

**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:



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SEPTEMBER 1, 2015

150876

**SPORE TRAP SAMPLING REPORT
FOR GLENWOOD MIDDLE SCHOOL
AUGUST 27, 2015**

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**SPORE TRAP SAMPLING REPORT
FOR GLENWOOD MIDDLE SCHOOL
AUGUST 27, 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 August 27, 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 August 27, 2015.

**Spore Trap Sampling Report
For Glenwood Middle School
August 27, 2015**

I. BACKGROUND

Representatives from Aria Environmental, Inc. (AE) visited Glenwood Middle School on August 27, 2015 to perform air monitoring in response to an ongoing indoor air quality complaint at the school. Indoor air samples were collected from classrooms 7, 8, 9, 15, 18, 19, 25, 26, 27, 33, 34 and Band Room 36. Outdoor air samples were also collected for comparison purposes in one courtyard and immediately outside classroom 35 (FACS). 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 overcast with a light breeze.

II. OBSERVATIONS AND MEASUREMENTS

A. Observations and Measurements on August 27, 2015

The room air temperature measured between 3:00 PM and 5:00 PM ranged from 73.6 to 77.7° F with an average of 74.4° F. The temperatures are considered acceptable for summer thermal comfort. The indoor relative humidity ranged from 36.7 to 44.4 percent. 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

The outside temperature at 4:10 PM was 75.5° F and the outdoor relative humidity was 48.8% in the back of the school near the FACS Room 35, and the outside temperature at 4:25 PM was 79.0° F and the relative humidity was 43.7% in the courtyard between the 7th and 8th grade wings. No windows or doors were observed to be open during the monitoring period. The U.S. Environmental Protection Agency (EPA) recommends maintaining indoor relative humidity below 60% and ideally between 30 and 50%. The indoor humidity measurements were within the ranges recommended for thermal comfort. The school was on a summer cooling schedule at the time of monitoring.

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 unoccupied. Carbon dioxide concentrations ranged from 376 to 498 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 339 to 351 ppm. Carbon dioxide concentrations were within the comfort parameters established by ASHRAE.

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Carbon monoxide is mainly attributed to incomplete combustion. Concentrations of CO ranged from 0.2 to 1.0 ppm indoors and the outdoor concentration was 0.1 ppm in both 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.

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**Table 2: Particle, Temperature, Relative Humidity, Carbon Dioxide and Carbon Monoxide
Measurements Collected on August 27, 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 7	3:01 PM	0	0	2	2	5	77.7	35.3	0.6	498
CR 8	3:04 PM	0	0	2	3	5	75.6	37.5	0.3	482
CR 9	3:07 PM	0	0	1	1	3	74.6	39.5	0.3	446
CR 15	3:13 PM	0	0	1	1	2	73.6	39.8	0.2	425
CR 18	3:17 PM	0	0	7	10	18	74.1	39	0.3	412
CR 19	3:19 PM	0	0	1	1	3	74.2	38.3	0.3	392
CR 25	3:23 PM	0	0	1	1	2	73.7	38.7	0.3	398
CR 26	3:26 PM	0	0	1	1	1	73.9	37.2	0.4	376
CR 27	3:28 PM	0	0	1	1	3	73.7	38.3	0.3	384
CR 33	3:31 PM	0	0	0	1	1	73.6	37.9	0.2	391
CR 34	3:34 PM	0	0	1	1	2	74.6	38.9	1	426
CR 36	3:40 PM	0	0	1	3	4	73.9	38.7	0.2	385
Outside 1 behind Classroom 35	4:10 PM	0	0	2	4	6	75.5	48.8	0.1	351
Outside in Courtyard between Classrooms 3 and 16	4:25 PM	0	0	1	3	6	79	43.7	0.1	339

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B. Air Monitoring for Fungal Identification and Counting on August 27, 2015

In the absence of visual sources of mold amplification and growth in the classrooms, non-viable spore trap samples were collected from twelve classrooms (classrooms 7, 8, 9, 15, 18, 19, 25, 26, 27, 33, 34 and Band Room 36) 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). Table 3 presents the results of the spore trap samples collected at Glenwood Middle School on August 27, 2015.

Indoor spore counts ranged from 400 to 747 total spores per cubic meter of air (m³) on August 27th, 2015. All indoor samples had total spore counts lower than the outdoor samples which ranged from 9,433 to 10,960 spores per m³. Spores identified as "colorless" were found in the Classroom 15 sample (60 spores per m³) and Classroom 18 sample (47 spores per m³) but not in the outdoor samples. Penicillium/Aspergillus spores were higher in the Classroom 15 sample (433 spores per m³) and the Classroom 25 sample (247 spores per m³) compared to the outdoor samples (33 – 227 Penicillium/Aspergillus spores per m³). The rusts spore count found in the Classroom 34 sample (13 spores per m³) was slightly higher than the outdoor samples that were both 7 spores per m³. Windows were not open during sampling.

No secondary colonizers including Chaetomium or Stachybotrys were detected in the air samples. Hyphal elements were detected in six of the twelve indoor samples and ranged from 7 to 33 spores/m³; however, all detected indoor hyphal fragments were lower than the outdoor sample hyphal element counts ranging from 47 to 60 fragments per m³ in the two outdoor samples. 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.

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Table 3: Results of Spore Trap Sampling in Selected Classrooms in Glenwood Middle School on August 27, 2015

Location	Outside near Classroom 35 (Out 1)	Outside in Courtyard near Room 3 (Out 2)	Room 7 (GM 07)	Room 8 (GM 08)	Room 9 (GM 09)	Room 15 (GM 15)	Room 18 (GM 18)	Room 19 (GM 19)
Spore Type	Spores/ m³	Spores/ m³	Spores/ m³	Spores/ m³	Spores/ m³	Spores/ m³	Spores/ m³	Spores/ m³
Alternaria	13	40	-	-	-	-	-	-
Ascospores	960	2,347	33	60	67	60	67	33
Basidiospores	4,587	5,333	147	113	120	127	113	227
Cercospora	47	33	-	-	-	-	-	-
Cladosporium	3,307	2,880	153	187	200	60	73	93
Colorless	-	-	-	-	-	60	47	-
Curvularia	-	13	-	-	-	-	-	-
Dreschslera/ Bipolaris	7	-	7	-	-	-	-	-
Epicoccum	60	113	-	7	-	-	-	-
Fusicladium	7	-	-	-	-	-	-	-
Hyphal Elements	60	47	7	20	7	-	-	-
Oidium	7	7	-	-	-	-	-	-
Penicillium/ Aspergillus	227	33	173	200	207	433	213	213
Pithomyces	107	80	7	-	-	-	-	7
Rusts	7	7	-	7	-	-	-	-
Smuts, Periconia, myxomycetes	27	13	7	13	-	7	-	7
Torula	13	7	-	-	-	-	-	-
Unknown	-	7	-	-	-	-	-	-
Total Fungi	9,433	10,960	533	607	600	747	513	580

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

*Spore Sampling Report
For Glenwood Middle School
August 27, 2015*

**Table 3: Results of Spore Trap Sampling in Selected Classrooms in Glenwood Middle School on August 27, 2015
(Continued)**

Location	Outside near Classroom 35 (Out 1)	Outside in Courtyard near Room 3 (Out 2)	Room 25 (GM 25)	Room 26 (GM 26)	Room 27 (GM 27)	Room 33 (GM 33)	Room 34 (GM 34)	Room 36 (GM 36)
Spore Type	Spores/ m ³	Spores/ m ³	Spores/ m ³	Spores/ m ³	Spores/ m ³	Spores/ m ³	Spores/ m ³	Spores/ m ³
<i>Alternaria</i>	13	40	-	-	-	-	-	-
Ascospores	960	2,347	27	93	100	53	60	113
Basidiospores	4,587	5,333	53	253	167	233	147	160
<i>Cercospora</i>	47	33	-	-	-	-	-	-
<i>Cladosporium</i>	3,307	2,880	80	127	133	87	47	120
Colorless	-	-	-	-	-	-	-	-
<i>Curvularia</i>	-	13	-	-	-	-	-	7
<i>Dreschslera/Bipolaris</i>	7	-	-	-	-	-	-	7
<i>Epicoccum</i>	60	113	-	-	-	-	-	-
<i>Fusicladium</i>	7	-	-	-	-	-	-	-
Hyphal Elements	60	47	13	-	-	-	20	33
<i>Oidium</i>	7	7	-	-	-	-	-	-
<i>Penicillium/Aspergillus</i>	227	33	247	80	147	93	100	113
<i>Pithomyces</i>	107	80	-	-	-	-	7	20
Rusts	7	7	-	-	-	-	13	-
Smuts, Periconia, myxomycetes	27	13	27	7	-	7	7	7
<i>Torula</i>	13	7	-	-	-	-	-	-
Unknown	-	7	-	-	-	-	-	-
Total Fungi	9,433	10,960	447	560	547	473	400	580

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

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For Glenwood Middle School
August 27, 2015**

III. CONCLUSIONS AND RECOMMENDATIONS

Thermal comfort parameters of temperature and humidity were measured on August 27, 2015 and found to be within the comfort ranges established by ASHRAE. Carbon dioxide, carbon monoxide and particulate matter measurements were within acceptable ranges for good indoor air quality in all areas.

Indoor spore counts ranged from 400 to 747 total spores per cubic meter of air (m³). All indoor samples had total spore counts lower than the two outdoor samples which ranged from 9,433 to 10,960 spores per m³. Penicillium/Aspergillus spores were higher in the Classroom 15 sample (433 spores per m³) and the Classroom 25 sample (247 spores per m³) compared to the outdoor samples (33 – 227 Penicillium/Aspergillus spores per m³). Colorless and rusts spore counts were detected at slightly higher concentrations compared to the outdoor samples, but the overall counts were low (less than 100 spores per m³).

Two days prior to this sampling event, on August 25, 2105, indoor counts ranged from 1,787 to 8,087 total spores per m³ of air and outdoor spore counts ranged from 34,001 to 37,316 total spores per m³ of air. These counts are approximately three times higher indoors and outdoors and demonstrate the variable nature of spore counts.

Spore measurements collected in classrooms were generally acceptable compared to outdoor samples with outdoor total spore counts approximately 18 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 September 2, 2015 and will be performed on a weekly basis until the end of September in order to monitor changes in conditions affected by seasonal variations and the new HVAC system.

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 August 27, 2015

High-lighted rooms designate areas sampled on August 27, 2015



E N T R A N C E

Glenwood Middle School Floor Plan



Attachment B:

**Report of Analysis and Chain of Custody Forms
August 27, 2015**

Aria Environmental
P.O. Box 286
Woodbine, Maryland 21797
Attn: Julie Barth
Project: **.PO# Y15-876GMS Glenwood, MS**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 08/27/2015
Date Received: 08/28/2015
Date Analyzed: 08/28/2015
Date Reported: 08/28/2015
Project ID: 15020173
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1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	GM07				Out1			
Sample Location	CR07				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-001				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	5	33	6	1/29	9	960	10	-
basidiospores	22	147	28	1/31	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	23	153	29	1/22	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	1	7	1	1/1	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	1	7	1	1/9	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	26	173	32	1/1	34	227	2	-
Pithomyces	1	7	1	1/16	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	80	533	~100%	1/18	170	9433	~100%	-

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Date Analyzed: 08/28/2015
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Project ID: 15020173

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Client Sample Number	GM08				Out1			
Sample Location	CR08				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-002				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	9	60	10	1/16	9	960	10	-
basidiospores	17	113	19	1/40	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	28	187	31	1/18	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	1	7	1	1/9	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	3	20	3	1/3	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	30	200	33	1/1	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	1	7	1	1/1	1	7	<1	-
Smuts,Periconia,Myxomycetes	2	13	2	1/2	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	91	607	~100%	1/16	170	9433	~100%	-

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Date Analyzed: 08/28/2015
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Project ID: 15020173

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Client Sample Number	GM09				Out1			
Sample Location	CR09				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-003				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	10	67	11	1/14	9	960	10	-
basidiospores	18	120	20	1/38	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	30	200	33	1/17	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	1	7	1	1/9	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	31	207	34	1/1	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	-	-	-	-	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	90	600	~100%	1/16	170	9433	~100%	-

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Project ID: 15020173

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Client Sample Number	GM015				Out1			
Sample Location	CR15				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-004				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	9	60	8	1/16	9	960	10	-
basidiospores	19	127	17	1/36	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	9	60	8	1/55	31	3307	35	-
Colorless	9	60	8	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	65	433	58	2/1	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	112	747	~100%	1/13	170	9433	~100%	-

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Date Collected: 08/27/2015
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Client Sample Number	GM018				Out1			
Sample Location	CR18				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-005				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	10	67	13	1/14	9	960	10	-
basidiospores	17	113	22	1/40	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	11	73	14	1/45	31	3307	35	-
Colorless	7	47	9	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	32	213	42	1/1	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	-	-	-	-	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	77	513	~100%	1/18	170	9433	~100%	-

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Project: **.PO# Y15-876GMS Glenwood, MS**
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Client Sample Number	GM019				Out1			
Sample Location	CR19				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-006				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	5	33	6	1/29	9	960	10	-
basidiospores	34	227	39	1/20	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	14	93	16	1/35	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	32	213	37	1/1	34	227	2	-
Pithomyces	1	7	1	1/16	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	87	580	~100%	1/16	170	9433	~100%	-

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Client Sample Number	GM25				Out1			
Sample Location	CR25				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-007				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	4	27	6	1/36	9	960	10	-
basidiospores	8	53	12	1/86	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	12	80	18	1/41	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	2	13	3	1/5	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	37	247	55	1/1	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	4	27	6	1/1	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 4				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments	Large amount of particulate seen.				Large amount particulate and fibers seen.			
Total *See Footnotes	67	447	~100%	1/21	170	9433	~100%	-

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Client Sample Number	GM26				Out1			
Sample Location	CR26				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-008				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	14	93	17	1/10	9	960	10	-
basidiospores	38	253	45	1/18	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	19	127	23	1/26	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	12	80	14	1/3	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	84	560	~100%	1/17	170	9433	~100%	-

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Client Sample Number	GM27				Out1			
Sample Location	CR27				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-009				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	15	100	18	1/10	9	960	10	-
basidiospores	25	167	30	1/28	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	20	133	24	1/25	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	22	147	27	1/2	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	-	-	-	-	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	82	547	~100%	1/17	170	9433	~100%	-

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Client Sample Number	GM33				Out1			
Sample Location	CR33				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-010				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	8	53	11	1/18	9	960	10	-
basidiospores	35	233	49	1/20	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	13	87	18	1/38	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	14	93	20	1/2	34	227	2	-
Pithomyces	-	-	-	-	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 2				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	71	473	~100%	1/20	170	9433	~100%	-

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Client Sample Number	GM34				Out1			
Sample Location	CR34				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-011				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	9	60	15	1/16	9	960	10	-
basidiospores	22	147	37	1/31	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	7	47	12	1/71	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	3	20	5	1/3	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	15	100	25	1/2	34	227	2	-
Pithomyces	1	7	2	1/16	16	107	1	-
Rusts	2	13	3	2/1	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	2	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments	Large amount of particulate and fibers seen.				Large amount particulate and fibers seen.			
Total *See Footnotes	60	400	~100%	1/24	170	9433	~100%	-

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Client Sample Number	GM36				Out1			
Sample Location	CR36				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-012				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	-	-	-	-	2	13	<1	-
ascospores	17	113	20	1/8	9	960	10	-
basidiospores	24	160	28	1/29	43	4587	49	-
Cercospora	-	-	-	-	7	47	<1	-
Cladosporium	18	120	21	1/28	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	1	7	1	-	-	-	-	-
Drechslera/Bipolaris group	1	7	1	1/1	1	7	<1	-
Epicoccum	-	-	-	-	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	5	33	6	1/2	9	60	1	-
Oidium	-	-	-	-	1	7	<1	-
Penicillium/Aspergillus group	17	113	20	1/2	34	227	2	-
Pithomyces	3	20	3	1/5	16	107	1	-
Rusts	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	1	1/4	4	27	<1	-
Torula	-	-	-	-	2	13	<1	-
Unknown	-	-	-	-	-	-	-	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments					Large amount particulate and fibers seen.			
Total *See Footnotes	87	580	~100%	1/16	170	9433	~100%	-

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Client Sample Number	Out2				Out1			
Sample Location	Outside in Courtyard 1				Outside CR 35			
Sample Volume (L)	150				150			
Lab Sample Number	15020173-014				15020173-013			
Spore Identification	Raw Ct	spr/m ³	% Ttl	In/Out	Raw Ct	spr/m ³	% Ttl	In/Out
Alternaria	6	40	<1	3/1	2	13	<1	-
ascospores	22	2347	21	2/1	9	960	10	-
basidiospores	50	5333	49	1/1	43	4587	49	-
Cercospora	5	33	<1	1/1	7	47	<1	-
Cladosporium	27	2880	26	1/1	31	3307	35	-
Colorless	-	-	-	-	-	-	-	-
Curvularia	2	13	<1	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	1	7	<1	-
Epicoccum	17	113	1	2/1	9	60	1	-
Fusicladium	-	-	-	-	1	7	<1	-
hyphal elements	7	47	<1	1/1	9	60	1	-
Oidium	1	7	<1	1/1	1	7	<1	-
Penicillium/Aspergillus group	5	33	<1	1/7	34	227	2	-
Pithomyces	12	80	1	1/1	16	107	1	-
Rusts	1	7	<1	1/1	1	7	<1	-
Smuts,Periconia,Myxomycetes	2	13	<1	1/2	4	27	<1	-
Torula	1	7	<1	1/2	2	13	<1	-
Unknown	1	7	<1	-	-	-	-	-
	Debris Rating 3				Debris Rating 3			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Comments	Large amount of particulate and fibers seen.				Large amount particulate and fibers seen.			
Total *See Footnotes	159	10960	~100%	1/1	170	9433	~100%	-

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Footnotes and Additional Report Information

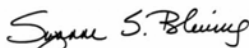
Debris Rating Table

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 Smut, Periconia, Myxomycete group is composed of three different groups whose spores have similar morphologies. Smuts are plant pathogens, Periconia is a relatively uncommon mold indoors, and Myxomycetes are not fungi but slime molds. Although these organisms do not typically proliferate indoors, their spores are potentially allergenic.
5. 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.
6. 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.
7. Dash (-) in this report, under raw count column means 'not detected (ND)'; otherwise 'not applicable' (NA).
8. 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.
9. Due to rounding totals may not equal 100%.
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 be 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

15 020173
 15020173



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: JCB/27/15		Relinquished By/Date: JCB/27/15	
Field Contact Julie Barth	Reporting Address PO Box 286, Woodbine, MD 21797	Relinquished By/Date:		Received By/Date: JCB/27/15	
Billing Address SAME	Phone/Fax 410-549-5774/410-549-4488	Sampler Type Andersen	Sample Type SAS	Sample Type AeroTrap	Other Allergens
Reporting Email (s) jbarth@ariaenviro.com	Project Name: Glenwood MS	PO#/Job#: J15-876 GMS	Notes:		
Routine <input type="radio"/> 24 Hour <input type="radio"/> Same Day <input checked="" type="radio"/> 4 Hour <input type="radio"/> 2 Hour <input type="radio"/>	5 Day (Asbestos Only) <input type="radio"/>	CC Info:			
SAMPLING LOCATION ZIP CODE 21738					

Sample No.	Test Code	Sample Location	Total Volume/Area
1	GM 07	CR 07	150
2	08	CR 08	
3	09	CR 09	
4	15	CR 15	
5	18	CR 18	
6	19	CR 19	
7	25	CR 25	
8	26	CR 26	
9	27	CR 27	
10	33	CR 33	
11	34	CR 34	
12	36	CR 36	
13	out 1	outside CR 35	
14	out 2	outside in courtyard 1	

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