April 27, 2018

Clemson University
310 Klugh Avenue
Clemson, South Carolina 29634

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

Re: Limited Indoor Environmental Quality Investigation Report
Holmes Hall, Rooms 227 and 229
Clemson, South Carolina 29631
Terracon Project No. 86127158 – Task 137

Dear Mr. Newberry:

Terracon Consultants, Inc. (Terracon) conducted a limited indoor environmental quality investigation at Holmes Hall, Rooms 227 and 229 in Clemson, South Carolina. These two dormitory rooms were impacted by a broken water line in the bathroom of Room 227 during spring break (the week of March 12-16, 2018). This service was conducted in general accordance with our Master Service Agreement with Clemson University.

PROJECT DESCRIPTION

Background/Scope of Services

At the request of Clemson University, Terracon representative Mr. Benjamin Hestir conducted a limited indoor environmental quality investigation in the dorm rooms at Holmes Hall Rooms 227 and 229 on Tuesday, April 10, 2018. At the time of our testing the rooms were unoccupied and drying efforts were completed.

On our April 10th visit, Terracon made measurements of temperature and relative humidity and conducted airborne mold sampling which consisted of collecting spore trap air samples in two locations inside (one in each room) and the collection of two additional samples outside for comparison. We also collected two composite dust samples (one in each room) for allergen analysis and two composite dust wipe samples for Cimex species (bedbug) analysis.

Standard of Care

This limited indoor environmental quality 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 and Allergen 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 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.

Three composite allergen dust samples were collected from carpet, chair fabrics and furniture surfaces in the occupied offices using a high volume air sampling pump in conjunction with a 3-piece 37 millimeter dust sampling cassette preloaded with a 5.0 micrometer polyvinyl chloride (PVC) filter.

After composite dust sample collection, the allergen samples were shipped by overnight courier to EMSL in Cinnaminson, New Jersey. EMSL is accredited by the AIHA® Laboratory Accreditation Programs, LLC under the Environmental Microbiology Laboratory Accreditation Program (EMLAP), Accreditation #100194. The allergen samples were analyzed by direct microscopic examination for allergens from dust mites, mouse, rat, cat, dog, and cockroach. Allergen results are reported in micrograms per gram of dust (µg/g).

Cimex Species (bedbug) Sampling

Two dust swab samples were collected from bedding, bed furniture and horizontal surfaces near the bed (one from each dorm room) using a HealthLink Transporter sterile swab. After collection the swab samples were shipped by overnight courier to Research Associates Laboratory (RAL) in Allen, Texas. RAL has been providing DNA analysis to the veterinary industry and others since 1992 and they hold the patent for Bedbug DNA testing. The swab sample was tested for the DNA of the two most common bedbug species (*Cimex lectilarius* and *Cimex hemipterus*) using quantitative real time polymerase chain reaction technology (qPCR). Results are reported as presence/absence.

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

- Each dorm room consisted of a room with a bathroom. The rooms were unoccupied and the personal contents were removed.
- Room 227 received more impact from the water leak, which originated in a toilet water supply line in the Room 227 bathroom. At the time of our investigation, Room 227 had been cleaned and the carpet tiles had been pulled up, dried and put back.
- Room 229 reportedly only had a small area of carpet outside the bathroom impacted.
- Photographs from the assessment are attached.

Mold Air Sampling

On the afternoon of April 10, 2018, Terracon collected two mold spore trap samples (one in each dorm room) at Holmes Hall Rooms 227 and 229 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 – April 10, 2018

Sample #	227-1	229-1	Outside-1	Outside-2
Location Description	**Room 227**	**Room 229**	**Outside main entrance to Holmes**	**Outside University Union**
Spore Type	**Spores/m³**	**Spores/m³**	**Spores/m³**	**Spores/m³**
Alternaria	13	---	---	---
Ascospores	78	39	936	1,250
Basidiospores	507	312	858	1,090
Chaetomium	---	---	---	---
Cladosporium	117	39	273	195
Epicoccum	---	---	---	65
Penicillium/ Aspergillus	195	234	117	234
Polythrincium	---	---	---	13
Rusts	---	13	26	13
Smuts/Periconia/ Myxomycetes	---	26	---	13
Spegazzinia	---	13	---	---
Total	**910**	**676**	**2,210**	**2,870**

Sample #	227-1	229-1	Outside-1	Outside-2
Location Description	Room 227	Room 229	Outside main entrance to Holmes	Outside University Union
Spore Type	Spores/m^3	Spores/m^3	Spores/m^3	Spores/m^3
Temperature (degrees F.)	72.5	71.7	70.3	---
Relative Humidity (%)	39.1	43.5	31.1	---

There was no visual evidence of mold growth or wet materials observed in the dorm rooms.

The lowest outdoor total spore count was approximately 2.4 times higher than the highest total spore count inside. The predominant mold types indoors were *Basidiospores* and *Penicillium/Aspergillus.* The predominant mold types outside were *Basidiospores* and *Ascospores.*

The weather on the day we sampled was warm (70.3ºF) and clear with a slight breeze. The laboratory analytical report is attached.

Temperature and Relative Humidity

The average indoor temperature was 72.1ºF and the average relative humidity was 41.3%. The outdoor temperature was 70.3ºF and the relative humidity was 31.1%.

Allergen Sampling

On the afternoon of April 10, 2018, Terracon collected a dust sample from the carpeting and furniture in rooms 227 and 229 at Holmes Hall. The samples were analyzed for allergens from dust mites, mouse, rat, cat, dog, and cockroach.

Allergens were identified in the samples. Table 2 below summarizes the laboratory results. The laboratory analytical report is attached and references additional information.

Table 2: Summary of Allergen Analyses – April 10, 2018

Sample #	227-2		229-2	
Location	Room 227		Room 229	
Allergen Type/Antigen	Concentration (ug/g)	Laboratory assigned risk factor	Concentration (ug/g)	Laboratory assigned risk factor
Dust Mites / Der fl	1.88	Low	0.93	Low
Dust Mites / Der pl	0.99	Low	0.25	Low

Sample #	227-2		229-2	
Location	Room 227		Room 229	
Allergen Type/Antigen	Concentration (ug/g)	Laboratory assigned risk factor	Concentration (ug/g)	Laboratory assigned risk factor
Mouse / Mus ml	ND	Low	ND	Low
Rat / Rat nl	ND	NA	ND	NA
Cat / Fel dl	0.13	Low	0.30	Low
Dog / Can fl	0.11	Low	0.22	Low
Cockroach / Bla G2	ND	Low	ND	Low

Note: ug = microgram (10^{-6} grams), NA = Not Applicable, ND = not detected

Cimex Species (bedbug) Sampling

On the afternoon of April 10, 2018, Terracon collected swab samples from the bedding, bed furniture, and horizontal surfaces in rooms 227 and room 229 at Holmes Hall. The samples were analyzed for DNA of the two most common bedbug species, *Cimex lectilarius* and *Cimex Hemipterus*. Bedbug DNA was not identified in the samples. The laboratory analytical report is attached.

CONCLUSIONS AND RECOMMENDATIONS

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

- The results of mold air sampling indicated that total airborne mold spore concentrations for the two spore traps collected inside the building were below total mold spore levels measured in the highest outdoor sample. Additionally the mold types identified indoors were also identified outdoors. This is considered normal and is not indicative of indoor mold growth.

- Common allergens were identified from the dust samples collected in the building. The allergen risk levels assigned by the lab for the allergens detected were all “low”.

- Common bedbug DNA was not detected from the dust samples submitted for that analysis.

- Temperature and relative humidity levels in the offices were within ASHRAE and EPA guideline ranges.

Terracon appreciates the opportunity to provide this service to Clemson University. If you have any questions regarding this limited indoor environmental quality investigation 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: Photographs
Laboratory Results

Photographs



Photo #1 View of Room 227 – Holmes Hall

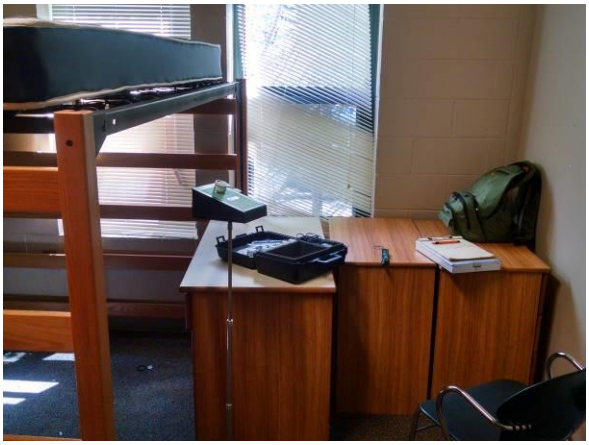


Photo #2 View of Room 229 – Holmes Hall



Photo #3 Beds in Room 229



Photo #4 Location of outside spore trap sample Outside-1



Photo #5 Location of outside spore trap sample Outside-2

Laboratory Results

SEEML Reference Number:
180411067

Southeast Environmental Microbiology Laboratories
102 Edinburgh Court
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:

- ☐ Surface/Bulk Report
- ☒ Spore Trap Report
- ☐ Andersen Fungal Report
- ☐ Quantitative Fungal Report

Lab Manager Review: Rafael Berrios Date: 04/11/18

Thank you for using SEEML laboratories. We strive to provide superior quality and service.
SEEML laboratories are accredited through AIHA-LAP, LLC (EMLAP # 173667) for the analysis of Spore Traps and Surface/Bulk Samples.

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

	Date Sampled: 04/10/18
Terracon	Date Received: 04/11/18
72 Pointe Circle	Date Analyzed: 04/11/18
Greenville, SC 29615	Date Reported: 04/11/18
	Date Revised:
	Project Name: Holmes Hall- Rooms 227 & 229
	Project Address: 86127158- Task 137
	Project City, State, ZIP:
	SEEML Reference # : 180411067

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

Client Sample ID	227-1			229-1			Outside-1		
Location	Dorm Room 227- Holmes Hall			Dorm Room 229- Holmes Hall			Outside Main Entrance to Holmes Hall		
Lab Sample ID	180411067-285			180411067-286			180411067-287		
Detection Limit (spores/m^3)	13			13			13		
Hyphal Fragments	3	39		6	78		2	26	
Pollen	2	26		5	65		183	2379	
Spore Trap Used	Allergenco			Allergenco			Allergenco		
	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%	raw ct.	spores/m^3	%
Alternaria	1	13	1						
Ascospores	6	78	9	3	39	6	72	936	42
Basidiospores	39	507	56	24	312	46	66	858	39
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	9	117	13	3	39	6	21	273	12
Curvularia									
Epicoccum									
Cercospora									
Fusarium									
Memnoniella									
Nigrospora									
Penicillium/Aspergillus	15	195	21	18	234	35	9	117	5
Polythrincium									
Rusts				1	13	2	2	26	1
Smuts/Periconia/Myxomy				2	26	4			
Spegazzinia				1	13	2			
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	70	**910**		52	**676**		170	**2210**	

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

102 Edinburgh Court
Greenville, SC 29607
Phone: (864) 233- 3770
Fax: (864) 233-6589
AIHA-LAP, LLC EMLAP # 173667

Spore Trap Report

	Date Sampled: 04/10/18
Terracon	Date Received: 04/11/18
72 Pointe Circle	Date Analyzed: 04/11/18
Greenville, SC 29615	Date Reported: 04/11/18
	Date Revised:
	Project Name: Holmes Hall- Rooms 227 & 229
	Project Address: 86127158- Task 137
	Project City, State, ZIP:
	SEEML Reference # : 180411067

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

Client Sample ID	Outside- 2								
Location	Outside Edgar Brown University Union Courtyard								
Lab Sample ID	180411067-288								
Detection Limit (spores/m^3)	13								
Hyphal Fragments	1	13							
Pollen	216	2808							
Spore Trap Used	Allergenco								
	raw ct.	spores/m^3	%						
Alternaria									
Ascospores	96	1250	44						
Basidiospores	84	1090	38						
Bipolaris/Drechslera									
Chaetomium									
Cladosporium	15	195	7						
Curvularia									
Epicoccum	5	65	2						
Cercospora									
Fusarium									
Memnoniella									
Nigrospora									
Penicillium/Aspergillus	18	234	8						
Polythrincium	1	13	<1						
Rusts	1	13	<1						
Smuts/Periconia/Myxomy	1	13	<1						
Spegazzinia									
Stachybotrys									
Stemphylium									
Tetraploa									
Torula									
Ulocladium									
Colorless/Other Brown 2									
Oidium									
Zygomycetes									
Pithomyces									
Background debris (1-5)3	3								
Sample Volume(liters)	75								
TOTAL SPORES/M^3	221	**2870**							

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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Southeast Environmental Microbiology Laboratories
Chain of Custody

102 Edinburgh Court, 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 #: 180411067	Lab ID: 285 - 288

Company Information	Client Information		Environmental Conditions	
(Project Manager) **Ben Hestir**	Date Sampled:	~~3/7/2018~~ 4/10/18 BP	Precipitation in last 16hrs:	None
(Company Name) **Terracon**	Project Name:	Holmes Hall - Rooms 227 and 229	Relative Humidity I/O:	41% / 31%
(Address) **72 Pointe Circle**	Project Address:	86127158 - Task 137	Temperature I/O:	72 deg / 70 deg
(City, State, Zip) **Greenville, SC 29615**	City, State, Zip:		Wind Conditions	
(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
227-1	Dorm room 227 - Holmes Hall	A	1		75	
229-1	Dorm room 229 - Holmes Hall	A	1		75	
Outside - 1	Outside main entrance to Holmes Hall	A	1		75	
Outside - 2	Outside Edgar Brown University Union courtyard	A	1		75	

Reliquished By:	Date/Time	Recieved By:	Date/Time
Ben Hestir - Terracon	4/11/18 9:35am		4-11-18

* Area is only required for culturable surface samples.

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

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800)220-3675 / (856)786-0262
http://www.EMSL.com cinnmicrolab@emsl.com

EMSL Order #:	**371806244**
Customer ID:	**GTER78**
Customer PO:	**86127158Task137**

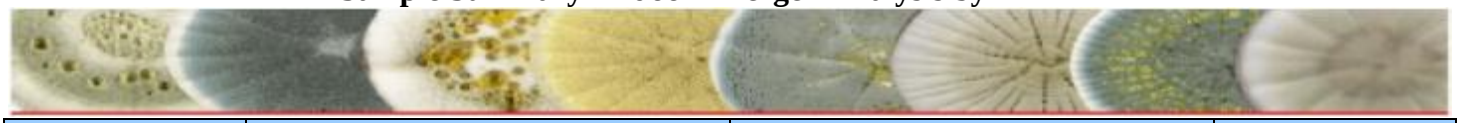
Attn: **Ben Hestir**
Terracon Consultants, Inc.
72 Pointe Circle
Greenville, SC 29615

Phone: **864-292-2901**
Fax: **864-292-6361**

Project: **Holmes Hall Rms 227 and 229**

Date Collected: **4/10/2018**
Date Received: **4/12/2018**
Date Analyzed: **4/16/2018**

Sample Summary -Indoor Allergen Analysis by MARIA®



Lab Sample Number	Client Sample ID	Sample Location	Sample Type
371806244-0001	227-2	Room 227	Bulk
371806244-0002	229-2	Room 229	Bulk

Report Date	Report Revision	Revision Comments
4/19/2018	R0	Initial Report

Vincent Iuzzolino, M.S., Laboratory Director
or approved EMSL Analytical, Inc. signatory

About Us

EMSL Analytical, Inc. offers a full line of analytical solutions for over 30 years across North America. For more information about our nationally accredited locations, vast line of testing services, and our food safety solutions please visit www.EMSL.com or call



Disclaimers

All samples were collected by and all sampling data was provided by the client. The results are valid only for those samples analyzed, and only for those samples collected in accordance with the appropriate methodology as determined by the client. The results herein do not denote or represent a medical or clinical diagnosis or conclusion. In the event that sample(s) were submitted in opened, used, non-sterile or otherwise adulterated condition, EMSL shall not be responsible or liable. EMSL Analytical (Cinnaminson, NJ) is accredited by the American Industrial Hygiene Association (AIHA) in the EMLAP accreditation program for specified Field(s) of Testing as documented on the scope of accreditation.

Please visit our website at http://www.microbiologytestinglab.com/
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EMSL Order #: **371806244**
Customer ID: **GTER78**
Customer PO: **86127158Task137**

Attn: **Ben Hestir**
Terracon Consultants, Inc.
72 Pointe Circle
Greenville, SC 29615

Phone: **864-292-2901**
Fax: **864-292-6361**

Project: **Holmes Hall Rms 227 and 229**

Date Collected: **4/10/2018**
Date Received: **4/12/2018**
Date Analyzed: **4/16/2018**

EMSL Sample #: **371806244-0001**
Client ID: **227-2**
Location: **Room 227**

Sample Type: **Bulk**
Sample Size: **46**
Sample Units: **mg**

Analytical Results -Indoor Allergen Analysis by MARIA®

Test Parameter	*Antigens*	*Detection Limits*		*Concentrations*		*Allergen Risk Levels*
Dust Mites Allergen	Der f1	0.012	µg/g	**1.88**	µg/g	☑
Dust Mites Allergen	Der p1	0.012	µg/g	**0.99**	µg/g	☑
Mouse Allergen	Mus m1	0.002	µg/g	**ND**	µg/g	☑
Rat Allergen	Rat n1	0.004	µg/g	**ND**	µg/g	†
Cat Allergen	Fel d1	0.004	µg/g	**0.13**	µg/g	☑
Dog Allergen	Can f1	0.012	µg/g	**0.11**	µg/g	☑
Cockroach Allergen	Bla g2	0.048	µg/g	**ND**	µg/g	☑

†Sufficient evidence is not available for risk levels.

Allergen Risk Levels:

High -Risk of acute asthmatic attack.

Moderate -Risk for sensitization and bronchial hyperactivity.

Low -Not sufficient to cause symptoms or ND (None Detected); Indicates that the amount of allergen in the sample is below the detection limits.

All samples were collected by and all sampling data was provided by the client. The results are valid only for those samples analyzed, and only for those samples collected in accordance with the appropriate methodology as determined by the client. The results herein do not denote or represent a medical or clinical diagnosis or conclusion. In the event that sample(s) were submitted in opened, used, non-sterile or otherwise adulterated condition, EMSL shall not be responsible or liable.

EMSL Analytical (Cinnaminson, NJ) is accredited by the American Industrial Hygiene Association (AIHA) in the EMLAP accreditation program for specified Field(s) of Testing as documented on the scope of accreditation.

This report has been prepared by EMSL Analytical, Inc. at the request of and for the exclusive use of the client named in this report. Completely read the important terms, conditions, and limitations that apply to this report

Report Date	**Report Revision**	**Revision Comments**
4/19/2018	R0	Initial Report

Vincent Iuzzolino, M.S., Laboratory Director
or approved EMSL Analytical, Inc. signatory

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EMSL Order #: **371806244**
Customer ID: **GTER78**
Customer PO: **86127158Task137**

Attn: **Ben Hestir**
Terracon Consultants, Inc.
72 Pointe Circle
Greenville, SC 29615

Phone: **864-292-2901**
Fax: **864-292-6361**

Project: **Holmes Hall Rms 227 and 229**

Date Collected: **4/10/2018**
Date Received: **4/12/2018**
Date Analyzed: **4/16/2018**

EMSL Sample #: **371806244-0002**
Client ID: **229-2**
Location: **Room 229**

Sample Type: **Bulk**
Sample Size: **61**
Sample Units: **mg**

Analytical Results -Indoor Allergen Analysis by MARIA®

Test Parameter	*Antigens*	*Detection Limits*		*Concentrations*		*Allergen Risk Levels*
Dust Mites Allergen	Der f1	0.012	µg/g	**0.93**	µg/g	☑
Dust Mites Allergen	Der p1	0.012	µg/g	**0.25**	µg/g	☑
Mouse Allergen	Mus m1	0.002	µg/g	**ND**	µg/g	☑
Rat Allergen	Rat n1	0.004	µg/g	**ND**	µg/g	†
Cat Allergen	Fel d1	0.004	µg/g	**0.30**	µg/g	☑
Dog Allergen	Can f1	0.012	µg/g	**0.22**	µg/g	☑
Cockroach Allergen	Bla g2	0.048	µg/g	**ND**	µg/g	☑

†Sufficient evidence is not available for risk levels.

Allergen Risk Levels:

High -Risk of acute asthmatic attack.

Moderate -Risk for sensitization and bronchial hyperactivity.

Low -Not sufficient to cause symptoms or ND (None Detected); Indicates that the amount of allergen in the sample is below the detection limits.

All samples were collected by and all sampling data was provided by the client. The results are valid only for those samples analyzed, and only for those samples collected in accordance with the appropriate methodology as determined by the client. The results herein do not denote or represent a medical or clinical diagnosis or conclusion. In the event that sample(s) were submitted in opened, used, non-sterile or otherwise adulterated condition, EMSL shall not be responsible or liable.

EMSL Analytical (Cinnaminson, NJ) is accredited by the American Industrial Hygiene Association (AIHA) in the EMLAP accreditation program for specified Field(s) of Testing as documented on the scope of accreditation.

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Report Date	**Report Revision**	**Revision Comments**
4/19/2018	R0	Initial Report

Vincent Iuzzolino, M.S., Laboratory Director
or approved EMSL Analytical, Inc. signatory

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800)220-3675 / (856)786-0262
http://www.EMSL.com cinnmicrolab@emsl.com

EMSL Order #: **371806244**
Customer ID: **GTER78**
Customer PO: **86127158Task137**

Attn: **Ben Hestir**
Terracon Consultants, Inc.
72 Pointe Circle
Greenville, SC 29615

Phone: **864-292-2901**
Fax: **864-292-6361**

Project: **Holmes Hall Rms 227 and 229**

Date Collected: **4/10/2018**
Date Received: **4/12/2018**
Date Analyzed: **4/16/2018**



Guidelines to Interpretation

µg/g

Allergens	<DL	<1	1	2	3	4	5	6	7	8	9	>10
Fel d1	ND	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High	High	High
Can f1	ND	Low	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High
Der p1	ND	Low	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High
Der f1	ND	Low	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High
Mus m1	ND	Low	Mod	Mod	Mod	High	High	High	High	High	High	High

µg/m3

Rat n1	ND	<0.7 µg /m3 = Not associated with increased risk of asthma

µg/g

	<DL	<0.08	0.08	0.09	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
Bla g2 †	ND	Low	Mod	Mod	Mod	Mod	Mod	Mod	High	High	High	High

† *Suggested levels. Not officially established.*

Note: *This report and guidelines furnish information only. Whether an individual suffers allergic symptoms or not depends on his/her medical history and previous exposure.*

References

Journal of Allergy and Clinical Immunology 1989; 83:416-427
Journal of Allergy and Clinical Immunology 1995; 96:449-456
The American review of respiratory disease 1990; 141:361-367
The American review of respiratory disease 1993; 147:573-578
Environmental Health Perspectives 2002; 110:419-425
Clinical and Experimental Allergy 1998; 28(5):537-44
Pediatric allergy-principles and practice. Mosby Inc 2003: 261-268.

Terminology

ELISA	Enzyme-linked Immunosorbent Assay
MARIA®	Multiplex Array for Indoor Allergens
Allergen	A substance which reacts with the body's immune system to produce an allergic reaction.
Antigen	A substance, foreign to the body, which stimulates the production of antibodies by the immune system.
Bla g2	*Blattella germanica* (Cockroach) allergen 2
Can f1	*Canis familiaris* (Dog) allergen 1
Der f1	*Dermatophagoides farinae* (Dust Mites) allergen 1
Der p1	*Dermatophagoides pteronyssinus* (Dust Mites) allergen 1
Detection Limits	DL is the smallest amount of a substance, in this case antigens, which can be measured.
Fel d1	*Felis domesticus* (Cat) allergen 1
Mus m1	*Mus musculus* (Mouse) allergen 1
ND	None detected, if any allergens are present they are below the detection limits.
Rat n1	*Rattus norvegicus* (Rat) allergen 1

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Important Terms, Conditions, and Limitations

A. Sample Retention
Samples analyzed by EMSL will be retained for 60 days after analysis date. Storage beyond this period is available for a fee with written request prior to the initial 30 day period. Samples containing hazardous/toxic substances which require special handling will be returned to the client immediately. EMSL reserves the right to charge a sample disposal fee or return samples to the client.

B. Change Orders and Cancellation
All changes in the scope of work or turnaround time requested by the client after sample acceptance must be made in writing and confirmed in writing by EMSL. If requested changes result in a change in cost the client must accept payment responsibility. In the event work is cancelled by a client, EMSL will complete work in progress and invoice for work completed to the point of cancellation notice. EMSL is not responsible for holding times that are exceeded due to such changes.

C. Warranty
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D. Limits of Liability
In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, but not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages, arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or any third party. We accept no legal responsibility for the purposes for which the client uses the test results. EMSL will not be held responsible for the improper selection of sampling devices even if we supply the device to the user. The user of the sampling device has the sole responsibility to select the proper sampler and sampling conditions to insure that a valid sample is taken for analysis. Any resampling performed will be at the sole discretion of EMSL, the cost of which shall be limited to the reasonable the original sample delivery group (SDG) samples. In no event shall EMSL be liable to a client orvalue of any third party, whether based upon theories of tort, contract or any other legal or equitable theory, in excess of the amount paid to EMSL by client thereunder.

E. Indemnification
Client shall indemnify EMSL and its officers, directors and employees and hold each of them harmless for any liability, expense or cost, including reasonable attorney's fees, incurred by reason of any third party claim in connection with EMSL's services, the test result data or its use by client.

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Report Date	Report Revision	Revision Comments
4/19/2018	R0	Initial Report

Vincent Iuzzolino, M.S., Laboratory Director
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EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Industrial Hygiene Chain of Custody

EMSL Order Number (Lab Use Only): 371801024 4

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE (800) 220-3675
FAX (856) 858-3502

RECEIVED EMSL CINNAMINSON, N.J. 2018 APR 12 A 10:11

Report To Contact Name:		**Bill To Company:** Terracon (GTER78)	**Client ID #:**
Company Name: Terracon Consultants, Inc.		**Attention To:**	
Street: 72 Pointe Circle		**Street:**	
City: Greenville	**State/Province:** SC **Zip/Postal Code:** 29615	**City:**	**State/Province:** **Zip/Postal Code:**
Phone : 864-293-7348 **Fax :**		**Phone:**	**Fax:**
Project Name: Holmes Hall Rms 227 and 229		**Email Results To:** ben.hestir@terracon.com	**U.S. State where Samples Collected:** SC
# Samples in Shipment: 2	**Date of Shipment:** 4/11/18	**Purchase Order:** 86127158 - Task 137	**Sampled By (Signature):** Ben Hestir

Turnaround Time (TAT) – Please Check: If No Selection Made, Standard 2 Week TAT Will Apply

☐ 2 Week ☑ 1 Week ☐ 4 Day ☐ 3 Day ☐ 2 Day ☐ 1 Day ☐ Other (Call Lab)

Media Type:

Manufacturer/Part #: **Lot #:**

Client Sample ID	Location/Description	Analyte / Method	Media	Flow (lpm)	Sample Time On	Sample Time Off	Volume / Area	Sample Type	Sample Date	Comments
227-2	Room 227	M038, M039, M044	Dust Cas				NA	☐ Area ☐ Personal	4/10/18	Allergens
229-2	Room 229	M038, M039, M044	Dust Cas				NA	☐ Area ☐ Personal	4/10/18	Allergens
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		(2)

Note: Most NIOSH and OSHA methods require field blanks. It is the IH field sampler's responsibility to submit the proper number of field blanks and duplicates.

Released By	Date	Received By	Date
Ben Hestir	4/11/18	AR FX	4/12/18 @ 1010A

Comments:

OrderID: 371806244

Research Associates Laboratory
(R.A.L.,Inc.)

411 East McDermott Drive Ste B. Allen, TX 75002
Phone: (972)960-2221 Fax: (972)960-1997
www.vetdna.com

TEST RESULTS

Acct ID:**P219**
TERRACON CONSULTANTS INC.
Attn:
72 POINTE CIRCLE
GREENVILLE, SC 29615
Phone: 864-292-2901
Fax: --
Email: BEN.HESTIR@TERRACON.COM

Owner Name: **HOLMES HALL**
Lab ID: **272172**
Test Date: **04/12/2018**
Animal Name: **227-3**
Species: **ENVIRONMENTAL**
Medium: **Swab**

Test Description	Result	Comments
Bed Bug - (C. lectularius and C. hemipterus)	**Negative**	

DIAGNOSTIC ANALYSIS PERFORMED BY QUANTITATIVE REAL TIME POLYMERASE CHAIN REACTION (qPCR)

Research Associates Laboratory
(R.A.L.,Inc.)

411 East McDermott Drive Ste B. Allen, TX 75002
Phone: (972)960-2221 Fax: (972)960-1997
www.vetdna.com

TEST RESULTS

Acct ID:**P219**
TERRACON CONSULTANTS INC.
Attn:
72 POINTE CIRCLE
GREENVILLE, SC 29615
Phone: 864-292-2901
Fax: --
Email: BEN.HESTIR@TERRACON.COM

Owner Name: **HOLMES HALL**
Lab ID: **272173**
Test Date: **04/12/2018**
Animal Name: **229-3**
Species: **ENVIRONMENTAL**
Medium: **Swab**

Test Description	Result	Comments
Bed Bug - (C. lectularius and C. hemipterus)	**Negative**	

DIAGNOSTIC ANALYSIS PERFORMED BY QUANTITATIVE REAL TIME POLYMERASE CHAIN REACTION (qPCR)