October 6, 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
Sirrine Hall – Rooms 120C, 123 and 151
515 Calhoun Drive
Clemson, South Carolina 29634
Terracon Project No. 86127158 – Task 107

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited mold investigation in Rooms 120C, 123 and 151 within Sirrine Hall located on the main campus of Clemson University in Clemson, South Carolina. Occupants have concerns regarding mold and/or odors in the faculty office spaces. This 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 the three previously mentioned faculty offices on September 13, 2017. The building, which contains primarily classrooms and office spaces, was originally constructed in 1938 and renovated in 1978. The request from Clemson University Environmental Health and Safety was for the investigation of two offices, but the senior administrative manager for the College of Business (Ms. Meg Bishop) requested that we add one additional office to our investigation while we were in the building.

The investigation included measurements of temperature and relative humidity, the collection of two (1) spore trap samples inside each of the faculty offices and two (2) spore trap samples outside the building 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

Mold Sampling

Total mold spore trap samples were collected using Allergenco-D™ spore trap 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 collection, the spore trap samples were hand delivered to the Southeastern Environmental Microbiology Lab (SEEML) in Greenville, South Carolina. 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 mold spore trap 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, with relative humidity between 20% and 60%, with preferred conditions falling between 30% and 50% for both winter and summer temperatures.

EPA recommends maintaining indoor humidity below 60%, ideally 30-50%, if possible.

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

FINDINGS

General Observations

- We were asked to add an additional room to our original scope by the Business School Senior Admin, Meg Bishop.
- Ms. Bishop stated that each of these rooms had dehumidifiers due to ongoing high humidity issues in the building. Odors, reportedly manure type, within the space was likely due to failure to empty/clean the dehumidifiers.
- Ms. Bishop stated that she had also offered for the College of Business to have each of the dehumidifiers permanently piped into the HVAC condensation drain so that they would not have to be emptied by the office occupants but the occupants had not followed up with a written request.
- Each of the office spaces is approximately 10 feet by 12 feet (or less).
- One of the offices (Room 120C) still contained the possessions of the faculty member. The other two offices (Rooms 123 and 151) were vacant except for chairs, desks and computers.
- Visible mold was observed in Room 120C.
- No significant musty or manure type odors were noted in the offices sampled or the common areas within the building at the time of testing by Terracon.

Mold Air Sampling / Temperature-Humidity Results

On the afternoon of September 13, 2017, Terracon collected one air sample in each of the three offices (120C, 123 and 151) and two outside the building for comparison. Measurements of temperature and relative humidity were also made. The results of the total spore count samples analyses and the measurements of temperature and relative humidity are presented in Table 1. The laboratory analytical reports are attached.

Table 1: Summary of Total Spore Count Analyses and
Temperature/Relative Humidity Measurements – September 13, 2017

Sample #	**120C-1**	**123-1**	**151-3**	**Outside-1**	**Outside -2**
Location Description	**Room 120C**	**Room 123**	**Room 151**	**Sirrine Courtyard Bench 1**	**Sirrine Courtyard Bench 2**
Spore Type	**Spores/ m^3**	**Spores/m^3**	**Spores/m^3**	**Spores/m^3**	**Spores/m^3**
Ascospores	273	---	---	741	156
Basidiospores	195	78	117	4,060	3,820
Bipolaris/Dreschlera	26	---	---	---	---
Cladosporium	2,500	195	39	3,510	1,990
Curvularia	---	13	---	91	---
Cercospora	---	---	---	39	
Nigrospora	---	13	---	---	13
Penicillium/ Aspergillus	6,240	273	195	---	---
Smuts/*Periconia*/ Myxomycetes	26	---	---	26	13
Total	**9,260**	**572**	**351**	**8,470**	**5,990**
Temperature (degrees Fahrenheit)	74.4	72.3	70.7	78.9	---
Relative Humidity (%)	54.2	60.1	56.7	51.0	---

Except for office 120C, indoor spore levels were below outdoor levels. The dominant mold genera indoors were *Penicillium/Aspergillus and Cladosporium.* The dominant mold genera outdoors were *Basidiospores and Cladosporium*. Conditions outside on the day we sampled were warm and sunny.

The laboratory analytical report is attached.

CONCLUSIONS

The following conclusions are provided based on our assessment:

- Room 120C had visual evidence of a surficial mold that was confirmed by the air sample.
- The results of mold air sampling in the other two offices tested indicated that total airborne mold spore concentrations inside were below the total mold spore levels measured in the two outdoor samples and with the exception of *Penicillium/Aspergillus,* concentrations of mold spore types inside the building were less than the highest corresponding outdoor mold spore levels measured.
- Measurements of temperature and relative humidity were within recommended ranges; however, temporary dehumidifiers were used.

RECOMMENDATIONS

The following recommendations are provided based on our assessment:

- It is our understanding the HVAC system is being re-evaluated. Until the system(s) can adequately reduce relative humidity in the offices, temporary dehumidifiers should be continuously used to maintain humidity levels below 60%.
- A daily maintenance schedule should be developed to empty and keep the temporary dehumidifiers clean to prevent unwanted odors.
- Because visible mold growth was observed in Room 120C, it should be cleaned and HEPA filtered during the cleaning process in general accordance with the American National Standards Institute (ANSI)/Institute of Inspection Cleaning and Restoration Certification (IICRC) R520, Reference Guide for Professional Mold Remediation. The other offices should also be cleaned.

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

Sincerely,
Terracon Consultants, Inc.



Benjamin Hestir, P.E.
Project Industrial Hygienist



Jeffrey A. Gurrie
Senior Industrial Hygienist

Attachments: Laboratory Results
Photo Log

Laboratory Results

SEEML Reference Number:
170914088

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: 09/14/17

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:
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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: 09/13/17
Terracon	Date Received: 09/14/17
72 Pointe Circle	Date Analyzed: 09/14/17
Greenville, SC 29615	Date Reported: 09/14/17
	Date Revised:
	Project Name: Sirrine Hall 120C, 123 & 151
	Project Address: 86127158- Task 107
	Project City, State, ZIP:
	SEEML Reference # : 170914088

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

Client Sample ID	120C-1			123-1			151-1		
Location	Office at Jason Thatcher			Office at A Colak			Office at M Akturk		
Lab Sample ID	170914088-321			170914088-322			170914088-323		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments	3	39							
Pollen				1	13		1	13	
Spore Trap Used	Allergenco			Allergenco			Allergenco		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria									
Ascospores	21	273	3						
Basidiospores	15	195	2	6	78	14	9	117	33
Bipolaris/Drechslera	2	26	<1						
Chaetomium									
Cladosporium	192	2500	27	15	195	34	3	39	11
Curvularia				1	13	2			
Epicoccum									
Cercospora									
Fusarium									
Memnoniella									
Nigrospora				1	13	2			
Penicillium/Aspergillus	480	6240	67	21	273	48	15	195	56
Polythrincium									
Rusts									
Smuts/Periconia/Myxomy	2	26	<1						
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	712	**9260**		44	**572**		27	**351**	

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: 09/13/17
Terracon	Date Received: 09/14/17
72 Pointe Circle	Date Analyzed: 09/14/17
Greenville, SC 29615	Date Reported: 09/14/17
	Date Revised:
	Project Name: Sirrine Hall 120C, 123 & 151
	Project Address: 86127158- Task 107
	Project City, State, ZIP:
	SEEML Reference # : 170914088

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

Client Sample ID	Outside-1			Outside - 2					
Location	Outside- Sirrine Courtyard Near Entrance			Outside- Sirrine Courtyard Near Street					
Lab Sample ID	170914088-324			170914088-325					
Detection Limit (spores/m^3)	13			13					
Hyphal Fragments									
Pollen	147	1911		6	78				
Spore Trap Used	Allergenco			Allergenco					
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%			
Alternaria									
Ascospores	57	741	9	12	156	3			
Basidiospores	312	4060	48	294	3820	64			
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	270	3510	41	153	1990	33			
Curvularia	7	91	1						
Epicoccum									
Cercospora	3	39	<1						
Fusarium									
Memnoniella									
Nigrospora				1	13	<1			
Penicillium/Aspergillus									
Polythrincium									
Rusts									
Smuts/Periconia/Myxomy	2	26	<1	1	13	<1			
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	651	**8470**		461	**5990**				

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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Greenville, SC 29607
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Southeast Environmental Microbiology Laboratories

Chain of Custody

506 Laurens Rd, Greenville, SC 29607

Phone : 864-233-3770, Fax: 864-233-6589, www.seeml.com, AIHA-LAP, LLC. (EMLAP) #173667

For Lab Use Only			
Condition of samples is acceptable	☐ YES ☐ NO	SEEML Ref #: 1709114088	Lab ID: 321-325

Company Information		Client Information		Environmental Conditions	
(Project Manager) **Ben Hestir**		Date Sampled:	9/13/2017	Precipitation in last 16hrs:	Yes
(Company Name) **Terracon**		Project Name:	Sirrine Hall 120C, 123 and 151	Relative Humidity I/O:	60.1%/51.0%
(Address) **72 Pointe Circle**		Project Address:	86127158 - Task 107	Temperature I/O:	74.4/78.9
(City, State, Zip) **Greenville, SC 29615**		City, State, Zip:		Wind Conditions	10-15 mph
(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
120C-1	Office of Jason Thatcher	A	1		75	
123-1	Office of A Colak	A	1		75	
151-1	Office of M Akturk	A	1		75	
Outside-1	Outside - Sirrine Courtyard near entrance	A	1		75	
Outside-2	Outside - Sirrine Courtyard near street	A	1		75	

Reliquished By:	Date/Time	Recieved By:	Date/Time
Ben Hestir	9/14/17 10 am		9-14-17

* Area is only required for culturable surface samples.

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

Photo Log



Photo #1 Sample location for 120C-1 – office of Jason Thatcher

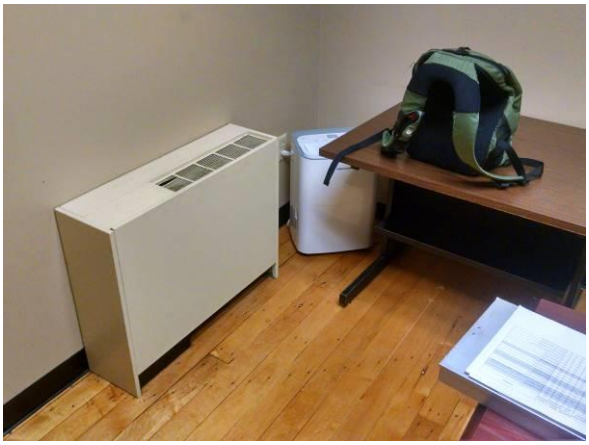


Photo #2 View of vacant office 151

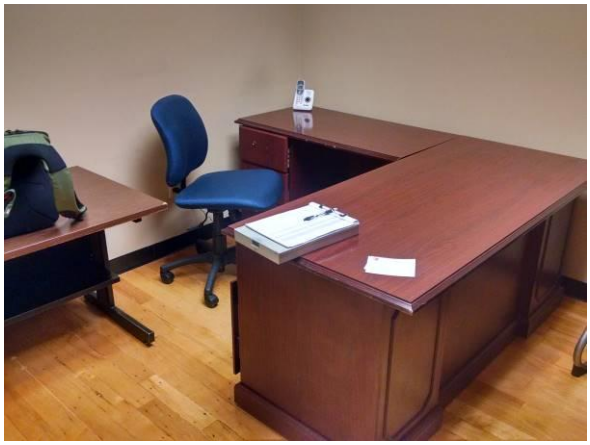


Photo #3 View of vacant office 123



Photo #4 View of surficial mold growth on light fixture in Room 120-C



Photo #5 View of outside sample location in Sirrine courtyard