

**SPORE SAMPLING REPORT
FOR
GLENWOOD MIDDLE SCHOOL
2680 ROUTE 97
GLENWOOD, MD 21738**

PREPARED FOR:

**HOWARD COUNTY PUBLIC SCHOOL SYSTEM
10910 ROUTE 108
ELLCOTT CITY, MD 21043**

PREPARED BY:



**ARIA ENVIRONMENTAL, INC.
PO BOX 286
WOODBINE, MD 21797**

OCTOBER 22, 2015

150876

**SPORE TRAP SAMPLING REPORT
FOR GLENWOOD MIDDLE SCHOOL
OCTOBER 14, 2015**

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

I. BACKGROUND 1

II. OBSERVATIONS AND MEASUREMENTS 1

 A. Observations and Measurements on October 14, 2015 1

 B. Air Monitoring for Fungal Identification and Counting on October 14, 2015 4

III. CONCLUSIONS AND RECOMMENDATIONS 7

IV. LIMITATIONS..... 8

Tables

Table 1 – Acceptable Ranges of Temperature and Relative Humidity in Summer and Winter

Table 2 – Particle, Temperature, Relative Humidity and Carbon Monoxide Measurements Collected on October 14, 2015 in Selected Classrooms at Glenwood Middle School

Table 3 – Results of Spore Trap Sampling in Selected Classrooms at Glenwood Middle School on October 14, 2015

Table 4 – Results of Spore Trap Sampling in Portable Classrooms at Glenwood Middle School on October 14, 2015

Table 5 – Summary of Spore Sampling Results to Date at GMS in the 2015-2016 School Year

Attachments

- A: Building Layout and Sample Location Plan for October 14, 2015
- B: Report of Analysis and Chain of Custody Forms October 14, 2015

**SPORE TRAP SAMPLING REPORT
FOR GLENWOOD MIDDLE SCHOOL
OCTOBER 14, 2015**

EXECUTIVE SUMMARY

Aria Environmental, Inc. (AE) was contracted by Howard County Public School System to perform spore trap sampling at the Glenwood Middle School at the end of August 2015 due to air quality concerns expressed by staff and parents and to monitor the school after a recent heating, ventilation and air-conditioning (HVAC) system upgrade. AE made measurements for temperature, humidity, carbon monoxide, carbon dioxide and particulate matter and collected microbial spore trap sampling for fungal spore identification and counting on October 14, 2015 as part of a series of spore sampling events that will occur in the first month of the 2015 - 2016 school year and less frequently throughout the school year. This report presents the results of air sampling made on October 14, 2015.

**Spore Trap Sampling Report
For Glenwood Middle School
October 14, 2015**

I. BACKGROUND

Representatives from Aria Environmental, Inc. (AE) visited Glenwood Middle School on October 14, 2015 to perform air monitoring in response to an ongoing indoor air quality complaint at the school. Measurements for temperature, humidity, carbon monoxide, carbon dioxide and particulate matter and microbial spore trap sampling were collected from classrooms 8, 11, 15, 17, 18, 19, 29 and 32 and portable classrooms 70 and 71. Outdoor air samples were also collected for comparison purposes in one courtyard and outside near portable classroom 70. This monitoring was performed in response to employee and parental complaints and as a follow up to HVAC improvements.

There was no visible evidence of mold growth nor observed odors consistent with mildew in the classrooms sampled. Weather on the day of monitoring was warm and sunny.

II. OBSERVATIONS AND MEASUREMENTS

A. Observations and Measurements on October 14, 2015

Industry guidelines or standards for seasonal temperature and humidity ranges for thermal comfort are established by the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) standard 55-2013. These ranges are presented in Table 1. The U.S. Environmental Protection Agency (EPA) recommends maintaining indoor relative humidity below 60% and ideally between 30 and 50%. The room air temperature measured between 3:38 PM and 4:46 PM ranged from 72.2 to 74.1° F with an average of 73.0° F. The indoor relative humidity ranged from 40.7 to 55.4 percent. The temperature and relative humidity measurements are considered acceptable for summer thermal comfort in all rooms except Classroom 8 and Portable Classroom 70 where the temperature measurements were slightly lower than 72.5° F. The outside temperature at 4:43 PM was 63.5° F and the outdoor relative humidity was 43.8% outside near Portable Classroom 70, and the outside temperature at 4:46 PM was 64.0° F and the relative humidity was 46.9% in the courtyard outside classroom 28. No windows or doors were observed to be open during the monitoring period. Results of temperature, relative humidity, carbon dioxide and carbon monoxide monitoring are presented in Table 2.

Table 1- Acceptable Ranges of Temperature and Relative Humidity in Summer and Winter^a

Relative Humidity	Winter Temperature	Summer Temperature
30%	68.5°F – 76.0°F	74.0°F – 80°F
40%	68.5°F - 75.5°F	73.5°F – 79.5°F
50%	68.5°F - 74.5°F	73.0°F – 79.0°F
60%	68.0°F - 74.0°F	72.5°F – 78.0°F

^aadapted from ASHRAE Standard 55-2013

Carbon dioxide and carbon monoxide measurements are used to assess ventilation system performance. The exhaled breath of building occupants is the main indoor source of carbon dioxide; therefore, the build-up of carbon dioxide indicates inadequate ventilation. Air monitoring was performed after school hours when the rooms were mostly unoccupied. Carbon dioxide concentrations ranged from 418 to 1,253 ppm indoors. The concentration of concern for carbon dioxide is set by ASHRAE standard 62.1–2013 as 700 ppm above outdoor air. On the day of monitoring, the outdoor air concentration of carbon dioxide ranged from 393 to 411 ppm.

**Spore Trap Sampling Report
For Glenwood Middle School
October 14, 2015**

Carbon dioxide concentrations were within the comfort parameters established by ASHRAE in all areas monitored except for Portable Classroom 70 (1,253 ppm). There were no students in these rooms at the time of monitoring, but the monitoring took place soon after school ended for the day.

Carbon monoxide is mainly attributed to incomplete combustion. Concentrations of CO ranged from 0.2 to 0.9 ppm indoors and the outdoor concentrations ranged from 0.2 to 0.7 ppm in the two outdoor locations measured. CO concentrations were below the ASHRAE concentration of concern of 9 ppm.

Particulate matter or PM is the term for a mixture of solid particles and liquid droplets found in the air. It does not distinguish between the types of particles in the air (e.g., pollen, skin cells, mold spores, soil, etc.). Particulate matter includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than 10 micrometers (PM 10) and "fine particles," with diameters that are 2.5 micrometers and smaller (PM 2.5). Particle loads expected to be a part of the school environment include carpet and clothing fiber, soil tracked from outside, paper dust, chalk dust, and dust and fibers from building materials. ASHRAE Standard 62.1-2013 suggests target indoor concentrations for PM 2.5 and PM 10 of 15 $\mu\text{g}/\text{m}^3$ and 50 $\mu\text{g}/\text{m}^3$, respectively. These concentrations are taken from the EPA's National Ambient Air Quality Standards (NAAQS) based on annual arithmetic means deemed acceptable for outdoor air quality. Occupational standards and guidelines for particles are nearly an order of magnitude higher than concentrations typically found in non-occupational settings and are not appropriate for comparison.

Particle measurements were taken with an Aerocet 531 particulate monitor. The particle monitor takes a two minute averaged sample of particle concentrations in 5 size fractions (PM 1, PM 2.5, PM 7, PM 10 and total suspended particles (TSP)). Results of particulate monitoring, presented in Table 2, revealed that PM 2.5 and PM 10 particle concentrations were well below the ASHRAE target concentrations in all areas monitored.

**Spore Sampling Report
For Glenwood Middle School
October 14, 2015**

**Table 2: Particle, Temperature, Relative Humidity, Carbon Dioxide and Carbon Monoxide
Measurements Collected on October 14, 2015 at Glenwood Middle School**

Location	Time	PM1 ($\mu\text{g}/\text{m}^3$)	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM7 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)	Temp ($^{\circ}\text{F}$)	Rh (%)	CO (ppm)	CO ₂ (ppm)
CR 08	3:38 PM	0	0	0	1	1	72.4	43.3	0.3	472
CR 11	3:40 PM	0	0	0	0	2	73.4	43.9	0.3	485
CR 15	3:50 PM	0	0	0	0	1	73.5	41.0	0.4	464
CR 17	3:52 PM	0	0	1	2	4	73.4	41.5	0.4	465
CR 18	4:03 PM	0	0	1	2	4	73.9	41.0	0.4	465
CR 19	4:05 PM	0	0	0	0	0	73.8	40.7	0.3	418
CR 29	4:16 PM	0	0	0	1	1	73.7	43.2	0.3	486
CR 32	4:18 PM	0	0	0	0	0	74.1	42.7	0.2	463
PCR 71	4:28 PM	0	0	3	3	5	73.6	45.0	0.9	748
PCR 70	4:40 PM	0	1	4	5	6	72.2	55.4	0.4	1,253
Out 1	4:43 PM	0	0	2	2	3	63.5	43.8	0.7	393
Out 2 CY	4:46 PM	0	0	3	4	6	64.0	46.9	0.2	411

CR = Classroom; PCR = Portable Classroom; CY = Courtyard; Bold type indicates measurements above the guidelines

**Spore Sampling Report
For Glenwood Middle School
October 14, 2015**

B. Air Monitoring for Fungal Identification and Counting on October 14, 2015

In the absence of visual sources of mold amplification and growth in the classrooms, non-viable spore trap samples were collected from eight classrooms within the main school building (Classrooms 8, 11, 15, 17, 18, 19, 29 and 32), two portable classrooms (70 and 71) and two outdoor locations to determine whether there was a difference between mold spore loads inside the building versus outside.

The spore trap samples were collected using AllergenCo-D cassettes attached to a Buck BioAire™ sampling pump calibrated to 15 liter per minute (LPM) air flow. The samples were collected for a period of ten minutes, the time period recommended for spore trap sampling in a clean indoor environment. The spore trap samples were submitted to Aerobiology Laboratory for analysis. The sample results are reported as the spores per cubic meter of air (spores per m³) of hyphal fragments and total fungal spores. Depending upon the morphology of the spores, they were counted by their unique genus or were grouped into spores exhibiting common characteristics (e.g., Penicillium/Aspergillus group). Tables 3 and 4 present the results of the spore trap samples collected at Glenwood Middle School on October 14, 2015.

Indoor spore counts ranged from 140 to 967 total spores per cubic meter of air (m³) in the main school building and from 1,473 to 2,700 in the portable classrooms on October 14, 2015. All indoor samples had total spore counts lower than the outdoor samples which ranged from 8,807 to 10,153 spores per m³.

Penicillium/Aspergillus spores were higher in the Classroom 17 and Portable Classroom 71 samples (213 and 913 spores per m³, respectively) than the outdoor samples (53 – 167 Penicillium/Aspergillus spores per m³). Curvularia (Classroom 29 and Portable Classroom 71), Pyricularia (Portable Classroom 71) and Stachybotrys (Portable Classroom 71) spores were detected indoors but were not detected in the outdoor samples. These samples were all 7 spores per m³ which is the equivalent to 1 spore detected per sample. All other individual spore types detected indoors were lower than the outdoor samples. Windows were not open during sampling.

No secondary colonizers including Chaetomium or Stachybotrys were detected in the indoor air samples except for the Portable Classroom 71 sample described above at 7 spores per m³. Hyphal elements were detected in five of the eight main building classrooms and in both of the portable classrooms. Indoor samples ranged from 7 to 27 hyphal elements per m³, and all detected indoor hyphal elements were lower than the outdoor sample hyphal element counts ranging from 167 to 260 elements per m³. Variations in outdoor spore concentrations are a function of diurnal rhythms of spore release, weather-related factors (e.g., wind, rain, snow cover, temperature), and physical spatial factors. Certificates of analysis are included as Attachment B.

**Spore Sampling Report
For Glenwood Middle School
October 14, 2015**

Table 3: Results of Spore Trap Sampling in Selected Classrooms in Glenwood Middle School on October 14, 2015

Location	Outside near Room 70 (Out 1)	Outside in Courtyard (Out 2)	Room 8 (GM 08)	Room 11 (GM 11)	Room 15 (GM 15)	Room 17 (GM 17)	Room 18 (GM 18)	Room 19 (GM 19)	Room 29 (GM 29)	Room 32 (GM 32)
Spore Type	Spores/m³	Spores/m³	Spores/m³	Spores/m³	Spores/m³	Spores/m³	Spores/m³	Spores/m³	Spores/m³	Spores/m³
Alternaria	40	67	-	-	-	-	-	-	7	-
Ascospores	107	87	27	7	13	-	7	7	7	-
Basidiospores	5,653	5,973	347	160	347	427	747	280	67	133
Cercospora	33	7	-	-	-	-	-	-	-	-
Cladosporium	2,347	3,200	93	40	113	127	93	200	47	73
Curvularia	-	-	-	-	-	-	-	-	7	-
Drechslera/Bipolaris group	13	-	-	-	-	-	-	-	-	-
Epicoccum	80	40	-	-	-	-	-	-	-	-
Hyphal Elements	167	260	27	27	13	-	7	-	-	7
Oidium	7	227	-	-	-	-	-	-	-	-
Penicillium/Aspergillus	53	167	33	47	133	213	100	7	-	-
Pithomyces	13	20	-	-	-	-	-	-	-	-
Polythrincium	-	7	-	-	-	-	-	-	-	-
Pyricularia	-	-	-	-	-	-	-	-	-	-
Rusts	33	-	-	-	-	-	-	-	-	-
Smuts, Periconia, myxomycetes	233	100	13	60	-	7	13	13	7	7
Stachybotrys	-	-	-	-	-	-	-	-	-	-
Unknown	27	-	-	-	-	-	-	-	-	-
Total Fungi	8,807	10,153	540	340	620	773	967	507	140	220

Bold numbers represent spore concentrations above the outdoor counts. Dashes designate none detected.

**Spore Sampling Report
For Glenwood Middle School
October 14, 2015**

**Table 4: Results of Spore Trap Sampling in Portable Classrooms
at Glenwood Middle School on October 14, 2015**

Location	Outside near Room 70 (Out 1)	Outside in Courtyard (Out 2)	Room 70 (GM 70)	Room 71 (GM 71)
Spore Type	Spores/ m ³	Spores/ m ³	Spores/ m ³	Spores/ m ³
Alternaria	40	67	-	7
Ascospores	107	87	27	40
Basidiospores	5,653	5,973	960	1,200
Cercospora	33	7	-	-
Cladosporium	2,347	3,200	340	480
Curvularia	-	-	-	7
Drechslera/Bipolaris group	13	-	-	-
Epicoccum	80	40	-	7
Hyphal Elements	167	260	7	13
Oidium	7	227	-	-
Penicillium/ Aspergillus	53	167	127	913
Pithomyces	13	20	-	-
Polythrincium	-	7	-	-
Pyricularia	-	-	-	7
Rusts	33	-	-	-
Smuts, Periconia, myxomycetes	233	100	13	20
Stachybotrys	-	-	-	7
Unknown	27	-	-	-
Total Fungi	8,807	10,153	1,473	2,700

Bold numbers represent spore concentrations above the outdoor counts.
Dashes designate none detected.

**Spore Sampling Report
For Glenwood Middle School
October 14, 2015**

III. CONCLUSIONS AND RECOMMENDATIONS

Aria Environmental, Inc. (AE) was contracted by Howard County Public School System to perform spore trap sampling at the Glenwood Middle School at the end of August 2015 due to air quality concerns expressed by staff and parents and to monitor the school after a recent heating, ventilation and air-conditioning (HVAC) system upgrade. AE made measurements for temperature, humidity, carbon monoxide, carbon dioxide and particulate matter and collected microbial spore trap samples on October 14, 2015.

Thermal comfort parameters of temperature and humidity were measured and found to be mostly within the comfort ranges established by ASHRAE with a few exceptions slightly outside the comfort ranges. Carbon dioxide was elevated in one portable classroom (70). Carbon monoxide and particulate matter measurements were within acceptable ranges for good indoor air quality in all areas.

Indoor spore counts ranged from 140 to 967 total spores per cubic meter of air (m³) in the main school building classrooms and from 1,473 to 2,700 in the portable classrooms on October 14, 2015. All indoor samples had total spore counts lower than the outdoor samples which ranged from 8,807 to 10,153 spores per m³. Penicillium/Aspergillus spores were higher in the Classroom 17 and Portable Classroom 71 samples (213 and 913 spores per m³, respectively) than the outdoor samples (53 – 167 Penicillium/Aspergillus spores per m³). Curvularia, Pyricularia and Stachybotrys spores were detected at 7 spores per m³ each in one or more classroom samples, but were not detected in the outdoor samples. All other individual spore types detected indoors were lower than those detected outdoors. Indoor hyphal elements ranged from 7 to 27 elements per m³. All indoor hyphal element counts were lower than the outdoor samples ranging from 167 to 260 elements per m³. Windows were not open during sampling.

Table 5 presents a summary of spore sampling results to date in the 2015 - 2016 school year. The indoor and outdoor ranges demonstrate the variable nature of spore counts.

Table 5 – Summary of Spore Sampling Results to Date at GMS in the 2015-2016 School Year

Date	Indoor Spore Count Range Spores per m³	Outdoor Spore Count Range Spores per m³
August 25, 2015	1,787 to 8,807	34,001 to 37,316
August 27, 2015	400 to 747	9,433 to 10,960
September 2, 2015	1,860 to 7,960	33,294 to 37,306
September 9, 2015	1,053 to 3,173	21,890 to 31,876
September 16, 2015	447 to 3,493	17,543 to 20,287
September 24, 2015	273 to 2,480	24,680 to 25,020
September 30, 2015	1,267 to 12,767	55,396 to 69,421
October 7, 2015	213 to 14,120	49,146 to 51,759
October 14, 2015	140 to 2,700	8,807 to 10,153

Spore measurements collected in classrooms were generally acceptable compared to outdoor samples with outdoor total spore counts over 11 times higher than the indoor counts on average. Indoor sample total spore counts and individual spore counts were all lower than the outdoor sample counts with a few exceptions described above. Follow up air sampling is scheduled for October 21, 2015 and will be performed regularly in order to monitor changes in conditions affected by seasonal variations and the new HVAC system.

**Spore Sampling Report
For Glenwood Middle School
October 14, 2015**

IV. LIMITATIONS

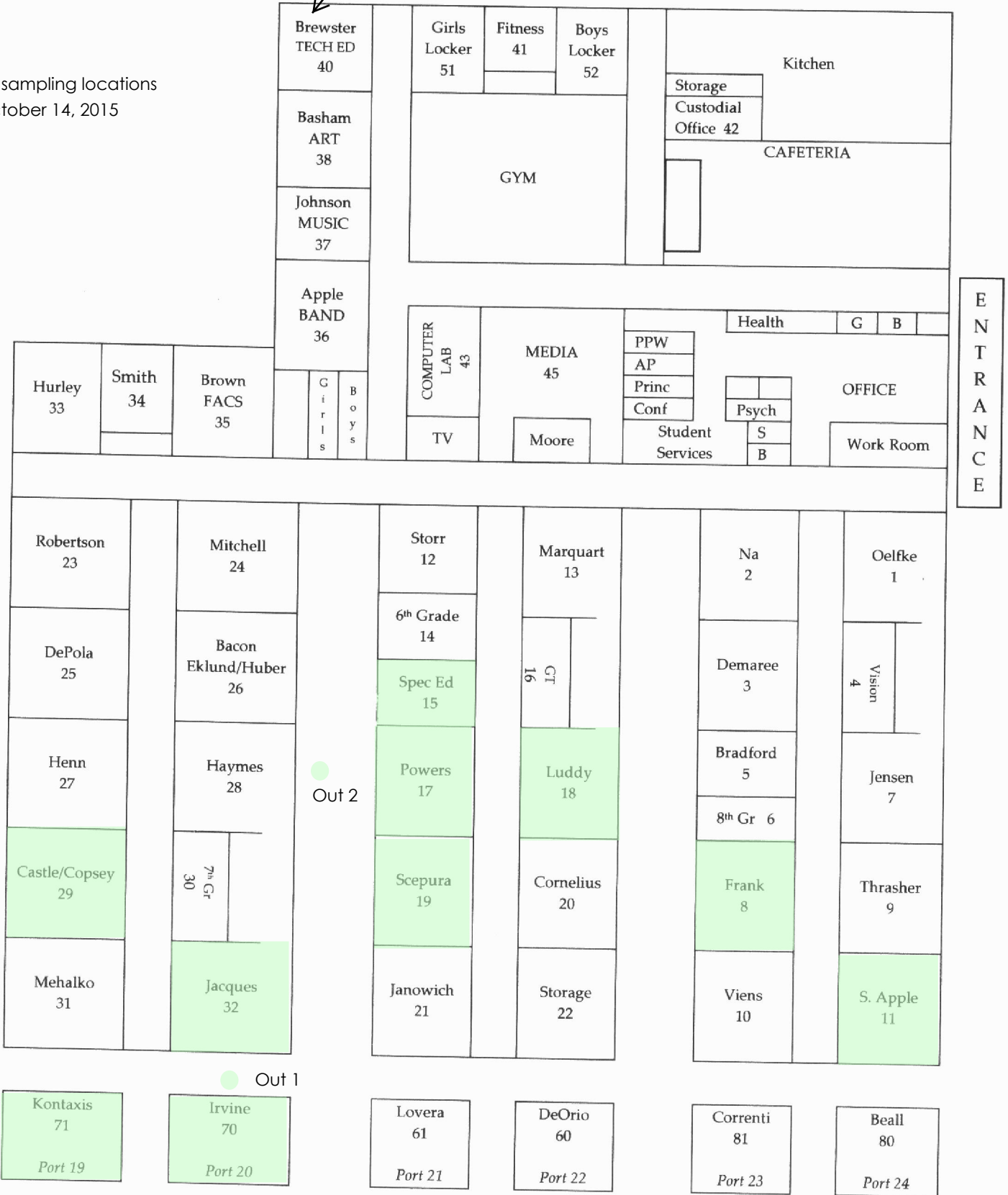
This report has been prepared for the exclusive use of the Howard County Public School System and/or their agents. This service has been performed in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made. Our conclusions and recommendations are based, in part, upon information provided to us by others and our site observations. We have not verified the completeness or accuracy of the information provided to us by others, unless otherwise noted. Our observations and recommendations are based upon conditions readily visible at the site at the time of our site visit, and upon current industry standards. Destructive sampling was not performed as part of this survey. No observations were made behind solid walls, ceilings or in pipe chases that weren't already openly visible.

By virtue of providing the services described in this report, the preparer does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies any conditions at the site that may present a potential danger to public health, safety, or the environment. It is the Client's responsibility to notify the appropriate local, state, or federal public agencies as required by law, or otherwise to disclose, in a timely manner, any information that may be necessary to prevent any danger to public health, safety, or the environment. Under this scope of services, the preparer assumes no responsibility regarding response actions (e.g. abatement, removal, etc.) initiated as a result of these findings. Response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements, and should be performed by appropriately licensed personnel as warranted.

Attachment A:

Building Layout and Sample Location Plan for October 14, 2015

Spore sampling locations
for October 14, 2015



Attachment B:

**Report of Analysis and Chain of Custody Forms
October 14, 2015**

Aria Environmental
P.O. Box 286
Woodbine, Maryland 21797
Attn: Julie Barth
Project: **J15-876 GMS Glenwood MS**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 10/14/2015
Date Received: 10/16/2015
Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480

Page 1 of 12

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	GM-08				Out 1			
Sample Location	Classroom 8				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-001				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	4	27	5	1/4	16	107	1	-
basidiospores	13	347	64	1/16	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	14	93	17	1/25	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	4	27	5	1/6	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	5	33	6	1/2	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	2	13	2	1/18	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m ³				Analytical Sensitivity: 7 spr/m ³			
Comments								
Total *See Footnotes	42	540	~100%	1/16	218	8807	~100%	-

Aria Environmental
P.O. Box 286
Woodbine, Maryland 21797
Attn: Julie Barth
Project: **J15-876 GMS Glenwood MS**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 10/14/2015
Date Received: 10/16/2015
Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480

Page 2 of 12

Client Sample Number	GM-11				Out 1			
Sample Location	Classroom 11				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-002				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	1	7	2	1/16	16	107	1	-
basidiospores	6	160	47	1/35	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	6	40	12	1/59	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	4	27	8	1/6	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	7	47	14	1/1	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	9	60	18	1/4	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m ³				Analytical Sensitivity: 7 spr/m ³			
Comments								
Total *See Footnotes	33	340	~100%	1/26	218	8807	~100%	-

Aria Environmental
 P.O. Box 286
 Woodbine, Maryland 21797
 Attn: Julie Barth
 Project: **J15-876 GMS Glenwood MS**
 Condition of Sample(s) Upon Receipt: Acceptable

 Date Collected: 10/14/2015
 Date Received: 10/16/2015
 Date Analyzed: 10/20/2015
 Date Reported: 10/20/2015
 Project ID: 15026480

Page 3 of 12

Client Sample Number	GM-15				Out 1			
Sample Location	Classroom 15				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-003				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	2	13	2	1/8	16	107	1	-
basidiospores	13	347	56	1/16	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	17	113	18	1/21	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	2	13	2	1/13	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	20	133	22	3/1	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	-	-	-	-	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	54	620	~100%	1/14	218	8807	~100%	-

Aria Environmental
 P.O. Box 286
 Woodbine, Maryland 21797
 Attn: Julie Barth
 Project: **J15-876 GMS Glenwood MS**
 Condition of Sample(s) Upon Receipt: Acceptable

 Date Collected: 10/14/2015
 Date Received: 10/16/2015
 Date Analyzed: 10/20/2015
 Date Reported: 10/20/2015
 Project ID: 15026480

Page 4 of 12

Client Sample Number	GM-17				Out 1			
Sample Location	Classroom 17				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-004				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	-	-	-	-	16	107	1	-
basidiospores	16	427	55	1/13	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	19	127	16	1/19	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	-	-	-	-	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	32	213	28	4/1	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/35	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	68	773	~100%	1/11	218	8807	~100%	-

Aria Environmental
 P.O. Box 286
 Woodbine, Maryland 21797
 Attn: Julie Barth
 Project: **J15-876 GMS Glenwood MS**
 Condition of Sample(s) Upon Receipt: Acceptable

 Date Collected: 10/14/2015
 Date Received: 10/16/2015
 Date Analyzed: 10/20/2015
 Date Reported: 10/20/2015
 Project ID: 15026480

Page 5 of 12

Client Sample Number	GM-18				Out 1			
Sample Location	Classroom 18				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-005				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	1	7	1	1/16	16	107	1	-
basidiospores	28	747	77	1/8	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	14	93	10	1/25	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	1	7	1	1/25	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	15	100	10	2/1	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	2	13	1	1/18	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	61	967	~100%	1/9	218	8807	~100%	-

Aria Environmental
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Condition of Sample(s) Upon Receipt: Acceptable

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Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480

Page 6 of 12

Client Sample Number	GM-19				Out 1			
Sample Location	Classroom 19				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-006				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	1	7	1	1/16	16	107	1	-
basidiospores	42	280	55	1/20	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	30	200	39	1/12	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	-	-	-	-	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	1	7	1	1/8	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	2	13	3	1/18	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	76	507	~100%	1/17	218	8807	~100%	-

Aria Environmental
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Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480

Page 7 of 12

Client Sample Number	GM-29				Out 1			
Sample Location	Classroom 29				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-007				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	1	7	5	1/6	6	40	<1	-
ascospores	1	7	5	1/16	16	107	1	-
basidiospores	10	67	48	1/85	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	7	47	33	1/50	44	2347	27	-
Curvularia	1	7	5	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	-	-	-	-	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	-	-	-	-	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	1	7	5	1/35	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	21	140	~100%	1/63	218	8807	~100%	-

Aria Environmental
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Attn: Julie Barth
Project: **J15-876 GMS Glenwood MS**
Condition of Sample(s) Upon Receipt: Acceptable

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Date Received: 10/16/2015
Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480

Page 8 of 12

Client Sample Number	GM-32				Out 1			
Sample Location	Classroom 32				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-008				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	-	-	-	-	16	107	1	-
basidiospores	20	133	61	1/42	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	11	73	33	1/32	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	1	7	3	1/25	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	-	-	-	-	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	1	7	3	1/35	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m ³				Analytical Sensitivity: 7 spr/m ³			
Comments								
Total *See Footnotes	33	220	~100%	1/40	218	8807	~100%	-

Aria Environmental
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Attn: Julie Barth
Project: **J15-876 GMS Glenwood MS**
Condition of Sample(s) Upon Receipt: Acceptable

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Date Reported: 10/20/2015
Project ID: 15026480

Page 9 of 12

Client Sample Number	GM-70				Out 1			
Sample Location	Portable Classroom 70				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-009				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	6	40	<1	-
ascospores	4	27	2	1/4	16	107	1	-
basidiospores	36	960	65	1/6	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	51	340	23	1/7	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	-	-	-	-	12	80	1	-
hyphal elements	1	7	<1	1/25	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	19	127	9	2/1	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	2	13	1	1/18	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m ³				Analytical Sensitivity: 7 spr/m ³			
Comments								
Total *See Footnotes	113	1473	~100%	1/6	218	8807	~100%	-

Aria Environmental
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Woodbine, Maryland 21797
Attn: Julie Barth
Project: **J15-876 GMS Glenwood MS**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 10/14/2015
Date Received: 10/16/2015
Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480
Page 10 of 12

Client Sample Number	GM-71				Out 1			
Sample Location	Portable Classroom 71				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-010				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	1	7	<1	1/6	6	40	<1	-
ascospores	6	40	1	1/3	16	107	1	-
basidiospores	45	1200	44	1/5	53	5653	64	-
Cercospora	-	-	-	-	5	33	<1	-
Cladosporium	72	480	18	1/5	44	2347	27	-
Curvularia	1	7	<1	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	1	7	<1	1/12	12	80	1	-
hyphal elements	2	13	<1	1/13	25	167	2	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	137	913	34	17/1	8	53	1	-
Pithomyces	-	-	-	-	2	13	<1	-
Pyricularia	1	7	<1	-	-	-	-	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	3	20	1	1/12	35	233	3	-
Stachybotrys	1	7	<1	-	-	-	-	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	270	2700	~100%	1/3	218	8807	~100%	-

Aria Environmental
P.O. Box 286
Woodbine, Maryland 21797
Attn: Julie Barth
Project: **J15-876 GMS Glenwood MS**
Condition of Sample(s) Upon Receipt: Acceptable

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Date Received: 10/16/2015
Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480

Page 11 of 12

Client Sample Number	Out 2 CY				Out 1			
Sample Location	Outside Courtyard				Outside Near PCR 70			
Sample Volume (L)	150				150			
Lab Sample Number	15026480-012				15026480-011			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	10	67	1	2/1	6	40	<1	-
ascospores	13	87	1	1/1	16	107	1	-
basidiospores	56	5973	59	1/1	53	5653	64	-
Cercospora	1	7	<1	1/5	5	33	<1	-
Cladosporium	30	3200	32	1/1	44	2347	27	-
Drechslera/Bipolaris group	-	-	-	-	2	13	<1	-
Epicoccum	6	40	<1	1/2	12	80	1	-
hyphal elements	39	260	3	2/1	25	167	2	-
Oidium	34	227	2	34/1	1	7	<1	-
Penicillium/Aspergillus group	25	167	2	3/1	8	53	1	-
Pithomyces	3	20	<1	2/1	2	13	<1	-
Polythrincium	1	7	<1	-	-	-	-	-
Rusts	-	-	-	-	5	33	<1	-
Smuts,Periconia,Myxomycetes	15	100	1	1/2	35	233	3	-
Unknown	-	-	-	-	4	27	<1	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments								
Total *See Footnotes	233	10153	~100%	1/1	218	8807	~100%	-

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Date Received: 10/16/2015
Date Analyzed: 10/20/2015
Date Reported: 10/20/2015
Project ID: 15026480
Page 12 of 12

Footnotes and Additional Report Information

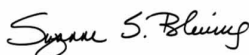
Debris Rating Table

1	Minimal (<5%) particulate present	Reported values are minimally affected by particulate load.
2	5% to 25% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
3	26% to 75% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
4	75% to 90% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
5	Greater than 90% of the trace occluded with particulate	Quantification not possible due to large negative bias. A new sample should be collected at a shorter time interval or other measures taken to reduce particulate load.

1. Penicillium/Aspergillus group spores are characterized by their small size, round to ovoid shape, being unicellular, and usually colorless to lightly pigmented. There are numerous genera of fungi whose spore morphology is similar to that of the Penicillium/Aspergillus type. Two common examples would be Paecilomyces and Acremonium. Although the majority of spores placed in this group are Penicillium, Aspergillus, or a combination of both. Keep in mind that these are not the only two possibilities.
2. Ascospores are sexually produced fungal spores formed within an ascus. An ascus is a sac-like structure designed to discharge the ascospores into the environment, e.g. Ascobolus.
3. Basidiospores are typically blown indoors from outdoors and rarely have an indoor source. However, in certain situations a high basidiospore count indoors may be indicative of a wood decay problem or wet soil.
4. The colorless group contains colorless spores which were unidentifiable to a specific genus. Examples of this group include Acremonium, Aphanocladium, Beauveria, Chrysosporium, Engyodontium microconidia, yeast, some arthrospores, as well as many others.
5. Hyphae are the vegetative mode of fungi. Hyphal elements are fragments of individual Hyphae. They can break apart and become airborne much like spores and are potentially allergenic. A mass of hyphal elements is termed the mycelium. Hyphae in high concentration may be indicative of colonization.
6. Dash (-) in this report, under raw count column means 'not detected (ND)'; otherwise 'not applicable' (NA).
7. The positive-hole correction factor is a statistical tool which calculates a probable count from the raw count, taking into consideration that multiple particles can impact on the same hole; for this reason the sum of the calculated counts may be less than the positive hole corrected total.
8. Due to rounding totals may not equal 100%.
9. Analytical Sensitivity for each spores is different for Non-viable sample when the spores are read at different percentage.
10. Minimum Reporting Limits (MRL) for BULKS, DUSTS, SWABS, and WATER samples are a calculation based on the sample size and the dilution plate on which the organism was counted. Results are a compilation of counts taken from multiple dilutions and multiple medias. This means that every genus of fungi or bacteria recovered can be counted on the plate on which it is best represented.
11. If the final quantitative result is corrected for contamination based on the blank, the blank correction is stated in the sample comments section of the report.
12. Analysis conducted on non-viable spore traps is completed using Indoor Environmental Standards Organization (IESO) Standard 2210.
13. The results in this report are related to this project and these samples only.
14. For samples with an air volume of < 100L, the number of significant figures in the result should be considered (2) two. For samples with air volumes between 100-999L, the number of significant figures in the result should considered (3) three. For example, a sample with a result of 55,443 spr/m³ from a 75L sample using significant figures should be considered 55,000. The same result of 55,443 from a 150L sample using significant figures should be considered 55,400 spr/m³.
15. If the In/Out ratio is greater than 100 times it is indicated >100/1, rather than showing the real value.

Terminology Used in Direct Exam Reporting

Conidiophores are a type of modified hyphae from which spores are born. When seen on a surface sample in moderate to numerous concentrations they may be indicative of fungal growth.



Suzanne S. Blevins, B.S., SM (ASCP)
Laboratory Director



LAB #192683 (CO)
 LAB #102977 (GA)
 LAB #163063 (VA)
 LAB #210229 (AZ)

NVLAP Lab Code 200860-0 (CO)
 NVLAP Lab Code 200829-0 (VA)
 NVLAP Lab Code 500097-0 (AZ)

AZ, CO, GA, VA, NJ

Aerobiology Client Aria Environmental, Inc.		Collected By/Date: 10/14/15		Relinquished By/Date: 10/15/15	
Field Contact	Julie Barth	Relinquished By/Date: 10/15/15		Received By/Date: <i>Em 10/16/2015</i>	
Reporting Address	PO Box 286, Woodbine, MD 21797	Sampler Type	Andersen _____ SAS _____	Sample Aire	Other <i>AllergencoD</i> _____
Billing Address	SAME	PO#/Job#:	J15-876 GMS		
Phone/Fax	410-549-5774/410-549-4488	Project Name:	Glenwood MS		
Reporting Email (s)	jbarth@ariaenviro.com	Routine <input checked="" type="radio"/>	24 Hour <input type="radio"/>	Same Day <input type="radio"/>	4 Hour <input type="radio"/>
		5 Day (Asbestos Only) <input type="radio"/>	2 Hour <input type="radio"/>	Notes:	
SAMPLING LOCATION ZIP CODE 21738		CC Info:			

Sample No.	Test Code	Sample Location	Total Volume/Area
1 GM-08	1054	Classroom 8	150 L
2 GM-11	1054	Classroom 11	150 L
3 GM-15	1054	Classroom 15	150 L
4 GM-17	1054	Classroom 17	150 L
5 GM-18	1054	Classroom 18	150 L
6 GM-19	1054	Classroom 19	150 L
7 GM-29	1054	Classroom 29	150 L
8 GM-32	1054	Classroom 32	150 L
9 GM-70	1054	Portable Classroom 70	150 L
10 GM-71	1054	Portable Classroom 71	150 L
11 Out 1	1054	Outside near PCR 70	150 L
12 Out 2 CY	1054	Outside Courtyard	150 L
13			
14			

1054	Direct, Non-viable Spore Trap	1015	Culture - WATER Legionella
1051	Direct, Qualitative- Swab/Tape	1017	Culture - SWAB Legionella
1050	Direct, Qualitative- Bulk	1010	WATER - Potable - E. coli/total coliforms
1005	AIR Culture - Bacterial Count w/ ID's	1012	SWAB - E. coli/total coliforms
1030	AIR Culture - Fungal Count w/ ID's	1028	Sewage Screen (E. coli/Enterococcus/fecal coliforms)
1006	SWAB Culture - Bacterial Count w/ ID's	2056	Heterotrophic Plate Count
1031	SWAB Culture - Fungal Count w/ ID's	3001	ASBESTOS - Point count
1008	BULK Culture - Bacterial Count w/ ID's	3002	ASBESTOS - PLM Analysis
1033	BULK Culture - Fungal Count w/ ID's	3003	ASBESTOS - Particle characterization
1007	WATER Culture - Bacterial Count w/ID's	3004	ASBESTOS - PCM Analysis

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