ati INC
Architecture | Engineering | Construction

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

December 18, 2020

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

RE: Indoor Air Quality Assessment, Hollywood Elementary School
IFB: 022-19
ATI Project Number: 20-705

Dear Mr. Baylor:

Prince George's County Public Schools requested that ATI, Inc., conduct a proactive indoor air quality (IAQ) assessment at Hollywood Elementary School on December 9, 2020. Its key findings are enclosed in the Executive Summary on page three, and the official laboratory report for total fungal spore trap sampling is enclosed in Appendix A.

Thank you for the opportunity to provide Industrial Hygiene services for Prince George's County Public Schools. If you have any questions regarding this report, please contact us at (202) 643-4283.

Sincerely,
**ATI, INC.**

Courtney E. McCall
Project Manager

Nate Burgei, CIH, CSP
Certified Industrial Hygienist

# Indoor Air Quality Assessment Report

Prince George's County Public Schools
Hollywood Elementary School
9811 49th Avenue
College Park, MD 20740

Prepared for:

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

**December 18, 2020**

Submitted by:

ATI Job # 20-705

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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 9, 2020, at Hollywood Elementary School, located at 9811 49th Ave., College Park, MD 20740.

The assessment included a visual assessment of randomly selected classrooms and other frequently occupied spaces, such as the cafeteria, the main office, and classrooms, for potential IAQ contributors and pathways. As part of the assessment, ATI measured common IAQ comfort parameters, including temperature, relative humidity, carbon dioxide, and carbon monoxide. Also, ATI collected total fungal air samples on spore trap cassettes for microbiological analysis.

The following is a summary of the key findings from this assessment:

1. One of the tested spaces had a temperature greater than the ASHRAE recommended winter range of 68-75°F.
2. Relative humidity in all tested spaces was less than the ASHRAE guidelines of <65%, yet was also <30%, which can cause occupant discomfort.
3. Carbon dioxide concentrations in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,126 parts per million (PPM).
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the tested spaces.
5. The fungal spore trap results do not suggest indoor spore amplification in the assessed spaces and are not considered unusual. There was a wet ceiling tile in the Computer Lab with signs of mold growth. This ceiling tile should be replaced, and the cause of the wet tile should be investigated and fixed if a water problem is found.

# 2 Assessment Methods

Sama Wanigasundara of ATI, Inc. conducted a visual assessment and air sampling on December 9, 2020. Sampled rooms were randomly selected and accounted for approximately 10% of classrooms or a minimum of five samples. Mr. Wanigasundara documented visual observations at the time he collected the air samples. ATI references the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) *Standard 62.1 – 2016* and ASHRAE *Standard 55 – 2017* when providing IAQ services to clients. ASHRAE is an industry leader on energy efficiency and indoor air quality.

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

Total fungal air samples were collected with a Buck BioAire High-Volume Sampling Pump on Zefon Air-O-Cell spore-trap cassettes at a flow rate of 15 liters per minute for five minutes, for a sample volume of 75 liters. EMSL Analytical, Inc. of Plymouth Meeting, PA, analyzed the samples using direct microscopic examination per ASTM D7391-09, which counts both viable and non-viable mold spores and particulates, which combined yields *total fungal* results. EMSL participates in the National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) for general laboratory performance and management, and the American Industrial Hygiene Association (AIHA) for Environmental Microbial Laboratory Accreditation Program (EMLAP). The EMSL laboratory reports are included in Appendix A.

# 3 Visual Observations

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

**Table 1: Visual Observations and Sampling Locations**

| Sample Location | Observations |
|---|---|
| Parking Lot – Outdoors | • Scattered clouds, mostly clear skies<br>• Light foot and vehicle traffic observed |
| Main Office | • Four occupants 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>• Four air return in this space<br>• Four air diffusers in the space<br>• Space is approximately 1200 ft.$^2$ |
| Cafeteria | • No odors, stained ceiling tiles, or visible mold growth observed<br>• Six occupants in area during sampling<br>• No dust accumulation<br>• Five air returns in this space (dust accumulated)<br>• Six air diffusers in this space (dust accumulated)<br>• Space is approximately 2,700 ft.$^2$ |
| Gymnasium | • No odors, stained ceiling tiles, or visible mold growth observed<br>• No occupants in the area during sampling<br>• Three air returns in this space (dust accumulated)<br>• Four diffusers in the space (dust accumulated)<br>• No dust accumulation in this space<br>• Space is approximately 4116 ft.$^2$ |
| Media Center | • No occupants in the area during sampling<br>• Light dust accumulation in this space<br>• One air return in this space<br>• Adjoining room with sink ceiling observed mold growth<br>• Two air diffusers in this space<br>• Space is approximately 2000 ft.$^2$ |
| Computer Lab | • Observed a ceiling tile with water marks/damage and likely mold growth (dark area on water damage)<br>• Wall unit OFF during sampling<br>• No visible air return in this space<br>• No occupants in area during sampling<br>• Bathroom inside the room |

| Sample Location | Observations |
|---|---|
| | • Door to outside closed.<br>• Space is approximately 600 ft.$^2$ |
| Room 2 | • No occupants in area during sampling<br>• Inside room bathroom<br>• No visible dust on flows and furniture<br>• No visible mold growth or odor observed<br>• One air diffuser and retune in this space<br>• Space is approximately 792ft.$^2$ |
| Room 18 | • No occupants in area during sampling<br>• Inside room bathroom<br>• No visible dust on flows and furniture<br>• No visible mold growth or odor observed<br>• One air diffuser and retune in this space<br>• Space is approximately 720ft.$^2$ |
| Room 17 | • No occupants in area during sampling<br>• Inside room bathroom<br>• No visible dust on flows and furniture<br>• No visible mold growth or odor observed<br>• One air diffuser and retune in this space<br>• Space is approximately 784ft.$^2$ |

# 4 Thermal Environmental Conditions for Human Occupancy

ASHRAE *Standard 55-2017, Thermal Environmental Conditions for Human Occupancy*, addresses thermal comfort in an office environment, which means that an employee wearing a normal amount of clothing feels neither too cold nor too warm. This standard discusses thermal comfort within the context of air temperature, humidity, and air movement and provides recommended ranges for temperature and humidity that are intended to satisfy 80% of occupants. The recommended ASHRAE ranges are referenced below by each comfort parameter.

## *4.1 Temperature*

The ASHRAE standard establishes a winter comfort range of between 68°F and 75°F and a summer range of between 73°F and 79°F. The temperature measured during the December 9, 2020, assessment is summarized in Table 2. As indicated by the data in the table, temperatures in the school averaged between 70°F and 78°F, with one location having greater and one location less than the ASHRAE recommended winter range.

**Table 2: Temperature**

| Sample Location | 12/09/2020 °F | | | ASHRAE Standard °F |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | 55 | 55 | 55 | N/A |
| **Indoors** | | | | |
| Main Office | 73 | 73 | 73 | 68-75°F |
| Cafeteria | 74 | 74 | 74 | 68-75°F |
| Gymnasium | 72 | 72 | 72 | 68-75°F |
| Media Center | 72 | 72 | 72 | 68-75°F |
| Computer Lab | 78 | 78 | 78 | 68-75°F |
| Room 2 | 69 | 70 | 70 | 68-75°F |
| Room 18 | 72 | 72 | 72 | 68-75°F |
| Room 17 | 72 | 73 | 73 | 68-75°F |

## *4.2 Relative Humidity*

Relative humidity is a key factor for mold growth. Mold has the potential of growing on suitable surfaces with humidity levels above 65%. ASHRAE *Standard 62.1-2016*, *Ventilation for Acceptable Indoor Air Quality,* recommends a maximum indoor relative humidity of 65% to prevent condensation of moisture on surfaces. Relative humidity less than 30% may result in drying of occupants' mucous membranes and skin. Relative humidity is summarized in Table 3. As indicated by the data in the table, relative humidity averaged between 15% and 29% with all tested locations measuring less than the ASHRAE maximum recommendation of 65% relative humidity, yet also less than 30% relative humidity.

**Table 3: Relative Humidity**

| Sample Location | 12/09/2020 (% RH) | | | ASHRAE Standard (% RH) |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | 19 | 19 | 19 | N/A |
| **Indoors** | | | | |
| Main Office | 25 | 25 | 25 | < 65 |
| Cafeteria | 15 | 15 | 15 | < 65 |
| Gymnasium | 20 | 20 | 20 | < 65 |
| Media Center | 22 | 22 | 22 | < 65 |
| Computer Lab | 16 | 16 | 16 | < 65 |
| Room 2 | 21 | 21 | 21 | < 65 |
| Room 18 | 29 | 29 | 29 | < 65 |
| Room 17 | 18 | 18 | 18 | < 65 |

## *4.3 Carbon Dioxide*

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

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

Carbon dioxide concentrations are summarized in Table 4. On the day of the assessment, the average outdoor carbon dioxide concentration measured was 426 ppm, which calculates to a maximum indoor concentration of 1,126 ppm (700 + 426). All tested locations indoors were less than the recommended maximum for the day of the assessment.

**Table 4: Carbon Dioxide**

| Sample Location | 12/09/2020 Concentration (parts per million) | | | ASHRAE Standard (ppm) NTE |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | 425 | 426 | 426 | N/A |
| **Indoors** | | | | |
| Main Office | 867 | 870 | 869 | 1,126 |
| Cafeteria | 437 | 440 | 439 | 1,126 |
| Gymnasium | 436 | 439 | 438 | 1,126 |
| Media Center | 423 | 427 | 425 | 1,126 |
| Computer Lab | 460 | 467 | 464 | 1,126 |
| Room 2 | 423 | 429 | 426 | 1,126 |
| Room 18 | 508 | 530 | 419 | 1,126 |
| Room 17 | 429 | 455 | 442 | 1,126 |

## *4.4 Carbon Monoxide*

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

**Table 5: Carbon Monoxide**

| Sample Location | 12/09/2020 Concentration (parts per million) | | | ASHRAE Standard (ppm) |
|---|---|---|---|---|
| | Min | Max | Average | |
| Outdoors | <3 | <3 | <3 | N/A |
| **Inside** | | | | |
| Main Office | <3 | <3 | <3 | < 9 |
| Cafeteria | <3 | <3 | <3 | < 9 |
| Gymnasium | <3 | <3 | <3 | < 9 |
| Media Center | <3 | <3 | <3 | < 9 |
| Computer Lab | <3 | <3 | <3 | < 9 |
| Room 2 | <3 | <3 | <3 | < 9 |
| Room 18 | <3 | <3 | <3 | < 9 |
| Room 17 | <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 9, 2020 mold assessment sampled air using spore trap cassettes in randomly selected classrooms and other areas throughout the facility. These cassettes collect both viable spores, those capable of producing more fungal colonies, and non-viable spores, which cannot reproduce. Based upon recognized industry practices, indoor mold concentrations are compared with those detected outdoors, which are also known as ambient or baseline samples.

In normal circumstances, the diversity of spores identified indoors and outdoors should be similar with some exceptions. The high concentration of one or two species of fungal spores identified indoors and the absence of the same species outdoors can indicate a moisture problem with the potential to degrade the air quality. Fungi species present indoors are typically found at levels ranging from approximately 10-50% of their levels in the outdoor air, reflecting the filtering by the building's HVAC system.

The findings indicated that the indoor concentrations were generally favorable compared to the outdoor concentrations. The total ambient spore concentration was 710 counts/$m^3$, and most tested rooms had spore concentrations less than the ambient total concentration. Although the gymnasium and main office had total concentrations greater than the total ambient concentration, 930 counts/$m^3$ and 1,150 counts/$m^3$, respectively, the total spore concentrations were less than 1,000 counts/$m^3$.

*Aspergillus/Penicillium* was detected in some of the indoor spaces, and the highest amount was 800 counts/$m^3$ in the main office. *Cladosporium* was also identified in some of the spaces with the gymnasium having the greatest *Cladosporium* concentration of 890 counts/$m^3$. Trace amounts of *Myxomycetes* and *Epicoccum* were detected in low concentrations that did not exceed 100 counts/$m^3$. The concentrations measured indoors do not suggest significant spore amplification. The measured concentrations are not unusual in occupied spaces, as total spore concentrations in a typical indoor space are at or less than 1,000 counts/$m^3$.

There was a wet ceiling tile in the Computer Lab with signs of mold growth. This ceiling tile should be replaced and the cause of the wet tile should be investigated and fixed if a water problem is found.

The official laboratory report with spore trap samples collected on December 9, 2020, is presented in Appendix A.

# 6 Summary of Findings

1. One of the tested spaces had a temperature greater than the ASHRAE recommended winter range of 68-75°F.
2. Relative humidity in all tested spaces was less than the ASHRAE guidelines of <65%, yet was also <30%, which can cause occupant discomfort.
3. Carbon dioxide concentrations in all tested spaces were less than the ASHRAE limit for carbon dioxide, which was 1,126 parts per million (PPM).
4. Carbon monoxide concentrations were less than the IAQ meter's detection limit throughout the tested spaces.
5. The fungal spore trap results do not suggest indoor spore amplification in the assessed spaces and are not considered unusual. There was a wet ceiling tile in the Computer Lab with signs of mold growth. This ceiling tile should be replaced, and the cause of the wet tile should be investigated and fixed if a water problem is found.

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:** 182004045
**Customer ID:** ATII25A
**Customer PO:**
**Project ID:**

**Attention:** Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
**Project:** Hollywood ES 20-705

**Phone:** (202) 832-1433
**Fax:**
**Collected Date:** 12/09/2020
**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: | 182004045-0001 | | | 182004045-0002 | | | 182004045-0003 | | |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID: | 3106-0589 | | | 3106-0574 | | | 3106-0590 | | |
| 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) | - | - | - | - | - | - | - | - | - |
| Ascospores | - | - | - | - | - | - | - | - | - |
| Aspergillus/Penicillium | 2 | 80 | 11.3 | - | - | - | 19 | 800 | 69.6 |
| Basidiospores | 14 | 590 | 83.1 | 1 | 40 | 4.3 | - | - | - |
| Bipolaris++ | - | - | - | - | - | - | - | - | - |
| Chaetomium | - | - | - | - | - | - | - | - | - |
| Cladosporium | - | - | - | 21 | 890 | 95.7 | 7 | 300 | 26.1 |
| Curvularia | - | - | - | - | - | - | - | - | - |
| Epicoccum | - | - | - | - | - | - | - | - | - |
| Fusarium | - | - | - | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - | - | - | - |
| Myxomycetes++ | 1 | 40 | 5.6 | - | - | - | 1 | 40 | 3.5 |
| Pithomyces++ | - | - | - | - | - | - | - | - | - |
| Rust | - | - | - | - | - | - | 1* | 10* | 0.9 |
| Scopulariopsis/Microascus | - | - | - | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - | - | - | - |
| Unidentifiable Spores | - | - | - | - | - | - | - | - | - |
| Zygomycetes | - | - | - | - | - | - | - | - | - |
| **Total Fungi** | **17** | **710** | **100** | **22** | **930** | **100** | **28** | **1150** | **100** |
| Hyphal Fragment | - | - | - | 2 | 80 | - | - | - | - |
| Insect Fragment | - | - | - | 1 | 40 | - | - | - | - |
| Pollen | - | - | - | 1* | 10* | - | - | - | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 42 | - | - | 42 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 13* | - | - | 13* | - |
| Skin Fragments (1-4) | - | 1 | - | - | 1 | - | - | 3 | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | 1 | - | - | 1 | - |
| Background (1-5) | - | 1 | - | - | 1 | - | - | 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 02:06 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

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**Project:** Hollywood ES 20-705

**Phone:** (202) 832-1433
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**Collected Date:** 12/09/2020
**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: | 182004045-0004 | | | 182004045-0005 | | | 182004045-0006 | | |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID: | 3106-0615 | | | 3106-0578 | | | 3106-0588 | | |
| Volume (L): | 75 | | | 75 | | | 75 | | |
| Sample Location: | MPR | | | Media Center | | | Computer Lab | | |
| **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 | 8.2 | - | - | - | - | - | - |
| Aspergillus/Penicillium | - | - | - | - | - | - | 3 | 100 | 45.5 |
| Basidiospores | 2 | 80 | 16.3 | - | - | - | 2 | 80 | 36.4 |
| Bipolaris++ | - | - | - | - | - | - | - | - | - |
| Chaetomium | - | - | - | - | - | - | - | - | - |
| Cladosporium | 8 | 300 | 61.2 | - | - | - | 1 | 40 | 18.2 |
| Curvularia | - | - | - | - | - | - | - | - | - |
| Epicoccum | 2* | 30* | 6.1 | - | - | - | - | - | - |
| Fusarium | - | - | - | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - | - | - | - |
| Myxomycetes++ | 1 | 40 | 8.2 | 1* | 10* | 100 | - | - | - |
| Pithomyces++ | - | - | - | - | - | - | - | - | - |
| Rust | - | - | - | - | - | - | - | - | - |
| Scopulariopsis/Microascus | - | - | - | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - | - | - | - |
| Unidentifiable Spores | - | - | - | - | - | - | - | - | - |
| Zygomycetes | - | - | - | - | - | - | - | - | - |
| **Total Fungi** | **14** | **490** | **100** | **1** | **10** | **100** | **6** | **220** | **100** |
| Hyphal Fragment | - | - | - | - | - | - | - | - | - |
| Insect Fragment | - | - | - | - | - | - | - | - | - |
| Pollen | - | - | - | - | - | - | - | - | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 42 | - | - | 42 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 13* | - | - | 13* | - |
| Skin Fragments (1-4) | - | 2 | - | - | 1 | - | - | 1 | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | 1 | - | - | 1 | - |
| Background (1-5) | - | 1 | - | - | 1 | - | - | 1 | - |

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

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



Initial report from: 12/17/2020 02:06 PM

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

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**Fax:**
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**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: | 182004045-0007 | | | 182004045-0008 | | | 182004045-0009 | | |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID: | 3106-0662 | | | 3106-8858 | | | 3106-0573 | | |
| Volume (L): | 75 | | | 75 | | | 75 | | |
| Sample Location: | Room 2 | | | Room 18 | | | Room 17 | | |
| **Spore Types** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** | **Raw Count** | **Count/M³** | **% of Total** |
| Alternaria (Ulocladium) | - | - | - | - | - | - | - | - | - |
| Ascospores | - | - | - | - | - | - | - | - | - |
| Aspergillus/Penicillium | - | - | - | 1 | 40 | 20 | - | - | - |
| Basidiospores | - | - | - | 2 | 80 | 40 | 1 | 40 | 100 |
| Bipolaris++ | - | - | - | - | - | - | - | - | - |
| Chaetomium | - | - | - | - | - | - | - | - | - |
| Cladosporium | - | - | - | 2 | 80 | 40 | - | - | - |
| Curvularia | - | - | - | - | - | - | - | - | - |
| Epicoccum | - | - | - | - | - | - | - | - | - |
| Fusarium | - | - | - | - | - | - | - | - | - |
| Ganoderma | - | - | - | - | - | - | - | - | - |
| Myxomycetes++ | 1 | 40 | 100 | - | - | - | - | - | - |
| Pithomyces++ | - | - | - | - | - | - | - | - | - |
| Rust | - | - | - | - | - | - | - | - | - |
| Scopulariopsis/Microascus | - | - | - | - | - | - | - | - | - |
| Stachybotrys/Memnoniella | - | - | - | - | - | - | - | - | - |
| Unidentifiable Spores | - | - | - | - | - | - | - | - | - |
| Zygomycetes | - | - | - | - | - | - | - | - | - |
| **Total Fungi** | **1** | **40** | **100** | **5** | **200** | **100** | **1** | **40** | **100** |
| Hyphal Fragment | - | - | - | - | - | - | - | - | - |
| Insect Fragment | - | - | - | - | - | - | - | - | - |
| Pollen | - | - | - | - | - | - | - | - | - |
| Analyt. Sensitivity 600x | - | 42 | - | - | 42 | - | - | 42 | - |
| Analyt. Sensitivity 300x | - | 13* | - | - | 13* | - | - | 13* | - |
| Skin Fragments (1-4) | - | 2 | - | - | 2 | - | - | 2 | - |
| Fibrous Particulate (1-4) | - | 1 | - | - | 1 | - | - | 1 | - |
| Background (1-5) | - | 1 | - | - | 1 | - | - | 1 | - |

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

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



Initial report from: 12/17/2020 02:06 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:** 182004045
**Customer ID:** ATII25A
**Customer PO:**
**Project ID:**

**Attention:** Courtney McCall
ATI
4221 Forbes Blvd
Suite 250
Lanham, MD 20706
**Project:** Hollywood ES 20-705

**Phone:** (202) 832-1433
**Fax:**
**Collected Date:** 12/09/2020
**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:** | **182004045-0010** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Client Sample ID:** | **3106-0585** | | | | | | | | |
| **Volume (L):** | | | | | | | | | |
| **Sample Location:** | **Field Blank** | | | | | | | | |
| **Spore Types** | **Raw Count** | **Count/M³** | **% of Total** | | | | | | |
| Alternaria (Ulocladium) | - | - | - | | | | | | |
| Ascospores | - | - | - | | | | | | |
| Aspergillus/Penicillium | - | - | - | | | | | | |
| Basidiospores | - | - | - | | | | | | |
| Bipolaris++ | - | - | - | | | | | | |
| Chaetomium | - | - | - | | | | | | |
| Cladosporium | - | - | - | | | | | | |
| Curvularia | - | - | - | | | | | | |
| Epicoccum | - | - | - | | | | | | |
| Fusarium | - | - | - | | | | | | |
| Ganoderma | - | - | - | | | | | | |
| Myxomycetes++ | - | - | - | | | | | | |
| Pithomyces++ | - | - | - | | | | | | |
| Rust | - | - | - | | | | | | |
| Scopulariopsis/Microascus | - | - | - | | | | | | |
| Stachybotrys/Memnoniella | - | - | - | | | | | | |
| Unidentifiable Spores | - | - | - | | | | | | |
| Zygomycetes | - | - | - | | | | | | |
| **Total Fungi** | **-** | **No Trace** | **-** | | | | | | |
| Hyphal Fragment | - | - | - | | | | | | |
| Insect Fragment | - | - | - | | | | | | |
| Pollen | - | - | - | | | | | | |
| Analyt. Sensitivity 600x | - | 0 | - | | | | | | |
| Analyt. Sensitivity 300x | - | 0* | - | | | | | | |
| Skin Fragments (1-4) | - | - | - | | | | | | |
| Fibrous Particulate (1-4) | - | - | - | | | | | | |
| Background (1-5) | - | - | - | | | | | | |

++ 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 02:06 PM

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

OrderID: 182004045

# Microbiology Chain of Custody

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

**182004045**

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**<br>*Third Party Billing requires written authorization from third party* |
| **Street:** 4221 Forbes Blvd Suite 250 | |
| **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:** Hollywood ES 20-705 | **Please Provide Results:** ☐ Fax ■ Email ☐ Fax |
| **U.S. State Samples Taken:** | **Connecticut Samples:** ☐ Commercial ☐ Residential |

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

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

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

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

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

**Other Microbiology Test Codes**

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

**Preservation Method (Water):**

| | |
|---|---|
| Don Samappriya Wanigasundara<br>**Name of Sampler:** | **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 |
| 3106-0589 | Outside Exterior | Air | M001 | 75L | 12/09/20 11:35AM |
| 3106-0574 | Gymnassim | Air | M001 | 75L | 12/09/20 09:50AM |
| 3106-0590 | Main Office | Air | M001 | 75L | 12/09/20 11:25AM |
| 3106-0615 | MPR | Air | M001 | 75L | 12/09/20 10:05AM |
| 3106-0578 | Media Center | Air | M001 | 75L | 12/09/20 10:15AM |
| 3106-0588 | Computor Lab | Air | M001 | 75L | 12/09/20 10:55AM |
| 3106-0662 | Room 2 | Air | M001 | 75L | 12/09/20 10:40AM |
| 3105-8858 | Room 18 | Air | Moo1 | 75L | 12/09/20 10:30AM |
| 3106-0573 | Room 17 | Air | Moo1 | 75L | 12/08/20 10:05AM |

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

RECEIVED
EMSL ANALYTICAL, INC.
BELTSVILLE MD
2020 DEC 10 PM 4:51
PTQ

OrderID: 182004045

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

# Microbiology Chain of Custody

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

**182004045**

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 |
|---|---|---|---|---|---|
| | | | | | |
| 3106-0585 | Filed Blank | Air | M001 | | 12/09/20 |
| | | | | Total Samples 10 | |
| | | | | | |
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****Comments/Special Instructions:**

Page _____ of _____ pages

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

182004045

# EMSL Analytical, Inc.

## Sample Transfer Form

| | | | |
|---|---|---|---|
| **Receiving Lab:** | EMSL- BELTSVILLE | **Phone Number:** | 3019375700 |
| | | **Fax Number:** | 3019375701 |
| **Relinquished to:** | EMSL- Plymouth Mtg. | **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:** | HOLLYWOOD ES 20-705 |
| **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):** | **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.

# Appendix B: Instrument Calibration Records

# Certificate of Calibration

(✓) Buck™ BioAire Pump Calibration Rotameter

( ) Buck™ BioSlide Pump Calibration Rotameter

**Serial number:** R14535

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

**Flow Calibration**

This is to certify that the rotameter listed above has been calibrated using a Buck Primary calibrator listed below which is calibrated according to A.P. Buck, Inc. calibration procedure APB-1, Ver. 6.2 and is traceable to the National Institute of Standards & Technology (N.I.S.T). A.P. Buck guarantees the accuracy of the rotameter to be within ± 5% of the actual flow rate.

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

| Description | MFR. | Model | Serial # |
|---|---|---|---|
| Primary Calibrator | A.P. Buck Inc. | M30B | ☐ A40020<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
A.P. BUCK, INC.

# CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

| ENVIRONMENT CONDITIONS | | |
|---|---|---|
| TEMPERATURE | 75.8 (24.3) | °F (°C) |
| RELATIVE HUMIDITY | 48 | %RH |
| BAROMETRIC PRESSURE | 28.72 (972.6) | inHg (hPa) |

| | |
|---|---|
| MODEL | 982 |
| SERIAL NUMBER | P17100006 |

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

## – CALIBRATION VERIFICATION RESULTS –

**GAS $CO_2$ AS FOUND** — SYSTEM G-101 — *Unit: ppm*

| # | STANDARD | MEASURED | ALLOWABLE RANGE | # | STANDARD | MEASURED | ALLOWABLE RANGE |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0~50 | 4 | 3020.5 | * 2874.5 | 2929.9~3111.1 |
| 2 | 504 | 460 | 454~554 | 5 | 5037 | * 4771.8 | 4885.9~5188.1 |
| 3 | 1008 | 964 | 958~1058 | | | | |

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

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

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

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

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

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

**Indicates Out-of-Tolerance Condition*

*TSI does hereby certify that the above described instrument conforms to the original manufacturer's specification (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to the United States National Institute of Standards and Technology (NIST) or has been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. TSI's calibration system is registered to ISO-9001:2015.*

| Measurement Variable | System ID | Last Cal. | Cal. Due | Measurement Variable | System ID | Last Cal. | Cal. Due |
|---|---|---|---|---|---|---|---|
| 5000 $CO_2$ | T-0660 | 07-15-20 | 07-15-28 | 200 CO | 149848 | 03-24-20 | 03-24-28 |
| N2 | CT308798 | 06-28-20 | 06-28-28 | Air | T608955 | 06-17-20 | 06-17-28 |
| Flow | E003341 | 09-03-19 | 09-30-20 | Flow | E003980 | 04-22-20 | 04-30-21 |
| Flow | E003525 | 01-06-20 | 01-31-21 | Flow | E003342 | 09-03-19 | 09-30-20 |
| 2000 C4H8 | EB0054467 | 08-13-19 | 08-12-22 | 100 C4H8 | CC507339 | 03-24-20 | 03-24-28 |
| Temperature | E010657 | 02-14-20 | 02-28-21 | Temperature | E010658 | 02-14-20 | 02-28-21 |
| Temperture | E010655 | 01-21-20 | 01-31-21 | Humidity | E003539 | 08-21-20 | 02-28-21 |

ChaoVang
VERIFIED

August 31, 2020
DATE

DOC ID CERT_GEN_WCC

TSI P/N 2300157

# 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 |

Bao Yang
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 | 71.33 (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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