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February 16, 2016

Department of General Services
Office of Safety and Health, Facilities Division
2000 14th Street NW, 5th Floor
Washington, DC 20009

Attention: Mr. Ricardo Eley, Mr. Brian Killian

RE: Weekly Indoor Air Quality Evaluation at Shepard Elementary School

Global Project Number: V0225

Dear Mr. Eley and Mr. Killian:

On February 9, 2016, Global Consulting, Inc. (GLOBAL) conducted a weekly indoor air quality (IAQ) evaluation at the Shepherd Elementary school, a property maintained by the Department of General Services (DGS), located at 7800 14th St. NW Washington DC 20012. This report provides a summary of observations and findings.

Methodology

The IAQ evaluation included a visual assessment, IAQ instrumentation screening, as well as sampling for non-viable mold in representative locations within the building. Additionally, one ambient set of samples was taken for comparison.

Non-viable fungal spore samples were collected on *Air-O-Cell* cassettes using a Buck BioAire calibrated pump. The air sample was taken within the breathing zone and no closer than three feet from the ground. In tandem with collecting mold samples, real-time readings for temperature, relative humidity, carbon dioxide, and carbon monoxide were collected using a Fluke 975 Air Meter.

Respirable particulate in air (PM_{2.5} and PM₁₀) size classes) was measured using an Aerocet 531 Particle Mass Counter and calibrated prior to sampling.

Microbial samples were delivered to EMSL Analytical, Inc. of Beltsville, Maryland, for analysis. The sample chain-of-custodies and laboratory reports are attached.

Observations

The table below summarizes the main observations at each space visited on February 9, 2016.

Location	Summary of Observations
Main Entrance Hallway First Floor; ca. 820 ft ²	One occupant at the time of inspection; Dropped ceiling and Tiled floor; No visible water leaks in the room; No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces; The entrance door was open at the time of inspection.
Room C-110; First Floor; ca. 850 ft ²	Eleven occupants at the time of inspection; Two ceiling mounted AC units; Dropped ceiling and Terrazzo floor; No visible water leaks in the room; No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces.
Resource Center; First Floor; ca. 320 ft ²	No occupants at the time of inspection; One ceiling mounted AC units; Dropped ceiling and carpet floor; No visible water leaks in the room; No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces.
Room 201; Second Floor; ca. 810 ft ²	One occupant at the time of inspection; Two wall mounted AC units; Dropped ceiling and Terrazzo floor; No visible water leaks in the room. No visual signs of microbial growth, No odor; Visible dust on the ceiling around air diffusers.
Auditorium; First Floor; ca. 3000 ft ²	Twelve occupants at the time of inspection; 16 Ceiling mounted AC units; Drop ceiling and Rubber/Plastic tile floor; No visible water leaks in the area. No visual signs of microbial growth, No odor; No visible dust on floor/ other surfaces.

Measurements of Indoor Environmental Quality Parameters

A summary of average measurements of comfort parameters and respirable particulates is provided in Table 1.

Temperature

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) have published recommendations for year round acceptable temperatures in Standard 55-2010 (*Thermal Environmental Conditions for Human Occupancy*). The winter comfort range is 20 to 24°C (68 to 75°F) and 23 to 26°C (73 to 79°F) is the summer comfort range. All the temperature readings fell within the ASHRAE recommended ranges.

Relative Humidity (RH)

Relative humidity is a key factor for mold growth. Mold has the potential of growing on suitable surfaces with humidity levels above 60%. ASHRAE standard 62.1-2010 (*Ventilation for Acceptable Indoor Air Quality*) recommends a maximum indoor relative humidity of 65% to preclude the likelihood of condensation on cool surfaces encouraging mold growth. All RH measurements fell within the ASHRAE recommended range.

Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas that is produced by the incomplete combustion of carbon-containing fuels. Oil, gasoline, diesel fuels, wood, coke, and coal are the major sources of CO. All registered CO concentrations were below the EPA National Ambient Air Quality Standard (NAAQS) of 9 ppm.

Carbon Dioxide

Under conditions of maximum occupancy, ASHRAE Standard 62.1-2010, Appendix C, infers that the acceptable carbon dioxide upper limit is the prevailing outdoor carbon dioxide concentration plus 700 parts per million (ppm). On the day of the space evaluation, the outdoor (ambient) carbon dioxide concentration was approximately 466.5 ppm so indoor concentrations should not exceed approximately 1166.5 ppm (700 + 466.5). All indoor carbon dioxide measurements were within the ASHRAE standards.

Respirable Particulates

Respirable particulate concentrations under PM_{2.5} & PM₁₀ size classes were below their respective National Ambient Air Quality Standard (NAAQS) levels. The highest average PM_{2.5} concentration during the monitoring period was 0.001mg/m³ (1 µg/m³). This is compared to the NAAQS primary standard for PM_{2.5} of 12 µg/m³ annual mean. The highest average PM₁₀ concentration during the same period was 0.017 mg/m³ (17 µg/m³), in the auditorium area. This is compared to NAAQS standard for PM₁₀ of 150µg/m³ 24 hr. average. <http://www.epa.gov/air/criteria.html>

**Table 1: Shepherd Elementary School, Measurements of Indoor Environmental Quality Parameters;
February 9, 2016. (08:30 AM- 10:50 AM)**

Sample Location	Temp °F	RH%	CO ppm	CO2 ppm	PM 2.5 mg/m ³	PM 10 mg/m ³
Standards	ASHRAE 68 to 75°F	ASHRAE <65%	NAAQS 9	ASHRAE 1166.5	NAAQS 0.012	NAAQS 0.150
Ambient	43.7	38.0	1	466.5	0.003	0.009
Main Entrance	67.5	20.7	1	754.0	0.000	0.008
Class room C110	70.3	21.2	1	823.5	0.001	0.015
Resource Room	71.6	20.4	1	767.5	0.000	0.015
Class room 201	73.0	17.1	2	677.5	0.000	0.001
Auditorium	70.3	23.4	2	791.0	0.000	0.017

Mold-in-Air Samples

There are no definitive regulations or standardized guidelines for addressing airborne mold in an indoor setting. If building systems (ventilation, envelope) are functioning properly, the indoor population profile should mimic what is encountered outdoors and the concentrations should be below the ambient levels.

Table 2 summarizes airborne mold spore (non-viable) sampling results and locations. On the day of sampling, the indoor mold population profiles were different to the outdoor mold profile, while the indoor mold concentrations (spore count/m³ of air) in some areas were slightly higher than the ambient concentrations. Laboratory analysis follows this report (see attachment).

**Table 2: Shepherd Elementary School, Measurements of Mold-in-Air samples;
February 9, 2016. (08:30 AM- 10:50 AM)**

Sample Location	Ambient	Main Entrance	Classroom C110	Resource Room	Classroom C201	Auditorium
<i>Alternaria</i>	-	-	10	-	-	-
<i>Ascospores</i>	40	-	-	-	-	-
<i>Aspergillus/Penicillium</i>	-	-	40	-	-	10
<i>Basidiospores</i>	-	-	-	10	-	40
<i>Bipolaris++</i>	-	-	-	-	-	-
<i>Chaetomium</i>	-	-	-	-	-	10
<i>Cladosporium</i>	-	-	40	-	-	40
<i>Curvularia</i>	-	30	-	-	-	-
<i>Epicoccum</i>	-	-	-	-	-	-
<i>Fusarium</i>	-	-	-	-	-	-
<i>Gonoderma</i>	-	-	-	-	-	-
<i>Myxomycetes++</i>	-	40	-	-	-	10
<i>Pithomyces</i>	-	-	-	-	-	-
<i>Rust</i>	-	-	-	-	-	40
<i>Scopulariopsis</i>	-	-	-	-	-	-
<i>Stachybotrys</i>	-	-	-	-	-	-
<i>Torula</i>	-	-	-	-	-	-
<i>Ulocladium</i>	-	-	-	-	-	-
<i>Unidentifiable Spores</i>	-	-	-	-	-	-
<i>Zygomycetes</i>	-	-	-	-	-	-
<i>Arthrinium</i>	-	-	-	-	-	10
<i>Hyphal Fragment</i>	-	-	-	80	-	40
<i>Insect Fragment</i>	-	40	-	-	-	-
<i>Pollen</i>	-	-	-	-	-	-
Total Molds	40	70	90	10	None Detect	160

Conclusions

The comfort parameters (i.e., temperature, relative humidity, carbon dioxide, and carbon monoxide levels) and respirable particulates in the areas of concern conform to ASHRAE and/or NAAQS guidelines. The indoor mold population profile was different to the outdoor profile, and the indoor mold spore concentrations in some locations were slightly higher than the ambient concentration. However, these results do not indicate any mold growth related air quality concerns. Based on the observations and results of the IAQ inspection at Shepherd Elementary School building, we have no further recommendations at this time.

Thank you for the opportunity to provide industrial hygiene services for the Department of General Services. If you have any questions, please contact me at 202.832.1433 (office).

Sincerely,



Channa Bambaradeniya, Ph.D., CIH, CHMM, PMP
Global Consulting, Inc.



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Washington, DC 20002

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Attachment

Mold Spore Sample Analytical Results and Chain-of-Custody

Forms

Microbiology Chain of Custody

EMSL Order Number (Lab Use Only):

191601126

PHONE:
FAX:

Company: SalUT Inc.		EMSL-Bill to: <input type="checkbox"/> Different <input type="checkbox"/> Same <small>If Bill to is Different note instructions in Comments**</small>	
Street: 1818 New York Ave. NE Suite 111		<i>Third Party Billing requires written authorization from third party</i>	
City: Washington	State/Province: DC	Zip/Postal Code: 20002	Country: USA
Report To (Name): Channa Bambaradeniya		Telephone #: 202 800 9702	
Email Address: cbambaradeniya@gciusa.biz		Fax #:	Purchase Order:
Project Name/Number: <i>Shepherd ES</i>		Please Provide Results: <input type="checkbox"/> FAX <input checked="" type="checkbox"/> E-mail <input type="checkbox"/> Mail	
U.S. State Samples Taken: <i>DC</i>		Connecticut Samples: <input type="checkbox"/> Commercial <input type="checkbox"/> Residential	

Turnaround Time (TAT) Options* - Please Check

3 Hour
 6 Hour
 24 Hour
 48 Hour
 72 Hour
 96 Hour
 1 Week
 2 Week

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

Non Culturable Air Samples (Spore Traps) – Test Codes

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

Other Microbiology Test Codes

<ul style="list-style-type: none"> • M041 Fungal Direct Examination • M005 Viable Fungi ID and Count • M006 Viable Fungi ID and Count (Speciation) • M007 Culturable Fungi • M008 Culturable Fungi (Speciation) • M009 Gram Stain Culturable Bacteria • M010 Bacterial Count and ID – 3 Most Prominent • M011 Bacterial Count and ID – 5 Most Prominent • M013 Sewage Contamination in Buildings 	<ul style="list-style-type: none"> • M014 Endotoxin Analysis • M015 Heterotrophic Plate Count • M180 Real Time Q-PCR-ERMI 36 Panel • M018 Total Coliform (Membrane Filtration) • M020 Fecal <i>Streptococcus</i> (Membrane Filtration) • M210-215 <i>Legionella</i> Detection • M026 Recreational Water Screen • M027 Mycotoxin Analysis 	<ul style="list-style-type: none"> • M029 <i>Enterococci</i> • M019 Fecal Coliform • M133 MRSA Analysis • M028 <i>Cryptococcus neoformans</i> Detection • M120 <i>Histoplasma capsulatum</i> Detection • M033-39 Allergen Testing • M044 Group Allergen (Cat, Dog, Cockroach, Dustmites) • Other See Analytical Price Guide
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Preservation Method (Water):

Name of Sampler: <i>Amila Wijayarathne</i>	Signature of Sampler: <i>A.C. Wijk</i>
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Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
Example: A1	Kitchen	Air	M001	75L	1/1/12 4:00 PM
<i>SES-02/016-001</i>	<i>Ambient</i>	<i>Air</i>	<i>M001</i>	<i>75L</i>	<i>02/10/16</i>
<i>SES-02/016-002</i>	<i>Main Entrance</i>	↓	↓	↓	↓
<i>SES-02/016-003</i>	<i>C-110</i>	↓	↓	↓	↓
<i>SES-02/016-004</i>	<i>Resouse Room</i>	↓	↓	↓	↓
<i>SES-02/016-005</i>	<i>C-201</i>	↓	↓	↓	↓
<i>SES-02/016-006</i>	<i>Auditorium</i>	↓	↓	↓	↓
<i>SES-02/016-007</i>	<i>FB</i>	↓	↓	↓	↓
<i>SES-02/016-008</i>	<i>FB</i>	↓	↓	↓	↓

Client Sample # (s): <i>A.C. Wijk</i>	Total # of Samples:
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Relinquished (Client):	Date:	Time:
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Received (Client): <i>Leo Walker</i>	Date: <i>2/10/16</i>	Time: <i>1140Am</i>
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Comments:
Please forward results to ijayatilake@gciusa.biz and msarathchandra@gciusa.biz



EMSL Analytical, Inc.

10768 Baltimore Avenue Beltsville, MD 20705
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<http://www.EMSL.com/beltsvillelab@emsl.com>

EMSL Order: 191601126
Customer ID: SALU50
Customer PO:
Project ID:

Attn: Channa Bambaradeniya
SaLUT
1818 New York Avenue
Suite 107
Washington, DC 20002
Project: SHEPHERD ES

Phone: (301) 595-3783
Fax: (301) 595-3787
Collected: 02/10/2016
Received: 02/10/2016
Analyzed: 02/10/2016

Test Report: Air-O-Cell™ Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	191601126-0001			191601126-0002			191601126-0003		
Client Sample ID:	SES-021016-001			SES-021016-002			SES-021016-003		
Volume (L):	75			75			75		
Sample Location	AMBIENT			MAIN ENTRANCE			C-110		
Spore Types	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total
Alternaria	-	-	-	-	-	-	1*	10*	11.1
Ascospores	1	40	100	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-	1	40	44.4
Basidiospores	-	-	-	-	-	-	-	-	-
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	-	-	-	1	40	44.4
Curvularia	-	-	-	2*	30*	42.9	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	1	40	57.1	-	-	-
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Arthrinium	-	-	-	-	-	-	-	-	-
Total Fungi	1	40	100	3	70	100	3	90	100
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	1	40	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	41	-	-	41	-	-	41	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	2	-	-	3	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	2	-	-	2	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

Stefanie Schneider, Microbiology Laboratory Manager
or other approved signatory

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Beltsville, MD AIHA-LAP, LLC --EMLAP Accredited #102891

Initial report from: 02/10/2016 14:36:35

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



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Project: SHEPHERD ES

Phone: (301) 595-3783
Fax: (301) 595-3787
Collected: 02/10/2016
Received: 02/10/2016
Analyzed: 02/10/2016

Test Report: Air-O-Cell™ Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	191601126-0004			191601126-0005			191601126-0006		
Client Sample ID:	SES-021016-004			SES-021016-005			SES-021016-006		
Volume (L):	75			75			75		
Sample Location:	RESOURCE RM			C-201			AUDITORIUM		
Spore Types	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total
Alternaria	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-	1*	10*	6.3
Basidiospores	1*	10*	100	-	-	-	1	40	25
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	1*	10*	6.3
Cladosporium	-	-	-	-	-	-	1	40	25
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	1*	10*	6.3
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	1	40	25
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Arthrinium	-	-	-	-	-	-	1*	10*	6.3
Total Fungi	1	10	100	-	None Detect	-	7	160	100
Hyphal Fragment	2	80	-	-	-	-	1	40	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	41	-	-	41	-	-	41	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	3	-	-	2	-	-	4	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	1	-	-	2	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

Stefanie Schneider, Microbiology Laboratory Manager
or other approved signatory

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

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Analyzed: 02/10/2016

Test Report: Air-O-Cell™ Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	191601126-0007			191601126-0008		
Client Sample ID:	SES-021016-007			SES-021016-008		
Volume (L):	0			0		
Sample Location	FB			FB		
Spore Types	Raw Count	Count/m³	% of Total	Raw Count	Count/m³	% of Total
Alternaria	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-
Basidiospores	-	-	-	-	-	-
Bipolaris++	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-
Cladosporium	-	-	-	-	-	-
Curvularia	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-
Pithomyces	-	-	-	-	-	-
Rust	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-
Torula	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-
Arthrinium	-	-	-	-	-	-
Total Fungi	-	No Trace	-	-	No Trace	-
Hyphal Fragment	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-
Pollen	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	0	-	-	0	-
Analyt. Sensitivity 300x	-	0*	-	-	0*	-
Skin Fragments (1-4)	-	-	-	-	-	-
Fibrous Particulate (1-4)	-	-	-	-	-	-
Background (1-5)	-	-	-	-	-	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
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High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "" Denotes particles found at 300X. "*" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Beltsville, MD AIHA-LAP, LLC --EMLAP Accredited #102891

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