March 21, 2017

Clemson University
310 Klugh Avenue
Clemson, South Carolina 29634

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

Re: Limited Mold Investigation Report
Lee Hall – Room 1-163
Clemson, South Carolina
Terracon Project No. 86127158 – Task 82

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited mold investigation in Lee Hall – Room 1-163 on the Clemson University campus in Clemson, South Carolina after a complaint by the current occupant of this office space (Dr. Beth Lauritis) regarding high humidity and respiratory irritation. According to Connie Robinson in Lee Hall, the air handler servicing this area is known to be deficient and has been scheduled for replacement by Clemson Facilities. This mold investigation service was conducted in general accordance with our Master Service Agreement with Clemson University.

PROJECT DESCRIPTION

Scope of Services

At the request of Clemson University, Terracon representative Mr. Benjamin Hestir conducted a limited mold investigation in Room 1-163 within Lee Hall at Clemson University on February 22, 2017. Reportedly, there has been a high humidity condition in the office prior to our investigation and the occupant may be working in another location until such times it can be corrected.

Terracon conducted a physical assessment, made measurements of temperature and relative humidity, and conducted airborne mold sampling which consisted of collecting spore trap air samples in three locations inside the residence, and the collection of two additional samples outside for comparison.

Standard of Care

This limited mold investigation 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 concentrations, 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

Physical Assessment

The physical assessment was conducted to determine whether building materials were impacted by moisture intrusion or condensate formation, and to identify the presence of visible fungal growth. The assessment focused primarily on collecting observational data (i.e., information obtained by physical assessment of the building and interviews with the building management and maintenance staff). The physical assessment can help to formulate plans for more in-depth investigation.

The physical assessment included:

- an examination of the physical structure and potential indoor and outdoor sources of moisture intrusion in the area of concern; and,
- the identification of any discoloration or odor that could indicate moisture intrusion, water damage, and/or fungal growth.

Mold Sampling

Total mold spore trap samples were collected using Allergenco-D™ cassettes 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), Greenville, SC. SEEML is accredited by the AIHA® Laboratory Accreditation Programs, LLC under the Environmental Microbiology Laboratory Accreditation Program (EMLAP), Accreditation #173667. Air samples were analyzed by direct microscopic examination and results 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 a heating, ventilation and air-conditioning (HVAC)-supplied building are typically less than, but qualitatively similar to, fungal spore concentrations found in the outside environment.

No state or federal exposure limits have been established for fungal aerosols. Regulatory standards, medically based threshold limit or dose-response relationships have not been established 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

Indoor air temperature and relative humidity are physical conditions important to the perception of comfort. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has published recommendations regarding thermal comfort. ASHRAE Standard 55-2013, Thermal Environmental Conditions for Human Occupancy, identifies six primary factors that affect comfort: metabolic rate (affected by the activity being performed); clothing insulation; air temperature; radiant temperature; air speed; and humidity.

Although the relationships are complex, a temperature range between 73 and 79 degrees Fahrenheit (°F) with relative humidity between roughly 20 and 60 percent (%) are recommended for persons in a conditioned setting wearing light summer clothing. Higher temperatures require lower humidity for comfort. For persons in winter clothing, temperatures can range between 68 and 75°F. EPA recommends relative humidity between 20% and 60%, with preferred conditions falling between 30% and 50% for both winter and summer temperatures.

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

FINDINGS

Physical Assessment

The one-room office was vacant at the time of our investigation. No indication of water infiltration was observed in the office. The HVAC supply register above the desk was observed to have spots of suspected fungal growth. The condensate pan in the dehumidifier (Frigidaire Model 70) located in the office was full and had shutoff automatically to keep from overflowing.

Mold Air Sampling

On the morning of February 22, 2017, Terracon collected three mold spore trap samples inside Lee Hall and two samples in outdoor locations for comparison. The results of the total spore count samples analyses are summarized in Table 1 below:

Table 1: Summary of Total Spore Count Analyses – February 22, 2017

Sample #	163-1	163-2	163-3	163-4	163-5
Location Description	**Desk of Dr. Beth Lauritis**	**Window Ledge near dehumidifier in Rm 1-163**	**In hallway near Lee Hall gallery**	**Outside in courtyard**	**Outside parking area between Lee Hall and the Fluor Bldg**
Spore Type	**Spores/m^3**	**Spores/m^3**	**Spores/m^3**	**Spores/m^3**	**Spores/m^3**
Alternaria	---	---	---	---	---
Ascospores	52	---	---	1,160	403
Basidiospores	273	312	273	2,150	2,650
Bipolaris/Dreschlera	---	---	---	---	---
Chaetomium	---	---	---	---	---
Cladosporium	13	78	78	117	78
Curvularia	---	---	---	---	---
Cercospora	---	---	---	---	---
Epicoccum	---	---	---	---	---
Nigrospora	---	---	---	---	---
Penicillium/ Aspergillus	234	117	273	---	39
Pithomyces	---	---	---	---	---
Rusts	---	---	---	390	338
Smuts/Periconia/ Myxomycetes	---	---	---	---	---
Total	**572**	**507**	**624**	**3,820**	**3,510**

The highest indoor total spore count was approximately 18% of the lowest total spore count outside. The dominant mold indoors was *Aspergillus/Penicillium* and Basidiospores. The dominant mold types outdoors were *Ascospores* and Basidiospores. The weather on the day we sampled was cool (60ºF) and cloudy with intermittent light rain and winds less than 10 mph.

The laboratory analytical report is attached. Photographs from the sampling event are attached.

Temperature and Relative Humidity

The indoor temperature was 65ºF and the relative humidity was 62%. The outdoor temperature was 60ºF and the relative humidity was 74%.

CONCLUSIONS

The following conclusions are provided based on our assessment:

- Total spore counts inside were lower than outdoor air.
- *Aspergillus/Penicillium* was identified at higher spore counts inside versus outside which may be a function of the limited mold areas noted on the HVAC register.
- Temperature was within ASHRAE recommended guidelines.
- Relative humidity in the office was higher than EPA recommended guidelines. The air handler servicing this area is known to be deficient and has been scheduled for replacement by Clemson Facilities. The new air handler should provide an ability to reduce the relative humidity to the recommended range. In the meantime the dehumidifier should be used and emptied on a regular schedule.
- The office (Room 1-163) appeared to be in generally good condition with no obvious dust accumulations or moisture infiltration issues.
- Suspect fungal growth on the HVAC register should be cleaned.
- Potential mold growth and relative humidity should be monitored until the HVAC system is corrected.

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

Sincerely,
Terracon Consultants, Inc.



Benjamin Hestir, P.E.
Project Industrial Hygienist



Jeffery A Gurrie
Senior Industrial Hygienist

Attachments: Photographs
Laboratory Results

Photographs



Photo #1 Occupant information – Room 1-163, Lee Hall

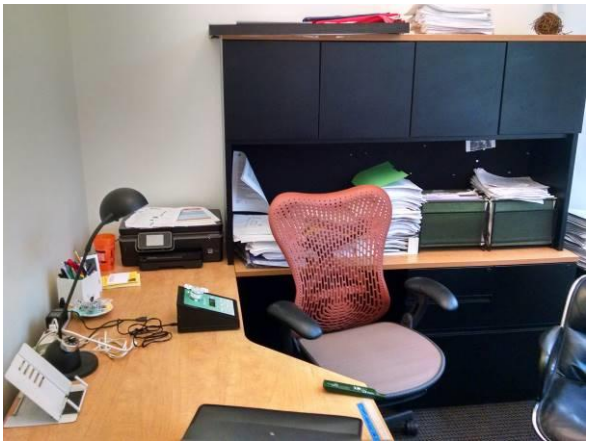


Photo #2 Desk of Dr. Lauritis – Lee Hall Room 1-163 – Sample 163-1 location



Photo #3 Supply duct above Dr. Lauritis's desk - Room 1-163

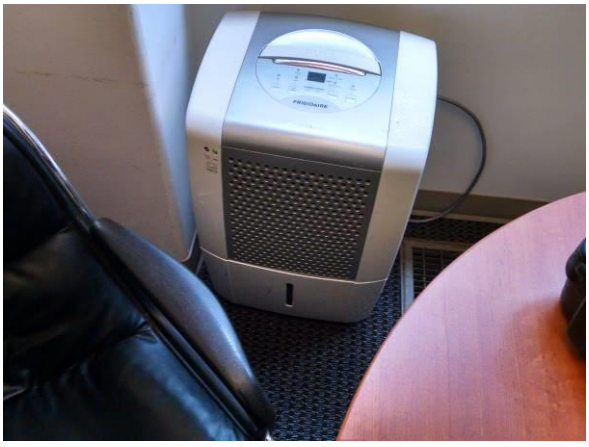


Photo #4 Dehumidifier in Room 1-163

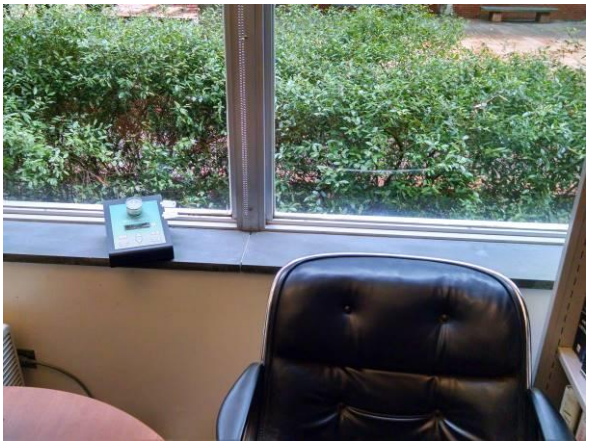


Photo #5 Air sample 163-2 location



Photo #6 Air sample 163-4 location outside

Laboratory Results

SEEML Reference Number:
170223007-DX

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: 02/23/17

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: 02/22/17
Terracon	Date Received: 02/23/17
72 Pointe Circle	Date Analyzed: 02/23/17
Greenville, SC 29615	Date Reported: 02/23/17
	Date Revised:
	Project Name: CU- Lee Hall Rm.163
	Project Address: 86127158 Task 82
	Project City, State, ZIP:
	SEEML Reference # : 170223007

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

Client Sample ID	163-1			163-2			163-3		
Location	Desk of Beth Lauritis- Rm. 163			Window Ledge- Rm. 163			Near Gallery in Lee Hall		
Lab Sample ID	170223007-016			170223007-017			170223007-018		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments	2	26							
Pollen									
Spore Trap Used	AOC			AOC			AOC		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria									
Ascospores	4	52	9						
Basidiospores	21	273	48	24	312	62	21	273	44
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	1	13	2	6	78	15	6	78	13
Curvularia									
Epicoccum									
Cercospora									
Fusarium									
Memnoniella									
Nigrospora									
Penicillium/Aspergillus	18	234	41	9	117	23	21	273	44
Polythrincium									
Rusts									
Smuts/Periconia/Myxomy									
Spegazzinia									
Stachybotrys									
Stemphylium									
Tetraploa									
Torula									
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	44	**572**		39	**507**		48	**624**	

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

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: 02/22/17
Terracon	Date Received: 02/23/17
72 Pointe Circle	Date Analyzed: 02/23/17
Greenville, SC 29615	Date Reported: 02/23/17
	Date Revised:
	Project Name: CU- Lee Hall Rm.163
	Project Address: 86127158 Task 82
	Project City, State, ZIP:
	SEEML Reference # : 170223007

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

Client Sample ID	163-4			163-5					
Location	Outside in Courtyard			Outside Between Lee & Floor					
Lab Sample ID	170223007-019			170223007-020					
Detection Limit (spores/m^3)	13			13					
Hyphal Fragments									
Pollen	1	13		2	26				
Spore Trap Used	AOC			AOC					
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%			
Alternaria									
Ascospores	89	1160	30	31	403	11			
Basidiospores	165	2150	56	204	2650	75			
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	9	117	3	6	78	2			
Curvularia									
Epicoccum									
Cercospora									
Fusarium									
Memnoniella									
Nigrospora									
Penicillium/Aspergillus				3	39	1			
Polythrincium									
Rusts	30	390	10	26	338	10			
Smuts/Periconia/Myxomy									
Spegazzinia									
Stachybotrys									
Stemphylium									
Tetraploa									
Torula									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces									
Background debris (1-5)3	3			3					
Sample Volume(liters)	75			75					
TOTAL SPORES/M^3	293	**3820**		270	**3510**				

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

Rafael Berrios

Rafael Berrios, Approved Laboratory Signatory

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AIHA-LAP, LLC EMLAP # 173667

Southeast Environmental Microbiology Laboratories

Chain of Custody

506 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 #: 170223007	Lab ID: 016 - 020

Company Information		Client Information		Environmental Conditions	
(Project Manager)	Ben Hestir	Date Sampled:	2/22/17	Precipitation in last 16hrs:	Yes
(Company Name)	Terracon	Project Name:	CU - Lee Hall Rm 163	Relative Humidity I/O:	62% / 74%
(Address)	72 Pointe Circle	Project Address:	86127158	Temperature I/O:	65° / 61°
(City, State, Zip)	Greenville, SC 29615	City, State, Zip:		Wind Conditions	light breeze
(Phone)	864-293-7348				
(Email)	ben.hestir@terracon.com				

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
163-1	Desk of Beth Lauritis - Rm 163	A	1		75	
163-2	Window ledge - Rm 163	"	"		"	
163-3	Near gallery in Lee Hall	"	"		"	
163-4	Outside in courtyard	"	"		"	
163-5	Outside between Lee + Fluor	"	"		"	

Relinquished By:	Date/Time	Recieved By:	Date/Time
Ben Hestir	2/23/17 0910		2/23/17

* Area is only required for culturable surface samples.

** Volume = Pump setting (L/min) x minutes