Selita

From: Kolkmeier, Aaron <Aaron.Kolkmeier@LibertyMutual.com>
Sent: Wednesday, May 13, 2015 10:03 AM
To: Selita
Subject: FW: Heaton Mold Pricing
Attachments: Mold Investigation Report & Remediation Protocol_Boyd.pdf; Invoice # 5130.pdf

Ms. Boyd,

I just received the mold protocol from Heaton Environmental. I will forward a copy to Restoration 1 so they can revise their estimate to address all of the mold concerns listed in this report.

Thank you,

Aaron Kolkmeier
Mitigation Specialist – ASD, AMRT, FSRT
Water Mitigation
Liberty Mutual Insurance
2120 W. Walnut Hill Lane
Irving, TX 75038
Office: 855-212-3227 x 76905
Fax: 866-999-8964
E-mail: Aaron.Kolkmeier@LibertyMutual.com

From: Caleb Weiler [mailto:caleb@heatonusa.com]
Sent: Tuesday, May 12, 2015 4:48 PM
To: Kolkmeier, Aaron
Subject: RE: Heaton Mold Pricing

Aaron,

Attached is the remediation protocol for the Boyd residence along with Heaton's invoice for the job. Please feel free to reach out to me if you have any questions. Thanks.

MOLD INVESTIGATION REPORT & REMEDIATION PROTOCOL

Prepared For
Liberty Mutual Insurance
C/O Aaron Kolkmeier

Subject Property
Boyd Residence
6841 Cavalier Ct
Stone Mountain, GA 30087

Inspection Date: May 5, 2015
Revised 2-26-2019

Prepared by

HEATON ENVIRONMENTAL INC.
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www.HeatonUSA.com

M-3222 reviewed by: _____

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EXECUTIVE SUMMARY

Per the request of Aaron Kolkmeier of Liberty Mutual Insurance, Heaton Environmental Inc. visited the Boyd Residence on May 5, 2015 to investigate reported/suspected mold growth.

The homeowner reported that multiple water losses occurred in two separate incidents which included sudden water heater failure and the bursting of a main water line in the home. (revised 2-26-2019)

The series of plumbing events caused water and mold damage to the garage and basement. A remediation company came to dry out the area, but it was reported that not all of the excess moisture was removed.

Heaton observed evidence of moisture intrusion and light mold growth in the garage and basement. Air samples indicated elevated mold spore counts in the home, and surface samples confirmed the presence of surface mold in the basement.

Excess moisture was detected in one corner of the basement and in some of the contents and boxes in the garage. Relative humidity in the basement was slightly elevated.

Recommendations include removal of contents from the garage and basement, remediation in the garage and basement, air scrubbing in the home, and retesting to ensure that mold spore counts are at acceptable levels.

Disclaimer: *This report includes test results, findings and recommended measures to remediate the mold and reduce the possibility of future mold growth. The report is intended for the sole use of the initial client and is not to be used without the consent of the initial client. Recommendations and/or suggestions given in this report are based on standard industry practices and information obtained from various Health Departments, EPA etc. As results may vary depending on contractors, cleaning methods and other factors, Heaton Environmental does not infer, suggest or warrant the success or results of any remediation. If post remediation sampling does not provide proper clearance levels, additional investigational work may be necessary. Mold growth and contamination may recur following the remediation and post remediation sampling if conditions again become conducive to mold growth.*

CLIENT & PROJECT INFORMATION

SECTION 2

2.1 Client & Contact:
Liberty Mutual Insurance
C/O Aaron Kolkmeier

2.2 Property Address:
Boyd Residence
6841 Cavalier Ct
Stone Mountain, GA 30087

2.3 Scope of Work:
Investigation of reported/suspected mold growth

2.4 Date of Visit
May 5, 2015 by Caleb Weiler

2.5 Background Information

The homeowner reported that the water loss was caused by two separate incidents which included sudden water heater failure and the bursting of a main water line in the home. (revised 2-26-2019)

It was reported that the plumbing incidents caused water and mold damage to the garage and basement. The date of initial loss was February 11, 2015. A remediation company came the next day and spent the next week removing wet building materials and drying out the affected areas. It was reported that not all of the excess moisture had been removed, so the remediation company came back and removed the tile in the basement bathroom and removed the remaining excess moisture. Many of the contents that got wet were boxed and placed in the garage.

INVESTIGATION

SECTION 3

Heaton Environmental Inc. visited the subject property on May 5, 2015 to conduct an investigation of reported/suspected mold growth. Heaton's investigation encompassed a visual inspection, moisture detection, and humidity measurement.

Visual Inspection:
Heaton observed the following during the investigation:

- The carpet in the garage had been removed prior to Heaton's visit.
- The sheetrock in the entire basement had been flood cut and the flooring removed prior to Heaton's visit.
- There was evidence of water intrusion in the plywood subflooring on the main level near the water heater (as seen from the basement below).
- Some of the wood framing in the basement had been encapsulated.
- There was discoloration on some of the wood framing in the basement that appeared to be mold growth.
- There was a significant amount of debris in the filters of the air scrubbers in the basement.
- Some of the furniture in the basement was water-damaged.
- Some of the sheetrock below the water heater in the garage was water-damaged.
- There was mold growth on some of the boxes stored in the garage.

Moisture:
Moisture detection devices are used to identify high moisture levels in normal building materials. Devices can measure on two different scales, a relative scale and a Wood Moisture Equivalent, or WME, scale. The relative scale is a measurement of moisture relative to the surrounding materials. Moisture measured on the Wood Moisture Equivalent scale should be maintained below 20% WME. When moisture elevates above 20% WME, the material and the surrounding areas become conducive to mold growth.

Excess moisture was detected in the following areas (see Appendix 1: Photographs and Exhibit 1):

Location	Material	WME
Wood base plate along exterior wall in business office	Wood	20% - 57%
Some of the boxes and contents stored in garage	Cardboard, paper	99.9%

Humidity:
Weather conditions at the time of the investigation were sunny, cool, and dry. Test results and humidity levels reflect the conditions at the time of the visit and may not reflect the worst case scenario. Relative humidity levels should be maintained at levels < 60% to reduce the possibility of mold growth. Air conditioning acts as a natural dehumidifier and

should be running regularly throughout the humid months. A de-humidifier may also be helpful in maintaining appropriate humidity levels. Low humidity is the key to prevent mold growth.

Relative humidity in the basement was 62% at the time of Heaton's investigation.

The EPA's guidelines for mold sampling are guidelines rather than standards due to the fact that there are no established normal levels of mold which are harmful to all individuals. There also are no known established levels of mold which could not be harmful to someone.

General EPA guidelines imply that the mold levels inside should be less than the mold levels outside. Sometimes the mold levels outside are measured at "0" or at very low levels. This condition makes it nearly impossible or financially impracticable to create a condition where the indoor levels are less than the outdoor levels. Environmental consulting firms often use different criteria with regards to the allowable or acceptable levels of mold within a home or facility.

Heaton's sampling criteria and acceptable levels are based on a conservative approach originally presented by Daniel Baxter. Mr. Baxter has conducted extensive research into mold sampling and is the inventor of the Air-O-Cell spore trap. He is one of the few individuals who, based on his research, has published what he considers acceptable mold levels for normal living environments.

Based on Mr. Baxter's research, he has concluded that some mold is expected to be in a normal living environment. His research has supported the theory that an acceptable mold level or "clean building" would include conditions where the total spore count is less than 2000 sp/m^3 of air and the *Penicillium/Aspergillus levels were less than 700 sp/m^3 with an outdoor total spore count of less than 500 sp/m^3. *(This information was presented in mold training courses provided by the Environmental Institute July 2014.)*
*Penicillium/Aspergillus are the most common mold types typically encountered in indoor environments.

Heaton Environmental has a goal of "0" Stachybotrys during post remediation sampling and verification. It is expected that efforts will be made (within financial reason) to eradicate Stachybotrys if possible.

Air Samples:
Air samples which are tested for mold are basically a snapshot in time and may not reflect all conditions and levels of mold. Mold levels vary during the day depending on relative humidity, temperature, wind speeds and direction, surrounding vegetation, moisture content of soil and many other factors. The samples taken during this sampling period compare inside conditions to outside conditions at that time.

A total of six (6) air samples were recorded during the investigation. Five (5) inside samples were recorded in the following areas: kitchenette (basement), studio (basement), garage (main level), living room/kitchen (main level), and master bedroom (upstairs). Another sample was recorded outside the home as a background sample. The accepted protocol for air sampling is to compare the inside sample(s) to the outside sample(s). If the

sample levels taken from inside the home exceed the outside levels, an elevated condition exists where it is expected that mold is actively growing. Conversely, lower mold levels inside compared with outside levels indicate a clean environment.

These samples were collected on a non-viable slit impactor. The samples were analyzed by Aerobiology Laboratory Associates Inc. in Atlanta, GA (see attached results).

Some mold spores were identified inside in very low levels that were either not identified outside or only slightly higher than outside. The levels were very low and would not be considered a significant growth issue. Active mold growth, with the exception of Stachybotrys Chartarum, typically generates spore counts in the thousands. Due to the commonly perceived health effects associated with Stachybotrys Chartarum, even relatively small spore counts are treated seriously and eradicated.

The mold levels in the table below show areas of concern. These mold levels indicate an elevated airborne mold spore count in the home.

Area of Concern	Mold Type	Sample Results Spores/Meter^3
Kitchenette	Stachybotrys	13
Studio	Stachybotrys	7
Garage	Penicillium/Aspergillus	24,213
	Stachybotrys	13

Tape Lift Samples:

Two (2) tape-lift samples were taken during the visit. The areas sampled were the ceiling framing near the exterior basement door in the kitchenette and the air scrubber filter in the kitchenette. The samples were analyzed by Aerobiology Laboratory Associates Inc. in Atlanta, GA (see attached results).

The tape-lift sample results are as follows:

Sample # 322207 – Ceiling Framing

Occasional Alternaria spores seen	*1-5 per cover slip*
Numerous Cladosporium spores seen	*3-4 per field (minimum)*
Moderate Cladosporium hyphae seen	*1 per 5 fields*
Moderate Cladosporium conidiophores seen	*1 per 5 fields*
Numerous hyphal elements seen	*3-4 per field (minimum)*
Numerous Penicillium/Aspergillus group spores seen	*3-4 per field (minimum)*
Occasional Smuts,Periconia,Myxomycetes spores seen	*1-5 per cover slip*

Sample # 322208 – Air Scrubber Filter

Occasional hyphal elements seen	*1-5 per cover slip*
Occasional Pithomyces spores seen	*1-5 per cover slip*
Few Smuts,Periconia,Myxomycetes spores seen	*5 per cover slip*

CONCLUSIONS

Air samples taken indicate that the basement and garage had elevated airborne mold spore counts. These counts may temporarily increase during remediation but can be reduced by having negative pressure/HEPA machines running throughout the remediation process. The presence of Stachybotrys is indicative of a long-term moisture issue as Stachybotrys requires an almost constant water source for an extended period of time in order to grow. The remaining moisture in the basement and in the contents in the garage has likely provided this moisture source.

Mold spore counts on the main level and upstairs appear to be at acceptable levels. There does not appear to have been any significant cross-contamination to these areas. The Penicillium/Aspergillus counts in the basement appear to be at acceptable levels, but a small number of Stachybotrys spores were present. The Penicillium/Aspergillus count in the garage was very elevated, most likely due to the wet and moldy boxes and contents stored there. There is likely mold growth on many of the contents in the unopened boxes stored in the garage, especially the ones that are still wet. While no excess moisture was detected in the sheetrock or baseboards in the garage, it is uncertain how long it took for those materials to dry out, so it is possible that there is mold growth on the backside of these materials in the areas that got wet.

Surface samples confirmed the presence of surface mold on the ceiling framing in the basement and on the air scrubber filter in the kitchenette. The mold on the air scrubber filter is mainly spores that have been sucked in by the air scrubber or that settled on the air scrubber filter. The presence of spores, hyphae, and conidiophores on the ceiling framing indicates mold growth. There was very little visible mold on the framing. The growth appears to be very light, especially given the low Penicillium/Aspergillus counts in the basement air samples. The relative humidity in the basement was slightly higher than recommended. High humidity can contribute to surface mold growth, particularly Penicillium/Aspergillus. Water from the flooding and the lack of air conditioning in the basement may have led to humid enough conditions in the basement to allow light mold growth to develop.

6.1 GENERAL RECOMMENDATIONS

The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of fungi and dust contaminated with fungi from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. The listed remediation methods are not meant to exclude other similarly effective methods. Any changes to the remediation methods listed in these guidelines, however, should be carefully considered prior to implementation.

In all situations, the underlying cause of water accumulation must be rectified or fungal growth will recur. Any initial water infiltration should be stopped and cleaned immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. If the source of water is elevated humidity, relative humidity should be maintained at levels below 60% to inhibit mold growth. Emphasis should be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur. Any roof leaks, plumbing leaks, siding leaks, HVAC repairs, etc. should be repaired to stop any moisture infiltration. This should be completed before the remediation if possible.

Dehumidification equipment should be set up and acceptable relative humidity levels should be maintained below 60% throughout the cleanup and remediation. Additional air drying equipment should be used if necessary to maintain low relative humidity levels.

Mold Remediation/Cleanup and Biocides - The purpose of mold remediation is to remove the mold to prevent human exposure and damage to building materials and furnishings. It is necessary to clean up mold contamination, not just to kill the mold. Dead mold is still allergenic, and some dead molds are potentially toxic. The use of a biocide, such as chlorine bleach, is not recommended as a routine practice during mold remediation, although there may be instances where professional judgment may indicate its use (for example, when immune-compromised individuals are present). In most cases, it is not possible or desirable to sterilize an area; a background level of mold spores will remain in the air (roughly equivalent to or lower than the level in outside air). These spores will not grow if the moisture problem in the home has been resolved.

If you choose to use disinfectants or biocides, always ventilate the area. Outdoor air may need to be brought in with fans. When using fans, take care not to distribute mold spores throughout an unaffected area. Biocides are toxic to humans, as well as to mold. You should also use appropriate PPE and read and follow label precautions. Never mix chlorine bleach solution with cleaning solutions or detergents that contain ammonia; toxic fumes could be produced.

Some biocides are considered pesticides, and some States require that only registered pesticide applicators apply these products. **Make sure anyone applying a biocide is properly licensed**, if necessary. Do not use fungicides developed for use outdoors for mold remediation or for any other indoor situation.

All moveable items should be removed from the work area, inspected, cleaned and stored in a clean area. Items which are determined to be "un-cleanable" should be discarded.

Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning should be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. A professional restoration consultant should be contacted when restoring porous materials with more than a small area of fungal contamination. All materials to be reused should be dry and visibly free from mold. Routine inspections should be conducted to confirm the effectiveness of remediation work.

All cleaned structural areas should be disinfected with fungicide and/or sealed with a fungicide encapsulant. If the fungicide is clear, add some color pigment so that proper coverage can be observed. Authorization from the owner will need to be obtained unless the areas are to be covered or repainted.

If any suspected contaminated areas are inaccessible and cannot be cleaned, the owner and consultant should be notified so that plans and options can be discussed regarding additional cleaning or modifications to prevent contamination of cleaned areas.

If any moisture intrusion is observed during the remediation that was not previously noted, the owner and consultant should be notified so that corrections can be made.

Do not run the HVAC system if you know or suspect that it is contaminated with mold (it is part of an identified moisture problem, for instance, or there is mold growth near the intake to the system).

Don't paint or caulk moldy surfaces; clean and dry surfaces before painting. Paint applied over moldy surfaces is likely to peel.

The work area and areas used by remedial workers for egress should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution and be visibly clean prior to the removal of isolation barriers.

Air monitoring should be conducted prior to occupancy to determine if the area is fit to reoccupy.

Cleanup Methods - A variety of mold cleanup methods are available for remediating damage to building materials and furnishings caused by moisture control problems and mold growth. The specific method or group of methods used will depend on the type of material affected.

- **Wet Vacuum** - Wet vacuums are vacuum cleaners designed to collect water. They can be used to remove water from floors, carpets, and hard surfaces where water has accumulated. They should not be used to vacuum porous materials, such as gypsum board. They should be used only when materials are still wet – wet vacuums may spread spores if sufficient liquid is not present. The tanks, hoses, and attachments of these vacuums should be thoroughly cleaned and dried after use since mold and mold spores may stick to the surfaces.

- **Damp Wipe** - Whether dead or alive, mold is allergenic, and some molds may be toxic. Mold can generally be removed from nonporous (hard) surfaces by wiping or scrubbing with water, or water and detergent. It is important to dry these surfaces quickly and thoroughly to discourage further mold growth. Instructions for cleaning surfaces, as listed on product labels, should always be read and followed. Porous materials that are wet and have mold growing on them may have to be discarded. Since molds will infiltrate porous substances and grow on or fill in empty spaces or crevices, the mold can be difficult or impossible to remove completely.

- **HEPA Vacuum** - HEPA (High-Efficiency Particulate Air) vacuums are recommended for final cleanup of remediation areas after materials have been thoroughly dried and contaminated materials removed. HEPA vacuums are also recommended for cleanup of dust that may have settled on surfaces outside the remediation area. Care must be taken to assure that the filter is properly seated in the vacuum so that all the air must pass through the filter. When changing the vacuum filter, remediators should wear PPE to prevent exposure to the mold that has been captured. The filter and contents of the HEPA vacuum must be disposed of in well-sealed plastic bags.

- **Discard** - Building materials and furnishings that are contaminated with mold growth and are not salvageable should be double-bagged using 6-mil polyethylene sheeting. These materials can then usually be discarded as ordinary construction waste. It is important to package mold-contaminated materials in sealed bags before removal from the containment area to minimize the dispersion of mold spores throughout the home. Large items that have heavy mold growth should be covered with polyethylene sheeting and sealed with duct tape before they are removed from the containment area.

The use of gaseous ozone or chlorine dioxide for remedial purposes is **not** recommended. Both compounds are highly toxic and contamination of occupied space may pose a health threat. Furthermore, the effectiveness of these treatments is unproven. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."

Containment - ***The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the home beyond the contaminated site.***

The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry with a zipper door so that the opening is airtight when it is closed. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the home. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the home. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal.

Always maintain the containment area under negative pressure. Exhaust fans to outdoors and ensure that adequate makeup air is provided. If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Personal Protective Equipment (PPE) - If the remediation job disturbs mold and mold spores become airborne, then the risk of respiratory exposure goes up. Actions that are likely to stir up mold include: breakup of moldy porous materials such as wallboard; invasive procedures used to examine or remediate mold growth in a wall cavity; actively stripping or peeling wallpaper to remove it; and using fans to dry items.

The primary function of Personal Protective Equipment (PPE) is to avoid inhaling mold and mold spores and to avoid mold contact with the skin or eyes. Please note that all individuals using certain PPE equipment, such as half-face or full-face respirators, must be trained, must have medical clearance, and must be fit-tested by a trained professional. In

addition, the use of respirators must follow a complete respiratory protection program as specified by the Occupational Safety and Health Administration.

- **Skin and Eye Protection** - Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a biocide (such as chlorine bleach) or a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or PVC. If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

- **Respiratory Protection** - Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. At a minimum, when cleaning up a area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates in the air, and is available in most hardware stores.

- **Disposable Protective Clothing** - Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold. Disposable paper overalls can be used.

6.2 SPECIFIC RECOMMENDATIONS

Specific remediation recommendations include the following (also see Exhibit 1):

- Secure airtight containments should be installed between the garage and kitchen and between the basement and main level to prevent cross-contamination during the remediation. All openings in the contained areas should also be sealed off.
- Remove all contents from the basement and garage.
- Continue dehumidification in the basement to reduce the moisture content in the wood base plate in the business office to less than 20% WME and to maintain relative humidity in the basement below 60%.
- Remove baseboards and flood cut sheetrock two feet up on both walls in the garage where water heater is. Continue removal until no more water damage or mold growth is detected.
- Remove the bottom stair treads in the garage and inspect for water damage and mold growth behind the stairs. If water damage or mold growth is detected, remove the moldy portions. Continue removal until no more water damage or mold growth is detected.
- Ensure that there is no excess moisture in the exposed framing in the garage. If there is excess moisture, place dehumidifier(s) in the garage until the excess moisture is removed.
- Remove all trash and debris from the basement and garage.
- Treat all areas affected by mold growth in the basement and garage. Wipe down and HEPA vacuum all walls, floors, framing, subflooring, structures, furnishings, and surfaces in the basement and garage. Framing and other hard-to-access areas may be encapsulated.
- Place air scrubbers in the basement, main level, and garage to filter airborne mold spores. The air scrubber filters in the basement should be replaced. The basement and garage should be under negative air pressure during remediation and static pressure after remediation. Allow air scrubbers to "scrub" sufficiently to reduce airborne mold spore content to acceptable levels.
- Salvageable items should be cleaned before being brought back into the house. Items that cannot be salvaged should be discarded.
- Post-remediation testing should be performed to ensure that mold spore counts are reduced to appropriate levels.

INSPECTION/TESTING/CLEARANCE SECTION 7

At the close of the project a final visual inspection and final clearance sampling should be conducted.

Final Visual Inspection
The visual inspection will consist of investigating each space. All dust and debris should be previously removed. All walls, floors, framing, subflooring, structures, furnishings, and surfaces should be cleaned and free of visible dust and mold.

Moisture Tests
Moisture levels should be less than 20% Wood Moisture Equivalent (WME) in wood members. Various members will be checked with a Protimeter pin type moisture meter. If any areas exceed 20% WME, Heaton will conduct additional investigation as to the source of the moisture. Additional drying may be required.

Relative Humidity
The relative humidity will be checked in the home during each visit. Humidity levels should never exceed 60%. If levels do exceed 60%, additional dehumidifying equipment will be requested.

Final Clearance Testing
Final testing will be conducted with a slit impaction sampler. The slit impaction system (non-viable) uses slide impact technology which can be analyzed within three business days.

Interior sample results will be compared to the exterior sample for clearance. The project will be cleared when the inside sample levels are less than or equal to the exterior sample levels.

PHOTOGRAPHS

APPENDIX 1

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *There was evidence of water intrusion in the plywood subflooring on the main level near the water heater (as seen from the basement below).*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *There was discoloration on some of the wood framing in the basement that appeared to be mold growth.*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Excess moisture was detected in the wood base plate along the exterior wall in the business office (20% - 57% WME).*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Expanded view of previous photo - Excess moisture was detected in the wood base plate along the exterior wall in the business office (20% - 57% WME). The sheetrock in the entire basement had been flood cut and the flooring removed prior to Heaton's visit. There was a significant amount of debris in the filters of the air scrubbers in the basement.*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Excess moisture was detected in the wood base plate along the exterior wall in the business office (20% - 57% WME).*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Some of the furniture in the basement was water-damaged.*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Some of the furniture in the basement was water-damaged.*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Some of the wood framing in the basement had been encapsulated.*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Some of the sheetrock below the water heater in the garage was water-damaged. The carpet in the garage had been removed prior to Heaton's visit.*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Excess moisture was detected in some of the boxes and contents stored in the garage (99.9%).*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Excess moisture was detected in some of the boxes and contents stored in the garage (99.9%).*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
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Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *Excess moisture was detected in some of the boxes and contents stored in the garage (99.9%).*

Date: *May 5, 2015*
Taken by: *Caleb Weiler*
Comments: *There was mold growth on some of the boxes stored in the garage.*

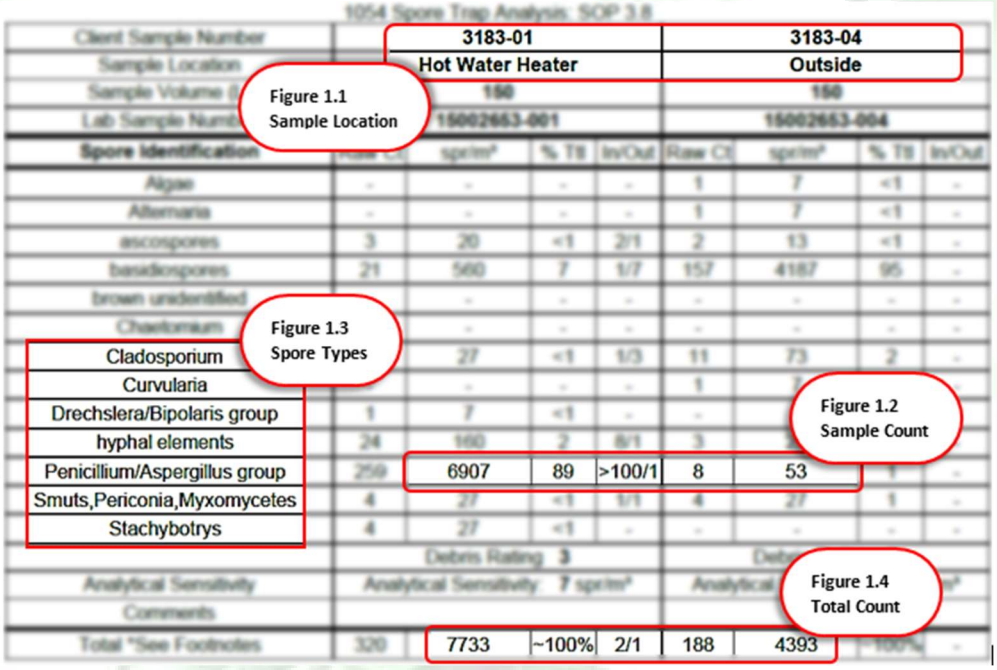
LAB RESULTS

APPENDIX 2

Four easy steps to reading your Spore Trap results:

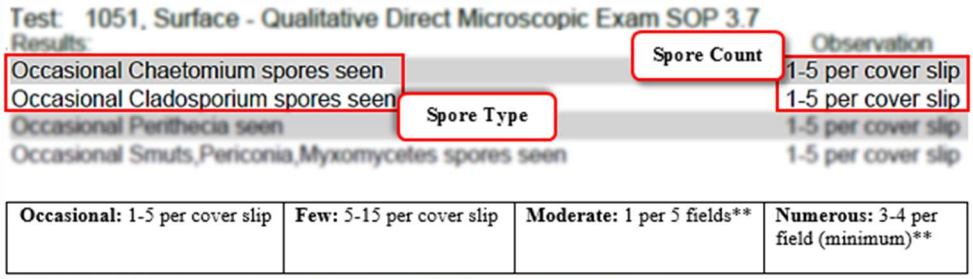
I. Identify the sample numbers and locations. (Figure 1.1)
II. Compare interior spore counts to exterior, or background, spore counts. (Figure 1.2)
III. Identify the spore type relating to the elevated spore counts. (Figure 1.3)
IV. Compare the interior total spore counts with the exterior total count. (Figure 1.4)

Aerobiology Laboratory Associates Inc. Sample Analysis:



Client Sample Number	3183-01				3183-04			
Sample Location	Hot Water Heater				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15002653-001				15002653-004			
Spore Identification	Raw Ct	spr/m³	% TI	In/Out	Raw Ct	spr/m³	% TI	In/Out
Algae	-	-	-	-	1	7	<1	-
Alternaria	-	-	-	-	1	7	<1	-
ascospores	3	20	<1	2/1	2	13	<1	-
basidiospores	21	560	7	1/7	157	4187	95	-
brown unidentified	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	27	<1	1/3	11	73	2	-	
Curvularia	-	-	-	-	1			
Drechslera/Bipolaris group	1	7	<1	-	-			
hyphal elements	24	160	2	8/1	3			
Penicillium/Aspergillus group	259	6907	89	>100/1	8	53	1	-
Smuts,Periconia,Myxomycetes	4	27	<1	1/1	4	27	1	-
Stachybotrys	4	27	<1	-	-	-	-	-
	Debris Rating: 3				Debris			
Analytical Sensitivity	Analytical Sensitivity: 7 spr/m³				Analytical			
Comments								
Total *See Footnotes	320	7733	~100%	2/1	188	4393	100%	-

Tape lift/Swab Analysis:



Occasional: 1-5 per cover slip	**Few:** 5-15 per cover slip	**Moderate:** 1 per 5 fields**	**Numerous:** 3-4 per field (minimum)**

*20mm x 30 mm area
** 15,000 fields

When a swab or tape lift sample is submitted for direct qualitative microscopic analysis, the maximum area analyzed is approximately 20 mm x 30 mm (the size of the cover slip). When “Occasional” or “Few” is reported, those are based on what is found under the entire cover slip. The area which the microscopic field covers is much smaller (there are approximately 15,000 microscopic fields under each cover slip). When the number observed is based on field count rather than cover slip count, the mold content is much higher.

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Certificate of Analysis
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Heaton Environmental, Inc.
2898 Mountain View Road
Snellville, Georgia 30078
Attn: Caleb Weiler
Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	322201				322206			
Sample Location	Kitchenette				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15008681-001				15008681-006			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	1	7	1	1/7	7	47	<1	-
ascospores	8	53	9	1/10	20	533	5	-
basidiospores	33	220	37	1/11	92	2453	21	-
brown unidentified	1	7	1	1/1	1	7	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	4	27	4	1/294	294	7840	68	-
Curvularia	1	7	1	-	-	-	-	-
Drechslera/Bipolaris group	1	7	1	1/16	16	107	1	-
Epicoccum	-	-	-	-	13	87	1	-
hyphal elements	9	60	10	5/1	2	13	<1	-
Oscillatoria	2	13	2	-	-	-	-	-
Penicillium/Aspergillus group	22	147	25	1/1	8	213	2	-
Pestalotia	1	7	1	1/1	1	7	<1	-
Pithomyces	2	13	2	-	-	-	-	-
Rusts	1	7	1	-	-	-	-	-
Smuts,Periconia,Myxomycetes	1	7	1	1/18	18	120	1	-
Stachybotrys	2	13	2	-	-	-	-	-
Torula	-	-	-	-	3	20	<1	-
	Debris Rating **4**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments	Spore counts may be underestimated due to heavy particulate.				Few pollen and occasional plant hair seen.			
Total *See Footnotes	89	593	~100%	1/19	475	11447	~100%	-

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Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

Client Sample Number	322202				322206			
Sample Location	Studio				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15008681-002				15008681-006			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	-	-	-	-	7	47	<1	-
ascospores	6	40	5	1/13	20	533	5	-
basidiospores	35	233	30	1/11	92	2453	21	-
brown unidentified	-	-	-	-	1	7	<1	-
Chaetomium	1	7	1	-	-	-	-	-
Cladosporium	8	53	7	1/147	294	7840	68	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	16	107	1	-
Epicoccum	-	-	-	-	13	87	1	-
hyphal elements	8	53	7	4/1	2	13	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	53	353	46	2/1	8	213	2	-
Pestalotia	-	-	-	-	1	7	<1	-
Pithomyces	-	-	-	-	-	-	-	-
Rusts	-	-	-	-	-	-	-	-
Smuts,Periconia,Myxomycetes	4	27	3	1/5	18	120	1	-
Stachybotrys	1	7	1	-	-	-	-	-
Torula	-	-	-	-	3	20	<1	-
	Debris Rating **4**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments					Few pollen and occasional plant hair seen.			
Total *See Footnotes	116	773	~100%	1/15	475	11447	~100%	-

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Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

Client Sample Number	322203				322206			
Sample Location	Garage				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15008681-003				15008681-006			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	-	-	-	-	7	47	<1	-
ascospores	7	187	1	1/3	20	533	5	-
basidiospores	37	987	4	1/2	92	2453	21	-
brown unidentified	5	33	<1	5/1	1	7	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	18	480	2	1/16	294	7840	68	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	16	107	1	-
Epicoccum	-	-	-	-	13	87	1	-
hyphal elements	15	100	<1	8/1	2	13	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	454	24213	93	>100/1	8	213	2	-
Pestalotia	-	-	-	-	1	7	<1	-
Pithomyces	1	7	<1	-	-	-	-	-
Rusts	-	-	-	-	-	-	-	-
Smuts,Periconia,Myxomycetes	5	33	<1	1/4	18	120	1	-
Stachybotrys	2	13	<1	-	-	-	-	-
Torula	-	-	-	-	3	20	<1	-
	Debris Rating **4**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments	Spore counts may be underestimated due to heavy particulate.				Few pollen and occasional plant hair seen.			
Total *See Footnotes	544	26053	~100%	2/1	475	11447	~100%	-

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Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

Client Sample Number	322204				322206			
Sample Location	**Living Room / Kitchen**				**Outside**			
Sample Volume (L)	**150**				**150**			
Lab Sample Number	**15008681-004**				**15008681-006**			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	1	7	1	1/7	7	47	<1	-
ascospores	2	13	1	1/40	20	533	5	-
basidiospores	26	173	15	1/14	92	2453	21	-
brown unidentified	-	-	-	-	1	7	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	61	407	35	1/19	294	7840	68	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	3	20	2	1/5	16	107	1	-
Epicoccum	-	-	-	-	13	87	1	-
hyphal elements	2	13	1	1/1	2	13	<1	-
Oscillatoria	1	7	1	-	-	-	-	-
Penicillium/Aspergillus group	73	487	42	2/1	8	213	2	-
Pestalotia	1	7	1	1/1	1	7	<1	-
Pithomyces	-	-	-	-	-	-	-	-
Rusts	-	-	-	-	-	-	-	-
Smuts,Periconia,Myxomycetes	2	13	1	1/9	18	120	1	-
Stachybotrys	-	-	-	-	-	-	-	-
Torula	-	-	-	-	3	20	<1	-
	Debris Rating **2**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments					Few pollen and occasional plant hair seen.			
Total *See Footnotes	172	1147	~100%	1/10	475	11447	~100%	-

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Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

Client Sample Number	322205				322206			
Sample Location	Master Bedroom				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15008681-005				15008681-006			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	1	7	2	1/7	7	47	<1	-
ascospores	5	33	12	1/16	20	533	5	-
basidiospores	5	33	12	1/74	92	2453	21	-
brown unidentified	-	-	-	-	1	7	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	12	80	28	1/98	294	7840	68	-
Curvularia	-	-	-	-	-	-	-	-
Drechslera/Bipolaris group	-	-	-	-	16	107	1	-
Epicoccum	-	-	-	-	13	87	1	-
hyphal elements	1	7	2	1/2	2	13	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	16	107	37	1/2	8	213	2	-
Pestalotia	1	7	2	1/1	1	7	<1	-
Pithomyces	-	-	-	-	-	-	-	-
Rusts	-	-	-	-	-	-	-	-
Smuts,Periconia,Myxomycetes	2	13	5	1/9	18	120	1	-
Stachybotrys	-	-	-	-	-	-	-	-
Torula	-	-	-	-	3	20	<1	-
	Debris Rating **2**				Debris Rating **2**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments					Few pollen and occasional plant hair seen.			
Total *See Footnotes	43	287	~100%	1/40	475	11447	~100%	-

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Attn: Caleb Weiler
Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

Client Sample #: 322207
Lab Sample #: 15008681-007
Sample Location: Ceiling Framing
Test: 1051, Surface - Qualitative Direct Microscopic Exam SOP 3.7

Results:	Observation
Occasional Alternaria spores seen	1-5 per cover slip
Numerous Cladosporium spores seen	3-4 per field (minimum)
Moderate Cladosporium hyphae seen	1 per 5 fields
Moderate Cladosporium conidiophores seen	1 per 5 fields
Numerous hyphal elements seen	3-4 per field (minimum)
Numerous Penicillium/Aspergillus group spores seen	3-4 per field (minimum)
Occasional Smuts,Periconia,Myxomycetes spores seen	1-5 per cover slip

Debris Rating: 4

Client Sample #: 322208
Lab Sample #: 15008681-008
Sample Location: Air Scrubber Filter
Test: 1051, Surface - Qualitative Direct Microscopic Exam SOP 3.7

Results:	Observation
Occasional hyphal elements seen	1-5 per cover slip
Occasional Pithomyces spores seen	1-5 per cover slip
Few Smuts,Periconia,Myxomycetes spores seen	5 per cover slip

Debris Rating: 4

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Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

Footnotes and Additional Report Information

Debris Rating Table

1	Minimal (<5%) particular present	Reported values are minimally affected by particulate load.
2	5% to 25% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
3	26% to 75% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
4	75% to 90% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
5	Greater than 90% of the trace occluded with particulate	Quantification not possible due to large negative bias. A new sample should be collected at a shorter time interval or other measures taken to reduce particulate load.

1. Penicillium/Aspergillus group spores are characterized by their small size, round to ovoid shape, being unicellular, and usually colorless to lightly pigmented. There are numerous genera of fungi whose spore morphology is similar to that of the Penicillium/Aspergillus type. Two common examples would be Paecilomyces and Acremonium. Although the majority of spores placed in this group are Penicillium, Aspergillus, or a combination of both. Keep in mind that these are not the only two possibilities.

2. Ascospores are sexually produced fungal spores formed within an ascus. An ascus is a sac-like structure designed to discharge the ascospores into the environment, e.g. Ascobolus.

3. Basidiospores are typically blown indoors from outdoors and rarely have an indoor source. However, in certain situations a high basidiospore count indoors may be indicative of a wood decay problem or wet soil.

4. The Smut, Periconia, Myxomycete group is composed of three different groups whose spores have similar morphologies. Smuts are plant pathogens, Periconia is a relatively uncommon mold indoors, and Myxomycetes are not fungi but slime molds. Although these organisms do not typically proliferate indoors, their spores are potentially allergenic.

5. The colorless group contains colorless spores which were unidentifiable to a specific genus. Examples of this group include Acremonium, Aphanocladium, Beauveria, Chrysosporium, Engyodontium microconidia, yeast, some arthrospores, as well as many others.

6. Hyphae are the vegetative mode of fungi. Hyphal elements are fragments of individual Hyphae. They can break apart and become airborne much like spores and are potentially allergenic. A mass of hyphal elements is termed the mycelium. Hyphae in high concentration may be indicative of colonization.

7. Dash (-) in this report, under raw count column means 'not detected (ND)'; otherwise 'not applicable' (NA).

8. The positive-hole correction factor is a statistical tool which calculates a probable count from the raw count, taking into consideration that multiple particles can impact on the same hole; for this reason the sum of the calculated counts may be less than the positive hole corrected total.

9. Due to rounding totals may not equal 100%.

10. Minimum Reporting Limits (MRL) for BULKS, DUSTS, SWABS, and WATER samples are a calculation based on the sample size and the dilution plate on which the organism was counted. Results are a compilation of counts taken from multiple dilutions and multiple medias. This means that every genus of fungi or bacteria recovered can be counted on the plate on which it is best represented.

11. If the final quantitative result is corrected for contamination based on the blank, the blank correction is stated in the sample comments section of the report.

12. Analysis conducted on non-viable spore traps is completed using Indoor Environmental Standards Organization (IESO) Standard 2210.

13. The results in this report are related to this project and these samples only.

14. For samples with an air volume of < 100L, the number of significant figures in the result should be considered (2) two. For samples with air volumes between 100-999L, the number of significant figures in the result should considered (3) three. For example, a sample with a result of 55,443 spr/m3 from a 75L sample using significant figures should be considered 55,000. The same result of 55,443 from a 150L sample using significant figures should be considered 55,400 spr/m^3.

15. If the In/Out ratio is greater than 100 times it is indicated >100/1, rather than showing the real value.

Terminology Used in Direct Exam Reporting

Conidiophores are a type of modified hyphae from which spores are born. When seen on a surface sample in moderate to numerous concentrations they may be indicative of fungal growth.

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Attn: Caleb Weiler
Project: **3222 - Boyd Residence**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 05/05/2015
Date Received: 05/06/2015
Date Analyzed: 05/08/2015
Date Reported: 05/11/2015
Project ID: 15008681

GLOSSARY

Alternaria: Alternaria is found world-wide. It is often found growing in buildings. It grows in soil, on organic debris, on food and on some textiles. Some species cause plant disease. It is potentially allergenic and sometimes causes hypersensitivity pneumonitis. It is also pathogenic in immunocompromised people. It produces several mycotoxins, of which the most poisonous is tenuazonic acid.

ascospores: Ascospores are the result of sexual reproduction and are produced by thousands of different fungi. They are found on a wide range of substrates. They are usually produced inside microscopic to macroscopic fruiting bodies before being forcibly ejected into the air for dispersal. They can have a wide range of shape, size, number of septations and can be colorless or darkly pigmented.

basidiospores: Basidiospores are extremely small, usually unicellular spores produced by many thousands of fungi as a result of sexual reproduction (these fungi include mushrooms, bracket fungi, puffballs, etc.) They are forcibly expelled from the fruiting bodies (mushrooms) into the air, and are especially numerous in Autumn. Most basidiospores recovered from buildings have entered with outside air. Basidiospores are not pathogenic or toxigenic, though some of the mushrooms themselves can be poisonous if eaten.

brown unidentified:

Chaetomium: Chaetomium produces its spores inside a microscopic fruiting body. It occurs worldwide and usually grows on substrates containing cellulose, such as paper, wallboard, textiles, seeds, etc. It produces brown, single-celled spores shaped like a lemon. Chaetomium produces mycotoxins including chaetoglobosins and sterigmatocystin. The spores may trigger asthma or hay fever in susceptible individuals. Chaetomium also produces cellulase enzymes and is used in fabric testing.

Cladosporium: Cladosporium is one of the most common fungi worldwide. It grows almost everywhere and on a wide variety of substrates. It is commonly found in buildings on wood or cellulose substrates and around the edges of windows. Some species grow at or below freezing. The spores are mostly single-celled, but some can be septate. They are pigmented and develop in dry, branching chains that are easily broken and dispersed into the air. Most species are not pathogenic but are potential allergens in high concentrations. Some species are reported to produce the toxin epicladosporic acid, which has immunosuppressive potential.

Curvularia: Curvularia is a fungus known as a mold. It occurs worlwide on leaves (especially those of grasses), on seeds, and in soil. It is found in buildings on various substrates, and enters with outdoor air. It's relatively large (though still microscopic) spores are several-septate, brown, dry, single, smooth-walled, and often curved; with the central cells usually larger and darker than end cells. In some species the spore walls are very thick. It may trigger hay fever and asthma, and allergic fungal sinusitis. Mostly in immunocompromised patients, it may cause infection of toenails, keratitis of the eye, sinusitis, internal heart infection, mycetoma, pneumonia, brain abscess, or disseminated infection (though most of these conditions are rare). It is not known to produce toxins.

Drechslera/Bipolaris group: Drechslera and Bipolaris occur worldwide, but are more common in warmer climates. They grow on soil, dead plant parts, and living leaves of grasses, where they can cause plant disease. They produce large, thick-walled, brown, dry, smooth-walled spores with pseudo septations. In Bipolaris the spores germinate only from the end cells, spores of Drechslera can germinate from any cell. They do not produce toxins, but can be potentially allergenic. In rare cases, they have caused phaeohyphomycosis (keratitis, osteomyelitis and sinusitis) in immunocompromised individuals.

Epicoccum: Epicoccum is a fungus that occurs all around the world and grows most commonly on the stems and leaves of many plants. It produces single, dry, globose, rough-walled spores in small cushion-like fructifications called sporodochia. The spores can become airborne and possibly trigger respiratory allergies in susceptible individuals.

hyphal elements: Hyphal elements are fragments of the thallus of most true fungi. They are tubular, usually about 5 microns (one-five-thousandth of an inch) in width and very variable in length. They may be colorless or pigmented. Having been broken off, they are open at one or both ends, and usually empty. The walls consist of a mixture of chitin and glucans, which may be allergenic. In the absence of spores or other diagnostic structures, they cannot be identified. They usually enter buildings with outside air.

Oscillatoria:

Penicillium/Aspergillus group: Penicillium and Aspergillus are among the most common fungi worldwide, occurring on a very large number of substrates. They produce unicellular, usually globose, hydrophobic spores in unbranched chains. Some species may cause infections in humans, particularly in immunocompromised patients. Some species produce mycotoxins, and some may be allergenic. The spores, when present without the diagnostic structures that produce them, are impossible to differentiate visually from eachother.

Pestalotia:

Pithomyces: Pithomyces is found worldwide. It grows on dead leaves and on paper. It produces dark, multicellular, dry spores which become airborne relatively easily but usually enter indoor environments with outside air.

Rusts: Rust fungi are found world-wide (there are 14 families, 163 genera, and almost 7,000 species). They grow only on living plants as obligate parasites. The reddish or orange unicellular summer spores (urediniospores) arising in patches on the host plant gave the group its name. They occur in houses only on some house plants, but spores often enter with air from outside, especially in summer and fall. They can trigger hay fever, but have no toxic or pathogenic potential.

Smuts,Periconia,Myxomycetes: Smuts/Periconia/Myxomycetes. The Smut, Periconia, Myxomycete group is composed of three different groups whose spores have similar morphologies. Smuts are plant pathogens, Periconia is a relatively uncommon mold indoors, and Myxomycetes are not fungi but slime molds. Although these organisms do not typically proliferate indoors, their spores are potentially allergenic. These are very different organisms which happen to produce similar spores, that tend to be globose, brown and with an ornamented wall. They occur on many different substrates. Smuts are parasitic on living plants, Periconia grows on dead plants, and myxomycetes usually eat bacteria and other microscopic food particles before producing spores.

Stachybotrys: Stachybotrys is a fungus that is often referred to as toxic black mold and occurs all around the world. It requires a damp environment and grows best on substrates containing cellulose, such as paper and cardboard, or textiles made of cotton. It grows commonly in damp buildings on the paper backing of wallboard. It can develop extensive dark colonies, producing small, single-celled, ellipsoidal black spores. These spores are initially produced in slime but when they eventually dry out they can become airborne and trigger respiratory allergies in susceptible individuals. Stachybotrys is a toxin producer but it is not a disease-causing organism, and is able to grow only on dead organic substrates.

Torula: Torula is a fungus known as a mold. It occurs worldwide on plant litter, soil, dung, and various cellulose-containing materials. It is fairly common in buildings on cellulosic substrates. It produces darkly pigmented, microscopic, dry, several-celled spores in branching chains; individual conidia are characteristically constricted at each cross-wall, and the apical cell is darker, often eventually collapsing and becoming cupulate. Torula does not appear to have any toxic or pathogenic potential, but can trigger allergies like hay fever and asthma.

Selita

From: Nathan Rusch <Nathan@heatonusa.com>
Sent: Wednesday, July 15, 2015 9:16 AM
To: selitab45@gmail.com
Subject: Report
Attachments: Boyd Mold Clearance Report.pdf

Selita,

Attached is the post remediation report. If there are any questions feel free to contact us at any time during our normal business hours.

Have a great day

Nathan Rusch
Office: 770-931-0918 Ext 102
Email: Nathan@heatonusa.com
Website: www.heatonusa.com

HEATON
ENVIRONMENTAL INC.

MOLD CLEARANCE REPORT

Prepared For
Liberty Mutual Insurance
C/o Aaron Kolkmeier

Subject Property
Boyd Residence
6841 Cavalier Ct
Stone Mountain, GA 30087

Inspection Date: July 7, 2015

Prepared by

HEATON ENVIRONMENTAL INC.
2898 Mountain View Road, Snellville, GA 30078
T: 770-931-0918 | E: contact@HeatonUSA.com
www.HeatonUSA.com

M-3222 reviewed by:

INSPECTION SUMMARY

Client & Contact:
Liberty Mutual Insurance
C/o Aaron Kolkmeier

Property Information:
Boyd Residence
6841 Cavalier Ct
Stone Mountain, GA 30087

Scope of Project/Results:
Mold Remediation Clearance Testing / **SUCCESSFUL REMEDIATION**

Remediation Contractor:
Water Medics
C/o George

Background Information & Current Conditions:
Per the request of Aaron Kolkmeier of Liberty Mutual Insurance, Heaton Environmental has conducted a final visual inspection and air sampling clearance for the mold remediation project conducted at the Boyd residence: 6841 Cavalier Ct, Stone Mountain, GA 30087. This inspection was conducted on July 7, 2015 by Nathan Rusch.

Air Samples:
Air samples which are tested for mold are basically a snapshot in time and may not reflect all conditions and levels of mold. Mold levels vary during the day depending on relative humidity, temperature, wind speeds and direction, surrounding vegetation, moisture content of soil, and many other factors. The samples taken during this sampling period compare inside conditions to outside conditions at that time.

A total of six (6) air samples were taken during the clearance. Three (3) inside were taken in the basement, two (2) more were taken in the garage and main floor kitchen/family room. Another sample was taken outside the home so as to obtain an acceptable background for the inside sample(s). The accepted protocol for clearance is to compare the inside sample(s) to the outside sample(s). If the sample levels taken from inside the home exceed the outside levels, an elevated condition exists where it is expected that mold is actively growing. Conversely, lower mold levels inside compared with outside levels indicate a successful remediation. The mold concentrations inside the home were lower than those measured outside, indicating a **SUCCESSFUL REMEDIATION ATTEMPT.**

Some mold spores were identified inside in very low levels that were either not identified outside or only slightly higher than outside. The levels were very low and would not be considered a significant growth issue. Active mold growth, with the exception of

Stachybotrys Chartarum, typically generates spore counts in the thousands. Due to the commonly perceived health effects associated with Stachybotrys Chartarum, even relatively small spore counts are treated seriously and eradicated.

These samples were collected on a non-viable slit impactor. The samples were analyzed by Aerobiology Laboratory Associates Inc. in Atlanta, GA (see attached results).

Surface Samples:

There were two (2) surface samples taken of the basement floor joists. The samples came with no mold growth on them.

Moisture:

Moisture detection devices are used to identify high moisture levels in normal building materials. Devices can measure on two different scales, a relative scale and a Wood Moisture Equivalent, or WME, scale. The relative scale is a measurement of moisture relative to the surrounding materials. Moisture measured on the Wood Moisture Equivalent scale should be maintained below 20% WME. When moisture elevates above 20% WME, the material and the surrounding areas become conducive to mold growth. No excess moisture was detected in the home.

Humidity:

Weather conditions at the time of the inspection were sunny and warm. Test results and humidity levels reflect the conditions at the time of the visit and may not reflect the worst case scenario. Relative humidity levels should be maintained at levels < 60% to reduce the possibility of mold growth. In the future, a de-humidifier may be helpful in maintaining appropriate humidity levels. Low humidity is the key to prevent mold growth. Relative humidity in the home was 78% in the basement.

Conclusions:

No visible mold growth or excess moisture was detected, and total mold spore counts inside the home at the time of completion were less than those in the background sample taken outside. At the time of sampling, it appears that the remediation has been completed in a successful manner.

Recommendations:

It is recommended that throughout the reconstruction process and into the future, the relative humidity levels be maintained below 60% to discourage mold growth. If the area should develop elevated humidity levels, several methods may be employed to reduce the levels. Air conditioning and dehumidifiers lower humidity levels and will vary depending on size, age, and efficiency. Local fans may not lower the humidity levels but will help to evaporate moisture on walls, fabric, and other surfaces which are subject to mold infestation. The key to mold prevention is to minimize the moisture necessary for mold growth.

If you have any questions regarding this report, please feel free to call Heaton Environmental, Inc. at 770-931-0918.

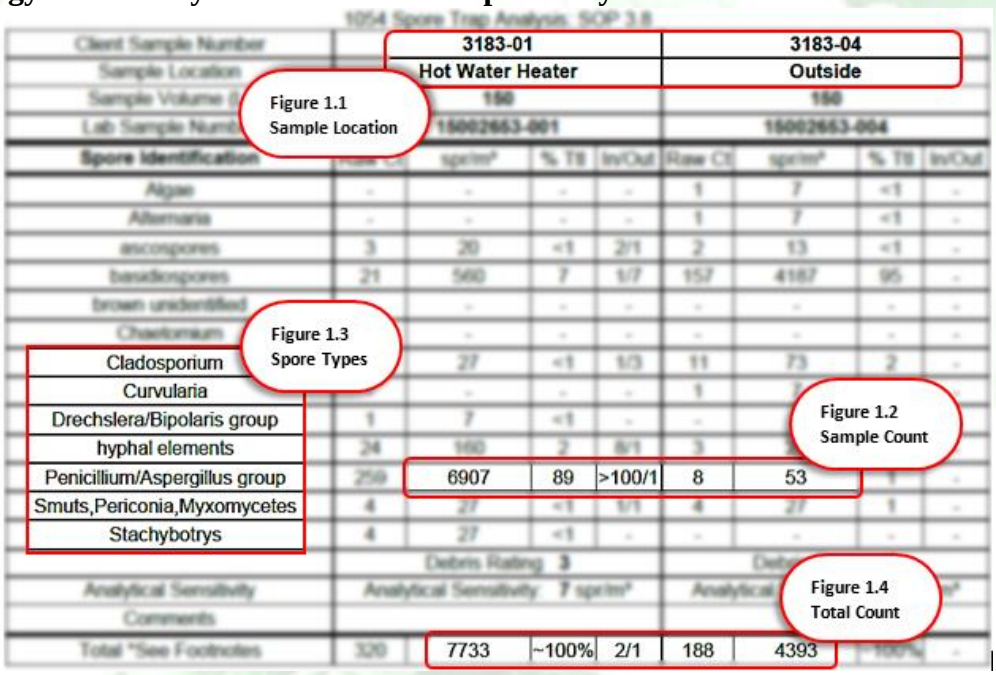
Disclaimer: *This report includes test results, findings and recommended measures to remediate the mold and reduce the possibility of future mold growth. The report is intended for the sole use of the initial client and is not to be used without the consent of the initial client. Recommendations and/or suggestions given in this report are based on standard industry practices and information obtained from various Health Departments, EPA etc. As results may vary depending on contractors, cleaning methods and other factors, Heaton Environmental does not infer, suggest or warrant the success or results of any remediation. If post remediation sampling does not provide proper clearance levels, additional investigational work may be necessary. Mold growth and contamination may recur following the remediation and post remediation sampling if conditions again become conducive to mold growth.*

SAMPLE INTERPRETATION

Four easy steps to reading your Spore Trap results:

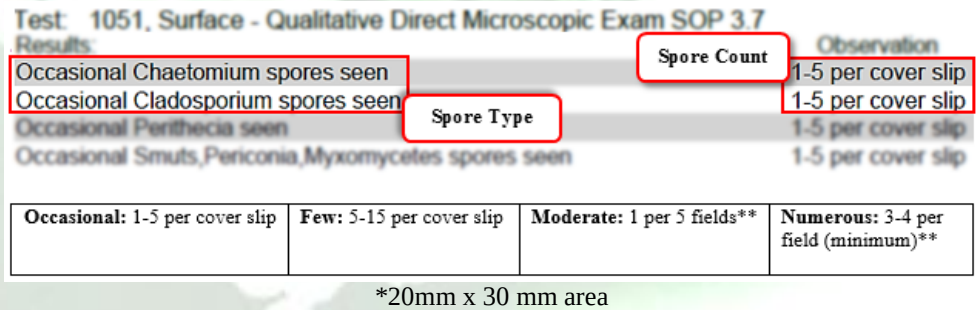
I. Identify the sample numbers and locations. (Figure 1.1)
II. Compare interior spore counts to exterior, or background, spore counts. (Figure 1.2)
III. Identify the spore type relating to the elevated spore counts. (Figure 1.3)
IV. Compare the interior total spore counts with the exterior total count. (Figure 1.4)

Aerobiology Laboratory Associates Inc. Sample Analysis:



Client Sample Number	3183-01				3183-04			
Sample Location	Hot Water Heater				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15002663-001				15002663-004			
Spore Identification	Raw Ct	spores/m³	% TB	In/Out	Raw Ct	spores/m³	% TB	In/Out
Algae	-	-	-	-	1	7	<1	-
Alternaria	-	-	-	-	1	7	<1	-
ascospores	3	20	<1	2/1	2	13	<1	-
basidiospores	21	560	7	1/7	157	4187	95	-
brown unidentified	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	27	<1	1/3	11	73	2	-	
Curvularia	-	-	-	-	1			
Drechslera/Bipolaris group	1	7	<1	-	-			
hyphal elements	24	160	2	8/1	3			
Penicillium/Aspergillus group	259	6907	89	>100/1	8	53	1	-
Smuts,Periconia,Myxomycetes	4	27	<1	1/1	4	27	1	-
Stachybotrys	4	27	<1	-	-	-	-	-
	Debris Rating 3				Debris Rating 1			
Analytical Sensitivity	Analytical Sensitivity: 7 spores/m³				Analytical Sensitivity: 7 spores/m³			
Comments								
Total *See Footnotes	320	7733	~100%	2/1	188	4393	100%	-

Tape lift/Swab Analysis:



Occasional: 1-5 per cover slip	**Few:** 5-15 per cover slip	**Moderate:** 1 per 5 fields**	**Numerous:** 3-4 per field (minimum)**

*20mm x 30 mm area
** 15,000 fields

When a swab or tape lift sample is submitted for direct qualitative microscopic analysis, the maximum area analyzed is approximately 20 mm x 30 mm (the size of the cover slip). When "Occasional" or "Few" is reported, those are based on what is found under the entire cover slip. The area which the microscopic field covers is much smaller (there are approximately 15,000 microscopic fields under each cover slip). When the number observed is based on field count rather than cover slip count, the mold content is much higher.

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

Certificate of Analysis
EMLAP# 163063

2400 Herodian Way
Suite 190
Smyrna, Georgia 30080
(770) 947-2828
www.aerobiology.net

Heaton Environmental, Inc.
2898 Mountain View Road
Snellville, Georgia 30078
Attn: Nathan Rusch
Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

1054 Spore Trap Analysis: SOP 3.8

Client Sample Number	**3222-01**				**3222-06**			
Sample Location	**Studio**				**Outside**			
Sample Volume (L)	**150**				**150**			
Lab Sample Number	**15013933-001**				**15013933-006**			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	-	-	-	-	-	-	-	-
ascospores	1	7	3	1/344	43	2293	13	-
basidiospores	11	73	35	1/202	278	14827	84	-
brown unidentified	-	-	-	-	-	-	-	-
Cercospora	-	-	-	-	2	13	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	6	40	19	1/1	8	53	<1	-
Curvularia	2	13	6	1/5	10	67	<1	-
Drechslera/Bipolaris group	-	-	-	-	6	40	<1	-
Epicoccum	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	3	20	<1	-
Nigrospora	-	-	-	-	1	7	<1	-
Non-Specified Spores	-	-	-	-	1	7	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	7	47	23	1/3	22	147	1	-
Pithomyces	1	7	3	1/1	1	7	<1	-
Smuts,Periconia,Myxomycetes	3	20	10	1/5	15	100	1	-
Torula	-	-	-	-	1	7	<1	-
Zygophiala	-	-	-	-	2	13	<1	-
	Debris Rating **3**				Debris Rating **3**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments								
Total *See Footnotes	31	207	~100%	1/85	394	17607	~100%	-

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Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

Client Sample Number	**3222-02**				**3222-06**			
Sample Location	**Back Room**				**Outside**			
Sample Volume (L)	**150**				**150**			
Lab Sample Number	**15013933-002**				**15013933-006**			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	1	7	4	-	-	-	-	-
ascospores	-	-	-	-	43	2293	13	-
basidiospores	10	67	36	1/222	278	14827	84	-
brown unidentified	1	7	4	-	-	-	-	-
Cercospora	-	-	-	-	2	13	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	2	13	7	1/4	8	53	<1	-
Curvularia	5	33	18	1/2	10	67	<1	-
Drechslera/Bipolaris group	3	20	11	1/2	6	40	<1	-
Epicoccum	-	-	-	-	1	7	<1	-
hyphal elements	-	-	-	-	3	20	<1	-
Nigrospora	1	7	4	1/1	1	7	<1	-
Non-Specified Spores	-	-	-	-	1	7	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	4	27	14	1/6	22	147	1	-
Pithomyces	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	4	1/15	15	100	1	-
Torula	-	-	-	-	1	7	<1	-
Zygophiala	-	-	-	-	2	13	<1	-
	Debris Rating **3**				Debris Rating **3**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments								
Total *See Footnotes	28	187	~100%	1/94	394	17607	~100%	-

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Attn: Nathan Rusch
Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

Client Sample Number	**3222-03**				**3222-06**			
Sample Location	**Hallway**				**Outside**			
Sample Volume (L)	**150**				**150**			
Lab Sample Number	**15013933-003**				**15013933-006**			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	-	-	-	-	-	-	-	-
ascospores	1	7	2	1/344	43	2293	13	-
basidiospores	5	33	11	1/445	278	14827	84	-
brown unidentified	1	7	2	-	-	-	-	-
Cercospora	-	-	-	-	2	13	<1	-
Chaetomium	1	7	2	-	-	-	-	-
Cladosporium	8	53	18	1/1	8	53	<1	-
Curvularia	4	27	9	1/3	10	67	<1	-
Drechslera/Bipolaris group	-	-	-	-	6	40	<1	-
Epicoccum	-	-	-	-	1	7	<1	-
hyphal elements	1	7	2	1/3	3	20	<1	-
Nigrospora	-	-	-	-	1	7	<1	-
Non-Specified Spores	-	-	-	-	1	7	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	16	107	36	1/1	22	147	1	-
Pithomyces	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	1	7	2	1/15	15	100	1	-
Torula	6	40	14	6/1	1	7	<1	-
Zygophiala	-	-	-	-	2	13	<1	-
	Debris Rating **3**				Debris Rating **3**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments								
Total *See Footnotes	44	293	~100%	1/60	394	17607	~100%	-

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Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

Client Sample Number	**3222-04**				**3222-06**			
Sample Location	**Garage**				**Outside**			
Sample Volume (L)	**150**				**150**			
Lab Sample Number	**15013933-004**				**15013933-006**			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	-	-	-	-	-	-	-	-
ascospores	2	13	5	1/172	43	2293	13	-
basidiospores	21	140	54	1/106	278	14827	84	-
brown unidentified	1	7	3	-	-	-	-	-
Cercospora	-	-	-	-	2	13	<1	-
Chaetomium	1	7	3	-	-	-	-	-
Cladosporium	3	20	8	1/3	8	53	<1	-
Curvularia	3	20	8	1/3	10	67	<1	-
Drechslera/Bipolaris group	-	-	-	-	6	40	<1	-
Epicoccum	-	-	-	-	1	7	<1	-
hyphal elements	1	7	3	1/3	3	20	<1	-
Nigrospora	-	-	-	-	1	7	<1	-
Non-Specified Spores	-	-	-	-	1	7	<1	-
Oscillatoria	-	-	-	-	-	-	-	-
Penicillium/Aspergillus group	4	27	10	1/6	22	147	1	-
Pithomyces	-	-	-	-	1	7	<1	-
Smuts,Periconia,Myxomycetes	3	20	8	1/5	15	100	1	-
Torula	-	-	-	-	1	7	<1	-
Zygophiala	-	-	-	-	2	13	<1	-
	Debris Rating **3**				Debris Rating **3**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments								
Total *See Footnotes	39	260	~100%	1/68	394	17607	~100%	-

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Attn: Nathan Rusch
Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

Client Sample Number	3222-05				3222-06			
Sample Location	Kitchen/Livingroom				Outside			
Sample Volume (L)	150				150			
Lab Sample Number	15013933-005				15013933-006			
Spore Identification	Raw Ct	spr/m³	% Ttl	In/Out	Raw Ct	spr/m³	% Ttl	In/Out
Alternaria	-	-	-	-	-	-	-	-
ascospores	2	13	4	1/172	43	2293	13	-
basidiospores	37	247	66	1/60	278	14827	84	-
brown unidentified	-	-	-	-	-	-	-	-
Cercospora	-	-	-	-	2	13	<1	-
Chaetomium	-	-	-	-	-	-	-	-
Cladosporium	4	27	7	1/2	8	53	<1	-
Curvularia	3	20	5	1/3	10	67	<1	-
Drechslera/Bipolaris group	-	-	-	-	6	40	<1	-
Epicoccum	-	-	-	-	1	7	<1	-
hyphal elements	1	7	2	1/3	3	20	<1	-
Nigrospora	-	-	-	-	1	7	<1	-
Non-Specified Spores	-	-	-	-	1	7	<1	-
Oscillatoria	1	7	2	-	-	-	-	-
Penicillium/Aspergillus group	4	27	7	1/6	22	147	1	-
Pithomyces	1	7	2	1/1	1	7	<1	-
Smuts,Periconia,Myxomycetes	3	20	5	1/5	15	100	1	-
Torula	-	-	-	-	1	7	<1	-
Zygophiala	-	-	-	-	2	13	<1	-
	Debris Rating **2**				Debris Rating **3**			
Analytical Sensitivity	Analytical Sensitivity: **7** spr/m³				Analytical Sensitivity: **7** spr/m³			
Comments								
Total *See Footnotes	56	373	~100%	1/47	394	17607	~100%	-

Client Sample #: 3222-07
Lab Sample #: 15013933-007
Sample Location: Cieling Framing
Test: 1051, Surface - Qualitative Direct Microscopic Exam SOP 3.7

Results:	Observation
Occasional brown unidentified spores seen	1-5 per cover slip

Debris Rating: 2

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2898 Mountain View Road
Snellville, Georgia 30078
Attn: Nathan Rusch
Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

Client Sample #: 3222-08
Lab Sample #: 15013933-008
Sample Location: Cieling Framing
Test: 1051, Surface - Qualitative Direct Microscopic Exam SOP 3.7

Debris Rating: 2
Comments: Numerous blackish particulate seen. No fungal spores seen.

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Attn: Nathan Rusch
Project: **3222 Boyd**
Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

Footnotes and Additional Report Information

Debris Rating Table

1	Minimal (<5%) particular present	Reported values are minimally affected by particulate load.
2	5% to 25% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
3	26% to 75% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
4	75% to 90% of the trace occluded with particulate	Negative bias is expected. The degree of bias increases directly with the percent of the trace that is occluded.
5	Greater than 90% of the trace occluded with particulate	Quantification not possible due to large negative bias. A new sample should be collected at a shorter time interval or other measures taken to reduce particulate load.

1. Penicillium/Aspergillus group spores are characterized by their small size, round to ovoid shape, being unicellular, and usually colorless to lightly pigmented. There are numerous genera of fungi whose spore morphology is similar to that of the Penicillium/Aspergillus type. Two common examples would be Paecilomyces and Acremonium. Although the majority of spores placed in this group are Penicillium, Aspergillus, or a combination of both. Keep in mind that these are not the only two possibilities.

2. Ascospores are sexually produced fungal spores formed within an ascus. An ascus is a sac-like structure designed to discharge the ascospores into the environment, e.g. Ascobolus.

3. Basidiospores are typically blown indoors from outdoors and rarely have an indoor source. However, in certain situations a high basidiospore count indoors may be indicative of a wood decay problem or wet soil.

4. The Smut, Periconia, Myxomycete group is composed of three different groups whose spores have similar morphologies. Smuts are plant pathogens, Periconia is a relatively uncommon mold indoors, and Myxomycetes are not fungi but slime molds. Although these organisms do not typically proliferate indoors, their spores are potentially allergenic.

5. The colorless group contains colorless spores which were unidentifiable to a specific genus. Examples of this group include Acremonium, Aphanocladium, Beauveria, Chrysosporium, Engyodontium microconidia, yeast, some arthrospores, as well as many others.

6. Hyphae are the vegetative mode of fungi. Hyphal elements are fragments of individual Hyphae. They can break apart and become airborne much like spores and are potentially allergenic. A mass of hyphal elements is termed the mycelium. Hyphae in high concentration may be indicative of colonization.

7. Dash (-) in this report, under raw count column means 'not detected (ND)'; otherwise 'not applicable' (NA).

8. The positive-hole correction factor is a statistical tool which calculates a probable count from the raw count, taking into consideration that multiple particles can impact on the same hole; for this reason the sum of the calculated counts may be less than the positive hole corrected total.

9. Due to rounding totals may not equal 100%.

10. Minimum Reporting Limits (MRL) for BULKS, DUSTS, SWABS, and WATER samples are a calculation based on the sample size and the dilution plate on which the organism was counted. Results are a compilation of counts taken from multiple dilutions and multiple medias. This means that every genus of fungi or bacteria recovered can be counted on the plate on which it is best represented.

11. If the final quantitative result is corrected for contamination based on the blank, the blank correction is stated in the sample comments section of the report.

12. Analysis conducted on non-viable spore traps is completed using Indoor Environmental Standards Organization (IESO) Standard 2210.

13. The results in this report are related to this project and these samples only.

14. For samples with an air volume of < 100L, the number of significant figures in the result should be considered (2) two. For samples with air volumes between 100-999L, the number of significant figures in the result should considered (3) three. For example, a sample with a result of 55,443 spr/m3 from a 75L sample using significant figures should be considered 55,000. The same result of 55,443 from a 150L sample using significant figures should be considered 55,400 spr/m^3.

15. If the In/Out ratio is greater than 100 times it is indicated >100/1, rather than showing the real value.

Terminology Used in Direct Exam Reporting

Conidiophores are a type of modified hyphae from which spores are born. When seen on a surface sample in moderate to numerous concentrations they may be indicative of fungal growth.

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Condition of Sample(s) Upon Receipt: Acceptable

Date Collected: 07/07/2015
Date Received: 07/08/2015
Date Analyzed: 07/09/2015
Date Reported: 07/10/2015
Project ID: 15013933

GLOSSARY

Alternaria: Alternaria is found world-wide. It is often found growing in buildings. It grows in soil, on organic debris, on food and on some textiles. Some species cause plant disease. It is potentially allergenic and sometimes causes hypersensitivity pneumonitis. It is also pathogenic in immunocompromised people. It produces several mycotoxins, of which the most poisonous is tenuazonic acid.

ascospores: Ascospores are the result of sexual reproduction and are produced by thousands of different fungi. They are found on a wide range of substrates. They are usually produced inside microscopic to macroscopic fruiting bodies before being forcibly ejected into the air for dispersal. They can have a wide range of shape, size, number of septations and can be colorless or darkly pigmented.

basidiospores: Basidiospores are extremely small, usually unicellular spores produced by many thousands of fungi as a result of sexual reproduction (these fungi include mushrooms, bracket fungi, puffballs, etc.) They are forcibly expelled from the fruiting bodies (mushrooms) into the air, and are especially numerous in Autumn. Most basidiospores recovered from buildings have entered with outside air. Basidiospores are not pathogenic or toxigenic, though some of the mushrooms themselves can be poisonous if eaten.

brown unidentified:

Cercospora: Cercospora is a fungus known as a mold. It occurs worldwide on the leaves of many plants, causing leafspot diseases. There are over 600 species. They produce long and tapering (though microscopic) pale spores with a broad, dark scar at the base. They do not normally grow in houses, the spores entering in outdoor air. They are not pathogenic to humans, and little is known about their allergenic or toxic potential.

Chaetomium: Chaetomium produces its spores inside a microscopic fruiting body. It occurs worldwide and usually grows on substrates containing cellulose, such as paper, wallboard, textiles, seeds, etc. It produces brown, single-celled spores shaped like a lemon. Chaetomium produces mycotoxins including chaetoglobosins and sterigmatocystin. The spores may trigger asthma or hay fever in susceptible individuals. Chaetomium also produces cellulase enzymes and is used in fabric testing.

Cladosporium: Cladosporium is one of the most common fungi worldwide. It grows almost everywhere and on a wide variety of substrates. It is commonly found in buildings on wood or cellulose substrates and around the edges of windows. Some species grow at or below freezing. The spores are mostly single-celled, but some can be septate. They are pigmented and develop in dry, branching chains that are easily broken and dispersed into the air. Most species are not pathogenic but are potential allergens in high concentrations. Some species are reported to produce the toxin epicladosporic acid, which has immunosuppressive potential.

Curvularia: Curvularia is a fungus known as a mold. It occurs worlwide on leaves (especially those of grasses), on seeds, and in soil. It is found in buildings on various substrates, and enters with outdoor air. It's relatively large (though still microscopic) spores are several-septate, brown, dry, single, smooth-walled, and often curved; with the central cells usually larger and darker than end cells. In some species the spore walls are very thick. It may trigger hay fever and asthma, and allergic fungal sinusitis. Mostly in immunocompromised patients, it may cause infection of toenails, keratitis of the eye, sinusitis, internal heart infection, mycetoma, pneumonia, brain abscess, or disseminated infection (though most of these conditions are rare). It is not known to produce toxins.

Drechslera/Bipolaris group: Drechslera and Bipolaris occur worldwide, but are more common in warmer climates. They grow on soil, dead plant parts, and living leaves of grasses, where they can cause plant disease. They produce large, thick-walled, brown, dry, smooth-walled spores with pseudo septations. In Bipolaris the spores germinate only from the end cells, spores of Drechslera can germinate from any cell. They do not produce toxins, but can be potentially allergenic. In rare cases, they have caused phaeohyphomycosis (keratitis, osteomyelitis and sinusitis) in immunocompromised individuals.

Epicoccum: Epicoccum is a fungus that occurs all around the world and grows most commonly on the stems and leaves of many plants. It produces single, dry, globose, rough-walled spores in small cushion-like fructifications called sporodochia. The spores can become airborne and possibly trigger respiratory allergies in susceptible individuals.

hyphal elements: Hyphal elements are fragments of the thallus of most true fungi. They are tubular, usually about 5 microns (one-five-thousandth of an inch) in width and very variable in length. They may be colorless or pigmented. Having been broken off, they are open at one or both ends, and usually empty. The walls consist of a mixture of chitin and glucans, which may be allergenic. In the absence of spores or other diagnostic structures, they cannot be identified. They usually enter buildings with outside air.

Nigrospora: Nigrospora is a fungus known as a mold. It grows on plants such as banana, rice, sugarcane, etc. and is relatively cosmopolitan. It produces characteristic single, round, black, unicellular spores which are forcibly expelled from the cells that produce them. The spores are relatively uncommon in houses and enter with outdoor air. This fungus has little pathogenic potential and is not known to produce toxins or to cause allergies.

Non-Specified Spores:

Oscillatoria:

Penicillium/Aspergillus group: Penicillium and Aspergillus are among the most common fungi worldwide, occurring on a very large number of substrates. They produce unicellular, usually globose, hydrophobic spores in unbranched chains. Some species may cause infections in humans, particularly in immunocompromised patients. Some species produce mycotoxins, and some may be allergenic. The spores, when present without the diagnostic structures that produce them, are impossible to differentiate visually from eachother.

Pithomyces: Pithomyces is found worldwide. It grows on dead leaves and on paper. It produces dark, multicellular, dry spores which become airborne relatively easily but usually enter indoor environments with outside air.

Smuts,Periconia,Myxomycetes: Smuts/Periconia/Myxomycetes. The Smut, Periconia, Myxomycete group is composed of three different groups whose spores have similar morphologies. Smuts are plant pathogens, Periconia is a relatively uncommon mold indoors, and Myxomycetes are not fungi but slime molds. Although these organisms do not typically proliferate indoors, their spores are potentially allergenic. These are very different organisms which happen to produce similar spores, that tend to be globose, brown and with an ornamented wall. They occur on many different substrates. Smuts are parasitic on living plants, Periconia grows on dead plants, and myxomycetes usually eat bacteria and other microscopic food particles before producing spores.

Torula: Torula is a fungus known as a mold. It occurs worldwide on plant litter, soil, dung, and various cellulose-containing materials. It is fairly common in buildings on cellulosic substrates. It produces darkly pigmented, microscopic, dry, several-celled spores in branching chains; individual conidia are characteristically constricted at each cross-wall, and the apical cell is darker, often eventually collapsing and becoming cupulate. Torula does not appear to have any toxic or pathogenic potential, but can trigger allergies like hay fever and asthma.

Zygophiala: Zygophiala is a fungus known as a mold. It occurs very widely on leaves and fruits of banana and apples, among other plants, and causes a 'flyspeck' disease of apples in Spring. It produces small (microscopic), single, dry, 2-celled spores that become airborne. Spores are not uncommonly found in houses, but do not appear to be allergenic, pathogenic (except to plants) or toxigenic.