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
Room B101B Klugh Avenue
Clemson, South Carolina
Terracon Project No. 86127158 – Task 85

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited mold investigation in Room B101B of the Clemson Facilities offices on Klugh Avenue on the Clemson University campus in Clemson, South Carolina after a complaint by the current occupant of this office space (Brad Newman) regarding a musty odor in a storage closet connected to his office. 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 B101B Klugh Avenue at Clemson University on March 1, 2017.

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 four locations inside the offices, 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 office was vacant at the time of our investigation. Suspected mold growth and evidence of water infiltration was observed in the storage closet connected to the office. The storage closet primarily contains books, documents and drawings and is located below ground level on the east side of this group of offices. A wooden chair and several three-ring binders were observed to have surficial mold growth. Staining on the south wall of the closet appeared to be present due to water infiltration.

Mold Air Sampling

On the morning of March 1, 2017, Terracon collected four mold spore trap samples inside the offices 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 – March 1, 2017

Sample #	B101B-1	B101B-2	B101B-3	B101B-4	B101B-5	B101B-6
Location Description	**In closet B101B**	**Desk of Brad Newman**	**In Room B101**	**In Room B102**	**Outside entrance to B102**	**Outside in Parking Area**
Spore Type	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**
Alternaria	---	---	---	---	---	---
Ascospores	39	---	---	---	624	156
Basidiospores	39	117	---	39	1,950	1,330
Bipolaris/Dreschlera	---	---	---	---	---	---
Chaetomium	---	---	---	---	---	---
Cladosporium	117	39	39	156	78	351
Curvularia	---	---	---	13	---	---
Cercospora	---	---	---	---	---	---
Epicoccum	13	---	---	---	---	---
Nigrospora	---	---	---	---	13	13
Penicillium/ Aspergillus	3,160	---	234	234	78	312
Pithomyces	---	---	---	---	---	---
Rusts	---	---	---	---	---	---
Smuts/Periconia/ Myxomycetes	13	13	---	13	13	13
Total	**3,380**	**169**	**273**	**455**	**2,760**	**2,180**

The closet was observed to have fungal growth on several surfaces and evidence of water infiltration.

Other than the sample collected in the closet, the highest indoor total spore count was approximately 21% of the lowest total spore count outside. The dominant molds indoors were *Aspergillus/Penicillium,* Basidiospores and *Cladosporium*. The dominant mold types outdoors were *Ascospores,* Basidiospores and *Cladosporium*. The weather on the day we sampled was warm (75ºF) and cloudy with 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 74ºF and the relative humidity was 52%. The outdoor temperature was 75ºF and the relative humidity was 54%.

CONCLUSIONS

The following conclusions are provided based on our assessment:

- With the exception of the closet, total spore counts inside were lower than outdoor air.
- *Aspergillus/Penicillium* was identified at higher spore counts inside versus outside in the closet. This may be due to the apparent mold growth on items in the closet.
- Temperature and relative humidity were within ASHRAE and EPA recommended guidelines.
- The closet connected to the office in Room B101B has water infiltration and mold growth.
- Repairs should be made to prevent water intrusion into the closet and moldy materials should be cleaned or discarded.

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 At entrance to B101B



Photo #2 Evidence of water infiltration in closet



Photo #3 Fungal growth on chair in closet – Room B101B



Photo #4 Air sample location – B101B office

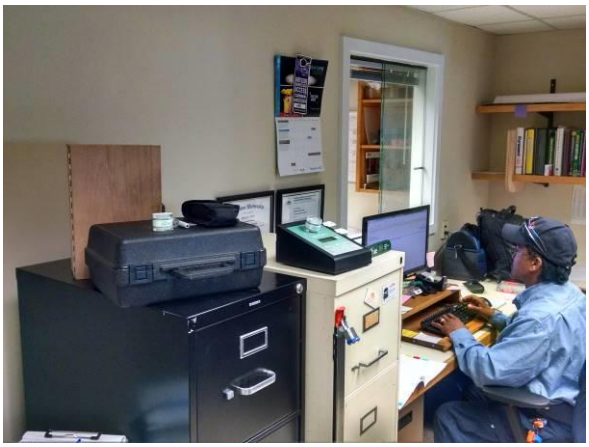


Photo #5 Air sample location – B101 office



Photo #6 Air sample location Room B102

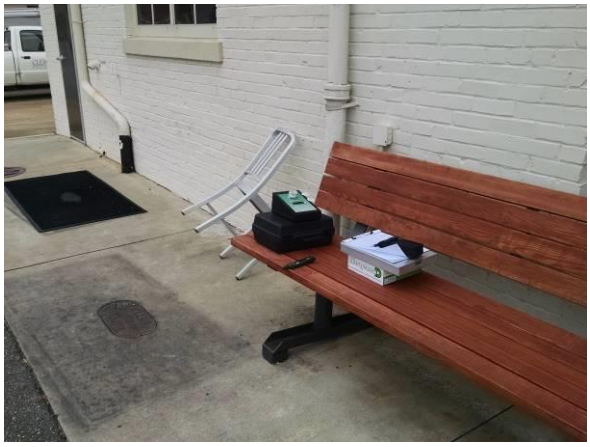


Photo #7 Air sample location – outside entrance to B102



Photo #8 Air sample location – outside in parking area across from entrance to B102

Laboratory Results

SEEML Reference Number:
170302012

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: 03/02/17

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: 3/01/17
Terracon	Date Received: 3/02/17
72 Pointe Circle	Date Analyzed: 3/02/17
Greenville, SC 29615	Date Reported: 3/02/17
	Date Revised:
	Project Name: CU-B105B Klugh Ave
	Project Address: 86127158 Task 85
	Project City, State, ZIP:
	SEEML Reference # : 170302012

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

Client Sample ID	B105B-1			B105B-2			B105B-3		
Location	Closet B105B			Desk B105B			B101		
Lab Sample ID	170302012-027			170302012-028			170302012-029		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments	8	104		1	13				
Pollen	2	26							
Spore Trap Used	AOC			AOC			AOC		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria									
Ascospores	3	39	1						
Basidiospores	3	39	1	9	117	69			
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	9	117	3	3	39	23	3	39	14
Curvularia									
Epicoccum	1	13	<1						
Cercospora									
Fusarium									
Memnoniella									
Nigrospora									
Penicillium/Aspergillus	243	3160	93				18	234	86
Polythrincium									
Rusts									
Smuts/Periconia/Myxomy	1	13	<1	1	13	8			
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	260	**3380**		13	**169**		21	**273**	

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: 3/01/17
Terracon	Date Received: 3/02/17
72 Pointe Circle	Date Analyzed: 3/02/17
Greenville, SC 29615	Date Reported: 3/02/17
	Date Revised:
	Project Name: CU-B105B Klugh Ave
	Project Address: 86127158 Task 85
	Project City, State, ZIP:
	SEEML Reference # : 170302012

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

Client Sample ID	B105B-4			B105B-5			B105B-6		
Location	B102			Outside Entrance			Outside In Parking		
Lab Sample ID	170302012-030			170302012-031			170302012-032		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments	1	13		1	13		1	13	
Pollen	1	13		13	169		2	26	
Spore Trap Used	AOC			AOC			AOC		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria									
Ascospores				48	624	23	12	156	7
Basidiospores	3	39	9	150	1950	71	102	1330	61
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	12	156	34	6	78	3	27	351	16
Curvularia	1	13	3						
Epicoccum									
Cercospora									
Fusarium									
Memnoniella									
Nigrospora				1	13	<1	1	13	<1
Penicillium/Aspergillus	18	234	51	6	78	3	24	312	14
Polythrincium									
Rusts									
Smuts/Periconia/Myxomy	1	13	3	1	13	<1	1	13	<1
Spegazzinia									
Stachybotrys									
Stemphylium									
Tetraploa									
Torula									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces									
Background debris (1-5)3	3			3			2		
Sample Volume(liters)	75			75			75		
TOTAL SPORES/M^3	35	**455**		212	**2760**		167	**2180**	

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 #: 170302-012	Lab ID: 027-032

Ave as in Avenue

Company Information		Client Information		Environmental Conditions	
(Project Manager)	Ben Hestir	Date Sampled:	3/1/17	Precipitation in last 16hrs:	Yes
(Company Name)	Terracon	Project Name:	CY - B105B Klugh Ave	Relative Humidity I/O:	51% / 54%
(Address)	72 Pointe Circle	Project Address:	86127158 Task 85	Temperature I/O:	74° / 75°
(City, State, Zip)	Greenville, SC 29615	City, State, Zip:		Wind Conditions	Breezy
(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
MS- 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
B105B-1	Closet B105B	A	1		75	
B105B-2	Desk B105B	"	"		"	
B105B-3	B101	"	"		"	
B105B-4	B102	"	"		"	
B105B-5	Outside entrance	"	"		"	
B105B-6	Outside in parking	"	"		"	

Relinquished By:	Date/Time	Recieved By:	Date/Time
Ben Hestir	3/2/17 0933		3/2/17

* Area is only required for culturable surface samples.

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