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Architecture | Engineering | Construction

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March 3, 2021

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

RE: Indoor Air Quality Assessment, Glenn Dale Elementary School
Purchase Order: 734977
ATI Project Number: 20-689

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) assessment at Glenn Dale Elementary School on December 2, 2020 and a follow-up assessment on February 27, 2021. The assessments' key findings are enclosed in the Executive Summary on page one, 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
Glenn Dale Elementary School
6700 Glenn Dale Road
Glenn Dale, MD 20769

Prepared for:

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

March 3, 2020

Submitted by:

ATI Job # 20-689

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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 2, 2020, at Glenn Dale Elementary School, located at 6700 Glenn Dale Road, Glenn Dale, MD and a follow-up assessment on February 27, 2021 in select rooms that had unusual results in the initial inspection.

The initial assessment on December 2, 2020 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. The Main Office, Multipurpose Room, and Rooms 1 and 25 had unusual fungal spore concentrations during the initial assessment and were selected for a follow-up assessment after actions were taken to reduce the presence of mold and repair any water issues discovered. On February 28, 2021, these four rooms were reassessed to determine if the mold remediation actions were sufficient. As part of both 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. One of the assessed spaces on December 2, 2020 had a temperature less than the ASHRAE recommended thermal comfort range of 68°F to 75°F for the winter months, and all other assessed spaces had a temperature within the recommended range. During the February 28 reassessment, two of the assessed spaces had a temperature less than the recommended range, and one space had a temperature greater than the recommended range. The reassessment occurred on the weekend when heating and cooling was likely operating at different temperatures to reduce energy costs.
2. All assessed spaces during the initial assessment on December 2 had a relative humidity less than the ASHRAE maximum relative humidity guidelines of 65%, and all except for one assessed space had a relative humidity less than 30%, which can cause occupant discomfort. All reassessed spaces during the reassessment on February 28 had a relative humidity less than 65% and one of the reassessed spaces had a humidity also less than 30%.
3. Carbon dioxide concentrations in all assessed spaces, during both assessments, were less than the ASHRAE limit for carbon dioxide calculated for the day of each assessment based on the ambient concentration.
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the assessed spaces on during both assessments.
5. Four of the assessed spaces had total and *Aspergillus/Penicillium*-like spore concentrations greater than the concentrations measured outdoors on December 2, 2020, which suggests indoor mold growth, either currently or sometime in the past. The Main Office had the greatest *Aspergillus/Penicillium*-like spore concentration of 471,120 spores/m^3, which suggests a significant degree of indoor spore amplification either currently or at some point in the past. The Multipurpose Room, Room 1 and Room 25 also had spore concentrations greater than the outdoors and were also recommended to be addressed to reduce the presence of mold in these areas.
6. Mold spore concentrations were reassessed in the Main Office, Multipurpose Room, Room 1 and Room 25 on February 28, 2021, all reassessed areas had an *Aspergillus/Penicillium*-like spore concentration reduction ranging from 95% to 100%. The results suggest the actions taken to reduce the airborne mold spore concentrations were successful and ATI has no further recommendations.

2 Assessment Methods

Courtney McCall, Industrial Hygienist with ATI, Inc., conducted a visual assessment and air sampling on December 2, 2020, as well as the reassessment on February 27, 2021. Sampled rooms were randomly selected and accounted for approximately 10% of classrooms or a minimum of five samples. Ms. McCall documented visual observations at the time she 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 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 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, 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. Many of the classrooms and multipurpose rooms had materials stored in boxes.

Table 1: Visual Observations and Sampling Locations

Sample Location	December 2, 2020 Initial Assessment Observations
Outdoors	• Light wind and small puddles in the parking lot were present from yesterday's heavy rain. Some grass and small plants were about 15 feet from the sampler.
Room 7	• Dozens of dead insects were on the ground and floors were not vacuumed • Sink present in the room was dripping slightly • Emergency exit door present • Student desks were clear and books and materials were stored along the perimeter of the room
Room 13	• The sink was running slowly and was unclear when it was turned on • Wall ventilator supplies the heat and was not running. It looked a bit dusty and had some paper debris in the vents. • Dust and dead insects were on the windowsills and on floor near the windows • One area rug was present and materials were stored on student desks • Room is approximately 1,420 square feet with vinyl flooring and roof deck ceiling
Room 14	• Wall ventilator supplied the heat and was not running • Dust and dead insects were in the ventilator supply vents • A dead plant was on a desk about 10 feet from the sampler • Student materials were not put away, and materials and papers are scattered through the room • Room is approximately 1,420 square feet with vinyl flooring and a roof deck ceiling
Cafeteria Multipurpose Room	• Three occupants were present during sampling • Heat was functioning in the room • Dozens of books were stacked on the adjoining stage • Wall convector units are present on both sides of the room elevated along ceiling and could not be inspected for dusts/debris • Approximately 4,700 square feet with vinyl tile flooring and a roof deck ceiling

Sample Location	December 2, 2020 Initial Assessment Observations
Room 18	• Wall ventilator was blowing cold air • Dust and insect fragments were on windowsills and on the floor by the ventilator • Two area rugs had dirt/debris on them • Student materials were scattered in the room. Computer monitors were staged in the rear of the room. • Room was approximately 1,420 square feet with vinyl flooring and a roof deck ceiling
Room 15 (Reading Room)	• Wall ventilator was functioning and blowing warm air • Most of room was covered in carpet (approx. 85%) and the rest was tile • Ventilator and window sill were dusty with insect fragments and dead insects on the floor • Restroom and office adjoin the room • Exit door to courtyard is present • Hundreds of books were stored, along with other student supplies • Approximately 675 square feet with most of room covered in carpet (approx. 85%) and the rest was tile
Main Office	• One occupant was present in the room during sampling • The office was orderly and housekeeping appeared good. Some papers/binders were near the testing site. Ceiling tile looked clean. • The door to the hall was shut during sampling • Room was approximately 450 square feet with vinyl tile flooring
Sample Location	**February 27, 2021 Reassessment Observations**
Main Office	• One occupant was present during sampling • Housekeeping appeared to be good but 12-15 cardboard boxes were near the sampler. Papers were neatly stacked on desk. • The adjacent Boiler Room had water present on the ground • Overall this room was tidy and no water intrusion was observed on ceiling tiles or walls
Room 1	• One occupant was present during sampling • Hot water radiators heat the room and were on during sampling. Room felt hot • Carpet at front of classroom needs to be vacuumed, wood floors and desks are dusty • Student materials are packed in plastic totes • Observed no water intrusion in the adjoining bathrooms
Multipurpose Room	• No occupants during sampling • Approx. 40 cardboard boxes of student materials were stored on the stage with another 100 boxes scattered in the room • Door to kitchen was open during sampling • Floors need to be vacuumed, especially under the cafeteria tables • Cobwebs were in the corner by the traffic cones • Wall mounted fan had dirty blades • Observed no signs of water intrusion
Room 25	• One occupant during sampling • Floor and area rug needed to be vacuumed • Desks and window sills have dust present • Sink was not dripping and observed no signs of water intrusion

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 2, 2020 assessment are summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 72°F and 77°F, with one of six assessed locations being greater than the ASHRAE recommended winter range.

ATI reassessed select rooms that had unusual fungal spore concentrations on February 27, 2021 after remediation actions were completed. At that time, the temperatures in the four designated locations were reevaluated. The average temperatures in the locations ranged between 65°F and 80°F, with two rooms less than and one room greater than the ASHRAE recommended winter temperature range, between 68°F - 75°F.

Table 2: Temperature Measurements

Sample Location	12/2/2020 Initial Assessment °F			ASHRAE Standard °F
	Min	Max	Average	
Outdoors	45	47	46	N/A
Indoors				
Room 7	71	73	72	68°F - 75°F
Room 1	76	78	77	68°F - 75°F
Library	74	75	75	68°F - 75°F
Cafeteria/Multipurpose Room	73	73	73	68°F - 75°F
Room 25	67	68	68	68°F - 75°F
Main Office	73	73	73	68°F - 75°F
02/27/2021 Reassessment °F				
Outdoors	51	52	52	N/A
Indoors				
Main Office	65	69	67	68°F - 75°F
Multipurpose Room	74	74	74	68°F - 75°F
Room 1	79	80	80	68°F - 75°F
Room 25	64	66	65	68°F - 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 occupants' mucous membranes and skin. Relative humidity measurements are summarized in Table 3. As indicated by the data in the table, average

relative humidity ranged between 21 and 36% with all tested spaces less than the ASHRAE maximum recommendation of 65% relative humidity, and all of the tested spaces except for Room 25 were also less than 30%.

ATI reassessed select rooms that had unusual fungal spore concentrations on February 27, 2021 after remediation actions were completed. ATI also reassessed the relative humidity in the spaces, and the average relative humidity ranged between 29% and 48% with all four locations measuring less than the ASHRAE maximum recommendation of 65% relative humidity and one location, Room 1, less than 30% relative humidity.

Table 3: Relative Humidity Measurements

Sample Location	12/2/2020 Initial Assessment (% RH)			ASHRAE Standard (% RH)
	Min	Max	Average	
Outdoors	35	36	36	N/A
Indoors				
Room 7	21	21	21	≤ 65
Room 1	22	23	23	≤ 65
Library	24	24	24	≤ 65
Cafeteria/Multipurpose Room	28	29	29	≤ 65
Room 25	35	37	36	≤ 65
Main Office	28	30	29	≤ 65
02/27/2021 Reassessment (%RH)				
Outdoors	58	62	60	N/A
Indoors				
Main Office	41	49	45	≤ 65
Multipurpose Room	31	33	32	≤ 65
Room 1	29	29	29	≤ 65
Room 25	46	49	48	≤ 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 can maintain indoor carbon dioxide concentrations less than 700 parts per million (ppm) greater than the outdoor air concentration. Typically, outdoor carbon dioxide concentrations 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 initial assessment, the average outdoor carbon dioxide concentration was 369 ppm, which calculates to a maximum indoor concentration of 1,069 ppm (700 + 369). All tested locations indoors were less than the recommended maximum for the day of the assessment.

ATI reassessed select rooms that had unusual fungal spore concentrations on February 27, 2021 after remediation actions were completed. The carbon dioxide concentrations measured during the reassessment are included in Table 4. The average outdoor

carbon dioxide concentration on February 27, 2021 was 400 ppm, which calculates to a maximum indoor concentration of 1,100 ppm (700 + 400). All tested locations indoors were less than the recommended maximum for the day of the reassessment.

Table 4: Carbon Dioxide Measurements

Sample Location	12/2/2020 Concentration (parts per million)			ASHRAE Standard (ppm) NTE
	Min	Max	Average	
Outdoors	362	375	369	N/A
Indoors				
Room 7	434	456	445	< 1,069
Room 1	443	452	448	< 1,069
Library	440	448	444	< 1,069
Cafeteria/Multipurpose Room	428	429	429	< 1,069
Room 25	414	427	421	< 1,069
Main Office	451	477	464	< 1,069

02/27/2021 Reassessment Concentration (parts per million)				
Outdoors	390	409	400	N/A
Indoors				
Main Office	443	443	443	< 1,100
Multipurpose Room	414	432	423	< 1,100
Room 1	446	452	449	< 1,100
Room 25	399	407	403	< 1,100

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 during the initial December assessment and the February reassessment were less than the Q-Trak's detection limit throughout the school.

Table 5: Carbon Monoxide Measurements

Sample Location	12/2/2020 Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Outdoors	< 3	< 3	< 3	N/A
Inside				
Room 7	< 3	< 3	< 3	< 9
Room 1	< 3	< 3	< 3	< 9
Library	< 3	< 3	< 3	< 9
Cafeteria/Multipurpose Room	< 3	< 3	< 3	< 9
Room 25	< 3	< 3	< 3	< 9

Sample Location	12/2/2020 Concentration (parts per million)			ASHRAE Standard (ppm)
	Min	Max	Average	
Main Office	< 3	< 3	< 3	< 9
2/27/21 Reassessment Concentration (parts per million)				
Outdoors	< 3	< 3	< 3	N/A
Indoors				
Main Office	< 3	< 3	< 3	< 9
Multipurpose Room	< 3	< 3	< 3	< 9
Room 1	< 3	< 3	< 3	< 9
Room 25	< 3	< 3	< 3	< 9

5 Total Fungal Air Sampling Results

Mold can be 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 or water to foster its growth. The December 2, 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 results from December 2, 2020 suggested unusual mold spore concentrations in the Main Office, Multipurpose Room, Room 1 and Room 25. The total ambient, outdoor spore concentration was 3,900 spores/m^3, with an *Aspergillus/Penicillium*-like spore concentration of 468 spores/m^3 and Cladosporium concentration of 832 spores/m^3. The Main Office had the greatest presence of mold with a total spore concentration of 471,588 spores/m^3, with *Aspergillus/Penicillium*-like spores being the predominant spores present at 471,120 spores/m^3, which makes up 99% of the spore types identified. The spore concentration in the Main Office was significantly greater than the concentration measured in most typical occupied spaces and suggests either present or past indoor mold amplification due to a water leak or moisture intrusion.

The Multipurpose Room, Room 1 and Room 25 had unusual spore concentrations as well; however, the *Aspergillus/Penicillium*-like spore concentrations ranged from 988 spores/m^3 to 5,712 spores/m^3, which is greater than a typical occupied space, but does not necessarily suggest significant moisture issues. Room 1 also had a *Cladosporium* concentration of 3,848 spores/m^3, which is greater than the typical concentration in an occupied space. ATI recommended evaluating these spaces and the surrounding areas to try and identify water sources, abate any mold issues and clean the area before retesting the space.

The Main Office, Multipurpose Room, Room 1 and Room 25 were reassessed on February 28, 2021 after the initial assessment indicated the unusual presence of airborne mold spores. The *Aspergillus/Penicillium*-like spore concentration in all retested spaces were reduced between 95% and 100% and *Cladosporium* concentration in Room 1 was reduced 100% (not detected), suggesting the actions taken to reduce the airborne mold spores in all reassessed spaces were effective. Differences in concentrations between both dates of assessment are summarized in Table 6.

Table 6: *Aspergillus/Penicillium* Concentration Comparison

Sample Location	December 2, 2020 Concentrations	February 27, 2021 Concentrations	% Change
Main Office	471,120	None Detected	100%
Multipurpose Room	5,712	106	98%
Room 1*	988	53	95%
Room 25	2,288	None Detected	100%

*Room 1 had elevated levels of *Cladosporium*, at 3,848 spores/m^3 during the initial assessment, which was not detected during the follow-up assessment.

The official laboratory reports with spore trap samples collected on December 2, 2020, and February 27, 2021 are presented in Appendix A.

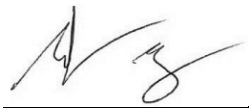
6 Summary of Findings

1. One of the assessed spaces on December 2, 2020 had a temperature less than the ASHRAE recommended thermal comfort range of 68°F to 75°F for the winter months, and all other assessed spaces had a temperature within the recommended range. During the February 28 reassessment, two of the assessed spaces had a temperature less than the recommended range, and one space had a temperature greater than the recommended range. The reassessment occurred on the weekend when heating and cooling was likely operating at different temperatures to reduce energy costs.
2. All assessed spaces during the initial assessment on December 2 had a relative humidity less than the ASHRAE maximum relative humidity guidelines of 65%, and all except for one assessed space had a relative humidity less than 30%, which can cause occupant discomfort. All reassessed spaces during the reassessment on February 28 had a relative humidity less than 65% and one of the reassessed spaces had a humidity also less than 30%.
3. Carbon dioxide concentrations in all assessed spaces, during both assessments, were less than the ASHRAE limit for carbon dioxide calculated for the day of each assessment based on the ambient concentration.
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the assessed spaces on during both assessments.
5. Four of the assessed spaces had total and Aspergillus/Penicillium-like spore concentrations greater than the concentrations measured outdoors on December 2, 2020, which suggests indoor mold growth, either currently or sometime in the past. The Main Office had the greatest *Aspergillus/Penicillium*-like spore concentration of 471,120 spores/m^3, which suggests a significant degree of indoor spore amplification either currently or at some point in the past. The Multipurpose Room, Room 1 and Room 25 also had spore concentrations greater than the outdoors and were also recommended to be addressed to reduce the presence of mold in these areas.
6. Mold spore concentration were reassessed in the Main Office, Multipurpose Room, Room 1 and Room 25 on February 28, 2021, all reassessed areas had an *Aspergillus/Penicillium*-like spore concentration reduction ranging from 95% to 100%. The results suggest the actions taken to reduce the airborne mold spore concentrations were successful and ATI has no further recommendations.

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

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 624345
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Courtney McCall

Job Name: Glenn Dale Elementary School
Job Location: 6700 Glenn Dale Rd, Glenn Dale, MD 20769
Job Number: 20-689
P.O. Number: Not Provided

Date Submitted: 12/03/2020
Person Submitting: Pending
Date Analyzed: 12/08/2020
Report Date: 12/08/2020

AMA Sample #	624345-1
Client ID	3146 1930
Analyst ID	TLW
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Room 7

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores					
Basidiospores	5	15	52	260	45.5%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	6	15	52	312	54.5%
Smuts/Periconia/Myxomycetes	Present	15	52	<52	
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 11 **Total sp/m³:** 572

Comments

AMA Sample #	624345-2
Client ID	3146 1906
Analyst ID	TLW
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	2
Location	Room 1

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	2	15	52	104	1.9%
Basidiospores	9	15	52	468	8.5%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	74	15	52	3848	69.8%
Curvularia	1	15	52	52	0.9%
Penicillium / Aspergillus	19	15	52	988	17.9%
Smuts/Periconia/Myxomycetes	Present	15	52	<52	
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless	1	15	52	52	0.9%
Hyphal Fragments*	1	15	52	52	0.9%

Total Raw Ct: 106 **Total sp/m³:** 5512

Comments

AMA Sample #	624345-3
Client ID	3146 2024
Analyst ID	TLW
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	2
Location	Library

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	1	15	52	52	6.7%
Basidiospores	11	15	52	572	73.3%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	2	15	52	104	13.3%
Smuts/Periconia/Myxomycetes	1	15	52	52	6.7%
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 15 **Total sp/m³:** 780

Comments

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 624345
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Courtney McCall

Job Name: Glenn Dale Elementary School
Job Location: 6700 Glenn Dale Rd, Glenn Dale, MD 20769
Job Number: 20-689
P.O. Number: Not Provided

Date Submitted: 12/03/2020
Person Submitting: Pending
Date Analyzed: 12/08/2020
Report Date: 12/08/2020

AMA Sample #	624345-4
Client ID	3146 2220
Analyst ID	TLW
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	2
Location	Cafeteria/Multipurpose Rm

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	Present	15	52	<52	
Basidiospores	15	15	52	780	11.6%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	11	15	52	572	8.5%
Curvularia					
Penicillium / Aspergillus	102	14	56	5712	79.1%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown	1	15	52	52	0.8%
Other Colorless					
Hyphal Fragments*	1	15	52	52	0.8%
Total Raw Ct:	129		**Total sp/m³:**	7116	

Comments

AMA Sample #	624345-5
Client ID	3146 2267
Analyst ID	TLW
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	3
Location	Room 25

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	1	15	52	52	1.7%
Basidiospores	8	15	52	416	13.6%
Bipolaris/Drechslera/Helm.					
Chaetomium	1	15	52	52	1.7%
Cladosporium	2	15	52	104	3.4%
Curvularia					
Penicillium / Aspergillus	44	15	52	2288	74.6%
Smuts/Periconia/Myxomycetes	3	15	52	156	5.1%
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*	6	15	52	312	10.2%
Total Raw Ct:	59		**Total sp/m³:**	3068	

Comments

AMA Sample #	624345-6
Client ID	3146 2231
Analyst ID	TLW
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	2
Location	Main Office

	Raw Ct	Trav/Flds	A.S.	sp/m³	%
Alternaria					
Ascospores	1	15	52	52	0.2%
Basidiospores	4	15	52	208	0.7%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	2	15	52	104	0.3%
Curvularia					
Penicillium / Aspergillus	604	1	780	471120	98.5%
Smuts/Periconia/Myxomycetes	2	15	52	104	0.3%
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*	2	15	52	104	0.3%
Total Raw Ct:	613		**Total sp/m³:**	471588	

Comments

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	624345	**Job Name:**	Glenn Dale Elementary School	**Date Submitted:**	12/03/2020
Client:	ATI, Inc.	**Job Location:**	6700 Glenn Dale Rd, Glenn Dale, MD 20769	**Person Submitting:**	Pending
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	20-689	**Date Analyzed:**	12/08/2020
		P.O. Number:	Not Provided	**Report Date:**	12/08/2020
Attention:	Courtney McCall				

AMA Sample #	624345-7	**AMA Sample #**	624345-8
Client ID	3146 1923	**Client ID**	3146 2022
Analyst ID	TLW	**Analyst ID**	TLW
Collection Apparatus	Air-O-Cell	**Collection Apparatus**	Air-O-Cell
Sample Volume (L)	75	**Sample Volume (L)**	0
Sample Condition	Acceptable	**Sample Condition**	Acceptable
Debris Loading	2	**Debris Loading**	1
Location	Ambient	**Location**	Field Blank

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	8	15	52	416	10.7%
Basidiospores	39	15	52	2028	52%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	16	15	52	832	21.3%
Curvularia					
Penicillium / Aspergillus	9	15	52	468	12%
Smuts/Periconia/Myxomycetes	3	15	52	156	4%
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*	4	15	52	208	5.3%
Total Raw Ct:	75		**Total sp/m^3:**	3900	

Comments

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores					
Basidiospores					
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					
Total Raw Ct:	0		**Total sp/m^3:**	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:	624345	**Job Name:**	Glenn Dale Elementary School	**Date Submitted:**	12/03/2020
Client:	ATI, Inc.	**Job Location:**	6700 Glenn Dale Rd, Glenn Dale, MD 20769	**Person Submitting:**	Pending
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	20-689	**Date Analyzed:**	12/08/2020
		P.O. Number:	Not Provided	**Report Date:**	12/08/2020
Attention:	Courtney McCall				

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

Interpretation of the data contained in this report is the sole responsibility of the client or the persons who conducted the field work. There are no federal or national standards for the number of fungal spores that may be present in the indoor environment. As a general rule and guideline that is widely accepted in the indoor air quality field, the numbers and types of spores that are present in the indoor environment should be comparable to those that are present outdoors at any given time. There will always be some mold spores present in "Normal" indoor environments. The purpose of sampling and counting spores is to help determine whether an abnormal condition exists within the indoor environment and if it does, to help pinpoint the area of contamination. Spore counts should not be used as the sole determining factor of mold contamination. There are many factors that can cause anomalies in the comparison of indoor and outdoor samples due to the dynamic nature of both of those environments.

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.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	624345	**Job Name:**	Glenn Dale Elementary School	**Date Submitted:**	12/03/2020
Client:	ATI, Inc.	**Job Location:**	6700 Glenn Dale Rd, Glenn Dale, MD 20769	**Person Submitting:**	Pending
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	20-689	**Date Analyzed:**	12/08/2020
		P.O. Number:	Not Provided	**Report Date:**	12/08/2020
Attention:	Courtney McCall				

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

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.

Chaetomium

Chaetomium is a genus of ascomycete fungi. It is a cosmopolitan, dark colored fungus (grayish-green to brown) commonly isolated from soil, seeds, dung, wood, and straw materials. Indoors, it is very commonly found on damp sheetrock and paper or cellulose-containing materials. There are certain characteristics such as color, shape, and size of the Chaetomium ascopores, asci, and ascomata that are unique in identification of the different species. Wind, insects, and water aid dispersal of spores. Due to their large size, they settle out of the air after just a few minutes. As a consequence, airborne mold levels are usually low even in infested environments. Due to this, exposure levels are likely to be low as well. Health Effects: Chaetomium does produce a variety of mycotoxins called chaetoglobsins, whose health effects on humans are unknown. Due to its toxigenic nature, special precautions may be required during remediation.

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.

Curvularia

Curvularia is a ubiquitous fungus commonly found dead plant material. It is often found outside growing in soil, seeds, plant litter, and decaying plants as well as on leaves. Indoors, it is found on a variety of building materials, especially those with cellulose surfaces. Colonies are expanding with olive-green to brown or black, with pinkish gray color and woolly or hairy in texture. The conidia (spores) are large and appear curved due to expanded central cells. This feature and the presence of edge to edge septations on the conidia walls distinguishes Curvularia from Bipolaris. Health Effects: This mold is a potential allergen. Some people may experience hay fever, asthma and or allergic fungal sinusitis.

Hyphal Fragments

Hyphal Fragments are segments or pieces of hyphae or mycelium that may have broken off during sampling (air, tape, dust). The mycelium is the entire mass of hyphae that makes up the vegetative body of a fungus. The presence of hyphal fragments may indicate the presence of viable mold.

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.

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.

Unknown Fungi

“Unknown Fungi” are spores that cannot be identified under direct microscopic analysis. This includes partial spores. This category also includes spores that are hidden or hard to see during microscopic examination due to heavy presence of particulate.

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) 6243945

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: Glenn Dale Elem School
2. Job Location: 6700 Glenn Dale Rd, Glenn Dale, MD 20769
3. Job #: 20-689 P.O. #: _____
4. Contact Person: Courtney McCall Cell: 703 399 5423
5. Collected by: Courtney McCall 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)
☐ 4 Hours ☐ Late Night
☐ Immediate Date Due: _____
☐ 24 Hours Time Due: _____
Comments: _____

NORMAL BUSINESS HOURS
☐ 4 Hours ☐ 3 Day ☐ Results Required By Noon
☐ Same Day ☑ 5 Day + Date Due: 12/10/20
☐ Next Day
☐ 2 Day

REPORT TO:
❑ Email: courtney@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
☐ 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)
☐ Vermiculite
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 8 (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
3146 1930	Room 7	120220 850	75L					x	x				x			
3146 1906	Room 1	120220 901	75L					x	x				x			
3146 2024	Library	120220 910	75L					x	x				x			
3146 2220	Cafeteria/Multipurpose Rm	120220 917	75L					x	x				x			
3146 2267	Room 25	120220 925	75L					x	x				x			
3146 2231	Main Office	120220 937	75L					x	x				x			
3146 1923	Ambient	120220 945	75L					x	x				x			
3146 2022	Field Blank	120220 NA	NA					x	x				x			

	Print Name	Signature	Date	Time
Relinquished by:	Courtney McCall	Courtney McCall	12/3/20	
Received by:	Ashley Ford	ashley ford	12/3/20	

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

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CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	625393	**Job Name:**	Glenn Dale Elementary	**Date Submitted:**	03/01/2021
Client:	ATI, Inc.	**Job Location:**	6700 Glenn Dale Road, Glenn Dale, MD 20769	**Person Submitting:**	Courtney McCall
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	20-689	**Date Analyzed:**	03/03/2021
		P.O. Number:	Not Provided	**Report Date:**	03/03/2021
Attention:	Courtney McCall				

AMA Sample #	625393-1	**AMA Sample #**	625393-2	**AMA Sample #**	625393-3
Client ID	31570012	**Client ID**	31569974	**Client ID**	31569993
Analyst ID	CD	**Analyst ID**	CD	**Analyst ID**	CD
Collection Apparatus	Air-O-Cell	**Collection Apparatus**	Air-O-Cell	**Collection Apparatus**	Air-O-Cell
Sample Volume (L)	75	**Sample Volume (L)**	75	**Sample Volume (L)**	75
Sample Condition	Acceptable	**Sample Condition**	Acceptable	**Sample Condition**	Acceptable
Debris Loading	1	**Debris Loading**	1	**Debris Loading**	1
Location	Main Office	**Location**	MPR	**Location**	Room 1

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	7	15	53	371	63.6%
Basidiospores	4	15	53	212	36.4%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	Present	15	53	<53	
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					
Total Raw Ct:	11	**Total sp/m^3:**	583		

Comments

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	2	15	53	106	18.2%
Basidiospores	7	15	53	371	63.6%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	2	15	53	106	18.2%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					
Total Raw Ct:	11	**Total sp/m^3:**	583		

Comments

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	5	15	53	265	33.3%
Basidiospores	7	15	53	371	46.7%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium					
Curvularia					
Penicillium / Aspergillus	1	15	53	53	6.7%
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless	2	15	53	106	13.3%
Hyphal Fragments*					
Total Raw Ct:	15	**Total sp/m^3:**	795		

Comments

AMA Analytical Services, Inc.
Focused On Results.

CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody: 625393
Client: ATI, Inc.
Address: 9220 Rumsey Road
Suite 100
Columbia, MD 21045
Attention: Courtney McCall

Job Name: Glenn Dale Elementary
Job Location: 6700 Glenn Dale Road, Glenn Dale, MD 20769
Job Number: 20-689
P.O. Number: Not Provided

Date Submitted: 03/01/2021
Person Submitting: Courtney McCall
Date Analyzed: 03/03/2021
Report Date: 03/03/2021

AMA Sample #	625393-4
Client ID	31569978
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Room 25

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	9	15	53	477	50%
Basidiospores	8	15	53	424	44.4%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	1	15	53	53	5.6%
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 18 **Total sp/m^3:** 954

Comments

AMA Sample #	625393-5
Client ID	31569985
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	75
Sample Condition	Acceptable
Debris Loading	1
Location	Ambient

	Raw Ct	Trav/Flds	A.S.	sp/m^3	%
Alternaria					
Ascospores	86	15	53	4558	95.6%
Basidiospores	3	15	53	159	3.3%
Bipolaris/Drechslera/Helm.					
Chaetomium					
Cladosporium	1	15	53	53	1.1%
Curvularia					
Penicillium / Aspergillus					
Smuts/Periconia/Myxomycetes					
Stachybotrys/Memnoniella					
Ulocladium					
Unknown					
Other Colorless					
Hyphal Fragments*					

Total Raw Ct: 90 **Total sp/m^3:** 4770

Comments

AMA Sample #	625393-6
Client ID	31569976
Analyst ID	CD
Collection Apparatus	Air-O-Cell
Sample Volume (L)	0
Sample Condition	Acceptable
Debris Loading	1
Location	Field Blank

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

Total Raw Ct: 0 **Total sp/m^3:** 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:	625393	**Job Name:**	Glenn Dale Elementary	**Date Submitted:**	03/01/2021
Client:	ATI, Inc.	**Job Location:**	6700 Glenn Dale Road, Glenn Dale, MD 20769	**Person Submitting:**	Courtney McCall
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	20-689	**Date Analyzed:**	03/03/2021
		P.O. Number:	Not Provided	**Report Date:**	03/03/2021
Attention:	Courtney McCall				

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

Interpretation of the data contained in this report is the sole responsibility of the client or the persons who conducted the field work. There are no federal or national standards for the number of fungal spores that may be present in the indoor environment. As a general rule and guideline that is widely accepted in the indoor air quality field, the numbers and types of spores that are present in the indoor environment should be comparable to those that are present outdoors at any given time. There will always be some mold spores present in "Normal" indoor environments. The purpose of sampling and counting spores is to help determine whether an abnormal condition exists within the indoor environment and if it does, to help pinpoint the area of contamination. Spore counts should not be used as the sole determining factor of mold contamination. There are many factors that can cause anomalies in the comparison of indoor and outdoor samples due to the dynamic nature of both of those environments.

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.

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CERTIFICATE OF ANALYSIS

ASTM D7391-09 Spore Trap Analysis Report

Chain of Custody:	625393	**Job Name:**	Glenn Dale Elementary	**Date Submitted:**	03/01/2021
Client:	ATI, Inc.	**Job Location:**	6700 Glenn Dale Road, Glenn Dale, MD 20769	**Person Submitting:**	Courtney McCall
Address:	9220 Rumsey Road Suite 100 Columbia, MD 21045	**Job Number:**	20-689	**Date Analyzed:**	03/03/2021
		P.O. Number:	Not Provided	**Report Date:**	03/03/2021
Attention:	Courtney McCall				

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): 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.

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) 625393

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: Glenn Dale Elementary
2. Job Location: 6700 Glenn Dale Rd, Glenn Dale, MD 20769
3. Job #: 20-689 P.O. #: _____
4. Contact Person: Courtney McCall Cell: 703 399 5423
5. Collected by: Courtney McCall 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)	NORMAL BUSINESS HOURS	REPORT TO:
☐ 4 Hours ☐ Late Night ☐ Immediate Date Due: _____ ☐ 24 Hours Time Due: _____ Comments: _____	☐ 4 Hours ☐ 3 Day ☐ Same Day ☐ 5 Day + ☑ Next Day Date Due: 3/2/21 ☐ 2 Day ☐ Results Required By Noon (Additional fee may apply)	☑ Email: courtney@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
☐ 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: _____
Collection Media: _____
☑ *Spore-Trap 6 (QTY) ☐ Surface Vacuum Dust ____ (QTY)
☐ *Surface Swab ____ (QTY)
☐ *Surface Tape ____ (QTY)
☐ Other (Specify ____) ____ (QTY)

SAMPLE INFORMATION				ANALYSIS						MATRIX							COMMENTS / SPECIAL INSTRUCTIONS
CLIENT ID #	SAMPLE LOCATION/ ID	DATE/ TIME	VOL (L)/ Wipe Area	TEM	PCM	PLM	LEAD	MOLD	AIR	BULK	DUST	WATER AND OTHER	SPORE TRAP	TAPE	SWAB		
31570012	Main Office	2/27/21 1213	75L					✓	✓				✓				
31569974	MPR	2/27/21 1229	75L					✓	✓				✓				
31569993	Room 1	2/27/21 1220	75L					✓	✓				✓				
31569978	Room 25	2/27/21 1240	75L					✓	✓				✓				
31569985	Ambient	2/27/21 1204	75L					✓	✓				✓				
31569976	Field Blank	2/27/21						✓	✓				✓				

	Print Name	Signature	Date	Time	Shipping Information
Relinquished by:	Courtney McCall	Courtney McCall	2/28/21	1134 AM	☐ UPS ☐ In-Person ☐ Other ☐ FedEx ☐ Drop Box ☐ USPS ☐ Courier
Received by:			3/1/21	0800	

Appendix B: Instrument Calibration Records

Certificate of Calibration

(✓) Buck™ BioAire Pump Calibration Rotameter
( ) Buck™ BioSlide Pump Calibration Rotameter

Serial number: R15042
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: Moroni 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	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

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	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

August 31, 2020
DATE

Doc. ID: CERT_GEN_WCC

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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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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	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

TSI P/N 2300157