October 29, 2015

Clemson University
310 Klugh Avenue
Clemson, South Carolina 29634

Attn: Mr. W. Robert Newberry, IV
E: wnewber@clemson.edu

Re: Limited Mold Sampling Report
Clemson University
Strom Thurmond Institute (2nd Floor)
Clemson, South Carolina
Terracon Project No. 86127158 – Task 46

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited mold sampling on the 2nd floor of the Strom Thurmond Institute located on Clemson University's main campus in Clemson, South Carolina. Specifically, our efforts focused on the air quality concerning mold in the area utilized by the Institute of Computational Ecology on the northeast side of the second floor. The sampling was performed in general accordance with our IDC with Clemson University.

PROJECT DESCRIPTION

Scope of Services

At the request of Clemson University Terracon conducted a limited mold sampling of multiple offices and work spaces on the 2nd floor of the Strom Thurmond Institute. A future occupant of an office (room 207) in the Institute of Computational Ecology has requested air quality tests due to concerns regarding allergies. Currently there are no complaints concerning mold in these offices.

The offices investigated included Rooms 204, 205, 206, 207 and 211 and the waiting room on the 2nd floor. Terracon representative Mr. Benjamin Hestir performed this sampling on October 16, 2015.

Standard of Care

This sampling was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. Terracon did not attempt to identify every potential exposure or hazard present in

the subject building. The results, findings, conclusions, and recommendations expressed in this report are based on conditions observed during our sampling. Many factors, such as weather conditions, building occupancy, ventilation patterns, and seasonal variations in fungal/bacterial concentrations or local sources of volatile chemicals, can affect the conditions observed. The information contained in this report should not be relied upon to represent conditions that existed prior to or after this sampling. Terracon does not warrant the services of regulatory agencies, laboratories, or other third parties supplying information that may have been used in the preparation of this report.

SAMPLING CRITERIA AND METHODS

Mold Sampling

Total non-viable (non-culturable) fungal spore trap samples were collected using Air-O-Cell™ spore trap cassette specifically designed for the collection of airborne mold spores. Air samples were collected using a calibrated Zefon Bio-Pump™ at a flow rate of 15 liters per minute (LPM) for 5 minutes at each location.

After air sample collection, the samples were hand delivered to Southeast Environmental Microbiology Laboratories, Inc. (SEEML), accredited by the American Industrial Hygiene Association (AIHA®) Laboratory Accreditation Programs, LLC under the Environmental Microbiology Laboratory Accreditation Program (EMLAP), Accreditation #173667. The total spore count samples were analyzed by direct microscopic examination and are reported in spores per cubic meter of air (spores/m^3).

To help interpret the sampling results, we compared indoor air and outdoor air measurements. High variability in airborne fungal spore concentrations can exist in different geographic locations, during different seasons, and weather patterns, and over the course of a given day. As a general rule, indoor air fungal spore concentrations in an HVAC-supplied building are typically less than, but qualitatively similar to, fungal spore concentrations found in the outside environment.

There are no state or federal exposure limits established for fungal aerosols. There are currently no regulatory standards or medically based threshold limit or dose-response relationships for exposure to airborne or surface concentrations of mold spores. Terracon relies upon experience, professional judgment, current scientific literature, guidelines and recommendations made by professional organizations and experts, and statistical methods in interpreting mold sampling results.

Temperature and Relative Humidity

Readings of temperature and relative humidity were made with an Extech Model 445580 instrument which was calibrated by the manufacturer.

FINDINGS

Visual Assessment

The Institute for Computational Ecology offices are located on the 2nd floor of Strom Thurmond Institute. At the time of assessment no musty odors were observed on the 2nd floor, however one of the office occupants had taped an air filter over their office HVAC supply duct and the filter was observed to be discolored. The filter observed had been placed over the supply duct for an unknown length of time and, therefore, the discoloration of the filter is difficult to assess.

An administrative assistant from the 2nd floor, Carolyn Benson, reported a recent water infiltration event through an elevator shaft that is under construction. That water intrusion was in the central hallway prior to entering the waiting area adjacent to the Institute for Computational Ecology office area on the northeast side of the Strom Thurmond Institute. No evidence of active water intrusion or visible mold growth was observed in the rooms sampled.

Mold Air Sampling

On the afternoon of October 16, 2015 Terracon collected eight (8) non-viable mold spore trap samples; one each in Room (204, 205, 206, 207, 211), the waiting area, and two outdoors for comparison.

At the time of testing the indoor temperatures ranged from 70º F to 76º F and indoor relative humidity ranged from 45% to 54%. Outdoor temperature was 83 ºF and outdoor relative humidity was 27% with on a clear day with very little wind. No rainfall was reported in the past 24 hours prior to the sampling.

The results of the total spore count samples are summarized in Table 1 below:

Table 1: Summary of Total Spore Count Results – October 16, 2015

Sample #	STI-1	STI-2	STI-3	STI-4	STI-5	STI-6	STI-7	STI-8
Location	**Room 205 Office**	**Room 206 Office**	**Room 204 Office**	**Room 207 Vacant Office**	**Room 211 Computer Lab**	**Waiting Area – 2nd floor**	**Outside STI Main Entrance**	**Outside at Plaza**
Spore Type	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**
Alternaria	---	---	---	---	---	---	65	13
Ascospores	---	---	---	---	---	---	78	---
Aspergillus/ Penicillium	195	585	234	351	351	78	---	78
Basidiospores	117	156	39	273	39	351	975	1,600
Cladosporium	78	13	39	117	117	117	546	546
Curvularia	---	13	---	---	26	---	---	13
Bipolaris/ Drechslera	---	52	13	26	39	---	---	---
Myxomycetes/ Perconia/Smuts	13	13	---	---	26	---	26	26
Nigrospora	13	---	---	---	13	---	---	---
Epiccocum	---	---	---	---	---	---	13	39
Polythrincium	---	---	---	---	---	---	---	13
Pithomyces	---	---	---	---	---	---	---	13
Total	**416**	**832**	**325**	**767**	**611**	**546**	**1,700**	**2,340**

The total spore counts in all interior locations sampled were lower than those outdoors. The types of mold identified from the indoor sampling were largely consistent with those identified on the outdoor samples, with the exception of minor detections of *Bipolaris/Drechslera* and *Nigrospora*. *Basidiospores, Cladosporium* and *Aspergillus/Penicillium* were dominant in the indoor samples and that was true outside with the exception of the *Aspergillus/Penicillium.*

The laboratory analytical report is attached.

Conclusions and Recommendations

The following conclusions and recommendations are provided based on our assessment:

- Total spore counts on the 2nd floor in representative offices of the Institute for Computational Ecology were all below the total spore counts measured outside the Strom Thurmond Institute and are not generally indicative of active indoor fungal growth. Indoor *Aspergillus/Penicillium* type mold spores appeared to be above outdoor levels. Although these mold spores were higher they were not a magnitude higher (i.e. - 100 times higher). This may indicate a past water intrusion event or the need for increased housekeeping.

- Temperature and relative humidity readings were within normal comfort levels for an office environment.

- Placement of filters over the outlets of HVAC supply ducts in small offices may have unintended negative consequences on the system although it may be temporarily

effective at preventing discomfort caused by drafts blowing directly onto occupants. A different supply diffuser may reduce occupant complaints.

- Past water infiltration issues in other parts of the building adjacent to the offices reportedly occurred. Terracon did not assess those areas.

Terracon appreciates the opportunity to provide this service to Clemson University. If you have any questions regarding this limited mold sampling report, please contact the undersigned at 864-292-2901.

Sincerely,
Terracon Consultants, Inc.



Benjamin Hestir, P.E.
Project Industrial Hygienist



Jeffrey Gurrie
Senior Industrial Hygienist

Attachments: Photographs
Laboratory Results

Photographs



Photo #1 Sample STI-1 location in Room 205



Photo #2 Temperature and Relative Humidity Reading in Room 205



Photo #3 Sample ST-2 location in Room 206



Photo #4 Temperature and Relative Humidity Reading in Room 206



Photo #5 Sample ST-4 location in Room 207



Photo #6 Temperature and Relative Humidity Reading in Room 207



Photo #7 Sample ST-5 location in Room 211



Photo #8 Temperature and Relative Humidity Reading in Room 211



Photo #9 Sample ST-6 location in Waiting Room



Photo #10 Temperature and Relative Humidity Reading in Waiting Room



Photo #11 Sample ST-7 location Outside Main Entrance to STI



Photo #12 Temperature and Relative Humidity Reading Outside

Laboratory Results

SEEML Reference Number:
151019019

Southeast Environmental Microbiology Laboratories
506 Laurens Rd
Greenville, SC 29607
Phone: (864) 233-3770
FAX: (864) 233-6589

The information and data for **Terracon** has been checked for thoroughness and accuracy. The following reports are contained within this document:

- ☐ Direct Exam Report
- ☒ Spore Trap Report
- ☐ Quantitative Fungal Report
- ☐ Andersen Fungal Report
- ☐ Quantitative Direct Exam Report

Lab Manager Review: Rafael Berrios Date: 10/19/15

Thank you for using SEEML laboratories. We strive to provide superior quality and service.
SEEML laboratories are AIHA (American Industrial Hygiene Association) Environmental Microbiology Accredited laboratory for only fungal analysis Air-Direct Examination (EMLAP # 173667).

The data within this report is reliable to three significant figures. The third significant figure is technically unjustified. In this instance, the third figure is reported as an estimate to facilitate the interpretation by the customer.

Confidentiality Notice:
The document(s) contained herein are confidential and privileged information, intended for the exclusive use of the individual or entity named above. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering it to the intended recipient, you are hereby notified that any dissemination, distribution or copying of the document(s) is strictly prohibited. If you have received this document in error, please immediately notify us by telephone to arrange for its return. Thank you.

Guidelines for Interpretation:
No accepted quantitative regulatory standards currently exist by which to assess the health risks related to mold and bacterial exposure. Molds and bacteria have been associated with a variety of health effects and sensitivity varies from person to person.
Several organizations, including: the American Conference of Government Industrial Hygienists (ACGIH); the American Industrial Hygiene Association (AIHA); the Indoor Air Quality Association (IAQA); the United States Environmental Protection Agency (USEPA); the Centers for Disease Control (CDC), as well as the California Department of Health Services (CADHS), have all published guidelines for assessment and interpretation of mold resulting from water intrusion in buildings.

Interpretation of the data and information within this document is left to the company, consultant, and/or persons who conducted the fieldwork.

Spore Trap Report

Attention: Ben Hestir	Date Sampled: 10/16/15
Terracon	Date Received: 10/19/15
3534 Rutherford Road	Date Analyzed: 10/19/15
Taylors, SC 29687	Date Reported: 10/19/15
	Date Revised:
	Project Name: STI-2nd Floor
	Project Address: Clemson, SC
	SEEML Reference # : 151019019

TEST METHOD: DIRECT MICROSCOPY EXAMINATION AT 400X (100% OF TRACE ANALYZED) SEEML SOP 7

Client Sample ID	STI-1			STI-2			STI-3		
Location	Room 205			Room 206			Room 204		
Lab Sample ID	151019019-067			151019019-068			151019019-069		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments							1	13	
Pollen									
Spore Trap Used	AOC			AOC			AOC		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria									
Ascospores									
Aureobasidium									
Basidiospores	9	117	28	12	156	19	3	39	12
Bipolaris/Drechslera				4	52	6	1	13	4
Botrytis									
Chaetomium									
Cladosporium	6	78	19	1	13	2	3	39	12
Curvularia				1	13	2			
Epicoccum									
Cercospora									
Fusarium									
Nigrospora	1	13	3						
Penicillium/Aspergillus	15	195	47	45	585	70	18	234	72
Rusts									
Smuts/Periconia/Myxomy	1	13	3	1	13	2			
Stachybotrys									
Stemphylium									
Memnoniella									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces									
Background debris (1-5)3	3			3			3		
Sample Volume(liters)	75			75			75		
TOTAL SPORES/M^3	32	**416**		64	**832**		25	**325**	
Quality Control									

Comments: Condition of the sample(s) upon receipt: Acceptable.

1=Total % may not equal 100 due to rounding.

2 = Colorless,other Brown are spores without a distinctive morphology on spore traps and non-viable surface samples.

3 = Background debris is the amount of particulate matter present on the slide and is graded from 1-5 with 1 = very light, 2= Light, 3 = Medium, 4 = Heavy, 5 = Very Heavy. The higher the rating the more likelihood spores may be underestimated. A rating of 5 should be interpreted as minimal counts and may actually be higher than reported.

The reporting limit is 1 Spore/sample.

Disclaimer: This report relates only to the samples tested

Respectfully submitted, SEEML, Inc.

Rafael Berrios

Rafael Berrios, Approved Laboratory Signatory

506 Laurens Road
Greenville, SC 29607
Phone: (864) 233- 3770
Fax: (864) 233-6589
AIHA-LAP, LLC EMLAP # 173667

Spore Trap Report

Attention: Ben Hestir	Date Sampled: 10/16/15
Terracon	Date Received: 10/19/15
3534 Rutherford Road	Date Analyzed: 10/19/15
Taylors, SC 29687	Date Reported: 10/19/15
	Date Revised:
	Project Name: STI-2nd Floor
	Project Address: Clemson, SC
	SEEML Reference # : 151019019

TEST METHOD: DIRECT MICROSCOPY EXAMINATION AT 400X (100% OF TRACE ANALYZED) SEEML SOP 7

Client Sample ID	STI-4			STI-5			STI-6		
Location	Room 207			Room 211			Waiting Area		
Lab Sample ID	151019019-070			151019019-071			151019019-072		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments				4	52		2	26	
Pollen				1	13				
Spore Trap Used	AOC			AOC			AOC		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria									
Ascospores									
Aureobasidium									
Basidiospores	21	273	36	3	39	6	27	351	64
Bipolaris/Drechslera	2	26	3	3	39	6			
Botrytis									
Chaetomium									
Cladosporium	9	117	15	9	117	19	9	117	21
Curvularia				2	26	4			
Epicoccum									
Cercospora									
Fusarium									
Nigrospora				1	13	2			
Penicillium/Aspergillus	27	351	46	27	351	57	6	78	14
Rusts									
Smuts/Periconia/Myxomy				2	26	4			
Stachybotrys									
Stemphylium									
Memnoniella									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces									
Background debris (1-5)3	3			3			3		
Sample Volume(liters)	75			75			75		
TOTAL SPORES/M^3	59	**767**		47	**611**		42	**546**	
Quality Control									

Comments: Condition of the sample(s) upon receipt: Acceptable.

1=Total % may not equal 100 due to rounding.

2 = Colorless,other Brown are spores without a distinctive morphology on spore traps and non-viable surface samples.

3 = Background debris is the amount of particulate matter present on the slide and is graded from 1-5 with 1 = very light, 2= Light, 3 = Medium, 4 = Heavy, 5 = Very Heavy. The higher the rating the more likelihood spores may be underestimated. A rating of 5 should be interpreted as minimal counts and may actually be higher than reported.

The reporting limit is 1 Spore/sample.

Disclaimer: This report relates only to the samples tested

Respectfully submitted, SEEML, Inc.

Rafael Berrios

Rafael Berrios, Approved Laboratory Signatory

506 Laurens Road
Greenville, SC 29607
Phone: (864) 233- 3770
Fax: (864) 233-6589
AIHA-LAP, LLC EMLAP # 173667

Spore Trap Report

Attention: Ben Hestir	Date Sampled: 10/16/15
Terracon	Date Received: 10/19/15
3534 Rutherford Road	Date Analyzed: 10/19/15
Taylors, SC 29687	Date Reported: 10/19/15
	Date Revised:
	Project Name: STI-2nd Floor
	Project Address: Clemson, SC
	SEEML Reference # : 151019019

TEST METHOD: DIRECT MICROSCOPY EXAMINATION AT 400X (100% OF TRACE ANALYZED) SEEML SOP 7

Client Sample ID	STI-7			STI-8					
Location	Outside-STI Entrance			Outside-Top of Stairs					
Lab Sample ID	151019019-073			151019019-074					
Detection Limit (spores/m^3)	13			13					
Hyphal Fragments	9	117		12	156				
Pollen	1	13							
Spore Trap Used	AOC			AOC					
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%			
Alternaria	5	65	4	1	13	<1			
Ascospores	6	78	5						
Aureobasidium									
Basidiospores	75	975	57	123	1600	68			
Bipolaris/Drechslera									
Botrytis									
Chaetomium									
Cladosporium	42	546	32	42	546	23			
Curvularia				1	13	<1			
Epicoccum	1	13	<1	3	39	2			
Cercospora									
Fusarium									
Nigrospora									
Penicillium/Aspergillus				6	78	3			
Rusts									
Smuts/Periconia/Myxomy	2	26	2	2	26	1			
Stachybotrys									
Polythrincium				1	13	<1			
Memnoniella									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces				1	13	<1			
Background debris (1-5)3	3			3					
Sample Volume(liters)	75			75					
TOTAL SPORES/M^3	131	**1700**		180	**2340**				
Quality Control									

Comments: Condition of the sample(s) upon receipt: Acceptable.

1=Total % may not equal 100 due to rounding.

2 = Colorless,other Brown are spores without a distinctive morphology on spore traps and non-viable surface samples.

3 = Background debris is the amount of particulate matter present on the slide and is graded from 1-5 with 1 = very light, 2= Light, 3 = Medium, 4 = Heavy, 5 = Very Heavy. The higher the rating the more likelihood spores may be underestimated. A rating of 5 should be interpreted as minimal counts and may actually be higher than reported.

The reporting limit is 1 Spore/sample.

Disclaimer: This report relates only to the samples tested

Respectfully submitted, SEEML, Inc.

Rafael Berrios

Rafael Berrios, Approved Laboratory Signatory

506 Laurens Road
Greenville, SC 29607
Phone: (864) 233- 3770
Fax: (864) 233-6589
AIHA-LAP, LLC EMLAP # 173667

Southeast Environmental Microbiology Laboratories
Chain of Custody

506-A Laurens Rd, Greenville, SC 29607
Phone : 864-233-3770, Fax: 864-233-3779, www.seeml.com, AIHA-LAP, LLC. (EMLAP) #173667

For Lab Use Only			
Condition of samples is acceptable	☒ YES ☐ NO	SEEML Ref #: 151019019	Lab ID: 067-074

Company Information		Client Information		Environmental Conditions	
Ben Hestir	(Project Manager)	Date Sampled:	10/16/15	Precipitation in last 16hrs:	No
Terracon	(Company Name)	Project Name:	STI - 2nd floor	Relative Humidity I/O:	50 / 38
3534 Rutherford Rd.	(Address)	Project Address:		Temperature I/O:	72 / 75
Taylors, SC 29687	(City, State, Zip)	City, State, Zip:	Clemson, SC	Wind Conditions	Breezy
64-293-7348	(Phone)				
ben.hestir@terracon.com	(Email)				

Sample Type Abbreviations:
A- Allergenco **S-**Swab **AP-**Andersen Plate
AOC- Air O Cell **T-**Tape **W-** Water
M5- Micro 5 **B-** Bulk **D-** Dust

Analysis Type:
1. SporeTrap, Air Sample Analysis-Same Day
2. Direct Exam Surface Sample Analysis -Same Day
3. Culturable Air / Surface Samples -7-10 days

Sample ID	Sample Location	Sample Type	Analysis Type	*Area	**Volume (L)	Notes
STI-1	Room 205	AOC	1		75	
STI-2	Room 206	AOC	1		75	
STI-3	Room 204	AOC	1		75	
STI-4	Room 207	AOC	1		75	
STI-5	Room 211	AOC	1		75	
STI-6	Waiting Area	AOC	1		75	
STI-7	Outside - STI Entrance	AOC	1		75	
STI-8	Outside - Top of Stairs	AOC	1		75	

Reliquished By:	Date/Time	Recieved By:	Date/Time
Ben Hestir	10/19/15 09:55		10-19-15

* Area is only required for culturable surface samples.
** Volume = Pump setting (L/min) x minutes