



Mold Testing Report



May 5, 2017

Dear Joe

It was a sincere pleasure meeting with you while conducting mold testing in your home

Mold Air Sample Results:

Location	Mold Levels	Type
Basement	Elevated	Aspergillus/Penicillium
Son's Bedroom	Moderate	Stachybotrys

Mold Surface Sample Results:

Location	Mold (Yes/No)	Type
Air Vents – Daughter Bedroom	Yes	Ascospores Cladosporium Curvularia Alternaria
HVAC	Yes	Cladosporium Myxomycetes
Basement Wall	No	N/A
Daughter's Bedroom Ceiling	Yes	Aspergillus/Penicillium
Air Vents – Son's Bedroom	Yes	Cladosporium Curvularia

Penicillium is readily identifiable on tape samples if sporulating structures are present. Old growth or samples with high numbers of spores may not exhibit sporulation structures necessary for identification and are therefore reported as "spores typical of Penicillium/Aspergillus." Penicillium is one of the most common fungal genera, worldwide. Penicillium commonly produces 2-methyl-isoborneol, a heavy musty odor. Common Type I allergies include hay fever and asthma. Like Penicillium, Aspergillus may cause similar Type I allergies with the increased risk of respiratory, invasive, cutaneous, ear, and corneal disease. Severe, invasive disease is usually associated with immunosuppressed hosts.

Stachybotrys is not typically found in airborne concentration outside. It is a greenish black mold that grows on material with a high cellulose content or such as hay, straw, wicker, and wood chips, as well as building materials such as ceiling tile, drywall, paper vapor barriers, wallpaper, insulation backing, cardboard boxes, paper files, fiberboard, the paper covering of gypsum wallboard, particleboard, jute, dust, and wood when these items become water damaged. This mold requires very wet or high humid conditions for days or weeks in order to grow. Excessive indoor humidity resulting in water vapor condensation on walls, plumbing leaks, spills from showering or bathing, water leaking



through foundations or roofs may lead to growth of many types of mold, including stachybotrys. Individuals with chronic exposure to toxins produced by this fungus reported cold and flu symptoms, memory loss, muscle aches, sore throats, diarrhea, headaches, fatigue, dermatitis, and intermittent local hair loss. The toxins produced by this fungus will suppress and could destroy the immune system affecting the lymphoid tissue and the bone marrow. Animals injected with the toxin from this fungus exhibited the following symptoms: necrosis and hemorrhage within the brain, thymus, spleen, intestine, lung, heart, lymph node, liver, and kidney. Affects by absorption of the toxin in the human lung are known as pneumomycosis. The toxins may also suppress the immune system.

Ascospores grow well under a variety of conditions and many are known to be plant pathogens. Ascospores are microscopic spores which develop during the winter on dead, fallen leaves that were infected the previous season. From budburst onwards, rain triggers the release of ascospores into the air. Ascospore release will continue until early December, or later in a dry season, and this is known as the primary infection season. Ascospores can be found everywhere and commonly grow indoors on damp materials. Ascospores have not been extensively studied but it is considered to be an allergen. Ascospores produce toxins. Many have been identified and depend greatly on genus and species.

The enzymes of Cladosporium are especially suited for breaking down cellulose, pectin and lignin (components of wood). Cladosporium can rapidly invade many different ecological niches, and is therefore considered ubiquitous and sometimes problematic. Heavy sporulation, easy dispersal, and buoyant spores due to the weak chain structure make it a fungal airway allergen. Cladosporium is one of the most commonly isolated from indoor and outdoor air. Cladosporium are found on decaying plants, wood, food, straw, soil, paint, textiles, and the surface of fiberglass. Sensitive individuals exposed to elevated airborne concentrations can develop symptoms of chronic allergy or even asthma. Some species may cause infection when it comes in contact with small cuts or abrasions on the skin. Prolong exposure can weaken the immune system allowing opportunistic bacteria and viruses to infect the host.

Curvularia lunata is a widespread contaminant of seed crops. Indoors it is common in floor and mattress dust; wallpaper and painted wood. Curvularia lunata poses an inhalation and a deep skin (dermal) inoculation health risk to persons with weak immune system.

Alternaria is a genus of ascomycete fungi. Alternaria species are known as major plant pathogens. They are also common allergens in humans, growing indoors and causing hay fever or hypersensitivity reactions that sometimes lead to asthma. They readily cause opportunistic infections in immunocompromised people. Specimens of Alternaria are often found growing on carpets, textiles and horizontal surfaces such as window frames. It is commonly found in soil, seeds and plants. It is known to be a common allergen. It



appears as a velvety tuft with long soft hairs and its color ranges from dark olive green to brown. Alternaria is a dry spore and is readily found in air samples as well as on tape lift samples. Alternaria is commonly found in water damaged buildings, and a significant increase in its numbers compared to outdoor levels can be a sign of growth.

A Myxomycete is a slime mold. Though originally considered fungi (as Class Myxomycota), they are actually protista (small eukaryotes that are not plants, fungi, or animals). They do resemble fungi though, using spores and developing fruiting bodies. Unlike fungi, they can move (generally 1mm/hour). They often appear as a slimy or gelatinous mass ranging from white to yellow to brown. They are usually found on damp forest floors or damp lawns. These spores are often present in humid conditions like bathrooms or within carpeting.

Currently, there is no widely accepted air count standard. General accepted guidelines set goals that the indoor spore levels should be comparable to the outside level. For a point of reference and excluding Basidiospores, the American Conference of Government Industrial Hygienists (ACGIH) suggests an average range of 50-500 corrected background spores per cubic meter and the California Healthy Building study suggests an average range of 100 to 1000 spores per cubic meter. Red flag indicators like Stachybotrys were detected.

Background: Clients child reported with adverse health symptoms and toxicity concerns stemming from mold leading to prolonged bedrest.

Observations and Key Diagnostics:

- Heavy accumulation of organic matter and foreign objects noted inside supply vents throughout the home

Daughter's Bedroom

- Visible signs of pronounced water damage within ceiling
- Slight musty odor* detected upon entry of bedroom consistent with decay

Basement

- Musty odor* detected upon entry of basement
- Heavy accumulation of organic matter inside HVAC system
- Moderate moisture content detected within exterior window frame

Findings:

- The air quality has been adversely impacted by mold in your son's bedroom and basement.



- The air ducts and HVAC system are heavily contaminated with accumulated organic matter, mold and foreign objects.
- Professional remediation is recommended

Recommendations:

- ✓ Schedule professional air duct and system cleaning using a licensed and reputable firm.
- ✓ Remove water damage to ceiling to include impacted insulation under full containment
- ✓ Sanitize and coat salvageable framework and bracing with a product like Fiberlock to inhibit future mold growth
- ✓ Schedule professional carpet cleaning using the extraction based method
- ✓ Conduct detailed sanitization and HEPA vacuuming on all vertical and horizontal surfaces in the basement
- ✓ Run a large capacity dehumidifier in the basement to ensure overall humidity remains below 45% year round. Monitor the humidity with a digital hygrometer.

Thank you again for entrusting us for your air quality testing needs. Please let us know how we can be of future assistance.

Respectfully,

Jeffrey J. Bradley

Owner

Environmental Engineer, CIEC, CMC

IndoorDoctor®



Professional restoration and cleaning is recommended whenever dealing with materials that may contain molds or in areas containing elevated spore counts. Hire a certified mold remediator or licensed restoration contractor familiar with standard protocol under the guidelines established by IICRC S520 Standard Reference Guide for Professional Mold Remediation. All contents, furnishings and belonging should be professionally cleaned or discarded per IICRC S520. Test older building materials for asbestos and lead prior to disturbance or removal. Maximal protective equipment should be worn at all times by all occupants and workers during the remediation effort of molds to include at a minimum HEPA mask, gloves, Tyvek suit, eye protection etc. Cross contamination measure like vapor barriers (20mil plastic liners to establish a containment zone) negative air pressure machines (to ensure particulates stay within the containment zone) and commercial grade air scrubbers should be strictly enforced. Any underlying moisture issues should be first addressed prior to engaging in remediation activities.



***Microbial Volatile Organic Compound Overview:**

The dank musty odor signifies the presence of microbial volatile organic compounds (MVOCs). People may recognize this odor to a locker room, old cheese, dirty socks, or wet dog. Traditional volatile organic compounds (VOCs) are mainly industrial made chemicals with low molecular weights, high vapor pressure and low water solubility. MVOCs are released from metabolic processes of decay agents like fungi, bacteria and biofilm. The off gassing of MVOCs include a wide range of alcohols, ketones, aldehyde, esters, carboxylic acids, lactones, terpenes, aromatic hydrocarbons, sulfur and nitrogen compounds.

Significance:

The perception of MVOC's is an indication that microbial growth is occurring. In the indoor environment, exposure to MVOC's has been blamed for headaches, nasal irritation, dizziness, fatigue, and nausea. Information on MVOCs produced in indoor settings and health effects is limited. The specific toxic properties and concentrations of MVOC's needed to produce symptoms are still unknown.



contact@hayesmicrobial.com
http://hayesmicrobial.com/

Analysis Report prepared for

IndoorDoctor, LLC

35 Manchester Rd.
Derry, NH.

Phone: (603) 494-4906 Fax: (800) 538-6347

Job Name: Sample
Date Sampled: 05-04-2017
Date Analyzed: 05-05-2017
Report Date: 05-05-2017

EPA Laboratory ID# VA01419



LAB #188863
AIHA EMPAT Lab ID# 188863



Mold License: LAB1021



License: #PH-0198



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

HMC #17011966

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH

May 5, 2017

Client Job Number:
Client Job Name:

Dear IndoorDoctor, LLC,

We would like to thank you for trusting Hayes Microbial for your analytical needs. On May 5, 2017 we received 8 samples by FedEx for the job referenced above. 8 samples were received in good condition.

The results in this analysis pertain only to this job, collected on the stated date and should not be used in the interpretation of any other job. This report may not be duplicated, except in full, without the written consent of Hayes Microbial Consulting, LLC.

This laboratory bears no responsibility for sample collection activities, analytical method limitations, or your use of the test results. Interpretation and use of test results are your responsibility. Any reference to health effects or interpretation of mold levels is strictly the opinion of Hayes Microbial Consulting. In no event, shall Hayes Microbial Consulting or any of its employees be liable for lost profits or any special, incidental or consequential damages arising out of your use of the test results.

Steve Hayes, BSMT(ASCP)
Laboratory Director
Hayes Microbial Consulting, LLC



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

Spore Trap Analysis
SOP #HMC101

HMC #17011966

Job Number:		Job Name:		Date Collected:	05/04/2017
Collected by:	John Bradley			Date Received:	05/05/2017
Email:	jeff.bradley@indoordocor.com			Date Reported:	05/05/2017

HMC ID Number	17011966 - 1	17011966 - 2	17011966 - 3
Sample ID#	001	002	003
Sample Name	Basement	Sons Bedroom	Outside
Sample Volume	75 liters	75 liters	75 liters
Reporting Limit	13 spores/M3	13 spores/M3	13 spores/M3
Background	2	3	1
Fragments	27/M3	ND	ND

Organism	17011966 - 1			17011966 - 2			17011966 - 3		
	Raw Count	Count / M3	% of Total	Raw Count	Count / M3	% of Total	Raw Count	Count / M3	% of Total
Alternaria				1	13	5.7%			
Ascospores	1	13	< 1%	2	27	11.9%	3	40	59.7%
Aspergillus Penicillium	126	1680	97.7%	3	40	17.6%			
Basidiospores				1	13	5.7%			
Bipolaris Drechslera									
Chaetomium									
Cladosporium	2	27	1.6%	5	67	29.5%	2	27	40.3%
Curvularia									
Epicoccum									
Fusarium									
Memnoniella									
Myxomycetes									
Pithomyces									
Stachybotrys				5	67	29.5%			
Stemphylium									
Torula									
Ulocladium									
Unspecified Spore									
Total	129	1720		17	227		5	67	

Water Damage Indicator Common Allergen Slightly Higher than Outside Air Significantly Higher than Outside Air Ratio Abnormality

Signature: Steph Enders

Date: 05/05/2017

Reviewed by: Stephen N. Hayes

Date: 05/05/2017



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

Direct ID Analysis
SOP #HMC102

HMC #17011966

Job Number:	Job Name:	Date Collected:	05/04/2017
Collected by: John Bradley		Date Received:	05/05/2017
Email: jeff.bradley@indoordocor.com		Date Reported:	05/05/2017

HMC ID Number: 17011966 - 4		Sample Media: Bio-Tape	
Sample ID Number: 004		Sample Name: Air Vents	
Organism	Spore Estimate	Mycelial Estimate	Note
Alternaria	Rare	ND	
Ascospores	Light	ND	
Cladosporium	Light	Trace	
Curvularia	Light	ND	

HMC ID Number: 17011966 - 5		Sample Media: Swab	
Sample ID Number: 005		Sample Name: HVAC	
Organism	Spore Estimate	Mycelial Estimate	Note
Cladosporium	Light	Trace	
Myxomycetes	Rare	ND	

HMC ID Number: 17011966 - 6		Sample Media: Bio-Tape	
Sample ID Number: 006		Sample Name: Basement Wall	
Organism	Spore Estimate	Mycelial Estimate	Note
No Fungi Detected			

HMC ID Number: 17011966 - 7		Sample Media: Swab	
Sample ID Number: 007		Sample Name: Daughter BR Ceiling	
Organism	Spore Estimate	Mycelial Estimate	Note
Aspergillus Penicillium	Light	Trace	

Signature: *Steph Enders*

Date: 05/05/2017

Reviewed by: *Stephen N. Hayes*

Date: 05/05/2017



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

Direct ID Analysis
SOP #HMC102

HMC #17011966

Job Number:		Job Name:		Date Collected:	05/04/2017
Collected by:	John Bradley			Date Received:	05/05/2017
Email:	jeff.bradley@indoordocor.com			Date Reported:	05/05/2017

HMC ID Number: 17011966 - 8		Sample Media: Swab	
Sample ID Number: 008		Sample Name: Air Vents	
Organism	Spore Estimate	Mycelial Estimate	Note
Cladosporium	Light	Trace	
Curvularia	Rare	ND	

Signature: Steph Enders

Date: 05/05/2017

Reviewed by: Stephen N. Hayes

Date: 05/05/2017



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

Spore Trap Information

HMC #17011966

Reporting Limit The Reporting Limit is the lowest number of spores that can be detected based on the total volume of the sample collected and the percentage of the slide that is counted. At Hayes Microbial, 100% of the slide is read so the LOD is based solely on the total volume. Raw spore counts that exceed 500 spores will be estimated.

Blanks Results have not been corrected for field or laboratory blanks.

Background The Background is the amount of debris that is present in the sample. This debris consists of skin cells, dirt, dust, pollen, drywall dust and other organic and non-organic matter. As the background density increases, the likelihood of spores, especially small spores such as those of Aspergillus and Penicillium may be obscured. The background is rated on a scale of 1 to 4 and each level is determined as follows:
ND : No background detected. (Pump or cassette malfunction.) Recollect sample.
1 : <5% of field occluded. No spores will be uncountable.
2 : 5-25% of field occluded.
3 : 25-75% of field occluded.
4 : 75-90% of field occluded.
5 : >90% of field occluded. Suggest recollection of sample.

Fragments Fragments are small pieces of fungal mycelium or spores. They are not identifiable as to type and when present in very large numbers, may indicate the presence of mold amplification.

Indoor/Outdoor Comparisons There are no national standards for the numbers of fungal spores that may be present in the indoor environment. As a general rule and guideline that is widely accepted in the indoor air quality field, the numbers and types of spores that are present in the indoor environment should not exceed those that are present outdoors at any given time. There will always be some mold spores present in "normal" indoor environments. The purpose of sampling and counting spores is to help determine whether an abnormal condition exists within the indoor environment and if it does, to help pinpoint the area of contamination. Spore counts should not be used as the sole determining factor of mold contamination. There are many factors that can cause anomalies in the comparison of indoor and outdoor samples due to the dynamic nature of both of those environments.

Water Damage Indicators	These molds are commonly seen in conditions of prolonged water intrusion and usually indicate a problem.
Common Allergens	Although all molds are potential allergens, these are the most common allergens that may be found indoors.
Slightly Higher than Outside Air	The spore count is slightly higher than the outside count and may or may not indicate a source of contamination.
Significantly Higher than Outside Air	The spore count is significantly higher than the outdoor count and probably indicates a source of contamination.
Ratio Abnormality	The types of spores found indoors should be similar to the ones that were identified in the outdoor sample. Significant increases (more than 25%) in the ratio of a particular spore type may indicate the presence of abnormal levels of mold, even if the total number of spores of that type is lower in the indoor environment than it was outdoors.

Color Note Fungi that are present in indoor samples at levels lower than 200 per cubic meter are not color coded on the report, unless they are one of the water damage indicators.



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

Direct Information

HMC #17011966

Additional Information for Direct Identification Analysis

Spore Estimate		Percentages
ND	None Detected	0%
Rare	Less than 10 spores	< 1%
Light	10 - 99 spores	1-10%
Moderate	100 - 999 spores	11-25%
Heavy	1000 - 9999 spores	26-50%
Very Heavy	10000 or greater spores	51-100%

Mycelial Estimate		
ND	None Detected	No active growth at site
Trace	Very small amount of Mycelium	Probably no active growth at site
Few	Some Mycelium	Possible active growth at site
Many	Large amount of Mycelium	Probable active growth at site



Alternaria

Habitat: Commonly found outdoors in soil and decaying plants. Indoors, it is commonly found on window sills and other horizontal surfaces.

Health Effects: A common allergen and has been associated with hypersensitivity pneumonitis. Alternaria is capable of producing toxic metabolites which may be associated with disease in humans or animals. Occasionally an agent of onychomycosis, ulcerated cutaneous infection and chronic sinusitis, principally in the immunocompromised patient.

Ascospores

Habitat: A large group consisting of more than 3000 species of fungi. Common plant pathogens and outdoor numbers become very high following rain. Most of the genera are indistinguishable by spore trap analysis and are combined on the report.

Health Effects: Health affects are poorly studied, but many are likely to be allergenic.

Aspergillus|Penicillium

Habitat: The most common fungi isolated from the environment. Very common in soil and on decaying plant material. Are able to grow well indoors on a wide variety of substrates.

Health Effects: This group contains common allergens and many can cause hypersensitivity pneumonitis. They may cause extrinsic asthma, and many are opportunistic pathogens. Many species produce mycotoxins which may be associated with disease in humans and other animals. Toxin production is dependent on the species, the food source, competition with other organisms, and other environmental conditions.

Basidiospores

Habitat: A common group of Fungi that includes the mushrooms and bracket fungi. They are saprophytes and plant pathogens. In wet conditions they can cause structural damage to buildings.

Health Effects: Common allergens and are also associated with hypersensitivity pneumonitis.

Cladosporium

Habitat: One of the most common genera worldwide. Found in soil and plant debris and on the leaf surfaces of living plants. The outdoor numbers are lower in the winter and often relatively high in the summer, especially in high humidity. The outdoor numbers often spike in the late afternoon and evening. Indoors, it can be found growing on textiles, wood, sheetrock, moist window sills and in HVAC supply ducts.

Health Effects: A common allergen, producing more than 10 allergenic antigens and a common cause of hypersensitivity pneumonitis.

Curvularia

Habitat: They exist in soil and plant debris, and are plant pathogens.

Health Effects: They are allergenic and a common cause of allergic fungal sinusitis. An occasional cause of human infection, including keratitis, sinusitis, onychomycosis, mycetoma, pneumonia, endocarditis and disseminated infection, primarily in the immunocompromised.



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC

35 Manchester Rd.

Derry, NH

Phone: (603) 494-4906 Fax: (800) 538-6347

Organism Descriptions

HMC #17011966

Myxomycetes

Habitat: Found on decaying plant material and as a plant pathogen.

Health Effects: Some allergenic properties reported, but generally pose no health concerns to humans.

Stachybotrys

Habitat: Commonly found in soil and on decaying plant material. It is cellulolytic, and can be found indoors on wet materials containing cellulose, such as wallboard, ceiling tile, and other paper-based materials. It is found outdoors on decaying plant material although it is rarely detected on outdoor air samples.

Health Effects: Allergenic properties are poorly studied and no cases of infection have been reported in humans. They do however produce potent tricothecene mycotoxins. The toxins produced by this fungus can suppress the immune system affecting the lymphoid tissue and the bone marrow. The mycotoxin is also reported to be a liver and kidney carcinogen.



HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

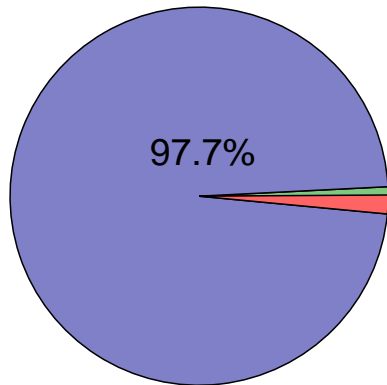
Graph Addendum

HMC #17011966

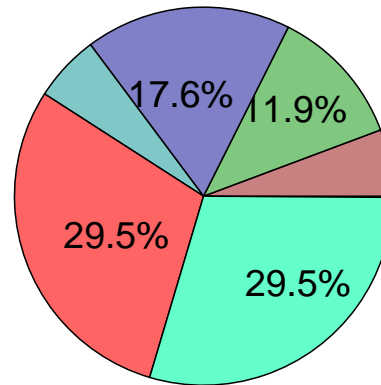
Job Number:	Job Name: 54 B South Depot	Date Collected: 05/04/2017
Collected by: John Bradley		Date Received: 05/05/2017
Email: jeff.bradley@indoordocor.com		Date Reported: 05/05/2017

Organism Percentages For Each Sample

Basement

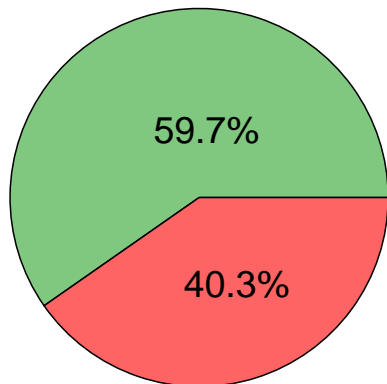


Sons Bedroom



- Alternaria
- Ascospores
- Aspergillus|Penicillium
- Basidiospores
- Cladosporium
- Stachybotrys

Outside





HAYES

MICROBIAL CONSULTING
3005 East Boundary Terrace, #F
Midlothian, VA 23112, USA
804.562.3435 Fax: 804.447.5562

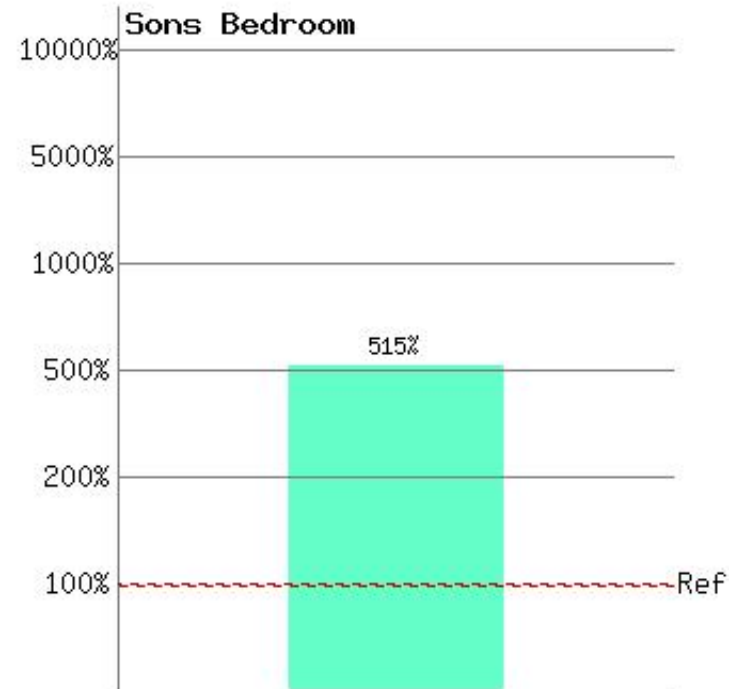
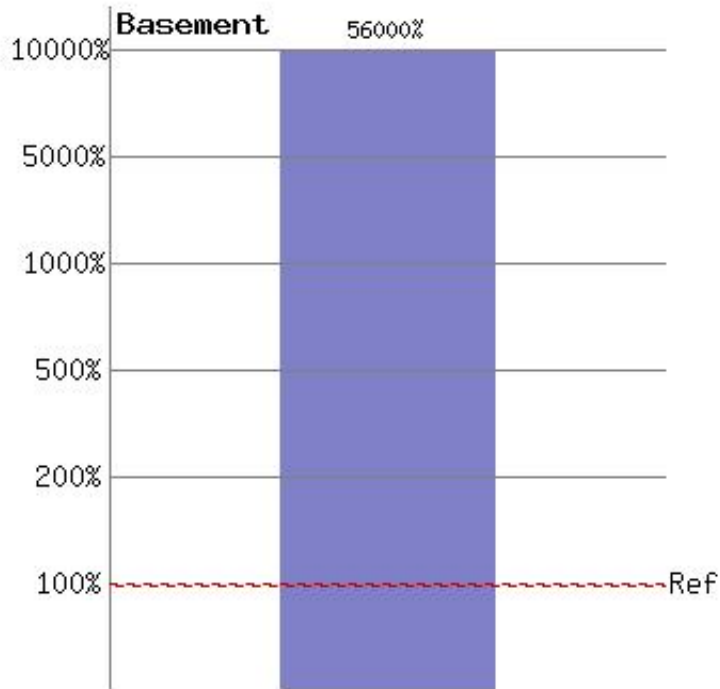
IndoorDoctor, LLC
35 Manchester Rd.
Derry, NH
Phone: (603) 494-4906 Fax: (800) 538-6347

Graph Addendum

HMC #17011966

Job Number:	Job Name:	Date Collected:	05/04/2017
Collected by: John Bradley		Date Received:	05/05/2017
Email: jeff.bradley@indoordoctor.com		Date Reported:	05/05/2017

Indoor Samples Compared to Outdoor Reference



Legend (100% = Outdoor Reference)

- Aspergillus|Penicillium
- Stachybotrys

Daughters Bedroom Air Vent Heavily Contaminated with Dust Mold and Foreign Objects



Loose fiberglass insulation, nails and other foreign matter noted

Sons' Bedroom Air Vent Heavily Contaminated



Foreign matter inside air vents



Heavy accumulation of dust and mold inside HVAC system

Heavy residue noted inside HVAC system on blower and inside blower door



Moderate moisture wood frame window basement

