____ (QTY)
- ☐ Pb TCLP _____ (QTY)
- ☐ Drinking Water ☐ Pb _____ (QTY) ☐ Cu _____ (QTY) ☐ As _____ (QTY)
- ☐ Waste Water ☐ Pb _____ (QTY) ☐ Cu _____ (QTY) ☐ As _____ (QTY)
- ☐ Pb Furnace (Media _____) _____ (QTY)

Fungal Analysis
Collection Apparatus for Spore Traps/Air Samples: _____
Collection Media _____
- ■ *Spore-Trap 11 (QTY) ☐ Surface Vacuum Dust _____ (QTY)
- ☐ *Surface Swab _____ (QTY) ☐ Culturable ID Genus (Media _____) _____ (QTY)
- ☐ *Surface Tape _____ (QTY) ☐ Culturable ID Species (Media _____) _____ (QTY)
- ☐ Other (Specify _____) _____ (QTY)

CLIENT ID #	SAMPLE INFORMATION: SAMPLE LOCATION/ ID	DATE/ TIME	VOL (L)/ Wipe Area	ANALYSIS: TEM	PCM	PLM	LEAD	MOLD	MATRIX: AIR	BULK	DUST	WATER AND OTHER	SPORE TRAP	TAPE	SWAB	CLIENT CONTACT (LABORATORY STAFF ONLY)
21-602 1	Parking lot	12:16	75 L										✓			Date/Time: Contact:By:
2	Field blank	N/A											✓			
3	main office	12:31	75 L										✓			
4	cafeteria	12:38	75 L										✓			
5	gymnasium	12:45	75 L										✓			Date/Time: Contact:By:
6	room 144	12:54	75 L										✓			
7	science rm 152	1:03	75 L										✓			
8	room 322	1:15	75 L										✓			
9	room 336	1:26	75 L										✓			Date/Time: Contact:By:
10	room 307	1:33	75 L										✓			
11	computer lab	1:39	75 L										✓			

	Print Name	Signature	Date	Time
Relinquished by:	Mikal Frater	mikal Frater	1/27/21	4:55PM
Received by:				
Relinquished by:			1/27/21	1055
Received for Lab by:				

Shipping Information
☐ UPS ☐ ~~In Person~~ ☐ Other
☐ FedEx ☐ Drop Box
☐ USPS ☐ Courier
Airbill/Tracking No: _____

AMA Analytical Services, Inc.
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CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 324880
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Nate Burgei

Job Name: EE Just Middle School
Job Location: Not Provided
Job Number: 21-602
P.O. Number: Not Provided

Date Submitted: 02/24/2021
Person Submitting: Nate Burgei
Date Analyzed: 02/24/2021
Report Date: 02/25/2021

AMA Sample #	324880-1
Client ID	31569722
Analyst ID	MG
Collection Apparatus	Air-O-Cell
Sample Volume (L)	150
Sample Condition	Acceptable
Debris Loading	1
Location	Computer Lab 302

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	8	23	26	208	42.1%
Basidiospores	8	23	26	208	42.1%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	3	23	26	78	15.8%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Hyphal Fragments*					

Total Raw Ct: 19 **Total sp/m³:** 494

Comments

AMA Sample #	324880-2
Client ID	31569782
Analyst ID	MG
Collection Apparatus	Air-O-Cell
Sample Volume (L)	150
Sample Condition	Acceptable
Debris Loading	2
Location	Outdoors

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	13	23	26	338	20%
Basidiospores	40	23	26	1040	61.5%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	4	23	26	104	6.2%
Curvularia					
Penicillium / Aspergillus	3	23	26	78	4.6%
Smuts/Periconia/Myxomycetes	5	23	26	130	7.7%
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Hyphal Fragments*					

Total Raw Ct: 65 **Total sp/m³:** 1690

Comments

AMA Sample #	324880-3
Client ID	31569715
Analyst ID	MG
Collection Apparatus	Air-O-Cell
Sample Volume (L)	0
Sample Condition	Acceptable
Debris Loading	1
Location	Blank

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores					
Basidiospores					
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Hyphal Fragments*					

Total Raw Ct: 0 **Total sp/m³:** 0

Comments
No mold spores observed.

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	324880	**Job Name:**	EE Just Middle School	**Date Submitted:**	02/24/2021
Client:	ATI, Inc.	**Job Location:**	Not Provided	**Person Submitting:**	Nate Burgei
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	21-602	**Date Analyzed:**	02/24/2021
		P.O. Number:	Not Provided	**Report Date:**	02/25/2021
Attention:	Nate Burgei				

Spore Comparison Guide

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Stachybotrys / Memnoniella, and Chaetomium	**Other Spores* (Control Present)**	**Other Spores* (No Control)**
1-4 Spores: Yellow 5-9 Spores: Orange 10+ Spores: Red	< 10 Spores: Insignificant (no color) <= Control's spore count: Green Between Control and 2x Control: Yellow Between 2x Control and 3x Control: Orange 3x+ Control: Red	< 10 Spores: Insignificant (no color) 10-20 Spores: Yellow 20-50 Spores: Orange 50+ Spores: Red

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AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	324880	**Job Name:**	EE Just Middle School	**Date Submitted:**	02/24/2021
Client:	ATI, Inc.	**Job Location:**	Not Provided	**Person Submitting:**	Nate Burgei
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	21-602	**Date Analyzed:**	02/24/2021
		P.O. Number:	Not Provided	**Report Date:**	02/25/2021
Attention:	Nate Burgei				

General Comments, Disclaimers, and Footnotes

Analytical Method: Sample are analyzed following the instructions and guidelines outlined in ASTM 7391-09.

Sample Condition: Acceptable: The sample was collected and delivered to the our location without disturbing the material on the sampling media.
Unacceptable: 1. The sample trace (TR) has been disturbed. 2. The sample was damaged or otherwise unsuitable for analysis.
0 = No particulate matter detected; 1= >nd-~5% Particulate Loading; 2 = ~5%-25% Particulate Loading; 3 = ~25%- 75% Particulate Loading; 4 = ~75%-90% Particulate Loading; 5 = >90% Particulate Loading

Spore Notes: Based on their small size and very few distinguishing characteristics, Aspergillus and Penicillium cannot be differentiated by non-viable sampling methods. There are other types of spores whose morphology is similar to Aspergillus and Penicillium and cannot be differentiated by non-viable sampling methods. Examples of these similar spores are Acremonium, Paecilomyces, Wallemia, Trichoderma, Scopulariopsis, and Gliocladium.
Smuts, Periconia and Myxomycetes are three different types of genera that have similar morphological characteristics.
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*Hyphal Fragments: A portion of the mycelium that becomes separated from the remainder of the thallus (vegetative body), each of which has the capacity to grow and form new individuals. Results for hyphal fragments are in fragments/m3 and are not incorporated in the total spore concentration.
The droplet symbol (💧) refers to water-intrusion indicator spores. These fungal spores, when found on indoor air samples, can be an indication of moisture sources and resultant fungal growth that may be problematic.

Quantification: Analytical Sensitivity (A.S.): This is dependent on the volume of air collected, size of the trace, ocular diameter, and the amount of the trace that was analyzed.
The value of "Present" indicated in the Raw Count column represents the presence of this spore type during the preliminary exam at 400x. The Raw Count converts to a whole number if the spore type is encountered again during the 600x-1,000x enumeration. The sp/m3concentration will be reported as less than the analytical sensitivity if "Present" is reported in the Raw Count.
Results are reported to 3 significant figures. sp/m3: Spores per cubic meter.
Uncertainty: for raw count in the range of 0-50 the SR is 0.375, 51-100 SR=0.333, 101-200 SR=0.257, >200 SR=0.245
All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.
Analyst(s): Michael Greenberg

Technical Director Tristan Ward

MOLD SPORE DESCRIPTIONS

Ascospores

Ascospores are spores formed inside an ascus (asci-plural) or sac-like cell which is contained inside a fruiting body called an ascocarp or an ascoma (ascomata-plural). An ascus typically contains a definite nuimber of ascospores, usually eight. Ascospores are unique in shape, size, and color as to the Genus/species they represent. These spores are specific to fungi classified as Ascomycetes. They are ubiquitous in nature. Many decay organic matter, others are plant or animal pathogens. They can grow indoors on damp materials. Release of ascospores are released by forcible ejection and dispersed by wind, water, animals and other agents. Health Effects: Depending on the Genera, Ascospores may be allergenic.

Basidiospores

Basidiospores are reproductive spores produced by a group of fungi called basidiomycetes. This group includes the mushrooms, shelf fungi and various other macrofungi. Basidipspores serve as the main air (wind) dispersal units for the fungi and their release is dependent upon moisture. The structure of the spore complex can develop in various manners resulting in different appearances. It is often found growing in soil, decaying plant debris, compost piles and fruit rot. Indoors, it can be found on water damaged building materials (chipboard /OSB, plywood, wallpaper, and glue) as well as on food items (dried foods, cheeses, fruits, herbs, spices, cereals). Health effects: Some basidiospores may produce toxins and can act as allergens. They have not been reported to be pathogens.

Cladosporium

Cladosporium is the most common indoor and outdoor mold. The spores are wind dispersed and are often extremely abundant in outdoor air. Many species are commonly found on living and dead plant material. Indoors, they may grow on surfaces with high moisture or high humidity levels such as damp window sills, poorly ventilated bathrooms and soiled refrigerators. It produces powdery or velvety olive-green to brown or black colonies. The conidia (spores) vary depending on the species and are formed in simple or branching chains with multi-attachment points. Health Effects: Cladosporium species are rarely pathogenic to humans, but have been reported to occassionally cause sinusitis and pulmonary infections as well as infections of the skin and toenails. The airborne spores are significant allergens, and in large amounts they may severely affect asthmatics and people with respiratory diseases.

Penicillium/Aspergillus Like

Penicillium and Aspergillus are ubiquitous, filamentous fungi that are found in soil, decaying plant debris, compost piles, and in the air. Indoors, spores are commonly found in house dust, in water-damaged buildings (wallpaper, wallpaper glue, decaying fabrics, moist chipboards, and behind paint) as well as fruit and grains. They are the most common fungal genera, worldwide. Both produce chains of spores that are small, round to oval, colorless or slightly pigmented, and smooth to rough walled. These spores are indistinguishable between the two as well as other genera, such as Gliocladium, Trichoderma, Paecilomyces, and Scopulariopsis. They differ as to their conidiophores or fruiting bodies. While, Aspergillus spores are produced from phialides supported on conidia heads or swollen vesicles, Penicillium spores are produced on finger-like projections. Depending on species, typical colonies of Aspergillus are initially white and later turn to either shades of green, yellow, orange, brown or black. Texture is usually velvety to cottony. Typical colonies of Penicillium, other than Penicillium marneffei (yeast-like at 37oC), grow rapidly, white in color at first, later becoming bluish green with white borders with velvety to powdery textures depending on species. Some species produce radial patterns. Health Effects: Both Aspergillus and Penicillium are potential allergens. Several species of Aspergillus (A. flavus and A. parasiticus) produce aflatoxins or natually occurring mycotoxins that are toxic and carcinogenic. These are found in contaminated foodstuff and are hazardous to consumers. Penicillium has only one known species that is pathogenic to humans (P. marneffei) that causes lethal systemic infection (Penicilliosis) in immunocompromised individuals.

Smuts/Periconia/Myxomycetes

Smuts, Periconia, and Myxomycetes spores are grouped together due to their similar round, brown morphology. Smuts are outdoor parasitic plant pathogens. They rarely grow indoors but may grow on host plants if appropriate conditions are present. They are parasitic plant pathogens. They can be found on cereal crops, grasses, flowing plants, weed, and other fungi. They can cause allergies. Periconia are found in soils, dead herbaceous stems and leaf spots, and grasses. They have wind dispersed dry spores. Their spores are abundant in the air but it is not known if they are allergenic. Myxomycetes are found on decaying logs, stumps and dead leaves. They have wind-dispersed dry spores and wet motile (amoebic phase) spores. During favorable conditions they move about like amoebae. They form dry airborne spores when conditions are unfavorable. They are rarely found indoors. Health Effects: They may cause Type 1 allergies (hay fever, asthma). No human infections have been reported.

AMA Analytical Services, Inc.
Focused on Results www.amalab.com
AIHA-LAP (#100470) NVLAP (#101143-0) NY ELAP (10920)
4475 Forbes Blvd. • Lanham, MD 20706
(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires) 324880

Mailing/Billing Information:
1. Client Name: ATI Inc
2. Address 1: 4221 Forbes BLVD STE 250
3. Address 2: LANHAM, MD
4. Address 3:
5. Phone #: Fax #:

Submittal Information:
1. Job Name: EE Just Middle School
2. Job Location:
3. Job #: 21-602 P.O. #:
4. Contact Person: Nate Burgei Cell: 614-286-5919
5. Collected by: Cell:

Reporting Info (Results provided as soon as technically feasible). If no TAT/Reporting Info is provided, AMA will assign defaults of 5-Day and email to contacts on file.

AFTER HOURS (must be pre-scheduled)
☐ 4 Hours ☐ Late Night
☐ Immediate Date Due:
☐ 24 Hours Time Due:
Comments:

NORMAL BUSINESS HOURS
☐ 4 Hours ☐ 3 Day
☐ Same Day ☐ 5 Day +
☒ Next Day Date Due: 2/25/21
☐ 2 Day
☐ Results Required By Noon (Additional fee may apply)

REPORT TO:
☐ Email: nate.burgei@atiinc.com
☐ Email 2: courtney@atiinc.com
☐ Verbals:

Asbestos Analysis
*PCM Air – Please Indicate Filter Type:
☐ NIOSH 7400 (QTY)
☐ Fiberglass (QTY)
TEM Air* – Please Indicate Filter Type:
☐ AHERA (QTY)
☐ NIOSH 7402 (QTY)
☐ Other (specify) (QTY)
PLM Bulk
☐ EPA 600 – Visual Estimate (QTY) ☐ Pos Stop
☐ EPA Point Count (QTY)
☐ NY State Friable 198.1 (QTY)
☐ Grav. Reduction ELAP 198.6 (QTY)
☐ Other (specify) (QTY)
MISC
☐ Asbestos Soil ASTM D7521 PLM (Qual) PLM (Quan) PLM/TEM (Qual) PLM/TEM (Quan)
*It is recommended that blank samples be submitted with all air and surface samples

TEM Bulk
☐ ELAP 198.4/Chatfield (QTY)
☐ NY State PLM/TEM (QTY)
☐ Residual Ash (QTY)
☐ Vermiculite (QTY)
TEM Dust*
☐ Qual. (pres/abs) Vacuum/Dust (QTY)
☐ Quan. (s/area) Vacuum D5755-95 (QTY)
☐ Quan. (s/area)Dust D6480-99 (QTY)
TEM Water
☐ Qual. (pres/abs) (QTY)
☐ ELAP 198.2/EPA 100.2 (QTY)
☐ EPA 100.1 (QTY)
☒ All samples received in good condition unless otherwise noted.
Lab use only (TEM Water samples °C)
If field data sheets are submitted, there is no need to complete bottom section.

Metals Analysis
☐ Pb Paint Chip ☐ % by Weight (QTY) ☐ mg/cm² (QTY)
☐ *Pb Dust Wipe (wipe type) (QTY)
☐ *Pb Air (QTY)
☐ Pb Soil/Solid (QTY)
☐ Pb TCLP (QTY)
☐ Drinking Water ☐ Pb (QTY) ☐ Cu (QTY)
☐ Waste Water ☐ Pb (QTY) ☐ Cu (QTY)
☐ Pb Furnace (Media) (QTY)
Fungal Analysis
Collection Apparatus for Spore Traps/Air Samples: BUCK BIOAIRE
Collection Media AIR-O-CELL
☐ *Spore-Trap 3 (QTY) ☐ Surface Vacuum Dust (QTY)
☐ *Surface Swab (QTY)
☐ *Surface Tape (QTY)
☐ Other (Specify) (QTY)

CLIENT ID #	SAMPLE INFORMATION SAMPLE LOCATION/ ID	DATE/ TIME	VOL (L)/ Wipe Area	ANALYSIS TEM	PCM	PLM	LEAD	MOLD	MATRIX AIR	BULK	DUST	WATER AND OTHER	SPORE TRAP	TAPE	SWAB	COMMENTS / SPECIAL INSTRUCTIONS
31569722	Computer Lab 302	2/24 11:07	150L										X			
31569782	OUTDOORS	2/24 11:27	150L										X			
31569715	Blank	2/24 11:28	0L										X			

	Print Name	Signature	Date	Time
Relinquished by:	Nate BURGEI		2/24/21	11:58
Received by:			2/24/21	1210

Shipping Information: ☐ UPS ☐ FedEx ☐ USPS ☒ In-Person ☐ Drop Box ☐ Courrier ☐ Other

Appendix B: Instrument Calibration Records

Certificate of Calibration

(✓) Buck™ BioAire Pump Calibration Rotameter

( ) Buck™ BioSlide Pump Calibration Rotameter

Serial number: R15046
Date Calibrated: 11/12/2020 **Calibration Due Date:** 11/12/2021

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: Moran Menk

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

BUCK

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	70.72 (21.5)	°F (°C)
RELATIVE HUMIDITY	39.0	%RH
BAROMETRIC PRESSURE	29.15 (987.1)	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	70.9 (21.6)	70.8 (21.6)	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	29.22 (989.5)	29.23 (989.8)	28.64~29.80 (969.9~1009.1)				

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	01-24-20	07-31-20	DC Voltage	E003493	08-14-19	08-31-20

Chao Vang
CALIBRATED

June 15, 2020
DATE

DOC ID: CERT_GEN_VCC

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	70.68 (21.5)	°F (°C)
RELATIVE HUMIDITY	38.0	%RH
BAROMETRIC PRESSURE	29.16 (987.5)	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	70.8 (21.6)	71.1 (21.7)	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	29.22 (989.5)	29.17 (987.8)	28.64~29.80 (969.9~1009.1)				

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	01-24-20	07-31-20	DC Voltage	E003493	08-14-19	08-31-20

ChaoVang
VERIFIED

June 15, 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	74.0 (23.3)	°F (°C)
RELATIVE HUMIDITY	34	%RH
BAROMETRIC PRESSURE	29.20 (988.8)	inHg (hPa)

MODEL	982
SERIAL NUMBER	P17100007

☐ AS LEFT ☒ AS FOUND

☐ IN TOLERANCE ☒ 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	3015.3	* 2902.7	2924.9~3105.8
2	499	458	449~549	5	5056	* 4859.6	4904.3~5207.7
3	1002	963	952~1052				

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	35.1	* 29.5	32.1~38.1	2	100.5	* 84.8	97.5~103.5

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	32.1 (0.0)	32.8 (0.4)	31.1~33.1 (−0.5~0.6)	2	140.02 (60.01)	* 141.31 (60.73)	139.02~141.02 (59.45~60.57)

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	10.4	7.0~13.0	4	70.0	67.1	67.0~73.0
2	30.0	29.3	27.0~33.0	5	90.01	* 85.88	87.01~93.01
3	50.0	48.5	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
5000 CO_2	14A044095	04-06-20	04-06-25
N2	T-0608	05-19-20	05-19-28
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
Temperature	E010657	02-14-20	02-28-21
Temperture	E010655	01-21-20	01-31-21

Measurement Variable	System ID	Last Cal.	Cal. Due
200 CO	149886	04-30-20	03-24-28
Air	T17939	04-09-20	04-09-28
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
Temperature	E010658	02-14-20	02-28-21
Humidity	E003539	02-26-20	08-31-20

Chimoua Vue
VERIFIED

June 15, 2020
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	70.41 (21.3)	°F (°C)
RELATIVE HUMIDITY	50.3	%RH
BAROMETRIC PRESSURE	29.15 (987.1)	inHg (hPa)

MODEL	982
SERIAL NUMBER	P17100007

☒ 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	32.1 (0.0)	31.9 (-0.1)	31.1~33.1 (-0.5~0.6)	2	140.0 (60.0)	140.3 (60.3)	139.0~141.0 (59.5~60.6)

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

#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	9.0	7.8~12.2	4	70.0	69.5	67.8~72.2
2	30.0	29.1	27.8~32.2	5	90.0	88.7	87.8~92.2
3	50.0	49.6	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	3016	3012	2926~3107
2	502	502	452~552	5	5056	5032	4904~5208
3	1005	1019	955~1055				

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 CO2	14A044095	04-06-20	04-06-25
N2	T-0608	05-19-20	05-19-28
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	02-26-20	08-31-20
200 CO	149886	04-30-20	03-24-28
Air	T17939	04-09-20	04-09-28
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

Chao Vang
CALIBRATED

June 16, 2020
DATE

Doc ID: CERT_GEN_WCC

TSI P/N 2300157