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March 4, 2021

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

RE: Indoor Air Quality Assessment, Beltsville Academy School
Purchase Order: 734977
ATI Project Number: 20-704

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) assessment at Beltsville Academy School on December 88, 2020 and a follow-up assessment on February 28, 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.**

Courtney E. McCall
Project Manager

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

# Indoor Air Quality Assessment Report

Prince George's County Public Schools
Beltsville Academy School
4300 Wicomico Ave.
Beltsville, MD 20705

Prepared for:

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

**March 4, 2020**

Submitted by:

ATI Job # 20-704

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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 8, 2020, at Beltsville Academy School, located at 4300 Wicomico Avenue, Beltsville, Maryland, and a follow-up assessment on February 28, 2021 in select rooms that had unusual results in the initial inspection.

The initial assessment on December 8, 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 Multipurpose Room, Rooms 113, 119, 125 and 212 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, the selected rooms were reassessed after unusual spore concentrations were present during the first assessment. 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. Three of the tested spaces during the initial assessment on December 8 had a temperature less than the ASHRAE recommended winter range of 68°F - 75°F. During the February 28 reassessment, four of five tested spaces had a temperature less than the ASHRAE recommended winter range; however, this reassessment occurred on a weekend when a more energy efficient HVAC mode was likely functioning.
2. During the initial December 8 assessment, relative humidity measurements in all tested spaces were less than the ASHRAE recommended maximum relative humidity of 65%, yet were also less than 30%, which can cause occupant discomfort. During the February reassessment, all tested spaces were less than 65%, but greater than 30%, which is optimal.
3. For the initial December 8 assessment, carbon dioxide ranges in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,103 parts per million (ppm). For the February 28 reassessment, carbon dioxide ranges in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,080 ppm.
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the tested spaces during both assessments.
5. The spore trap sampling results from the initial assessment suggested some level of indoor amplification specifically of *Aspergillus/Penicillium*-like spores, in the Multipurpose Room and Rooms 113, 119, 125, and 212. ATI recommended to evaluate the spaces for moisture issues and thoroughly clean each space before reassessing the spaces. Other tested spaces did not suggest noteworthy amplification.
6. The February 28, 2021 reassessment showed a favorable decrease in *Aspergillus/Penicillium*-like spores in all the tested spaces, ranging from an 85% decrease to a 99% decrease. The total spore concentrations in all reassessed spaces were still unusually elevated, ranging between 11,075 spores/$m^3$ up to 18,019 spores/$m^3$. These total spore concentrations were still all less than the outdoor total spore concentration and the spore type ratios closely matched the spore ratios from the outdoor sample. This suggests most, if not all the spores observed indoors on February 28 were from outdoor origin. It was reported that some windows were replaced, and recent construction occurred, which likely exposed these spaces to unfiltered outdoor air.
7. ATI recommends a thorough cleaning of Room 113 using HEPA vacuums, wet wiping all vertical and horizontal surfaces and materials, and running HEPA equipped air scrubbers for at least 24 - 48 hours.
8. Room 113 still had a *Cladosporium* concentration of 3,127 spores/$m^3$, which is greater than the initial assessment. This may have been contamination from disturbed building materials containing these spores or could be from water issues still present. ATI recommends further evaluating this space for moisture issues, and if no further moisture issues are found, the recommended cleaning should reduce the remaining presence of airborne mold to acceptable concentrations.

# 2 Assessment Methods

Sama Wanigasundara, Industrial Hygienist of ATI, conducted a visual assessment and air sampling on December 8, 2020. Sampled rooms were randomly selected and accounted for approximately 10% of classrooms or a minimum of five samples. He documented visual observations at the time he collected the air samples. Courtney McCall, Industrial Hygienist of ATI, conducted the follow-up assessment on February 28, 2021. ATI references the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) *Standard 62.1 – 2016* and ASHRAE *Standard 55 – 2017* when providing IAQ services to clients. ASHRAE is an industry leader on energy efficiency and indoor air quality.

All measurements and air samples were collected between three-six feet from floor elevation, which represents the breathing zone, and away from air-supply and return diffusers. Real-time direct readings for temperature, relative humidity, carbon dioxide ($CO_2$), and carbon monoxide (CO), were obtained with a calibrated TSI Q-Trak 7575-X Meter and attached 982 Probe.

Total fungal air samples were collected with a 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. AMA Analytical Services, Inc. of Lanham, MD, and EMSL Analytical, Inc. of Plymouth Meeting, PA, 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. Both laboratories participate 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 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 | December 8, 2020 Initial Assessment Observations |
|---|---|
| Parking Lot – Outdoors | • Scattered clouds, mostly clear skies<br>• Light foot and vehicle traffic observed |
| Main Office | • No occupant in the area during sampling<br>• No odors, stained ceiling tiles, or visible mold growth observed<br>• Door to corridor OPEN during sampling<br>• Oscillating fan OFF during sampling<br>• Room splits into three adjoining office spaces<br>• One air return in this space<br>• No visible dust on the space<br>• Space is approximately 400 ft.$^2$ |
| Cafeteria/MPR | • No odors, stained ceiling tiles, or visible mold growth observed<br>• Light foot traffic<br>• Spaces doubles as auditorium<br>• One occupant in area during sampling<br>• No dust accumulation on the floor and furniture<br>• Four air returns trace dust accumulation<br>• Two air diffusers trace dust accumulation |

| Sample Location | December 8, 2020 Initial Assessment Observations |
|---|---|
| | • Space is approximately 2,339 ft.$^2$ |
| Gymnasium | • No odors, stained ceiling tiles, or visible mold growth observed<br>• Two occupants in the area during sampling (Construction)<br>• Four air returns in this space<br>• Twenty-four air diffusers trace dust accumulation<br>• Four air returns trace dust accumulation<br>• Space is approximately 6912 ft.$^2$ |
| Media Center | • No occupants in the area during sampling<br>• No dust accumulation in this space<br>• Three air return in this space<br>• Three air diffusers in this space<br>• Space is approximately 3000 ft.$^2$ |
| Room 213 | • No odors, stained ceiling tiles, or visible mold growth observed<br>• Wall unit OFF during sampling<br>• One air return in this space<br>• Two air diffusers in this space<br>• No occupants in area during sampling<br>• Space is approximately 910 ft.$^2$ |
| Room119 | • No occupants in area during sampling<br>• Conjoined with adjacent classroom through shared bathroom<br>• No visible mold growth or odor observed<br>• One diffuser in this space<br>• One return in this space<br>• Space is approximately 1200 ft.$^2$ |
| Room 125 | • No occupants in area during sampling<br>• No visible mold growth or odor observed<br>• Wall mount unit.<br>• One window mount A/C unit<br>• One diffuser in this space<br>• One return in this space<br>• Space is approximately 864 ft.$^2$ |
| Room 128A | • No occupants in area during sampling<br>• Conjoined with adjacent classroom through shared bathroom<br>• No visible mold growth or odor observed<br>• One diffuser in this space<br>• One return in this space<br>• Space is approximately 660ft.$^2$ |
| Room 212 | • No occupants in area during sampling<br>• No visible mold growth or odor observed<br>• Wall mount unit.<br>• One window mount A/C unit<br>• Two diffusers in this space<br>• Two returns in this space<br>• Space is approximately 900 ft.$^2$ |

| Sample Location | February 28, 2021 Reassessment Observations |
|---|---|
| Ambient | • Collected sample under front façade canopy with asphalt and sidewalks nearby<br>• Moderate rain and light wind |
| Multipurpose Room/Cafeteria | • No occupants were present during sampling<br>• Student materials were stored on the stage and on approx. 15 cafeteria tables<br>• Approx. five dozen cardboard boxes were present<br>• Stage had old curtains and another set of large curtains covered windows in the rear of the room<br>• Was actively raining during sampling but no leaks were observed<br>• Doors to the kitchen were open during sampling<br>• Overhead air supplies had dirt load<br>• Ceilings had no remarkable staining<br>• School recently underwent renovations |
| Room 212 | • No occupants were present during sampling<br>• Windows are replaced and had no apparent leaks during active rain<br>• Ceiling tiles were older but not stained<br>• Two dozen desks and IT carts were pushed to room's center<br>• Sink had water in the basin<br>• Old bulletin boards were still hanging up<br>• Old cardboard boxes stored on window sill had water stains – of unknown age and origin<br>• Floors had some debris and dust |
| Room 113 | • No occupants present during sampling<br>• Ventilator was supplying heat during sampling<br>• Chilled water pipes run in the corner of the room<br>• Sink was not wet or dripping<br>• Area rug in room had debris on it<br>• No apparent leaks at the replacement windows<br>• Art supplies and reams of paper were present in the room |
| Room 119 | • No occupants present during sampling<br>• Ceiling tile was peeling in one area<br>• Shelves in two alcoves housed many student books and supplies<br>• Two upholstered chairs were present<br>• Sink was dry<br>• Floors had debris and dust but shelves and books on surfaces did not have much dust<br>• Ventilator was not functioning during sampling but appeared clean |
| Room 125 | • No occupants present during sampling<br>• Had adjoining walk in closet filled with student materials<br>• Replacement windows had no apparent leaks<br>• Room was filled with posters hanging and student materials stacked around the room |

# 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 measurements obtained during the December 8, 2020, assessment are summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 60°F and 74°F, with three locations having a measured temperature less than the ASHRAE temperature range for the winter months.

ATI reassessed select rooms that had unusual fungal spore concentrations on February 28, 2021, after remediation actions were completed. ATI also reassessed the temperature in the reassessed rooms. The average temperatures in the reassessed locations range between 61°F and 71°F, with four of five tested locations less than the ASHRAE recommended winter range. This reassessment occurred on the weekend when it is probable that an energy efficient HVAC mode was operating and set to a cooler temperature, however.

**Table 2: Temperature Measurements**

| Sample Location | 12/08/2020 Initial Assessment Temperature in °F | | | ASHRAE Standard °F |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | 48 | 49 | 49 | N/A |
| **Indoors** | | | | |
| Main Office | 66 | 65 | 66 | 68°F - 75°F |
| Multipurpose Room/Cafeteria | 74 | 74 | 74 | 68°F - 75°F |
| Media Center | 71 | 71 | 71 | 68°F - 75°F |
| Gymnasium | 60 | 60 | 60 | 68°F - 75°F |
| Room 113 | 70 | 70 | 70 | 68°F - 75°F |
| Room 119 | 71 | 72 | 71 | 68°F - 75°F |
| Room 125 | 68 | 68 | 68 | 68°F - 75°F |
| Room 128A | 69 | 69 | 69 | 68°F - 75°F |
| Room 212 | 66 | 66 | 66 | 68°F - 75°F |
| **02/28/2021 Reassessment Temperature in °F** | | | | |
| Outdoors | 48 | 49 | 49 | N/A |
| **Indoors** | | | | |
| Multipurpose Room/Cafeteria | 59 | 62 | 61 | 68°F - 75°F |
| Room 212 | 65 | 66 | 66 | 68°F - 75°F |
| Room 113 | 66 | 66 | 66 | 68°F - 75°F |
| Room 119 | 67 | 67 | 67 | 68°F - 75°F |
| Room 125 | 71 | 71 | 71 | 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 the mucous membranes and skin. Relative humidity measurements are summarized in Table 3. As indicated by the data in the table, relative humidity measurements averaged between 18% and 29% with all tested locations reporting less than the ASHRAE maximum recommendation of 65% relative humidity, but also less than 30% relative humidity.

ATI reassessed select rooms that had unusual fungal spore concentrations on February 28, 2021, after remediation actions were completed. ATI also reassessed the relative humidity in the space during the reassessment, and the average relative humidity ranged between 39% and 61% with all tested locations measuring less than the ASHRAE maximum recommendation of 65% relative humidity and greater than 30% relative humidity, which is optimal.

**Table 3: Relative Humidity Measurements**

| Sample Location | 12/08/2020 Initial Assessment (% RH) | | | ASHRAE Standard (% RH) |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | 26 | 26 | 26 | N/A |
| **Indoors** | | | | |
| Main Office | 29 | 30 | 29 | ≤ 65 |
| Multipurpose Room/Cafeteria | 23 | 23 | 23 | ≤ 65 |
| Media Center | 18 | 18 | 18 | ≤ 65 |
| Gymnasium | 20 | 20 | 20 | ≤ 65 |
| Room 113 | 21 | 21 | 21 | ≤ 65 |
| Room 119 | 24 | 24 | 24 | ≤ 65 |
| Room 125 | 29 | 29 | 29 | ≤ 65 |
| Room 128A | 24 | 24 | 24 | ≤ 65 |
| Room 212 | 27 | 27 | 27 | ≤ 65 |
| **02/28/2021 Reassessment (% RH)** | | | | |
| Ambient | 84 | 85 | 85 | NA |
| **Indoors** | | | | |
| Multipurpose Room/Cafeteria | 57 | 64 | 61 | ≤ 65 |
| Room 212 | 48 | 48 | 48 | ≤ 65 |
| Room 113 | 44 | 45 | 45 | ≤ 65 |
| Room 119 | 45 | 45 | 45 | ≤ 65 |
| Room 125 | 39 | 39 | 39 | ≤ 65 |

## *4.3 Carbon Dioxide*

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

Research has indicated that buildings with adequately operating ventilation systems are able to remove odors generated by activities in an indoor office environment efficiently. ASHRAE *Standard 62.1-2016* states that comfort (odor) criteria with respect to human bioeffluents are likely to be satisfied if the ventilation results indoor carbon dioxide concentrations are less than 700 parts per million (ppm) above the outdoor air concentration. Typically, outdoor levels of carbon dioxide range from 300-450 ppm, with the higher range typically found in urban areas during peak rush hour.

Carbon dioxide measurements are summarized in Table 4. On the day of the assessment, the average outdoor carbon dioxide concentration obtained was 403 ppm, which calculates to a maximum indoor concentration of 1,103 ppm (700 + 403). 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 28, 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 28, 2021 was 380 ppm, which calculates to a maximum indoor concentration of 1,080 ppm (700 + 380). All tested locations indoors were less than the recommended maximum for the day of the reassessment.

**Table 4: Carbon Dioxide Measurements**

| Sample Location | 12/08/2020 Initial Assessment Concentration (parts per million) | | | ASHRAE Standard (ppm) NTE |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | 427 | 379 | 403 | N/A |
| **Indoors** | | | | |
| Main Office | 459 | 463 | 461 | < 1,103 |
| Multipurpose Room/Cafeteria | 461 | 463 | 462 | < 1,103 |
| Media Center | 699 | 705 | 702 | < 1,103 |
| Gymnasium | 403 | 405 | 404 | < 1,103 |
| Room 113 | 425 | 427 | 426 | < 1,103 |
| Room 119 | 724 | 768 | 746 | < 1,103 |
| Room 125 | 653 | 675 | 664 | < 1,103 |
| Room 128A | 432 | 436 | 435 | < 1,103 |
| Room 212 | 506 | 524 | 515 | < 1,103 |
| **02/28/2021 Reassessment Concentration (parts per million)** | | | | |
| Ambient | 375 | 384 | 380 | N/A |
| **Indoors** | | | | |
| Multipurpose Room/Cafeteria | 459 | 503 | 481 | < 1,080 |
| Room 212 | 470 | 486 | 478 | < 1,080 |
| Room 113 | 467 | 473 | 470 | < 1,080 |
| Room 119 | 469 | 472 | 471 | < 1,080 |
| Room 125 | 505 | 514 | 510 | < 1,080 |

## *4.4 Carbon Monoxide*

Carbon monoxide is a colorless and odorless gas produced by the incomplete combustion of carbon containing fuels. Oil, gasoline, diesel fuels, wood, coke, and coal are the major sources of carbon monoxide. ASHRAE recommends that carbon monoxide not exceed nine ppm indoors over an eight-hour time-weighted average. ATI measured carbon monoxide concentrations using a TSI Q-Trak model number 7575-X with an attached IAQ probe (model number 982). The instrument's carbon monoxide sensor has an error range of ± 3% of the reading or three (3) ppm, whichever is greater. As indicated by the data in Table 5, carbon monoxide concentrations were less than the Q-Trak's detection limit throughout the school.

ATI reassessed select rooms that had unusual fungal spore concentrations on February 28, 2021, after remediation actions were completed. The carbon monoxide concentrations measured during the reassessment are included in Table 5. The carbon monoxide

concentrations from the reassessment were 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 Measurements**

| Sample Location | 12/08/2020 Concentration (parts per million) | | | ASHRAE Standard (ppm) |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | < 3 | < 3 | < 3 | N/A |
| | | | | |
| Main Office | < 3 | < 3 | < 3 | < 9 |
| Cafeteria/MPR | < 3 | < 3 | < 3 | < 9 |
| Media Center | < 3 | < 3 | < 3 | < 9 |
| Gymnasium | < 3 | < 3 | < 3 | < 9 |
| Room 113 | < 3 | < 3 | < 3 | < 9 |
| Room 119 | < 3 | < 3 | < 3 | < 9 |
| Room 125 | < 3 | < 3 | < 3 | < 9 |
| Room 128A | < 3 | < 3 | < 3 | < 9 |
| Room 212 | < 3 | < 3 | < 3 | < 9 |
| **02/28/2021 Reassessment Concentration (parts per million)** | | | | |
| Outdoors | < 3 | < 3 | < 3 | N/A |
| **Indoors** | | | | |
| Multipurpose Room/Cafeteria | < 3 | < 3 | < 3 | < 9 |
| Room 212 | < 3 | < 3 | < 3 | < 9 |
| Room 113 | < 3 | < 3 | < 3 | < 9 |
| Room 119 | < 3 | < 3 | < 3 | < 9 |
| Room 125 | < 3 | < 3 | < 3 | < 9 |

# 5 Total Fungal Air Sampling Results

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

The December 8, 2020 and February 28, 2021 mold assessments 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 8, 2020 indicated unusual mold spore concentrations in the Multipurpose Room and Rooms 113, 119, 125, and 212. The total ambient, outdoor spore concentration was 4,540 spores/m$^3$, with an *Aspergillus/Penicillium*-like spore concentration of 3,500 spores/m$^3$ which made up 77% of the spores on the outdoor sample. The Multipurpose Room and Rooms 113, 119, 125, and 212 had an *Aspergillus/Penicillium*-like spore concentration ranging from 1,400 spores/m$^3$ in Room 112, up to 88,200 spores/m$^3$ in Room 113. The measured *Aspergillus/Penicillium*-like spore concentrations in the Multipurpose Room and Room 113, 119 and 125 are greater than the outdoor *Aspergillus/Penicillium*-like spore concentration and greater than the typical concentration measured in indoor occupied spaces. ATI recommended further evaluating the Multipurpose Room and Rooms 113, 119, 125, and 212 and the surrounding areas for potential water problems, along with HEPA vacuuming all surfaces, wet-wiping all horizontal and vertical surfaces and, if possible, running a HEPA equipped air scrubber for at least 24 to 48-hours after any water issues are addressed.

ATI reassessed the Multipurpose Room and Rooms 113, 119, 125, and 212 on February 28, after corrective actions were completed to reduce indoor airborne spore concentrations. The *Aspergillus/Penicillium*-like spore concentrations decreased in the reassessed spaces from an 85% reduction to a 99% reduction. The total airborne spore concentrations in all of the reassessed spaces, while less than the outdoor total spore concentration of 47,431 spores/m$^3$, were still greater than the typical indoor occupied space; however, the spore types and ratios of the identified spores were similar to the types and ratios measured in the outdoor sample, mostly basidiospores and ascospores. This suggests these spaces were exposed to unfiltered outdoor air, which ATI was notified that construction took place in the school and some of the windows were replaced, which would expose the interior to unfiltered outdoor air.

Room 113 still had a *Cladosporium* concentration of 3,127 spores/m$^3$, which was greater than the initial assessment concentration of 550 spores/m$^3$. This may have been contamination from disturbed building materials containing these spores, especially if construction activities occurred in or near this room or could be from water issues still present in the space. ATI recommends evaluating for moisture issues, and if no further moisture issues are found, the recommended cleaning of all spaces should reduce the remaining presence of airborne mold to acceptable concentrations.

Due to the unusual spore concentrations throughout all reassessed space, ATI recommends a thorough cleaning throughout the school consisting of HEPA vacuuming all horizontal and vertical surfaces, wet-wiping all non-porous horizontal and vertical surfaces and, if possible, running a HEPA equipped air scrubber for at least 24 to 48-hours.

**Table 6: *Aspergillus/Penicillium* Concentration Comparison**

| Sample Location | December 8, 2020 Concentrations | February 28, 2021 Concentrations | % Change |
|---|---|---|---|
| Multipurpose Room/Cafeteria | 13,600 | 424 | - 97% |
| Room 212 | 1,400 | 212 | - 85% |
| Room 113 | 88,200 | 901 | - 90% |
| Room 119 | 31,000 | 265 | - 99% |
| Room 125 | 5,400 | 371 | - 93% |

The official laboratory report with spore trap samples collected on December 8, 2020, and February 28, 2021, are presented in Appendix A.

# 6 Summary of Findings

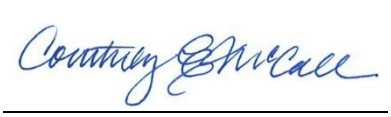
1. Three of the tested spaces during the initial assessment on December 8 had a temperature less than the ASHRAE recommended winter range of 68°F - 75°F. During the February 28 reassessment, four of five tested spaces had a temperature less than the

ASHRAE recommended winter range; however, this reassessment occurred on a weekend when a more energy efficient HVAC mode was likely functioning.

2. During the initial December 8 assessment, relative humidity measurements in all tested spaces were less than the ASHRAE recommended maximum relative humidity of 65%, yet were also less than 30%, which can cause occupant discomfort. During the February reassessment, all tested spaces were less than 65%, but greater than 30%, which is optimal.
3. For the initial December 8 assessment, carbon dioxide ranges in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,103 parts per million (ppm). For the February 28 reassessment, carbon dioxide ranges in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,080 ppm.
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the tested spaces during both assessments.
5. The spore trap sampling results from the initial assessment suggested some level of indoor amplification specifically of *Aspergillus/Penicillium*-like spores, in the Multipurpose Room and Rooms 113, 119, 125, and 212. ATI recommended to evaluate the spaces for moisture issues and thoroughly clean each space before reassessing the spaces. Other tested spaces did not suggest noteworthy amplification.
6. The February 28, 2021 reassessment showed a favorable decrease in *Aspergillus/Penicillium*-like spores in all the tested spaces, ranging from an 85% decrease to a 99% decrease. The total spore concentrations in all reassessed spaces were still unusually elevated, ranging between 11,075 spores/$m^3$ up to 18,019 spores/$m^3$. These total spore concentrations were still all less than the outdoor total spore concentration and the spore type ratios closely matched the spore ratios from the outdoor sample. This suggests most, if not all the spores observed indoors on February 28 were from outdoor origin. It was reported that some windows were replaced, and construction occurred, which likely exposed these spaces to unfiltered outdoor air.
7. ATI recommends a thorough cleaning of Room 113 using HEPA vacuums, wet wiping all vertical and horizontal surfaces and materials, and running HEPA equipped air scrubbers for at least 24 - 48 hours.
8. Room 113 still had a *Cladosporium* concentration of 3,127 spores/$m^3$, which is greater than the initial assessment. This may have been contamination from disturbed building materials containing these spores or could be from water issues still present. ATI recommends further evaluating this space for moisture issues, and if no further moisture issues are found, the recommended cleaning should reduce the remaining presence of airborne mold to acceptable concentrations.

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

Best,
**ATI, INC.**



Courtney E. McCall
Project Manager

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

# Appendix A: Laboratory Report and Chain of Custody

# EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

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


**EMSL Order:** 182004042
**Customer ID:** ATII25A
**Customer PO:**
**Project ID:**

**Attention:** Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
**Project:** Belstville ES 20-704

**Phone:** (202) 832-1433
**Fax:**
**Collected Date:** 12/08/2020
**Received Date:** 12/10/2020 03:57 PM
**Analyzed Date:** 12/17/2020

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

| Lab Sample Number: | 182004042-0001 | | | 182004042-0002 | | | 182004042-0003 | | |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID: | 3106-0600 | | | 3106-0598 | | | 3146-1941 | | |
| Volume (L): | 75 | | | 75 | | | 75 | | |
| Sample Location: | Outside Exterior | | | Gymnassim | | | Main Office | | |
| **Spore Types** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** |
| Alternaria (Ulocladium) | - | - | - | 1 | 40 | 1.7 | - | - | - |
| Ascospores | - | - | - | 1 | 40 | 1.7 | - | - | - |
| Aspergillus/Penicillium | 84 | 3500 | 77.1 | 34 | 1400 | 59.3 | 1 | 40 | 14.3 |
| Basidiospores | 14 | 590 | 13 | 2 | 80 | 3.4 | 1 | 40 | 14.3 |
| Bipolaris++ | - | - | - | - | - | - | - | - | - |
| Chaetomium | - | - | - | 1 | 40 | 1.7 | - | - | - |
| Cladosporium | 9 | 400 | 8.8 | 11 | 460 | 19.5 | 4 | 200 | 71.4 |
| Curvularia | - | - | - | - | - | - | - | - | - |
| Epicoccum | - | - | - | - | - | - | - | - | - |
| Fusarium | - | - | - | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - | - | - | - |
| Myxomycetes++ | - | - | - | - | - | - | - | - | - |
| Pithomyces++ | - | - | - | - | - | - | - | - | - |
| Rust | - | - | - | - | - | - | - | - | - |
| Scopulariopsis/Microascus | - | - | - | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - | - | - | - |
| Arthrinium | - | - | - | - | - | - | - | - | - |
| Cercospora++ | 1 | 40 | 0.9 | - | - | - | - | - | - |
| Polythrincium | - | - | - | 6 | 300 | 12.7 | - | - | - |
| Spadicoides | - | - | - | - | - | - | - | - | - |
| Spegazzinia | 1* | 10* | 0.2 | - | - | - | - | - | - |
| **Total Fungi** | **109** | **4540** | **100** | **56** | **2360** | **100** | **6** | **280** | **100** |
| Hyphal Fragment | - | - | - | 1 | 40 | - | - | - | - |
| Insect Fragment | - | - | - | 1 | 40 | - | - | - | - |
| Pollen | - | - | - | - | - | - | - | - | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 42 | - | - | 42 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 13* | - | - | 13* | - |
| Skin Fragments (1-4) | - | 2 | - | - | 1 | - | - | 2 | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | 1 | - | - | 1 | - |
| Background (1-5) | - | 3 | - | - | 3 | - | - | 1 | - |

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

**Kevin Ream, Laboratory Manager**
**or other Approved Signatory**



Initial report from: 12/17/2020 02:08 PM

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

# EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

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


**EMSL Order:** 182004042
**Customer ID:** ATII25A
**Customer PO:**
**Project ID:**

**Attention:** Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
**Project:** Belstville ES 20-704

**Phone:** (202) 832-1433
**Fax:**
**Collected Date:** 12/08/2020
**Received Date:** 12/10/2020 03:57 PM
**Analyzed Date:** 12/17/2020

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

| Lab Sample Number: | 182004042-0004 | | | 182004042-0005 | | | 182004042-0006 | | |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID: | 3146-2007 | | | 3146-2227 | | | 3106-0607 | | |
| Volume (L): | 75 | | | 75 | | | 75 | | |
| Sample Location: | MPR | | | Media Center | | | Room 119 | | |
| **Spore Types** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** |
| Alternaria (Ulocladium) | - | - | - | - | - | - | - | - | - |
| Ascospores | - | - | - | - | - | - | - | - | - |
| Aspergillus/Penicillium | 322 | 13600 | 99.1 | 2 | 80 | 47.1 | 735 | 31000 | 99.5 |
| Basidiospores | 1 | 40 | 0.3 | 2 | 80 | 47.1 | - | - | - |
| Bipolaris++ | - | - | - | - | - | - | - | - | - |
| Chaetomium | - | - | - | - | - | - | - | - | - |
| Cladosporium | 1 | 40 | 0.3 | 1* | 10* | 5.9 | 3 | 100 | 0.3 |
| Curvularia | - | - | - | - | - | - | - | - | - |
| Epicoccum | - | - | - | - | - | - | - | - | - |
| Fusarium | - | - | - | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - | - | - | - |
| Myxomycetes++ | 1* | 10* | 0.1 | - | - | - | 1 | 40 | 0.1 |
| Pithomyces++ | - | - | - | - | - | - | - | - | - |
| Rust | - | - | - | - | - | - | - | - | - |
| Scopulariopsis/Microascus | - | - | - | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - | - | - | - |
| Arthrinium | 1 | 40 | 0.3 | - | - | - | - | - | - |
| Cercospora++ | - | - | - | - | - | - | - | - | - |
| Polythrincium | - | - | - | - | - | - | - | - | - |
| Spadicoides | - | - | - | - | - | - | 1* | 10* | 0 |
| Spegazzinia | - | - | - | - | - | - | - | - | - |
| **Total Fungi** | **326** | **13730** | **100** | **5** | **170** | **100** | **740** | **31150** | **100** |
| Hyphal Fragment | - | - | - | 1* | 10* | - | 1 | 40 | - |
| Insect Fragment | - | - | - | - | - | - | - | - | - |
| Pollen | - | - | - | - | - | - | 1* | 10* | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 42 | - | - | 42 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 13* | - | - | 13* | - |
| Skin Fragments (1-4) | - | 2 | - | - | 2 | - | - | 1 | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | 1 | - | - | 1 | - |
| Background (1-5) | - | 1 | - | - | 1 | - | - | 4 | - |

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

**Kevin Ream, Laboratory Manager**
**or other Approved Signatory**



Initial report from: 12/17/2020 02:08 PM

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

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5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

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


**EMSL Order:** 182004042
**Customer ID:** ATII25A
**Customer PO:**
**Project ID:**

**Attention:** Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
**Project:** Belstville ES 20-704

**Phone:** (202) 832-1433
**Fax:**
**Collected Date:** 12/08/2020
**Received Date:** 12/10/2020 03:57 PM
**Analyzed Date:** 12/17/2020

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

| Lab Sample Number: | 182004042-0007 | | | 182004042-0008 | | | 182004042-0009 | | |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID: | 3106-0584 | | | 3106-0634 | | | 3106-0571 | | |
| Volume (L): | 75 | | | 75 | | | 75 | | |
| Sample Location: | Room 128A | | | Room 113 | | | Room 212 | | |
| **Spore Types** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** |
| Alternaria (Ulocladium) | - | - | - | - | - | - | - | - | - |
| Ascospores | 1 | 40 | 100 | 4 | 200 | 0.2 | - | - | - |
| Aspergillus/Penicillium | - | - | - | 2090 | 88200 | 99.1 | 33 | 1400 | 100 |
| Basidiospores | - | - | - | 1 | 40 | 0 | - | - | - |
| Bipolaris++ | - | - | - | - | - | - | - | - | - |
| Chaetomium | - | - | - | - | - | - | - | - | - |
| Cladosporium | - | - | - | 13 | 550 | 0.6 | - | - | - |
| Curvularia | - | - | - | - | - | - | - | - | - |
| Epicoccum | - | - | - | - | - | - | - | - | - |
| Fusarium | - | - | - | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - | - | - | - |
| Myxomycetes++ | - | - | - | 1* | 10* | 0 | - | - | - |
| Pithomyces++ | - | - | - | - | - | - | - | - | - |
| Rust | - | - | - | 1* | 10* | 0 | - | - | - |
| Scopulariopsis/Microascus | - | - | - | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - | - | - | - |
| Arthrinium | - | - | - | - | - | - | - | - | - |
| Cercospora++ | - | - | - | - | - | - | - | - | - |
| Polythrincium | - | - | - | - | - | - | - | - | - |
| Spadicoides | - | - | - | - | - | - | - | - | - |
| Spegazzinia | - | - | - | - | - | - | - | - | - |
| **Total Fungi** | **1** | **40** | **100** | **2110** | **89010** | **100** | **33** | **1400** | **100** |
| Hyphal Fragment | - | - | - | 3 | 100 | - | - | - | - |
| Insect Fragment | - | - | - | 2 | 80 | - | - | - | - |
| Pollen | - | - | - | 1* | 10* | - | - | - | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 42 | - | - | 42 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 13* | - | - | 13* | - |
| Skin Fragments (1-4) | - | 2 | - | - | 1 | - | - | 2 | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | 1 | - | - | 1 | - |
| Background (1-5) | - | 1 | - | - | 4 | - | - | 1 | - |

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

**Kevin Ream, Laboratory Manager**
**or other Approved Signatory**



Initial report from: 12/17/2020 02:08 PM

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

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Suite 250
Lanham, MD 20706
**Project:** Belstville ES 20-704

**Phone:** (202) 832-1433
**Fax:**
**Collected Date:** 12/08/2020
**Received Date:** 12/10/2020 03:57 PM
**Analyzed Date:** 12/17/2020

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

| Lab Sample Number: | 182004042-0010 | | | 182004042-0011 | | |
|---|---|---|---|---|---|---|
| Client Sample ID: | 3106-0577 | | | 3106-0602 | | |
| Volume (L): | 75 | | | | | |
| Sample Location: | Room 125 | | | Field Blank | | |
| **Spore Types** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** |
| Alternaria (Ulocladium) | - | - | - | - | - | - |
| Ascospores | 1 | 40 | 0.7 | - | - | - |
| Aspergillus/Penicillium | 128 | 5400 | 91.1 | - | - | - |
| Basidiospores | 2 | 80 | 1.3 | - | - | - |
| Bipolaris++ | - | - | - | - | - | - |
| Chaetomium | - | - | - | - | - | - |
| Cladosporium | 1 | 40 | 0.7 | - | - | - |
| Curvularia | - | - | - | - | - | - |
| Epicoccum | 2* | 30* | 0.5 | - | - | - |
| Fusarium | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - |
| Myxomycetes++ | 6 | 300 | 5.1 | - | - | - |
| Pithomyces++ | - | - | - | - | - | - |
| Rust | 1 | 40 | 0.7 | - | - | - |
| Scopulariopsis/Microascus | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - |
| Arthrinium | - | - | - | - | - | - |
| Cercospora++ | - | - | - | - | - | - |
| Polythrincium | - | - | - | - | - | - |
| Spadicoides | - | - | - | - | - | - |
| Spegazzinia | - | - | - | - | - | - |
| **Total Fungi** | **141** | **5930** | **100** | **-** | **No Trace** | **-** |
| Hyphal Fragment | - | - | - | - | - | - |
| Insect Fragment | 2 | 80 | - | - | - | - |
| Pollen | 1* | 10* | - | - | - | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 0 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 0* | - |
| Skin Fragments (1-4) | - | 2 | - | - | - | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | - | - |
| Background (1-5) | - | 2 | - | - | - | - |

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

**Kevin Ream, Laboratory Manager**
**or other Approved Signatory**



Initial report from: 12/17/2020 02:08 PM

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

OrderID: 182004042

# Microbiology Chain of Custody

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

**182004042**

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

| | |
|---|---|
| **Company:** ATI INC | **EMSL-Bill to:** ■ Same ☐ Different<br>If Bill to is Different note instructions in Comments** |
| **Street:** 4221 Forbes Blvd Suite 250 | *Third Party Billing requires written authorization from third party* |
| **City:** Lanham **State/Province:** MD | **Zip/Postal Code:** 20706 **Country:** USA |
| **Report To (Name):** Courtney McCall | **Telephone #:** 703-399-5423 |
| **Email Address:** courtney@atiinc.com, samappriya@atiinc.com | **Fax #:** 202-905-0335 **Purchase Order:** |
| **Project Name/Number:** Beltsville ES 20-704 | **Please Provide Results:** ☐ Fax ■ Email ☐ Fax |
| **U.S. State Samples Taken:** | **Connecticut Samples:** ☐ Commercial ☐ Residential |

**Turnaround Time (TAT) Options* - Please Check**

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

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

**Non Culturable Air Samples (Spore Traps) – Test Codes**

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

**Other Microbiology Test Codes**

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

**Preservation Method (Water):**

**Name of Sampler:** Don Samappriya Wanigasundara

**Signature of Sampler:** DW

| Sample # | Sample Location | Sample Type | Test Code | Volume/Area | Date/Time Collected |
|---|---|---|---|---|---|
| **Example:** A1 | Kitchen | Air | M001 | 75L | 1/1/12 4:00 PM |
| 3106-0600 | Outside Exterior | Air | M001 | 75L | 12/08/20 05:05PM |
| 3106-0598 | Gymnassim | Air | M001 | 75L | 12/08/20 03:25PM |
| 3146-1941 | Main Office | Air | M001 | 75L | 12/08/20 02:50PM |
| 3146-2007 | MPR | Air | M001 | 75L | 12/08/20 03:00PM |
| 3146-2227 | Media Center | Air | M001 | 75L | 12/08/20 03:17PM |
| 3106-0607 | Room 119 | Air | M001 | 75L | 12/08/20 04:35PM |
| 3106-0584 | Room 128A | Air | M001 | 75L | 12/08/20 04:50PM |
| 3106-0634 | Room 113 | Air | Moo1 | 75L | 12/08/20 04:40PM |
| 3106-0571 | Room 212 | Air | Moo1 | 75L | 12/08/20 03:55PM |

| | | | |
|---|---|---|---|
| **Client Sample # (s):** | - | **Total # of Samples:** | |
| **Relinquished (Client):** DW | **Date:** 12/10/20 | **Time:** | |
| **Received (Client):** L. Yarworth Drop Box | **Date:** | **Time:** | |
| **Comments:** | | | |

RECEIVED
DEC 10 2020
EMSL ANALYTICAL, INC.
CINNAMINSON, NJ
10 D 3:
PM

OrderID: 182004042

# Microbiology Chain of Custody

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

182004042

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

*Additional Pages of the Chain of Custody are only necessary if needed for additional sample information*

| Sample # | Sample Location | Sample Type | Test Code | Volume/Area | Date/Time Collected |
|---|---|---|---|---|---|
| 3106-0577 | Room 125 | Air | M001 | 75L | 12/08/20 04:15PM |
| 3106-0602 | Filed Blank | Air | M001 | | 12/08/20 |
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****Comments/Special Instructions:**

Page _____ of _____ pages

182004042

GEN-FM-10-1: Sample Transfer-One Time
Revision 4.2
Revision Date: 1/05/2016
Effective Date: 1/05/2016

# EMSL Analytical, Inc.

## Sample Transfer Form

| | | | |
|---|---|---|---|
| **Receiving Lab:** | EMSL- BELTSVILLE | **Phone Number:** | 3019375700 |
| | | **Fax Number:** | 3019375701 |
| **Relinquished to:** | EMSL- | **Phone Number:** | 8002203675 |
| | | **Fax Number:** | 8567860262 |
| **Does new lab hold equivalent or additional accreditation? *** | | ☒ Yes ☐ No | |

| | |
|---|---|
| **EMSL Customer ID # (if known):** | ATII25A |
| **Client Name:** | ATI INC |
| **Client Project:** | BELTSVILLE ES 20-704 |
| **Tests to be Performed:** | MOLD |
| **Date Received:** | 12/10/20 |
| **Date Relinquished:** | 12/14/20 |
| **Date Due:** | 1 WEEK - DUE 12/17 |
| **Special Instructions:** (e.g. Work Order # , required qualifications, project specific procedures/modifications) | |

| | | | |
|---|---|---|---|
| **Relinquished by (Signature):** L. Howarth | **Date:** 12/14/20 | **Received by (Signature):** | **Date:** 12.15.20 |
| **Relinquished by (Signature):** | **Date:** | **Received by (Signature):** | **Date:** |

**Customer Agreement**- Please sign form and send to the receiving laboratory. By signing below, you agree to permit the above named receiving lab to transfer samples to a separate EMSL lab with equivalent qualifications* for analysis. The final report will be issued from the analyzing laboratory. Ensure any requirements are listed in special instructions.

| **Name (please print):** | **Signature:** | **Agent of:** | **Date:** |
|---|---|---|---|
| | | | |

*If this is a recurring project or sample type that may require samples to be relinquished on a regular basis, a Standing Agreement form must be completed.*

* Receiving and analyzing labs shall be aware of required qualifications of project prior to transfer of samples.

Note: If customer has been notified and approved this transfer verbally or by e-mail, the receiving lab must sign for the customer above. EMSL employee filling out form on behalf of customer shall print name of person to whom they spoke, date agreement was received, and then sign under Signature.

AMA Analytical Services, Inc.
Focused On Results.

# CERTIFICATE OF ANALYSIS

## ASTM D7391-09 Spore Trap Analysis Report

| | | | | | |
|---|---|---|---|---|---|
| **Chain of Custody:** | 625389 | **Job Name:** | Beltsville Academy | **Date Submitted:** | 03/01/2021 |
| **Client:** | ATI, Inc. | **Job Location:** | 4300 Wicomico Avenue, Beltsville, MD 20705 | **Person Submitting:** | Courtney McCall |
| **Address:** | 9220 Rumsey Road<br>Suite 100<br>Columbia, MD 21045 | **Job Number:** | 20-704 | **Date Analyzed:** | 03/03/2021 |
| | | **P.O. Number:** | Not Provided | **Report Date:** | 03/03/2021 |
| **Attention:** | Courtney McCall | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **AMA Sample #** | 625389-1 | **AMA Sample #** | 625389-2 | **AMA Sample #** | 625389-3 |
| **Client ID** | 31569981 | **Client ID** | 31569973 | **Client ID** | 31569975 |
| **Analyst ID** | TLW | **Analyst ID** | TLW | **Analyst ID** | TLW |
| **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** | 2 | **Debris Loading** | 1 | **Debris Loading** | 1 |
| **Location** | Ambient | **Location** | MPR | **Location** | RM 119 |

| | Raw Ct | Trav/Flds | A.S. | sp/m$^3$ | % |
|---|---|---|---|---|---|
| Alternaria | | | | | |
| Ascospores | 141 | 10 | 80 | 11280 | 50.7% |
| Basidiospores | 135 | 3 | 267 | 36045 | 48.6% |
| Bipolaris/Drechslera/Helm. | | | | | |
| Chaetomium | | | | | |
| Cladosporium | Present | 15 | 53 | <53 | |
| Curvularia | | | | | |
| Penicillium / Aspergillus | 2 | 15 | 53 | 106 | 0.7% |
| Smuts/Periconia/Myxomycetes | | | | | |
| Stachybotrys/Memnoniella | | | | | |
| Ulocladium | | | | | |
| Unknown | | | | | |
| Pithomyces | | | | | |
| Other Colorless | | | | | |
| Hyphal Fragments* | | | | | |
| **Total Raw Ct:** | 278 | **Total sp/m$^3$:** | 47431 | | |

**Comments**

| | Raw Ct | Trav/Flds | A.S. | sp/m$^3$ | % |
|---|---|---|---|---|---|
| Alternaria | | | | | |
| Ascospores | 16 | 15 | 53 | 848 | 12.7% |
| Basidiospores | 101 | 5 | 160 | 16160 | 80.2% |
| Bipolaris/Drechslera/Helm. | | | | | |
| Chaetomium | | | | | |
| Cladosporium | 1 | 15 | 53 | 53 | 0.8% |
| Curvularia | | | | | |
| Penicillium / Aspergillus | 8 | 15 | 53 | 424 | 6.3% |
| Smuts/Periconia/Myxomycetes | | | | | |
| Stachybotrys/Memnoniella | | | | | |
| Ulocladium | | | | | |
| Unknown | | | | | |
| Pithomyces | | | | | |
| Other Colorless | | | | | |
| Hyphal Fragments* | | | | | |
| **Total Raw Ct:** | 126 | **Total sp/m$^3$:** | 17485 | | |

**Comments**

| | Raw Ct | Trav/Flds | A.S. | sp/m$^3$ | % |
|---|---|---|---|---|---|
| Alternaria | | | | | |
| Ascospores | 17 | 15 | 53 | 901 | 13.3% |
| Basidiospores | 105 | 5 | 160 | 16800 | 82% |
| Bipolaris/Drechslera/Helm. | | | | | |
| Chaetomium | | | | | |
| Cladosporium | 1 | 15 | 53 | 53 | 0.8% |
| Curvularia | | | | | |
| Penicillium / Aspergillus | 5 | 15 | 53 | 265 | 3.9% |
| Smuts/Periconia/Myxomycetes | | | | | |
| Stachybotrys/Memnoniella | | | | | |
| Ulocladium | | | | | |
| Unknown | | | | | |
| Pithomyces | | | | | |
| Other Colorless | | | | | |
| Hyphal Fragments* | | | | | |
| **Total Raw Ct:** | 128 | **Total sp/m$^3$:** | 18019 | | |

**Comments**

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# CERTIFICATE OF ANALYSIS

## ASTM D7391-09 Spore Trap Analysis Report

| | | | | | |
|---|---|---|---|---|---|
| **Chain of Custody:** | 625389 | **Job Name:** | Beltsville Academy | **Date Submitted:** | 03/01/2021 |
| **Client:** | ATI, Inc. | **Job Location:** | 4300 Wicomico Avenue, Beltsville, MD 20705 | **Person Submitting:** | Courtney McCall |
| **Address:** | 9220 Rumsey Road<br>Suite 100<br>Columbia, MD 21045 | **Job Number:** | 20-704 | **Date Analyzed:** | 03/03/2021 |
| | | **P.O. Number:** | Not Provided | **Report Date:** | 03/03/2021 |
| **Attention:** | Courtney McCall | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **AMA Sample #** | 625389-4 | **AMA Sample #** | 625389-5 | **AMA Sample #** | 625389-6 |
| **Client ID** | 31569990 | **Client ID** | 31569980 | **Client ID** | 31569972 |
| **Analyst ID** | TLW | **Analyst ID** | TLW | **Analyst ID** | TLW |
| **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** | 2 | **Debris Loading** | 2 | **Debris Loading** | 2 |
| **Location** | RM 113 | **Location** | RM 212 | **Location** | RM 125 |

| | Raw Ct | Trav/Flds | A.S. | sp/m$^3$ | % |
|---|---|---|---|---|---|
| Alternaria | | | | | |
| Ascospores | 9 | 15 | 53 | 477 | 4.6% |
| Basidiospores | 105 | 7 | 114 | 11970 | 53.6% |
| Bipolaris/Drechslera/Helm. | | | | | |
| Chaetomium | | | | | |
| Cladosporium | 59 | 15 | 53 | 3127 | 30.1% |
| Curvularia | | | | | |
| Penicillium / Aspergillus | 17 | 15 | 53 | 901 | 8.7% |
| Smuts/Periconia/Myxomycetes | 3 | 15 | 53 | 159 | 1.5% |
| Stachybotrys/Memnoniella | | | | | |
| Ulocladium | | | | | |
| Unknown | 1 | 15 | 53 | 53 | 0.5% |
| Pithomyces | Present | 15 | 53 | <53 | |
| Other Colorless | 2 | 15 | 53 | 106 | 1% |
| Hyphal Fragments* | 2 | 15 | 53 | 106 | 1% |
| **Total Raw Ct:** | 196 | | **Total sp/m$^3$:** | 16793 | |

**Comments**

| | Raw Ct | Trav/Flds | A.S. | sp/m$^3$ | % |
|---|---|---|---|---|---|
| Alternaria | | | | | |
| Ascospores | 30 | 15 | 53 | 1590 | 21.6% |
| Basidiospores | 103 | 9 | 89 | 9167 | 74.1% |
| Bipolaris/Drechslera/Helm. | | | | | |
| Chaetomium | | | | | |
| Cladosporium | 1 | 15 | 53 | 53 | 0.7% |
| Curvularia | | | | | |
| Penicillium / Aspergillus | 4 | 15 | 53 | 212 | 2.9% |
| Smuts/Periconia/Myxomycetes | 1 | 15 | 53 | 53 | 0.7% |
| Stachybotrys/Memnoniella | | | | | |
| Ulocladium | | | | | |
| Unknown | | | | | |
| Pithomyces | | | | | |
| Other Colorless | | | | | |
| Hyphal Fragments* | | | | | |
| **Total Raw Ct:** | 139 | | **Total sp/m$^3$:** | 11075 | |

**Comments**

| | Raw Ct | Trav/Flds | A.S. | sp/m$^3$ | % |
|---|---|---|---|---|---|
| Alternaria | | | | | |
| Ascospores | 9 | 15 | 53 | 477 | 6.8% |
| Basidiospores | 114 | 8 | 100 | 11400 | 86.4% |
| Bipolaris/Drechslera/Helm. | | | | | |
| Chaetomium | | | | | |
| Cladosporium | 2 | 15 | 53 | 106 | 1.5% |
| Curvularia | | | | | |
| Penicillium / Aspergillus | 7 | 15 | 53 | 371 | 5.3% |
| Smuts/Periconia/Myxomycetes | | | | | |
| Stachybotrys/Memnoniella | | | | | |
| Ulocladium | | | | | |
| Unknown | | | | | |
| Pithomyces | | | | | |
| Other Colorless | | | | | |
| Hyphal Fragments* | | | | | |
| **Total Raw Ct:** | 132 | | **Total sp/m$^3$:** | 12354 | |

**Comments**

AMA Analytical Services, Inc.
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# CERTIFICATE OF ANALYSIS

## ASTM D7391-09 Spore Trap Analysis Report

**Chain of Custody:** 625389
**Client:** ATI, Inc.
**Address:** 9220 Rumsey Road
Suite 100
Columbia, MD 21045
**Attention:** Courtney McCall

**Job Name:** Beltsville Academy
**Job Location:** 4300 Wicomico Avenue, Beltsville, MD 20705
**Job Number:** 20-704
**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 #** | 625389-7 |
| **Client ID** | 31569983 |
| **Analyst ID** | TLW |
| **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 | | | | | |
| Pithomyces | | | | | |
| 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:** | 625389 | **Job Name:** | Beltsville Academy | **Date Submitted:** | 03/01/2021 |
| **Client:** | ATI, Inc. | **Job Location:** | 4300 Wicomico Avenue, Beltsville, MD 20705 | **Person Submitting:** | Courtney McCall |
| **Address:** | 9220 Rumsey Road<br>Suite 100<br>Columbia, MD 21045 | **Job Number:** | 20-704 | **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<br>5-9 Spores: Orange<br>10+ Spores: Red | < 10 Spores: Insignificant (no color)<br><= Control's spore count: Green<br>Between Control and 2x Control: Yellow<br>Between 2x Control and 3x Control: Orange<br>3x+ Control: Red | < 10 Spores: Insignificant (no color)<br>10-20 Spores: Yellow<br>20-50 Spores: Orange<br>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:** | 625389 | **Job Name:** | Beltsville Academy | **Date Submitted:** | 03/01/2021 |
| **Client:** | ATI, Inc. | **Job Location:** | 4300 Wicomico Avenue, Beltsville, MD 20705 | **Person Submitting:** | Courtney McCall |
| **Address:** | 9220 Rumsey Road<br>Suite 100<br>Columbia, MD 21045 | **Job Number:** | 20-704 | **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)**: 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.

## 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.

## 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.

## Pithomyces

Pithomyces is a cosmopolitan, dark-walled fungus often found growing outside in soil, decaying leaves, and grasses. It is rarely found growing indoors, but will grow on paper given the right conditions. Colonies grow rapidly, cottony in texture with light to dark brownish black surface color. Spores are single, oval yellow to dark brown, multi-celled, and usually rough. One identification feature of the spores is the resemblance to barrels. Another identifying character is beak-like structures on young spores. Spores of Pithomyces chartarum are most common and are identified by distinctive tranverse septa. This species has been linked to facial eczema in sheep. Health Effects: It is a potential but not well-studied allergen or human pathogen.

## 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) 625389

**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: Beltsville Academy
2. Job Location: 4300 Wicomico Ave, Beltsville, MD 20705
3. Job #: 20-704 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<br>☐ Immediate Date Due: _____<br>☐ 24 Hours Time Due: _____<br>Comments: _____ | ☐ 4 Hours ☐ 3 Day<br>☐ Same Day ☐ 5 Day +<br>☑ Next Day Date Due: 3/2/21<br>☐ 2 Day ☐ Results Required By Noon (Additional fee may apply) | ☑ Email: courtney@atiinc.com<br>☐ Email 2: _____<br>☐ 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 7 (QTY) ☐ Surface Vacuum Dust ____ (QTY)
☐ *Surface Swab ____ (QTY)
☐ *Surface Tape ____ (QTY)
☐ Other (Specify ____) ____ (QTY)

| SAMPLE INFORMATION | | | | ANALYSIS | | | | | | MATRIX | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | COMMENTS / SPECIAL INSTRUCTIONS |
| 3156 9981 | Ambient | 2/28/21 857 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| 3156 9973 | MPR | 2/28/21 905 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| 3156 9975 | Room 119 | 2/28/21 943 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| 3156 9990 | Room 113 | 2/28/21 925 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| 3156 9980 | Room 212 | 2/28/21 915 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| 3156 9972 | Room 125 | 2/28/21 950 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| 3156 9983 | F Blank | 2/28/21 | 75L | | | | | ✓ | ✓ | | | | ✓ | | | |
| | | | | | | | | | | | | | | | | |
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| | Print Name | Signature | Date | Time | Shipping Information |
|---|---|---|---|---|---|
| Relinquished by: | Courtney McCall | Courtney McCall | 2/28/21 | 1129 AM | ☐ UPS ☐ In-Person ☐ Other<br>☐ FedEx ☐ Drop Box<br>☐ 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<br>☑ 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

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 | 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 |

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VERIFIED

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 | 71.33 (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 |

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CALIBRATED

August 31, 2020
DATE

Doc. ID. CERT_GEN_WCC

TSI P/N 2300157