August 21, 2015

Clemson University
310 Klugh Avenue
Clemson, South Carolina 29634

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

Re: Limited Mold Investigation Report
Clemson University
Edgar Brown University Union Building (6th, 7th and 8th Floors)
Clemson, South Carolina
Terracon Project No. 86127158 – Task 40

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited mold investigation on the 6th, 7th and 8th floors of the Edgar Brown University Union Building located on Clemson University's main campus in Clemson, South Carolina. It is our understanding there are occupant complaints pertaining to mold. 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 investigation of two rooms on the 8th floor of the Edgar Brown University Union Building. The occupant of the office (Mr. Todd Chamberlin) had complaints of allergic reactions when he spends time in the office.

This office (Room 806) is located in the southwest corner of the building. At the request of Mr. Chamberlin, both the office and the conference room on the 8th floor were investigated. At the request of Clemson EHS, additional investigation was performed on the 6th and 7th floors of the same structure due to air quality complaints from other employees within the Student Affairs department, which uses the office spaces on these floors. Terracon representative Mr. Benjamin Hestir performed this investigation on July 29th and 30th, 2015.

Standard of Care

This 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 investigation. 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 investigation. 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.

INVESTIGATION CRITERIA AND METHODS

Physical Inspection

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 inspection focused primarily on collecting observational data (i.e., information obtained by physical inspection of the building and interviews with the building management, owners, and occupants). The physical inspection can help to formulate plans for more in-depth investigation. Destructive sampling or testing to inspect interior wall cavity spaces or mechanical enclosures was not within the scope of work for this project.

The physical inspection included:

- an examination of the physical structure and potential indoor and outdoor sources of moisture intrusion;
- the identification of any discoloration or odor that could indicate moisture intrusion, water damage, and/or fungal growth;
- an examination of the HVAC system(s) and its components.

Mold Sampling

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.

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. To help interpret the sampling results, we compared indoor air and outdoor air measurements.

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.

Total viable (cultured) fungal samples were collected by drawing a measured volume of air over culture media in petri dishes using an Anderson N-6 type impactor in series with a high-volume sample collection pump calibrated to a flow rate of 28.3 LPM. The culture media (malt extract agar or MEA) was exposed to the airflow for three (3) minutes at the indoor locations and two (2) minutes at the outdoor location.

After air sample collection, the samples were hand delivered to Southeast Environmental Microbiology Laboratories, Inc. (SEEML), accredited by the 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). The viable samples were incubated in a warm environment for seven (7) days before being analyzed by direct microscopic examination and are reported in colony forming units per cubic meter of air (CFUs/m^3).

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

Physical Assessment

The Student Affairs office is in Room 806 on the 8th floor, southwest corner of the Edgar Brown University Union. At the time of assessment no musty odors were observed in the Room 806 office or in the 8th floor conference room located just to the north of Room 806. A slight musty odor was observed on the morning of July 30th in Room 706 but not in Room 602. Heating and cooling in each room is supplied by a fan coil HVAC unit with no fresh air controls. No evidence of previous water intrusion or damage was observed in the rooms sampled.

Mold Air Sampling

On the afternoon of July 29, 2015 three non-viable mold spore trap samples were collected; two indoors on the 8th floor and one outdoors for comparison. Also, three viable mold spore samples were collected in the same locations as the spore traps.

On the morning of July 30, 2015, two additional mold spore trap samples were collected in Suite 706 (occupied by Mr. Bernardo Dargan) and in Suite 602 (vacant at the time of our sampling).

At the time of testing the indoor temperatures ranged from 74 ºF to 77 ºF and indoor relative humidity ranged from 53% to 64%. The highest humidity reading (64%) was in Suite 602 which was unoccupied at the time of our sampling. Outdoor temperature was 83 ºF and outdoor relative humidity was 78% with light winds and a rain shower occurred on the afternoon of July 29, 2015 just before outdoor samples were collected.

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

Table 1: Summary of Total Spore Count Results – July 29-30, 2015

Sample #	**CUSU1**	**CUSU3**	**CUSU5**	**CUSU7**	**CUSU8**
Location	**Room 806 Office**	**8th floor Conference Room**	**Outside University Union**	**Room 706 Admin Office**	**Room 602 west hallway**
Spore Type	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**
Alternaria	26	---	39	---	---
Ascospores	39	156	6,970	---	---
Aspergillus/ Penicillium	---	624	---	897	546
Basidiospores	---	39	2,610	390	39
Cladosporium	156	117	741	117	39
Curvularia	---	---	26	13	---
Cercospora	---	---	52	---	---
Myxomycetes/ Perconia/Smut	13	---	52	13	---
Nigrospora	26	---	---	---	---
Total	**260**	**936**	**10,500**	**1,430**	**624**

The indoor total mold spore result in all interior locations sampled was lower than the outdoor level. The types of mold identified from the indoor sampling were largely consistent with those identified on the outdoor samples, with the exception of *Aspergillus/Penicillium* and one indoor detection of *Nigrospora*. However, Terracon had also conducted outdoor mold sampling on July 29th elsewhere on the Clemson campus that did have *Aspergillus/Penicillium* in the samples.

The results of the viable mold samples are summarized in Table 2 below:

Table 2: Summary of Viable Mold Results – July 29-30, 2015

Sample #	CUSU2	CUSU4	CUSU6
Location	**Room 806 Office**	**8th floor Conference Room**	**Outside University Union**
Spore Type	**CFUs/m³**	**CFUs/m³**	**CFUs/m³**
Cladosporium	168	180	594
Epicoccum	12	---	---
Aspergillus*	---	---	---
Penicillium	48	24	90
Trichoderma	12	---	---
Total	**240**	**204**	**684**

The viable mold result in both interior locations sampled was lower than the outdoor level. 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 *Trichoderma* and *Epicoccum*.

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 6th, 7th and 8th floors were well below the total spore count measured outside the University Union entrance. *Aspergillus/Penicillium* (which cannot be differentiated by direct examination) was detected in three of the four indoor total spore count samples but was not detected outside in the total spore sample. However, Terracon had also conducted outdoor mold sampling on July 29th elsewhere on the Clemson campus that did have *Aspergillus/Penicillium* in the samples.
- Viable mold levels on the 8th floor were below those measured outdoors with *Cladosporium* and *Penicillium* being the dominant spores inside and out.
- Complaints of window condensation and lack of fresh air were made by employees of the 7th and 8th floors.
- A musty mold-like odor was reported to be common on the 7th floor in warmer months and is only alleviated by opening windows overnight according to Mr. Dargan in Room 706. Terracon detected a slight musty odor at the time of the sample collection on July 30, 2015.
- HVAC in the building is provided by multiple fan coil units with no fresh air control. Leaks from the condensate pans in the units were not reported or observed.

- Inspection and cleaning of the fan coil units and the associated condensation pan is recommended with a final cleaning of the inside of the unit and the area around it with a HEPA filtered vacuum to reduce any potentially allergenic particulate disturbed by the cleaning effort.

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

Sincerely,
Terracon Consultants, Inc.



Benjamin Hestir, P.E.
Project Industrial Hygienist



Scott D. Rohlf CIH
Authorized Project Reviewer

Attachments: Photographs
Laboratory Results

Photographs

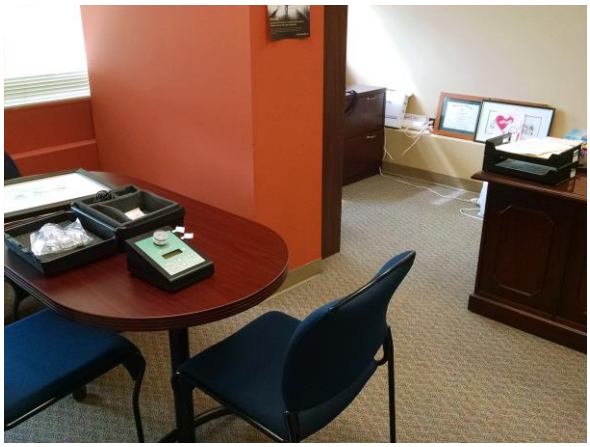


Photo #1 View of location of sample CUSU1 in office of Room 806

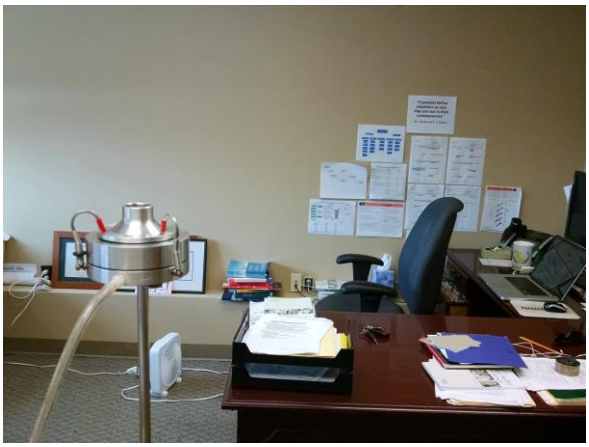


Photo #2 View of location of sample CUSU2 in office of Room 806



Photo #3 View of location of samples CUSU 5 and CUSU6 outside of University Union

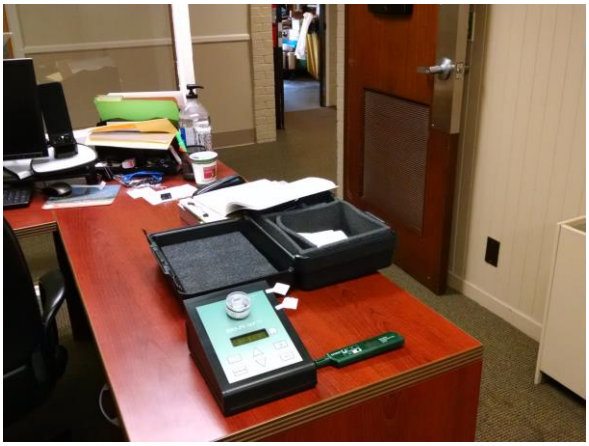


Photo #4 View of location of sample CUSU7 in Room 706 outer office



Photo #5 View of location of sample CUSU8 in hallway of Room 602

Laboratory Results

SEEML Reference Number:
150730053

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: 07/30/15

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).

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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: 07/29/15
Terracon	Date Received: 07/30/15
3534 Rutherford Road	Date Analyzed: 07/30/15
Taylors, SC 29687	Date Reported: 07/30/15
	Date Revised:
	Project Name: CU Student Union
	Project Address: Clemson, SC
	SEEML Reference # : 150730053

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

Client Sample ID	CUSU1			CUSU3			CUSU5		
Location	Rm. 806-Chamberlin Office			8th Floor Conference Room			Ouside Studen Union Entrance		
Lab Sample ID	150730053-194			150730053-196			150730053-198		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments	1	13		1	13				
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	2	26	10				3	39	<1
Ascospores	3	39	15	12	156	17	536	6970	66
Aureobasidium									
Basidiospores				3	39	4	201	2610	25
Bipolaris/Drechslera									
Botrytis									
Chaetomium									
Cladosporium	12	156	60	9	117	13	57	741	7
Curvularia							2	26	<1
Epicoccum									
Cercospora							4	52	<1
Fusarium									
Nigrospora	2	26	10						
Penicillium/Aspergillus				48	624	67			
Rusts									
Smuts/Periconia/Myxomy	1	13	5				4	52	<1
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	20	**260**		72	**936**		807	**10500**	
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: 07/29/15
Terracon	Date Received: 07/30/15
3534 Rutherford Road	Date Analyzed: 07/30/15
Taylors, SC 29687	Date Reported: 07/30/15
	Date Revised:
	Project Name: CU Student Union
	Project Address: Clemson, SC
	SEEML Reference # : 150730053

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

Client Sample ID	CUSU7			CUSU8					
Location	Suite 706 Admin Desk			Suite 602 hall desk					
Lab Sample ID	150730053-200			150730053-201					
Detection Limit (spores/m^3)	13			13					
Hyphal Fragments	1	13							
Pollen	1	13		1	13				
Spore Trap Used	Allergenco			Allergenco					
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%			
Alternaria									
Ascospores									
Aureobasidium									
Basidiospores	30	390	27	3	39	6			
Bipolaris/Drechslera									
Botrytis									
Chaetomium									
Cladosporium	9	117	8	3	39	6			
Curvularia	1	13	<1						
Epicoccum									
Cercospora									
Fusarium									
Nigrospora									
Penicillium/Aspergillus	69	897	63	42	546	88			
Rusts									
Smuts/Periconia/Myxomy	1	13	<1						
Stachybotrys									
Stemphylium									
Memnoniella									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces									
Background debris (1-5)3	3			3					
Sample Volume(liters)	75			75					
TOTAL SPORES/M^3	110	**1430**		48	**624**				
Quality Control									

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

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Disclaimer: This report relates only to the samples tested

Respectfully submitted, SEEML, Inc.

Rafael Berrios

Rafael Berrios, Approved Laboratory Signatory

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Greenville, SC 29607
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SEEML Reference Number:
150730053

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Lab Manager Review: Rafael Berrios Date: 08/18/15

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

Viable Air (Andersen) Fungal Report

Attn: Ben Hestir	Date Sampled: 07/29/15 - 07/30/15
Terracon	Date Received: 07/30/15
3534 Rutherford Rd.	Date Analyzed: 08/06/15
Taylorsc, SC. 29687	Date Reported: 08/06/15
	Project Name: CU Student Union
	Project Number:
	SEEML Reference # : 150730053

Test Method: Stereomicroscopy

PHCC* 400

Client Sample ID	CU SU 2			CU SU 4			CU SU 6		
Location	Room 806 - Chamber in Office			8th Floor Conference Room			Outside Student Union Entrance		
Lab Sample ID	150730053-195			150730053-197			150730053-199		
Detection Limit (cfu/m^3)	12			12			18		
Media Used	MEA			MEA			MEA		
	raw ct.	cfu**/m^3	%	raw ct.	cfu**/m^3	%	raw ct.	cfu**/m^3	%
Acremonium									
Alternaria									
Aspergillus flavus									
Aspergillus fumigatus									
Aspergillus nidulans									
Aspergillus niger									
Aspergillus glaucus									
Aspergillus sydowii									
Aspergillus terreus									
Aspergillus versicolor									
Aspergillus other									
Aureobasidium									
Botrytis									
Bipolaris/Dreshclera									
Cladosporium	14	168	70	15	180	88	33	594	87
Chaetomium									
Curvularia									
Epicoccum	1	12	5						
Mucor									
Non-sporulating Fungi									
Paecilomyces									
Penicillium	4	48	20	2	24	12	5	90	13
Phoma/Coelmycetes									
Trichoderma	1	12	5						
Stachybotrys chartarum									
Yeast									
Volume (liters)	84.9			84.9			56.6		
TOTAL cfu/m^3	20	**240**		17	**204**		38	**684**	
Quality Control									

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

PHCC * Particle Hole Coeffecient Correction

**colony forming units (The reporting limit is 1cfu/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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AIHA EMLAP # 173667