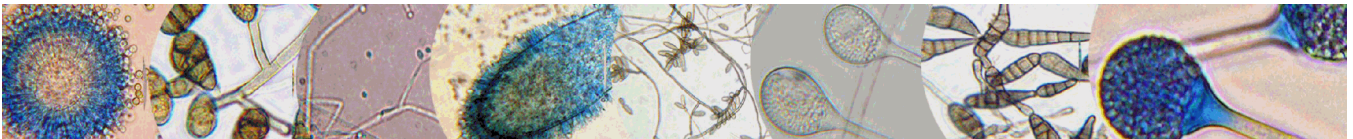


# EXPANDED FUNGAL REPORT

Prepared Exclusively For

Client Business Name  
123 Street  
City, STATE ZIP

**Report Date:** 10/25/2006  
**Project:** IAQ Investigation  
**EMSL Order:** 990600039



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



# EMSL Analytical, Inc.

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Email: [testlab@emsl.com](mailto:testlab@emsl.com)

Attn: Client Contact Name  
Client Business Name  
123 Street  
City, STATE ZIP

EMSL Order: 990600039  
Customer ID: DOUG  
Received: 10/18/06  
Analyzed: 10/18/06  
Report Date: 10/25/06

Proj: IAQ Investigation

## 1. Description of Analysis

### Analytical Laboratory

EMSL Analytical, Inc. (EMSL) is a nationwide, full service, analytical testing laboratory network providing Asbestos, Mold, Indoor Air Quality, Microbiological, Environmental, Chemical, Forensic, Materials, Industrial Hygiene and Mechanical Testing services since 1981. Ranked as the premier independently owned environmental testing laboratory in the nation, EMSL puts analytical quality as its top priority. This quality is recognized by many well-respected federal, state and private accrediting agencies, such as AIHA's EMLAP and EMPAT programs, and assured by our high quality personnel, including many Ph.D. microbiologists and mycologists.

EMSL is an independent laboratory that performed the analysis of these samples. EMSL did not conduct the sampling or site investigation for this report. The samples referenced herein were analyzed under strict quality control procedures using state-of-the-art microbiological methods. The analytical methods used and the data presented are scientifically and legally defensible.

The laboratory data is provided in compliance with AIHA policy modules and ISO 17025 guidelines for the particular test(s) requested, including any associated limitations for the methods employed. These data are intended for use by professionals having knowledge of the testing methods necessary to interpret them accurately.

### Air Samples - Spore traps:

Spore traps are commercially available sampling devices that capture airborne particles on an adhesive slide. Air is pulled through the device using a vacuum pump. Spores, as well as other airborne particles, are impacted on the collection adhesive. Using spore trap collection methods has inherent limitations. These collection methods are biased towards larger spore sizes.

The analysis for total spore counts is a direct microscopic examination and does not include culturing or growing the fungi. Therefore, the results include both viable and non-viable spores. Some fungal groups produce similar spore types that cannot be distinguished by direct microscopic examination alone (i.e., *Aspergillus/Penicillium*, and others). Other spore types may lack distinguishing features that aid in their identification. These types are grouped into larger categories such as Ascospores or Basidiospores.

Fungal spores are identified and grouped by morphological characteristics including color, shape, septation, ornamentation, and fruiting structures (if present) which are compared to published mycological identification keys and texts. EMSL reports provide spore counts per cubic meter of air to three significant figures. Please note that each spore category is reported to three significant figures. Due to rounding and the application of three significant figures the sum



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of the individual spore numbers may not equal the total spore count on the report. EMSL does not maintain responsibility for final volume concentrations (counts/m<sup>3</sup>) since this volume is provided by the field collector and can not be verified by EMSL.

EMSL analyzes spore traps using phase contrast microscopy. There is a wide choice of collection devices (Air-O-Cell, Micro-5, Burkhard, etc.) on the market. Differences in analytical method may exist between spore trap devices.

Spore trap results are reported in spores per cubic meter of air. Due to the other airborne particles collected with the spores, EMSL reports a background particle density. Background density is an indication of overall particulate matter present on the sample (i.e. dust in the air). High background concentrations may obscure spores such as the *Penicillium/Aspergillus* group. The rating system is from 1-5 with 1 = 1 - 25% of the background obscured by material, 2 = 26 - 50%, 3 = 51 - 75%, 4 = 76% - 99%, 5 = 100% or overloaded. A background rating of 4 or higher should be regarded as a minimum count since the actual concentrations may be higher than those reported. EMSL will not be held responsible for overloading of samples. Sample volumes are left to the discretion of the company or persons conducting the fieldwork.

Skin fragment density is the percentage of skin cells making up the total background material, 1 = 1 - 25%, 2 = 26 - 50%, 3 = 51 - 75%, 4 = 76-100%. Skin fragment density is considered an indication of the general cleanliness in the area sampled. It has been estimated that up to 90% of household dust consists of dead skin cells.

### **Surface Samples - Tape Lifts, Swabs, Bulks:**

Suspect mold contamination on surfaces is typically sampled using tape lifts, swabs, or collecting a bulk sample. The analysis performed is a direct microscopic examination because the samples are not cultured or grown. The laboratory can determine viability by a separate culture test if needed and requested. We recommend culturing from swab and bulk samples only.

Samples containing reproductive structures, hyphae, or mycelium are indicated on the report by an asterisk. These fungal structures are important in the interpretation of the data since they indicate fungal growth and amplification (see section 3). Spores are classified by morphological characteristics including color, shape, septation, ornamentation, and reproductive structures which are compared to published mycological identification keys and texts.

## **2. Analytical Results**

See attached data reports and charts.



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## Air-O-Cell™ Cassette Analysis of Fungal Spores & Other Airborne Particulates by Optical Microscopy (EMSL Method M001)

Lab Sample Number: Client Sample ID: Volume: Sample Location:	990600039-0001			990600039-0002			990600039-0003		
	Air-1			Air-2			Air-3		
	75			75			75		
	Outside			Basement			Bedroom		
Spore Types	Raw Count	Count/m <sup>3</sup>	% of Total	Raw Count	Count/m <sup>3</sup>	% of Total	Raw Count	Count/m <sup>3</sup>	% of Total
Agrocybe/Coprinus	2	84	0.9	-	-	-	-	-	-
Alternaria	12	504	5.4	2	84	0.7	1	42	1
Ascospores	14	588	6.3	-	-	-	2	84	2
Aspergillus/Penicillium	67	2810	29.9	230	9660	79.6	31	1300	31
Basidiospores	32	1340	14.3	5	210	1.7	21	882	21
Bipolaris	2	84	0.9	-	-	-	-	-	-
Chaetomium	-	-	-	1	42	0.3	-	-	-
Cladosporium	87	3650	38.8	45	1890	15.6	43	1810	43
Curvularia	2	84	0.9	1	42	0.3	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	3	126	1	-	-	-
Ganoderma	-	-	-	-	-	-	2	84	2
Myxomycete	4	168	1.8	-	-	-	-	-	-
Paecilomyces	-	-	-	-	-	-	-	-	-
Pithomyces/Ulocladium	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	2	84	0.7	-	-	-
Torula	1	42	0.4	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Spegazzinia	1	42	0.4	-	-	-	-	-	-
<b>Total Fungi</b>	-	9400	99.5	-	12100	101	-	4200	100
Fibrous Particulate	-	-	-	65	2730	-	14	588	-
Hyphal Fragment	3	126	-	24	1010	-	2	84	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analytical Sensitivity	-	42	-	-	42	-	-	42	-
Skin Fragments (1-4)	-	1	-	-	2	-	-	1	-
Background (1-5)	-	2	-	-	2	-	-	2	-

No discernable field blank was submitted with this group of samples.

ACCREDITATIONS: AIHA EMLAP #100194.

Samples received in good condition unless otherwise noted.

High Levels of background particulate can obscure spores and other particulates leading to underestimation.

Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification.

The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment.

Present= Spores found during additional scan at lower mag. This report relates only to the samples reported and may not be reproduced,

except in full, without written approval by EMSL. Results have not been adjusted for field or laboratory blank unless otherwise noted.

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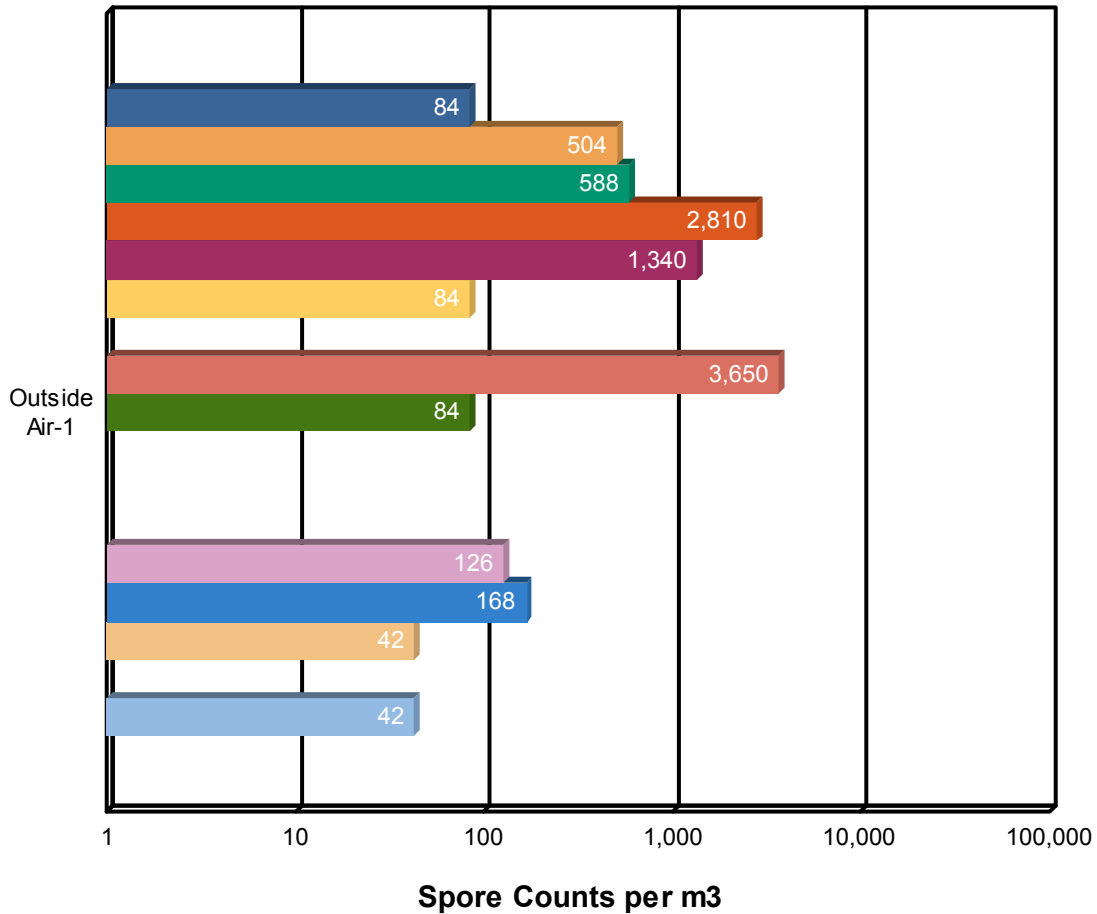
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## Spore Trap Report: Total Counts



Agrocybe/Coprinus	Alternaria	Ascospores
Aspergillus/Penicillium	Basidiospores	Bipolaris
Chaetomium	Cladosporium	Curvularia
Fibrous Particulate	Fusarium	Ganoderma
Hyphal Fragment	Myxomycete	Spegazzinia
Stachybotrys	Torula	

\* The chart is displayed using a logarithmic scale. Bar size is not directly proportional to the number of spores.

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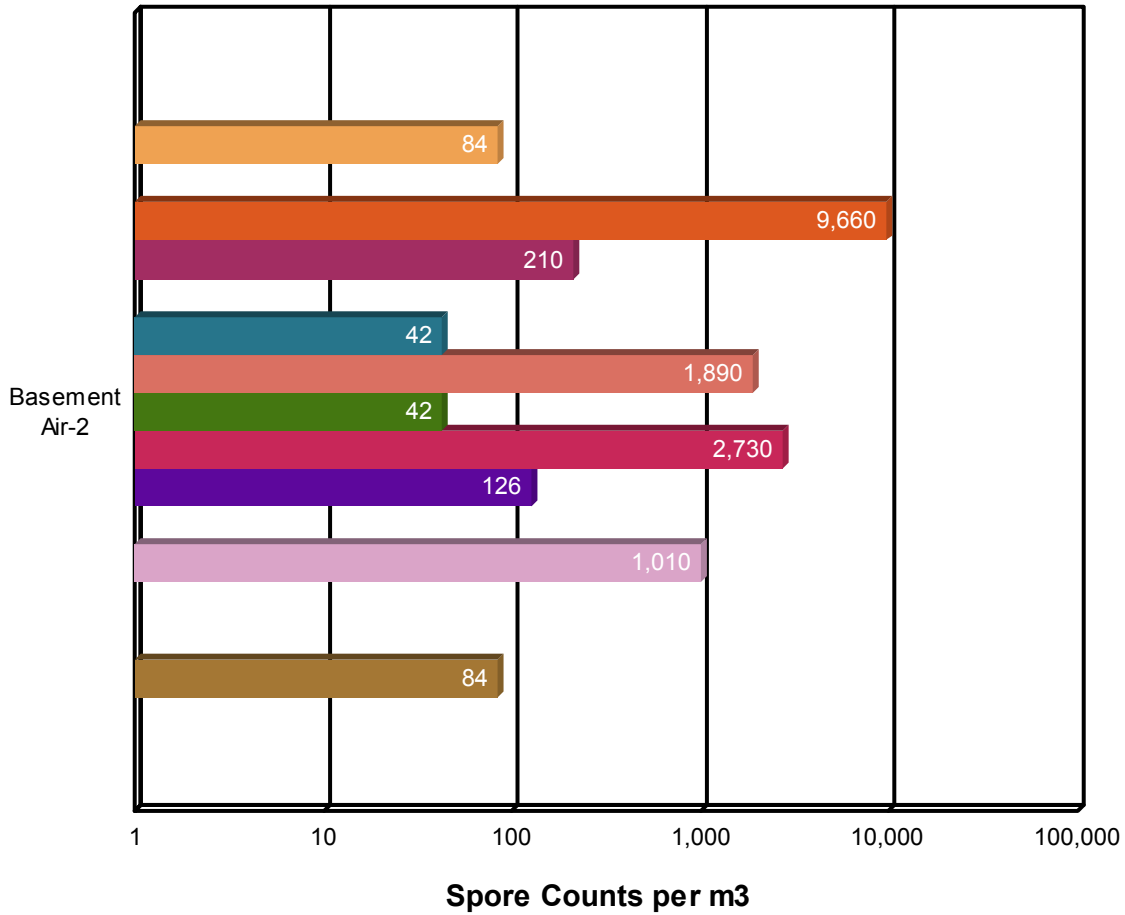
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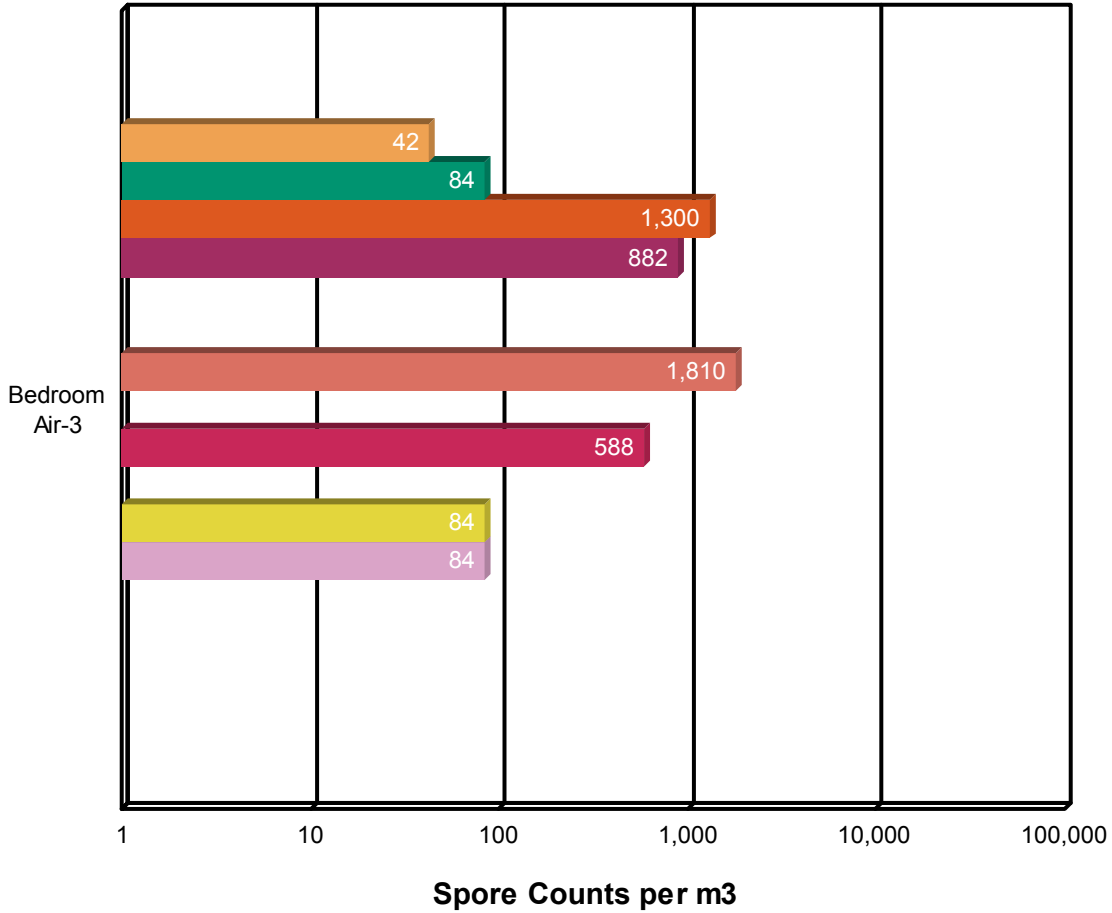
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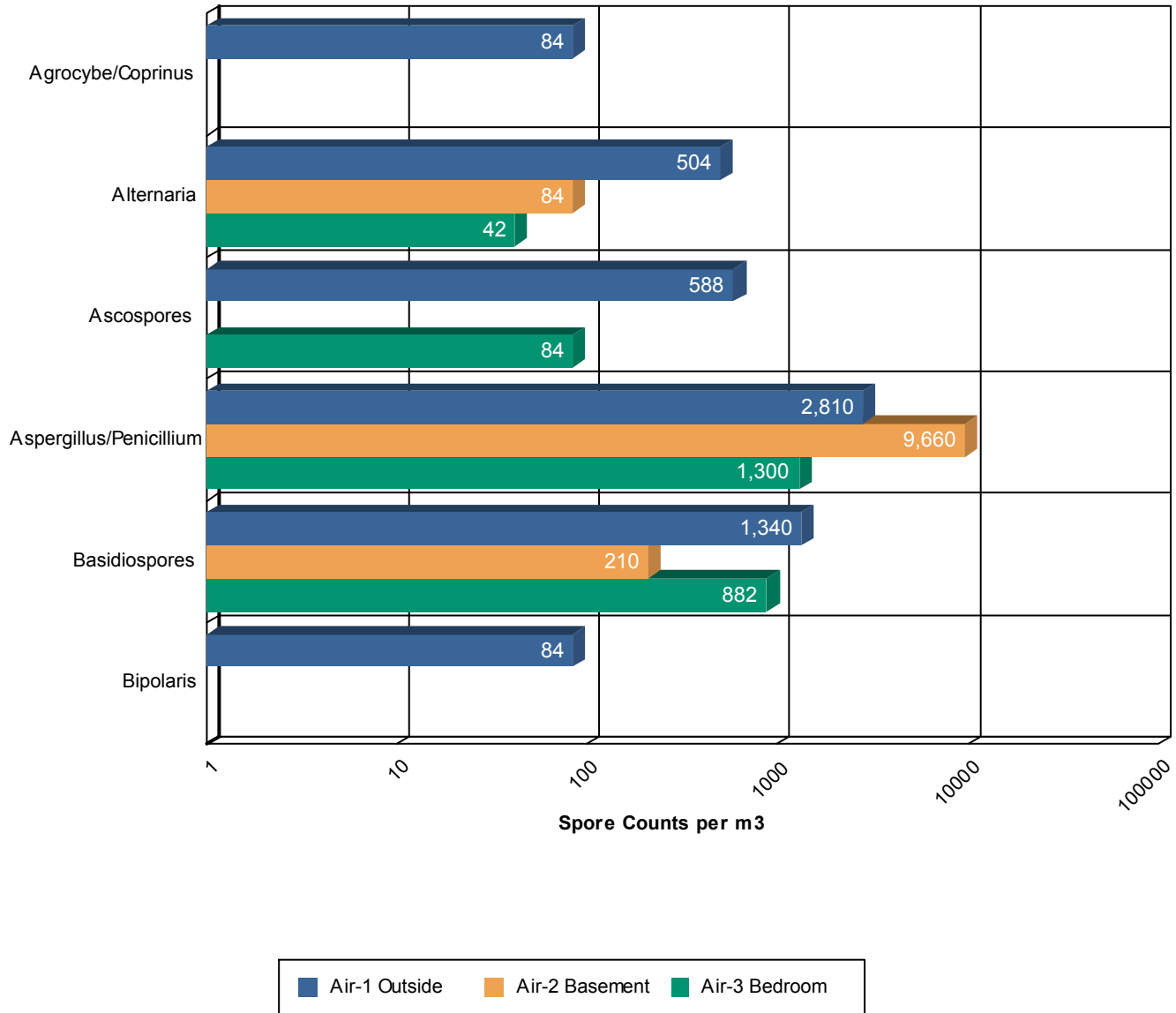
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## Background Comparison Chart



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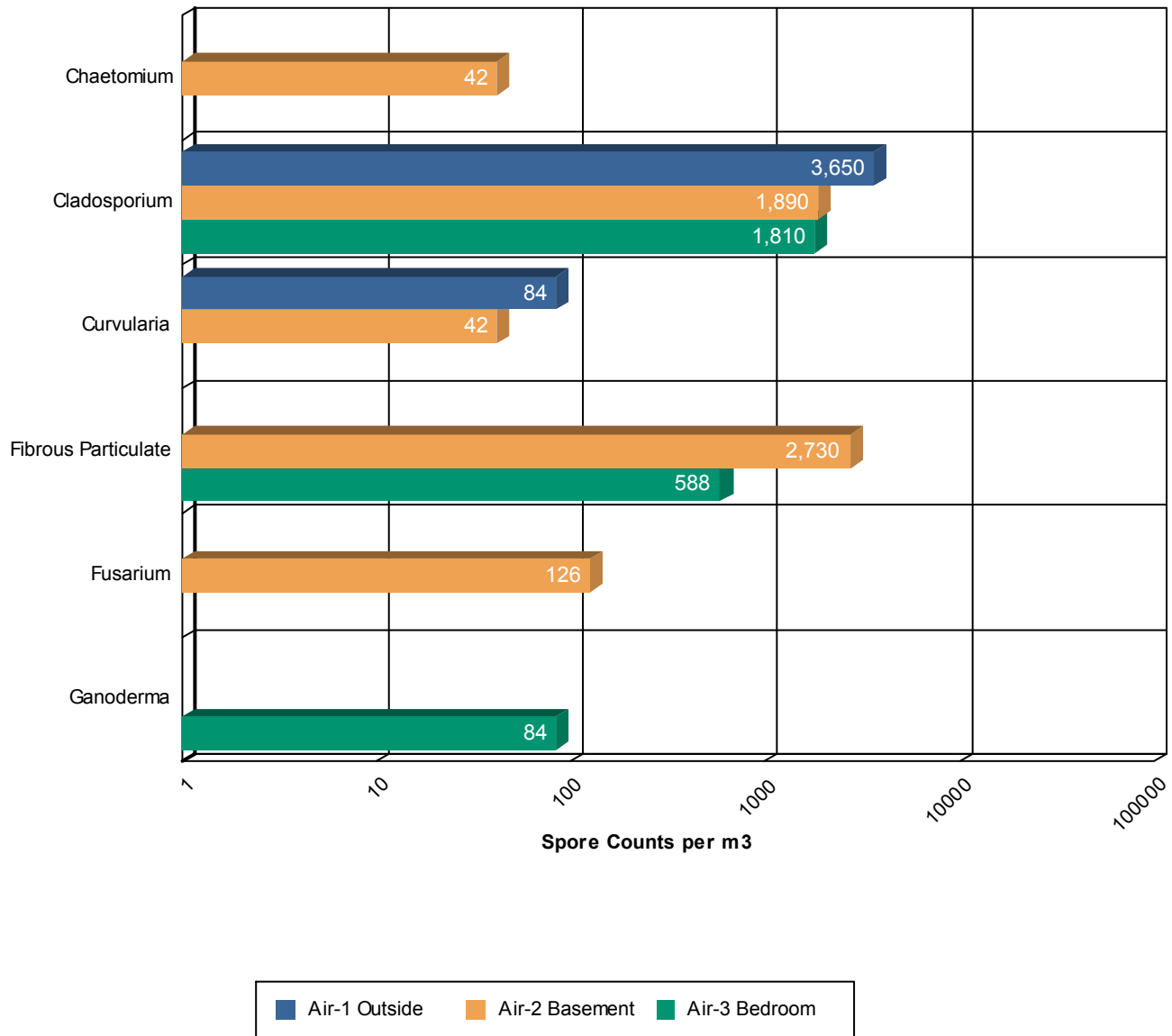
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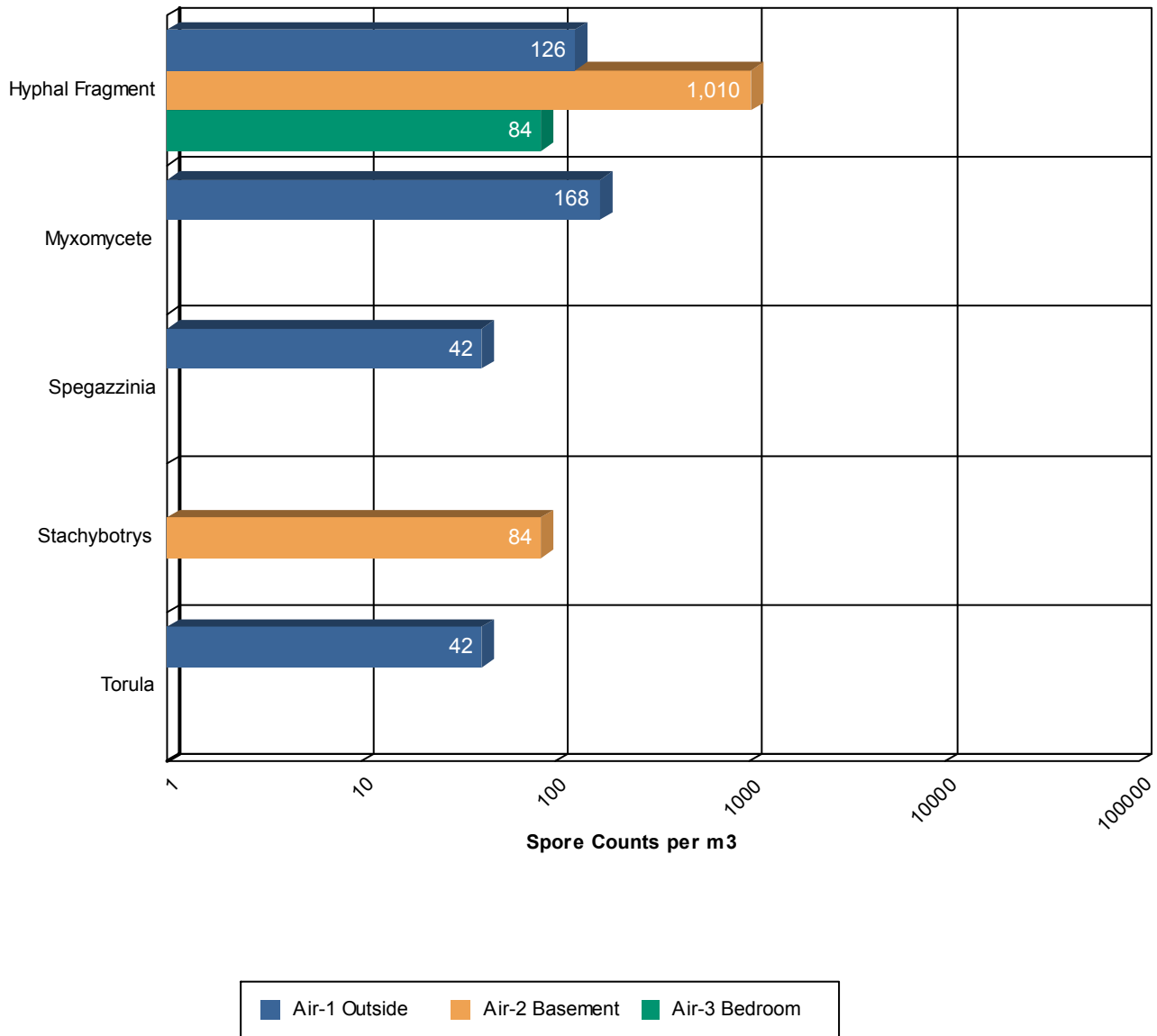
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## Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Tape Samples (EMSL Method: M041)

Lab Sample Number:	990600039-0004	990600039-0005	990600039-0006		
Client Sample ID:	Tape-1	Tape-2	Tape-3		
Sample Location:	Under sink	Basement wall	Bed post		
Spore Types	Category	Category	Category	-	-
Agrocybe/Coprinus	-	-	-		
Alternaria	*High*	-	-		
Ascospores	-	-	-		
Aspergillus/Penicillium	Low	-	Rare		
Basidiospores	Rare	-	Rare		
Bipolaris	-	-	-		
Chaetomium	-	*High*	-		
Cladosporium	Low	-	Rare		
Curvularia	-	-	-		
Epicoccum	-	-	-		
Fusarium	-	Rare	-		
Ganoderma	-	-	-		
Myxomycete	-	-	-		
Paecilomyces	-	-	-		
Pithomyces/Ulocladium	-	-	-		
Rust	-	-	-		
Scopulariopsis	-	-	-		
Stachybotrys	-	*High*	-		
Torula	-	-	-		
Unidentifiable Spores	-	-	-		
Zygomycetes	-	-	-		
Fibrous Particulate	-	-	Rare		
Hyphal Fragment	-	-	-		
Insect Fragment	-	Low	-		
Pollen	-	-	-		
Sample Notes	-	-	-		

Category: Count Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000

No discernable field blank was submitted with this group of samples.

\* Sample contains fruiting structures and/or hyphae associated with the spores.

ACCREDITATIONS: AIHA EMLAP #100194.

Samples were received in good condition unless otherwise noted on this report. EMSL Analytical maintains liability limited to cost of analysis. Interpretation of the data contained in this report is the responsibility of the client. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL Analytical. EMSL Analytical bears no responsibility for the sample collection activities or analytical method limitations.

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### 3. Understanding the Results

EMSL Analytical, Inc. is an independent laboratory, providing unbiased and scientifically valid results. These data represent only a portion of an overall IAQ investigation. Visual information and environmental conditions measured during the site assessment (humidity, moisture readings, etc.) are crucial to any final interpretation of the results. Many factors impact the final results; therefore, result interpretation should only be conducted by qualified individuals. The American Conference of Governmental Industrial Hygienists (ACGIH) has published a good reference book covering sampling and data interpretation. It is entitled, Bioaerosols: Assessment and Control, 1999.

#### Air Samples:

Air samples are typically evaluated by means of fungal type identified and by comparing indoor and outdoor concentrations, complaint to non-complaint areas, or area of concern to areas of non-concern. In general, the levels and types of fungi in the indoor air (in non-problem buildings) should be similar to or lower than those found in the outdoor air. Higher levels of spores (order of magnitude) found inside may indicate that moisture sources and resultant fungal growth are present. Spore count results are influenced by geographic location, seasonal and diurnal variation, and biotic/abiotic outside conditions. For example, fresh snow cover on the ground will affect the outdoor spore count concentration.

Use the following guidelines when interpreting the results:

1. The composition and diversity of fungi in indoor, non-problem buildings should be similar to that of the outdoor air.
2. Compare spore count concentrations indoors and outdoors. Elevated indoor concentrations may indicate indoor fungal growth. Be aware that this is not always consistent and additional sampling may be needed.
3. Certain fungi are very good indicators of water damage. The presence of these spores, even in small quantities, indicates the presence of water damage. These indicator fungi include, but are not limited to, *Chaetomium*, *Fusarium*, *Stachybotrys* (including *Memnoniella*), and *Ulocladium*.
4. Different types of fungi grow at different levels of biologically available water. These differences in fungal growth suggest the degree of water damage or saturation. For example, *Stachybotrys* is an indication of short term, severe, or prolonged water damage over time.



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### Surface Samples:

The presence of common spores in the “rare” or “low” categories in surface samples suggests only background deposition and not growth. Categories greater than this or the presence of fungal vegetative and/or reproductive fragments (e.g., hyphae and conidiophores) suggests fungal colonization, growth, and/or accumulation at or near the sampled location. The presence of water damage associated fungi is also an indicator that indoor growth may be occurring. These indicator fungi include, but are not limited to, *Chaetomium*, *Fusarium*, *Stachybotrys* (including *Memnoniella*), and *Ulocladium*.

Fungal spores are found everywhere. Whether or not symptoms develop in people exposed to fungi depends on the nature of the fungal material (e.g., allergenic, toxic, or infectious), the exposure level, and the susceptibility of exposed persons. Susceptibility varies with the genetic predisposition (e.g., allergic reactions do not always occur in all individuals), age, pre-existing medical conditions (e.g., diabetes, cancer, or chronic lung conditions), use of immunosuppressive drugs, and concurrent exposures. These reasons make it difficult to identify dose/response relationships that are required to establish “safe” or “unsafe” levels (i.e., permissible exposure limits).

It is generally accepted in the industry that indoor fungal growth is undesirable and inappropriate, necessitating removal or other appropriate remedial actions. The New York City guidelines and EPA guidelines for mold remediation in schools and commercial buildings define the conditions warranting mold remediation. Always remember that water is the key. Preventing water damage or water condensation will prevent mold growth.

This report is not intended to provide medical advice or advice concerning the relative safety of an occupied space. Always consult an occupational or environmental health physician who has experience addressing indoor air contaminants if you have any questions.



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## 4. Glossary of Fungi

<b><i>Agrocybe</i></b>	
<b>Natural Habitat</b>	•Bark mulch •Wood chips •Iceplant •Grass
<b>Suitable Substrates in the Indoor Environment</b>	•Unknown
<b>Water Activity</b>	•Unknown
<b>Mode of Dissemination</b>	•Wind
<b>Allergenic Potential</b>	•Unknown
<b>Potential Opportunist or Pathogen</b>	•Unknown
<b>Industrial Uses</b>	• <i>Agrocybe aegerita</i> is a delicious edible mushroom cultivated commercially as "Louisiana Roman Mushroom"
<b>Potential Toxins Produced</b>	•Unknown
<b>Other Comments</b>	•Thought to cause white rot •No <i>Agrocybe</i> species should be considered edible since they are hard to identify, and could be confused with several poisonous mushrooms

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<b><i>Alternaria</i></b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"> <li>• Common saprobe and pathogen of plants. Typically found on plant tissue, decaying wood, and foods.</li> <li>• Soil</li> <li>• Air outdoors</li> </ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"> <li>• Indoors near condensation (window frames, showers)</li> <li>• House dust (in carpets, and air)</li> <li>• Also colonizes building supplies, computer disks, cosmetics, leather, optical instruments, paper, sewage, stone monuments, textiles, wood pulp, and jet fuel</li> </ul>
<b>Water Activity</b>	<ul style="list-style-type: none"> <li>• Aw = 0.85-0.88</li> </ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"> <li>▪ Wind</li> </ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"> <li>• Type I allergies (hay fever, asthma)</li> <li>• Type III (hypersensitivity pneumonitis)</li> </ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"> <li>• Phaeohyphomycosis (causing cystic granulomas in the skin and subcutaneous tissue)</li> <li>• In immunocompetent patients, <i>Alternaria</i> colonizes the paranasal sinuses, leading to chronic hypertrophic sinusitis</li> </ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"> <li>• Biocontrol of weed plants</li> <li>• Biocontrol fungal plant pathogens</li> </ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"> <li>▪ Alternariol (AOH)</li> <li>• Alternariol monomethylether (AME)</li> <li>• Tenuazonic acid (TeA)</li> <li>• Altenuene (ALT)</li> <li>• Altertoxins (ATX)</li> </ul>
<b>Other Comments</b>	<ul style="list-style-type: none"> <li>• <i>Alternaria</i> spores are one of the most common and potent indoor and outdoor airborne allergens. Additionally, <i>Alternaria</i> sensitization has been determined to be one of the most important factors in the onset of childhood asthma. Synergy with <i>Cladosporium</i> or <i>Ulocladium</i> may increase the severity of symptoms</li> </ul>

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<b>Ascospores</b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"><li>• Everywhere in nature</li></ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"><li>• Depends on genus and species</li></ul>
<b>Water Activity</b>	<ul style="list-style-type: none"><li>• Depends on genus and species</li></ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"><li>• Forcible ejection or passive release and dissemination by wind or insects</li></ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"><li>• Depends on genus and species</li></ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"><li>• Depends on genus and species</li></ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"><li>• Depends on genus and species</li></ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"><li>• Depends on genus and species</li></ul>
<b>Other Comments</b>	<ul style="list-style-type: none"><li>• Ascospores are the result of sexual reproduction and produced in a saclike structure called an ascus. All ascospores belong to members of the Phylum Ascomycota, which encompasses a plethora of genera worldwide.</li></ul>



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<b>Basidiospore</b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"><li>• Forest floors</li><li>• Lawns</li><li>• Plants (saprobes or pathogens depending on genus)</li></ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"><li>• Depends on genus</li><li>• Wood products</li></ul>
<b>Water Activity</b>	<ul style="list-style-type: none"><li>• Unknown</li></ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"><li>• Forcible ejection</li><li>• Wind currents</li></ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"><li>• Type I allergies (hay fever, asthma)</li><li>• Type III (hypersensitivity pneumonitis)</li></ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"><li>• Depends on genus</li></ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"><li>• Edible mushrooms are used in the food industry</li></ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"><li>• Amanitins</li><li>• monomethyl-hydrazine</li><li>• muscarine</li><li>• ibotenic acid</li><li>• psilocybin.</li></ul>
<b>Other Comments</b>	<ul style="list-style-type: none"><li>• Basidiospores are the result of sexual reproduction and formed on a structure called the basidium. Basidiospores belong to the members of the Phylum Basidiomycota, which includes mushrooms, shelf fungi, rusts, and smuts</li></ul>

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<b><i>Chaetomium</i></b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"> <li>▪ Dung</li> <li>▪ Seeds</li> <li>• Soil</li> <li>• Straw</li> </ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"> <li>• Paper</li> <li>• Sheetrock</li> <li>• Wallpaper</li> </ul>
<b>Water Activity</b>	<ul style="list-style-type: none"> <li>• <math>A_w=0.84-0.89</math></li> </ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"> <li>• Wind</li> <li>• Insects</li> <li>• Water splash</li> </ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"> <li>• Type I (asthma and hay fever)</li> </ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"> <li>• Onychomycosis</li> <li>• <i>C. perucidum</i> recognized as a new agent of cerebral phaeohyphomycosis.</li> </ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"> <li>• Cellulase production</li> <li>▪ Textile testing</li> </ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"> <li>• Chaetomin</li> <li>• Chaetoglobosins A,B,D and F are produced by <i>Chaetomium globosum</i></li> <li>• Sterigmatocystin is produced by rare species</li> </ul>

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<b><i>Cladosporium</i></b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"><li>• Dead plant matter</li><li>• Straw</li><li>• Soil</li><li>• Woody plants</li></ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"><li>• Fiberglass duct liner</li><li>• Paint</li><li>• Textiles</li><li>• Found in high concentration in water-damaged building materials</li></ul>
<b>Water Activity</b>	<ul style="list-style-type: none"><li>• Aw 0.84-0.88</li></ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"><li>• Air</li></ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"><li>• Type I (asthma and hay fever)</li></ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"><li>• Edema</li><li>• <a href="#">keratitis</a></li><li>• <a href="#">onychomycosis</a></li><li>• <a href="#">pulmonary infections</a></li><li>• Sinusitis</li></ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"><li>• Produces 10 antigens</li></ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"><li>• Cladosporin</li><li>• Emodin</li></ul>

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<b><i>Fusarium</i></b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"> <li>• Soil</li> <li>• Plant pathogen causing root rot, stem rot, and wilt of many ornamental and crop plants.</li> </ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"> <li>• Often found in humidifiers</li> <li>• wet, cellulose-based building materials</li> </ul>
<b>Water Activity</b>	<ul style="list-style-type: none"> <li>• Aw=0.86-0.91</li> </ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"> <li>• Insects</li> <li>• Water droplets, rain</li> <li>• Wind when spores become dry</li> </ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"> <li>• Type I allergies (hay fever, asthma)</li> </ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"> <li>• Esophageal cancer is believed to happen after consumption of <i>F. moniliforme</i> infected corn</li> <li>• Keratitis</li> <li>• Endophthalmitis</li> <li>• Onychomycosis</li> <li>• Cutaneous infections</li> <li>• Mycetoma</li> <li>• Sinusitis</li> <li>• Pulmonary infections</li> <li>• Endocarditis</li> <li>• Peritonitis</li> <li>• Central venous catheter infections</li> <li>• Septic arthritis</li> <li>• Neurological disease in horses after consumption of <i>F. moniliforme</i> infected corn</li> <li>• Respiratory disease in pigs after consumption of <i>F. moniliforme</i> infected corn</li> </ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"> <li>• Biological Weapon</li> </ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"> <li>▪ Trichothecenes</li> <li>▪ Zearalenone</li> <li>▪ Fumonisin</li> </ul>
<b>Other Comments</b>	<ul style="list-style-type: none"> <li>• Major plant pathogen</li> </ul>
<b>References</b>	<ul style="list-style-type: none"> <li>• <i>Atlas of Moulds in Europe causing respiratory Allergy</i>, Foundation for Allergy Research in Europe, Edited by Knud Wilken-Jensen and Suzanne Gravesen, ASK Publishing, Denmark, 1984</li> </ul>

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<b><i>Ganoderma</i></b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"> <li>• Grows on conifers and hardwoods worldwide, causing white rot, root rot, and stem rot</li> </ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Water Activity</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"> <li>• Wind</li> </ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"> <li>• <i>Ganoderma</i> species are known to cause allergies in people on a worldwide scale</li> </ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"> <li>• Biopulping of wood for the paper industry</li> <li>• Potential medicinal use due to: 1. Inhibition of Ras dependent cell transformation, 2. antifibrotic activity, 3. immunomodulating activity, 4. free-radicle scavenging</li> </ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Other Comments</b>	<ul style="list-style-type: none"> <li>• Used in traditional Chinese medicine as an herbal supplement</li> <li>• It is also known as a "shelf fungus" because the fruiting body forms a stalk-less shelf on the sides of trees and logs</li> <li>• It is sometimes called "artists conk" because when you scratch the white pores of the fruiting body, the white rubs away and exposes the brown hyphae underneath. Thus, pictures can be produced on the fruiting body</li> </ul>
<b>References</b>	<ul style="list-style-type: none"> <li>• References: Craig, R.L., Levetin, E. 2000. Multi-year study of <i>Ganoderma</i> aerobiology. <i>Aerobiologia</i> 16: 75-81.</li> <li>• <a href="http://www.pfc.forestry.ca/diseases/CTD/Group/Heart/heart6_e.html">http://www.pfc.forestry.ca/diseases/CTD/Group/Heart/heart6_e.html</a></li> </ul>

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<b><i>Myxomycetes</i></b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"> <li>• Decaying logs</li> <li>• Dead leaves</li> <li>• Dung</li> <li>• Lawns</li> <li>• Mulched flower beds</li> </ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"> <li>• Rotting lumber</li> </ul>
<b>Water Activity</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"> <li>• Insects</li> <li>• Water</li> <li>• Wind</li> </ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"> <li>• Type I</li> </ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>
<b>Other Comments</b>	<ul style="list-style-type: none"> <li>• Young sporophores of one genera (<i>Enteridium lycoperdon</i>) are fried and eaten in Mexico, and the dish is called caca de luna</li> <li>• Myxomycetes are not members of the Kingdom Fungi. This is due to morphological differences and DNA evidence</li> </ul>

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<b>Stachybotrys</b>	
<b>Natural Habitat</b>	<ul style="list-style-type: none"> <li>Decaying plant materials</li> <li>Soil</li> </ul>
<b>Suitable Substrates in the Indoor Environment</b>	<ul style="list-style-type: none"> <li>Water damaged building materials such as: ceiling tiles, gypsum board, insulation backing, sheet rock, and wall paper</li> <li>Paper</li> <li>Textiles</li> </ul>
<b>Water Activity</b>	<ul style="list-style-type: none"> <li><math>A_w=0.94</math></li> </ul>
<b>Mode of Dissemination</b>	<ul style="list-style-type: none"> <li>Insects</li> <li>Water</li> <li>Wind</li> </ul>
<b>Allergenic Potential</b>	<ul style="list-style-type: none"> <li>Type I (hay fever, asthma)</li> </ul>
<b>Potential Opportunist or Pathogen</b>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>
<b>Industrial Uses</b>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>
<b>Potential Toxins Produced</b>	<ul style="list-style-type: none"> <li>Cyclosporins</li> <li>Macrocyclic trichothecenes: roridin E, satratoxin F, G &amp; H, sporidesmin G, trichoverrol, verrucarins J</li> <li>Stachybotryolactone</li> </ul>
<b>Other Comments</b>	<ul style="list-style-type: none"> <li><i>Stachybotrys</i> may play a role in the development of sick building syndrome. The presence of this fungus can be significant due to its ability to produce mycotoxins. Exposure to the toxins can occur through inhalation, ingestion, or skin exposure</li> </ul>

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### 5. References and Informational Links

#### Books

- Bioaerosols: Assessment and Control. Janet Macher, Ed., American Conference of Governmental Industrial Hygienists, Cincinnati, OH 1999.
- Exposure Guidelines for Residential Indoor Air Quality. Environmental Health Directorate, Health Protection Branch, Health Canada, Ottawa, Ontario, 1989.
- Fungal Contamination in Public Buildings: Health Effects and Investigation Methods. Health Canada, Ottawa, Ontario, 2004.
- IICRC: S500 Standard and Reference Guide for Professional Water Damage Restoration. 3rd Edition, Institute of Inspection, Cleaning, and Restoration Certification, Vancouver, WA, 2006
- IICRC: S520 Standard and Reference Guide for Professional Mold Remediation. 1st Edition, Institute of Inspection, Cleaning, and Restoration Certification, Vancouver, WA, 2004
- Field Guide for the Determination of Biological Contaminants in Environmental Samples. 2nd Edition, American Industrial Hygiene Association, 2005.

#### Consumer Links

- Read the full text of AIHA's "The Facts About Mold" consumer brochure.  
<http://www.aiha.org/content/accessinfo/consumer/factsaboutmold.htm>
- The Occupational Safety and Health Administration (OSHA)  
<http://www.osha.gov/SLTC/molds/index.html>
- CDC Mold Facts  
<http://www.cdc.gov/mold/faqs.htm>
- CDC Stachybotrys - Questions and answers on Stachybotrys chartarum and other molds  
<http://www.cdc.gov/nceh/airpollution/mold/stachy.htm>
- IOM, NAS: Clearing the Air: Asthma and Indoor Air Exposures  
<http://fermat.nap.edu/books/0309064961/html/index.html>

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- National Library of Medicine-Mold website  
<http://www.nlm.nih.gov/medlineplus/molds.html>
- California Department of Health Services (CADOHS)  
<http://www.cal-iaq.org/mold0107.htm>
- Minnesota Department of Health  
<http://www.health.state.mn.us/divs/eh/indoorair/mold/index.html>
- New York City Department of Health and Mental Hygiene  
<http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml>
- H.R.: The United States Toxic Mold Safety and Protection Act  
<http://www.house.gov/conyers/mold.htm>

### EPA

- "Should You Have the Air Ducts in Your Home Cleaned?"  
<http://www.epa.gov/iaq/pubs/airduct.html>
- "Fact Sheet: Flood Cleanup - Avoiding Indoor Air Quality Problems"  
<http://www.epa.gov/iaq/pubs/flood.html>
- General information about molds and actions that can be taken to clean up or prevent a mold problem.  
<http://www.epa.gov/iaq/asthma/triggers/molds.html>
- "A Brief Guide to Mold, Moisture, and Your Home" - Includes basic information on mold, cleanup guidelines, and moisture and mold prevention.  
<http://www.epa.gov/iaq/molds/moldguide.html>
- "Mold Remediation in Schools and Commercial Buildings" - Information on remediation in schools and commercial property, references for potential mold and moisture remediators.  
<http://www.epa.gov/iaq/molds/mold-remediation.html>

### FEMA

- "Homes That Were Flooded May Harbor Mold Problems" - Information and tips for cleaning mold.  
<http://www.fema.gov/diz01/d1364n18.shtml>

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- “Mold Can Damage Home and Health” - How to check for mold, potential health effects of mold, and how to treat mold in the home.  
<http://www.fema.gov/diz01/d1379n41.shtm>
- “Prompt Flood Cleanup Can Help Prevent Health Problems” - How to clean up in-house mold problems (not large or serious exposures).  
<http://www.fema.gov/diz99/d1279n09.shtm>



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City, STATE ZIP

EMSL Order: 990600039  
Customer ID: DOUG  
Received: 10/18/06  
Analyzed: 10/18/06  
Report Date: 10/25/06

Proj: IAQ Investigation

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### 6. Important Terms, Conditions, and Limitations

#### A. Sample Retention

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

#### B. Change Orders and Cancellation

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

#### C. Warranty

EMSL warrants to its clients that all services provided hereunder shall be performed in accordance with established and recognized analytical testing procedures and with reasonable care in accordance with applicable federal, state and local laws. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied. EMSL disclaims any other warranties, express or implied, including a warranty of fitness for particular purpose and warranty of merchantability.

#### D. Limits of Liability

In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, but not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages, arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or any third party. We accept no legal responsibility for the purposes for which the client uses the test results. EMSL will not be held responsible for the improper selection of sampling devices even if we supply the device to the user. The user of the sampling device has the sole responsibility to select the proper sampler and

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



## EMSL Analytical, Inc.

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Phone: (856) 858 4800

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Email: [testlab@emsl.com](mailto:testlab@emsl.com)

Attn: Client Contact Name  
Client Business Name  
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sampling conditions to insure that a valid sample is taken for analysis. Any resampling performed will be at the sole discretion of EMSL, the cost of which shall be limited to the reasonable value of the original sample delivery group (SDG) samples. In no event shall EMSL be liable to a client or any third party, whether based upon theories of tort, contract or any other legal or equitable theory, in excess of the amount paid to EMSL by client thereunder.

### E. Indemnification

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