ADDENDUM 1 TO THE
INDOOR ENVIRONMENTAL QUALITY INVESTIGATION
FOR
GLENWOOD MIDDLE SCHOOL

PREPARED FOR:

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

PREPARED BY:

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

JANUARY 24, 2014 ✓

130767

ADDENDUM 1 TO THE
INDOOR ENVIRONMENTAL QUALITY INVESTIGATION
FOR
GLENWOOD MIDDLE SCHOOL

Reviewed by: _____

Michele M. Twilley, DrPH, CIH
Aria Environmental, Inc.

ADDENDUM 1 TO THE
INDOOR ENVIRONMENTAL QUALITY INVESTIGATION
FOR
GLENWOOD MIDDLE SCHOOL

TABLE OF CONTENTS

Tables

Attachments

ADDENDUM 1 TO THE
INDOOR ENVIRONMENTAL QUALITY INVESTIGATION
FOR
GLENWOOD MIDDLE SCHOOL

EXECUTIVE SUMMARY

Aria Environmental, Inc. (AEI) was contracted by Howard County Public School System to perform an indoor environmental quality investigation of the Glenwood Middle School at the end of August 2013. A complaint was lodged by one of the teachers about high humidity, mold and adverse health effects experienced while she is in the school. AEI conducted interviews with Glenwood Middle School faculty, staff and administrators, Howard County Public School System facilities and building services personnel and Global Facilities Solutions (a mechanical engineering consultant). AEI also performed visual inspections of the classrooms, boiler room and crawlspace; made measurements for temperature, humidity, carbon monoxide, carbon dioxide, particulate matter and fungal identification and counting; and has attended meetings with HCPSS and Global Facilities Solutions. On December 16, 2013, HCPSS requested additional air monitoring for the presence of mold spores at Glenwood Middle School. This addendum report presents the results of air sampling for fungi and indoor air quality measurements for temperature, relative humidity, carbon monoxide, carbon dioxide and particulate matter made on December 17, 2013. Methods used in the investigation and background information are presented in the November 1, 2013 report.

I. BACKGROUND

A representative from Aria Environmental, Inc. (AEI) visited Glenwood Middle School on December 17, 2013 to perform additional air monitoring in response to an ongoing indoor air quality complaint at the school. Indoor air samples were collected from classrooms 7, 11, 15, 26 and 29. One outdoor air sample was also collected for comparison purposes. The background associated with the complaint is detailed in the Indoor Environmental Quality Investigation report dated November 1, 2013. We understand that there have been no changes made in the school concerning the crawl space or mechanical systems since the November 1, 2013 report.

The school did not appear to be under the influence of strong negative pressure as evidenced by the ease of opening and closing doors to the outside. No measurements were made to determine pressurization of the school or air flow patterns. Mr. Steve Harrison was onsite during the air monitoring activities and he confirmed that the exhaust fans in the corridors were shut down and that the unit ventilators were running. There was no evidence of mold growth observed in the classrooms. Moldy/musty odors were observed in the main corridor connecting the 6th and 8th grade wings of the school.

Weather on the day of monitoring was cloudy and cold with a little drizzle earlier in the day. A couple of inches of accumulated snow from the December 14, 2013 storm remained in the fields surrounding the school but was not present in the courtyards between classroom wings or near the portable classrooms.

II. OBSERVATIONS AND MEASUREMENTS

A. Observations and Measurements on December 17, 2013

The room air temperature measured between 3:31 pm and 5:04 pm ranged from 69.1 and 70.9°F with an average of 69.9°F. The temperatures are considered acceptable for winter thermal comfort. The indoor relative humidity ranged between 21.3 and 25.2 percent. Dry conditions can lead to increased static electricity and health problems, such as skin, eye, nose and throat irritation, the relative humidity should be greater than 30% to prevent these problems. 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

[a]adapted from ASHRAE Standard 55-2010

The outside temperature at 3:59 pm was 38.0°F and the outdoor relative humidity was 55.3%. Snow from December 14, 2013 was covering large areas of ground away from the school building but was not present in the courtyards between classroom wings or between the school and the portable classrooms. 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% to prevent mold growth. The indoor humidity measurements were below the range for comfort.

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 were 421-617 ppm. 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 was 414 ppm. Carbon dioxide concentrations were within the comfort parameters established by ASHRAE. Carbon monoxide is mainly attributed to incomplete combustion and was not detected in the school. Carbon monoxide 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 $\mu g/m^3$ and 50 $\mu g/m^3$, 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.

The visual inspection of the rooms visited on December 17, 2013 did not reveal any obvious sources of water damage, moisture or mold growth. A musty/mildew odor was observed in the main hallway providing access to the 6th and 8th grade wings.

Table 2: Particle and Indoor Air Quality (IAQ) Measurements

Date: 12/17/2013 Location: Glenwood Middle School Operator: Michele Twilley

Location	December 17, 2013									
	Time	PM1 (mg/m^3)	PM2.5 (mg/m^3)	PM7 (mg/m^3)	PM10 (mg/m^3)	TSP (mg/m^3)	Temp (°F)	Rh (%)	CO (ppm)	CO2 (ppm)
Room 26	15:31	0.000	0.001	0.003	0.003	0.010	69.1	25.2	0.0	557
Room 29	15:42	0.000	0.001	0.002	0.003	0.006	69.3	23.5	0.0	617 (2 people in room)
Outside	15:59	0.004	0.008	0.018	0.020	0.025	38.0	55.3	1.0	414
Room 15	16:36	0.001	0.002	0.008	0.011	0.017	70.9	23.2	0.0	421
Room 11	16:50	0.001	0.002	0.005	0.007	0.009	70.7	21.3	0.0	434
Room 7	17:04	0.001	0.002	0.003	0.003	0.006	69.3	22.6	0.0	499

B. Air Monitoring for Fungal Identification and Counting on December 17, 2013

In the absence of visual sources of mold amplification and growth in the classrooms, non-viable spore trap samples were collected from five indoor locations and one outdoor location to determine whether there was a difference between mold spore loads inside the building versus outside. Sample locations included five classrooms (classrooms 7, 11, 15, 26, 29), and one sample outdoors for comparison. Classrooms 7, 15, 26, and 29 are complaint areas and classroom 11 is a non-complaint area.

The spore trap samples were collected using AllergenCo-D cassettes attached to a sampling pump calibrated to 15 liter per minute (LPM) air flow. The samples were collected for a period of 10 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 m^3) 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 December 17, 2013.

Table 3 - Results of Spore Trap Sampling in Selected Classrooms in Glenwood Middle School on December 17, 2013

Location	Outside (131217-03)	Room 26 (131217-01)	Room 29 (131217-02)	Room 15 (131217-04)	Room 11 (131217-05)	Room 7 (131217-06)
Spore Type	**Spores/ m^3**	**Spores/ m^3**	**Spores/ m^3**	**Spores/ m^3**	**Spores/ m^3**	**Spores/ m^3**
Ascospores	13	**67**	---	---	**33**	**20**
Basidiospores	3,413	3,200	67	127	260	260
Cladosporium	40	**4,267**	7	**107**	**73**	33
Hyphal Elements	---	---	---	13	---	---
Penicillium/ Aspergillus	313	**1,600**	**5,973**	**4,153**	53	233
Smuts, Periconia, myxomycetes	7	---	7	**13**	7	7
Total Fungi	3,786	**9,134**	**6,054**	**4,413**	426	553

Bold numbers represent spore concentrations above the outdoor counts.

Indoor spore counts ranged from 426 to 9,134 total spores per cubic meter of air (m^3) and were lower in classrooms 7 and 11 than the total spore count for the outdoor sample.

The presence of Penicillium/Aspergillis group spores was higher indoors than outdoors in classrooms 15, 26 and 29. The concentration of Penicillium/Aspergillis spores in classrooms 15, 26 and 29 are all greater than 800 spores/m^3 of air above outdoor concentrations and is likely from an indoor source.

No secondary colonizers including Chaetomium or Stachybotrys were detected in the classrooms. Hyphal fragments were detected in classroom 15 but in none of the other classrooms or in the outdoor air sample. Certificates of analysis are included as Attachment B.

Table 4a presents the spore counts per cubic meter of air measured in classrooms 11, 15, 26 and 29 on October 18th, 28th and December 17, 2013. The tables show natural variability in the spore counts within in the building.

Table 4a: Spore Concentrations on October 18, 2013, October 28, 2013 and December 17, 2013
Glenwood Middle School Classrooms 11, 15, 26 and 29

Spore (mg/m^3)	Classroom (CR) Number and Date of Spore Trap Sampling for Selected Spore Types								
	CR11 10/18/13	**CR11 12/17/13**	**CR15 10/18/13**	**CR15 10/28/13**	**CR15 12/17/13**	**CR26 10/18/13**	**CR26 12/17/13**	**CR29 10/18/13**	**CR29 12/17/13**
Ascospores	7	**33**	47	33	---	20	**67**	73	---
Basidiospores	4,480	260	12,373	620	127	**22,062**	3,200	3,627	67
Cladosporium	333	**73**	1,067	33	**107**	720	**4,267**	513	7
Pen/Asp sp	27	53	**1,440**	**287**	**4,153**	80	**1,600**	**187**	**5,973**
Total	4,947	426	15,055	1,013	**4,413**	**22,942**	**9,134**	4,447	**6,054**

Bold represents spore concentrations that were higher indoors than outdoors on the day of monitoring.

Table 4b presents a comparison of the outdoor spore concentrations for three days of monitoring for select spore types. The outdoor spore concentrations were within the range of expected concentrations for Maryland as reported by EMLab in their MoldRANGE tables. 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.

Table 4b: Outdoor Spore Concentrations on October 18, 2013, October 28, 2013 and December 17, 2013
Glenwood Middle School

Spore (mg/m^3)	10/18/13	10/28/13	12/17/13
Ascospores	173	507	13
Basidiospores	13,845	2,880	3,413
Cladosporium	5,120	107	40
Pen/Asp sp	80	140	313
Total	20,204	3,834	3,786

III. CONCLUSIONS AND RECOMMENDATIONS

Thermal comfort parameters of temperature and humidity were measured on December 17, 2013. The temperature was within the comfort range established by ASHRAE but the relative

humidity was below 30% and is considered dry. Dry conditions can lead to increased static electricity and health problems, such as skin, eye, nose and throat irritation, the relative humidity should be greater than 30% to prevent these problems. Carbon monoxide, carbon dioxide and particulate matter measurements were within acceptable ranges for good indoor air quality.

Fewer types of spores were identified on December 17, 2013 than on October 18, 2013 as would be expected with the winter season. No new spore types were identified in December than were identified in October. Spore measurements made in classrooms 7 and 11 were generally acceptable compared to outdoor samples with outdoor total spore counts exceeding indoors. Spore measurements made in classrooms 15, 26 and 29 reveal increased Penicillium/Aspergillus species spore concentrations over outdoors on December 17, 2013.

Cladosporium increased in CR 26 over outdoors and over the October monitoring period. Penicillium/Aspergillus species spores continue to exist indoors at concentrations above outdoors in classrooms 15 and 29 and are now above outdoors in classroom 26. Furthermore the concentration of Penicillium/Aspergillus species spores has increased indoors from October in classrooms 26 and 29 while outdoor concentrations also increased over October concentrations in outdoor air.

We understand that there has been no modification to building systems or the crawl space since November 1, 2013. The increased spore concentrations of Penicillium/Aspergillus species spores in the complaint rooms of the school indicate the need for further evaluation to determine the appropriate course of action for control. These measures include understanding the pressure differential and transport patterns between the classrooms, crawlspaces, corridors and outdoors. Diffusional air movement generally occurs when air velocities are below 50 feet per minute and where there is movement from higher pressure to lower pressure. Measuring the pressure differentials will provide quantitative and temporal descriptions of the air movement patterns and establish parameters for installation of engineering controls to control airflow. Scented vapors can be used to confirm diffusional air flow patterns and the effectiveness of controls.

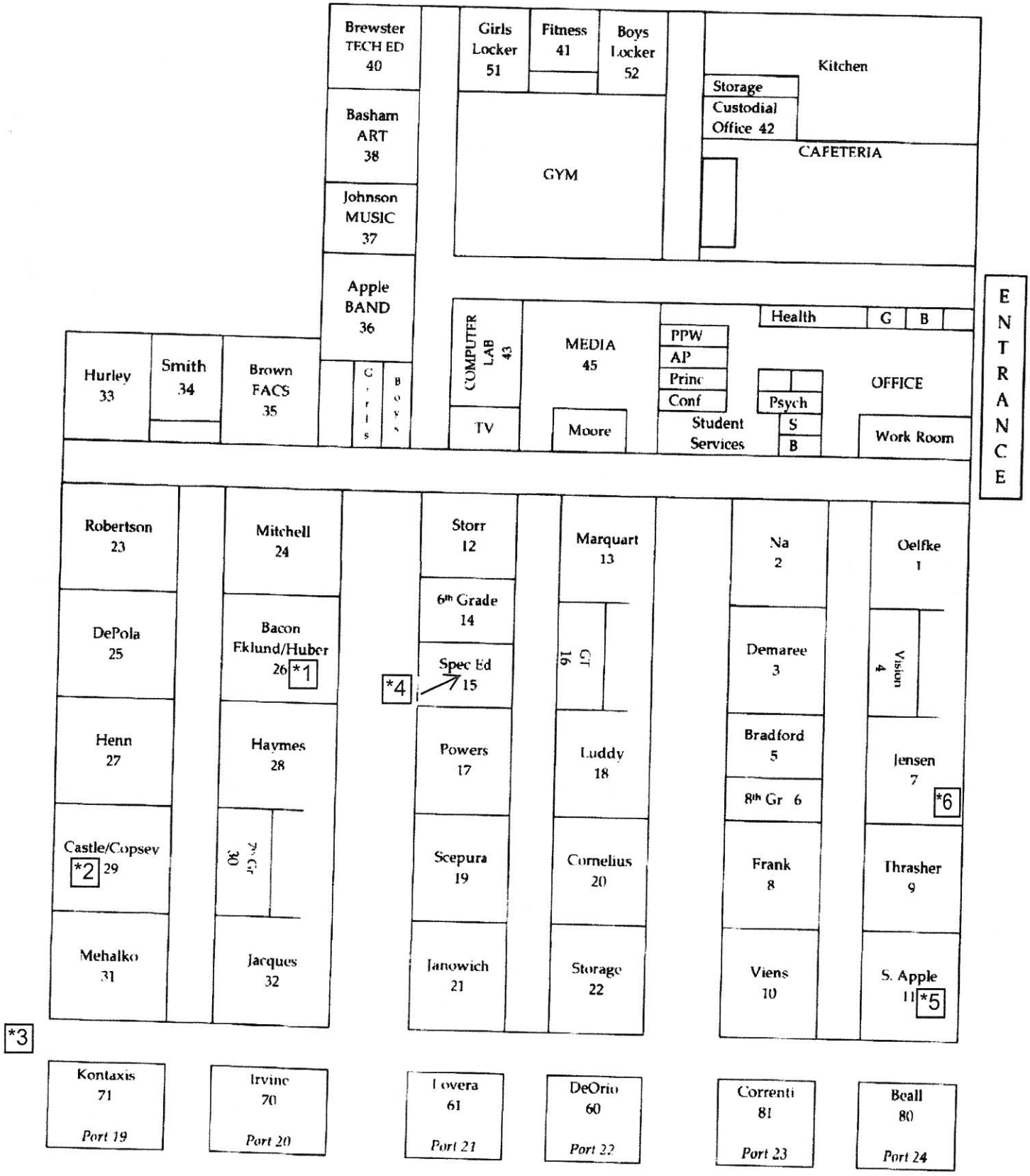
IV. LIMITATIONS

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 my 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 December 17, 2013



Glenwood Middle School Floor Plan

Sample Location Plan
December 17, 2013

N

As of 8/02/13

Attachment B:

Report of Analysis and Chain of Custody Forms
December 17, 2013

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

43760 Trade Center Place
Suite 100
Dulles, VA 20166
(877) 648-9150
www.aerobiology.net

Certificate of Analysis
EMLAP# 102977

Aria Environmental
P.O. Box 286
Woodbine, MD 21797
Attn: Julie Barth
Project : 130767 GMS
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 12/17/2013
Date Received: 12/19/2013
Date Analyzed: 12/24/2013
Date Reported: 12/24/2013
Project ID: 13019384

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	131217-01				131217-03			
Sample Location	CR 26				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	13019384-001				13019384-003			
Spore Identification	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**
ascospores	10	67	1	5.2/1	2	13	-	-
basidiospores	30	3200	35	1/1.1	32	3413	90	-
Cladosporium	40	4267	47	107/1	6	40	1	-
Penicillium/Aspergillus group	30	1600	18	5.1/1	47	313	8	-
smuts,Periconia,myxomycetes	-	-	-	-	1	7	-	-
	Debris Rating 3*				Debris Rating 3*			
	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Total *See Footnotes	110	9134	~100%	2.4/1	88	3786	~100%	-

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	131217-02				131217-03			
Sample Location	CR 29				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	13019384-002				13019384-003			
Spore Identification	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**
ascospores	-	-	-	-	2	13	-	-
basidiospores	10	67	1	1/51	32	3413	90	-
Cladosporium	1	7	-	1/5.7	6	40	1	-
Penicillium/Aspergillus group	56	5973	99	19/1	47	313	8	-
smuts,Periconia,myxomycetes	1	7	-	1.0/1	1	7	-	-
	Debris Rating 3*				Debris Rating 3*			
	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Total *See Footnotes	68	6054	~100%	1.6/1	88	3786	~100%	-

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

43760 Trade Center Place
Suite 100
Dulles, VA 20166
(877) 648-9150
www.aerobiology.net

Certificate of Analysis
EMLAP# 102977

Aria Environmental
P.O. Box 286
Woodbine, MD 21797
Attn: Julie Barth
Project : 130767 GMS
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 12/17/2013
Date Received: 12/19/2013
Date Analyzed: 12/24/2013
Date Reported: 12/24/2013
Project ID: 13019384

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	131217-04				131217-03			
Sample Location	CR 15				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	13019384-004				13019384-003			
Spore Identification	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**
ascospores	-	-	-	-	2	13	-	-
basidiospores	19	127	3	1/27	32	3413	90	-
Cladosporium	16	107	2	2.7/1	6	40	1	-
hyphal elements	2	13	-	-	-	-	-	-
Penicillium/Aspergillus group	623	4153	94	13/1	47	313	8	-
smuts,Periconia,myxomycetes	2	13	-	1.9/1	1	7	-	-
	Debris Rating 3*				Debris Rating 3*			
	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Total *See Footnotes	662	4413	~100%	1.2/1	88	3786	~100%	-

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	131217-05				131217-03			
Sample Location	CR 11				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	13019384-005				13019384-003			
Spore Identification	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**
ascospores	5	33	8	2.5/1	2	13	-	-
basidiospores	39	260	61	1/13	32	3413	90	-
Cladosporium	11	73	17	1.8/1	6	40	1	-
Penicillium/Aspergillus group	8	53	12	1/5.9	47	313	8	-
smuts,Periconia,myxomycetes	1	7	2	1.0/1	1	7	-	-
	Debris Rating 3*				Debris Rating 3*			
	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Total *See Footnotes	64	426	~100%	1/8.9	88	3786	~100%	-

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

Certificate of Analysis
EMLAP# 102977

43760 Trade Center Place
Suite 100
Dulles, VA 20166
(877) 648-9150
www.aerobiology.net

Aria Environmental
P.O. Box 286
Woodbine, MD 21797
Attn: Julie Barth
Project : 130767 GMS
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 12/17/2013
Date Received: 12/19/2013
Date Analyzed: 12/24/2013
Date Reported: 12/24/2013
Project ID: 13019384

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	131217-06				131217-03			
Sample Location	CR 7				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	13019384-006				13019384-003			
Spore Identification	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**	**Raw Ct**	**spr/m³**	**% Ttl**	**In/Out**
ascospores	3	20	4	1.5/1	2	13	-	-
basidiospores	39	260	47	1/13	32	3413	90	-
Cladosporium	5	33	6	1/1.2	6	40	1	-
Penicillium/Aspergillus group	35	233	42	1/1.3	47	313	8	-
smuts,Periconia,myxomycetes	1	7	1	1.0/1	1	7	-	-
	Debris Rating 3*				Debris Rating 3*			
	Analytical Sensitivity: 7 spr/m³				Analytical Sensitivity: 7 spr/m³			
Total *See Footnotes	83	553	~100%	1/6.8	88	3786	~100%	-

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

43760 Trade Center Place
Suite 100
Dulles, VA 20166
(877) 648-9150
www.aerobiology.net

Certificate of Analysis
EMLAP# 102977

Aria Environmental		Date Collected:	12/17/2013
P.O. Box 286		Date Received:	12/19/2013
Woodbine, MD 21797		Date Analyzed:	12/24/2013
Attn: Julie Barth		Date Reported:	12/24/2013
Project : 130767 GMS		**Project ID:**	**13019384**
Condition of Sample(s) Upon Receipt: Acceptable			Page 4 of 4

Footnotes and Additional Report Information

Debris Rating Table

1	Minimal (<5%) particular 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 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.

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

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

13019384

13019384

Page 1 of 1

ELITE
CO, GA, VA

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

ARIA LAP, LLC
LAB #192683 (CO)
LAB #102977 (GA)
LAB #163063 (VA)

Aerobiology Client	Aria Environmental, Inc.
Field Contact	Michele M. Twilley, DrPH, CIH
Address	PO Box 286
Address	Woodbine, MD 21797
Phone/Fax	410-549-5774
Email	mtwilley@ariaenviro.com

Collected By/Date:	MMT/ 12/17/13
Relinquished By/Date:	
Sampler Type	Andersen___ SAS___

Relinquished By/Date:	MMT/ 12/18/13
Received By/Date:	SB 12/19/13
	SampleAire___ AeroTrap___ Other___ BioCulture___

PO#/Job#/Project Name: 130767 GMS

Routine ◉ 24 Hour ○ Same Day ○ 4 Hour ○ 2 Hour ○ 5 Day (Asbestos Only) ○

Notes/CC Info:

Zip Code Where Work Is Performed 21738

	Sample No.	Test Code	Sample Location	Total Volume/Area
1	131217-01	1054	CR 26	150
2	131217-02	1054	CR 29	150
3	131217-03	1054	Outside	150
4	131217-04	1054	CR 15	150
5	131217-05	1054	CR 11	150
6	131217-06	1054	CR 7	150
7				
8				
9				
10				
11				
12				
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

780 Simms Street, Suite 104, Golden, CO 80401 - **(866) 620-9348** Fax (303) 232-0283 - email: denver@aerobiology.net
43780 Trade Center Place, Suite 100, Dulles, VA 20166 - **(877) 648-9150** Fax (703) 661-8379 - email: info@aerobiology.net
4501 Circle 75 Parkway, Suite A1190, Atlanta GA 30339 - **(866) 620-9313** Fax (770) 947-2938 - email: ATL@aerobiology.net
1761 Hotel Circle South, Suite 121, San Diego, CA 92108 - **(650) 302-2223** Fax (720) 235-5916 - e-mail: aerobiologywest@aerobiology.net