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AIHA EMPAT #180253



03/19/2010

Lab ID: 5168-1

**RE: Smith** samples collected at 124 Your Street, Cincinnati, Ohio on 3/17/2010

Melissa Rupert  
Concentra EH&S of Cincinnati  
4623 Wesley Ave., Ste F  
Cincinnati, OH 45212

**Date Received:** 3/17/2010

**Date Analyzed:** 3/19/2010

**Analyte:** Total Airborne Fungal Spores

**Sampling Media:** Allergenco-D Positrack Cassettes

Dear Melissa Rupert:

Thank you for submitting your samples to Quantus Analytical. The condition of your samples was considered to be satisfactory unless otherwise specified.

For bioaerosol samples, the total number of spores per cubic meter is based on raw count data obtained by Quantus, as well as on information provided to Quantus by the client including sampling duration, flow rate, and volume of air sampled. All spores observed in each sample are identified to the genus or group level and are included in the laboratory results. Spores that cannot be successfully identified to the genus or group level are included as "unclassified" spores.

Surface fungal analysis is intended to determine whether fungi are colonizing, growing, and amplifying, as well as to identify the type of fungi present. Surface analyses are intended to be qualitative and descriptive.

Analysis of your samples was performed by a microbiology professional trained in fungal identification methods presented by the prestigious McCrone Research Institute in Chicago, Illinois. Spore trap samples were analyzed in accordance with ASTM Method D 7391-09.

Please find the attached report for your Smith project. If you have any questions, please refer to Lab ID # 5168-1, and then contact us with that number at **513.871.5400** or you may decide to visit our website at [www.quantuslabs.com](http://www.quantuslabs.com).

Analyzed by:

Javier Ortega

Aerobiologist

Quality Review by:

Denise Mattingly

Report Quality Reviewer

Lab ID: 5168-1

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**Total Airborne Fungal Spores: Laboratory Analysis**

| Sample Volume (L):                  | 75   |            |            | 45         |              |            |
|-------------------------------------|--|------------|------------|------------|--------------|------------|
| Sample Number:                      | 01721608   |            |            | 01725593   |              |            |
| Sample Location:                    | Upstairs   |            |            | Basement   |              |            |
| Fungal Spore Type                   | Raw Count  | Spores/m3  | % of Total | Raw Count  | Spores/m3    | % of Total |
| <u>Aspergillus/Penicillium type</u> | 5  | 67         | 27.8       | 85         | 1,889        | 83.3       |
| <u>Basidiospores</u>                | 8  | 107        | 44.4       | 2          | 44           | 2.0        |
| <u>Chaetomium sp.</u>               |  |            |            | 2          | 44           | 2.0        |
| <u>Hyphal fragments</u>             | 1  | 13         | 5.6        | 2          | 44           | 2.0        |
| <u>Pithomyces sp.</u>               | 1  | 13         | 5.6        |            |              |            |
| <u>Scopulariopsis-like</u>          |  |            |            | 1          | 22           | 1.0        |
| <u>Smuts/Myxomycetes/Periconia</u>  | 1  | 13         | 5.6        |            |              |            |
| <u>Stachybotrys sp.</u>             | 2  | 27         | 11.1       | 9          | 200          | 8.8        |
| <u>Ulocladium sp.</u>               |  |            |            | 1          | 22           | 1.0        |
| <b>Totals</b>                       | <b>18</b>  | <b>240</b> | <b>100</b> | <b>102</b> | <b>2,267</b> | <b>100</b> |
| <b>Background Debris</b>            | <u>2</u>   |            |            | <u>1</u>   |              |            |
| <b>Comments:</b>                    | 01721608   |            |            |            |              |            |
|                                     | None   |            |            |            |              |            |
| <b>Comments:</b>                    | 01725593   |            |            |            |              |            |
|                                     | <u>Aspergillus/Penicillium type spores observed forming chains and/or clusters</u> |            |            |            |              |            |

Interpretation is left to the company and/or persons who conducted the field work. Variation is an inherent part of biological sampling. The presence or absence of a few genera in small number should not be considered atypical. A substantial increase of one or two spore types which are inconsistent with and non-reflective of the outside distribution of spore types is usually indicative of an indoor mold reservoir. The spores of *Aspergillus* and *Penicillium* (and others such as *Paecilomyces* and *Acremonium*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted. Background debris is an indication of the amount of non-biological material present on the slide (dust in the air) and is graded from 0 to 5 with 5 indicating the largest debris concentrations. It is important to modify sample volume to account for dust differences. The Background Debris score is also an indication of visibility for the analyst where higher scores relate to increased difficulty in reading the slide. Concentrations from areas with a "4-5" should be regarded as minimal counts where concentrations may be higher than those reported. Results from "4-5" debris samples are provided for your convenience, but should be considered estimates only, and are more qualitative than quantitative.

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**Total Airborne Fungal Spores: Laboratory Analysis**

|                                     |                  |                  |                   |                  |                  |                   |
|-------------------------------------|------------------|------------------|-------------------|------------------|------------------|-------------------|
| <b>Sample Volume (L):</b>           | 45               |                  |                   |                  |                  |                   |
| <b>Sample Number:</b>               | 01723480         |                  |                   |                  |                  |                   |
| <b>Sample Location:</b>             | Outside          |                  |                   |                  |                  |                   |
| <b>Fungal Spore Type</b>            | <b>Raw Count</b> | <b>Spores/m3</b> | <b>% of Total</b> | <b>Raw Count</b> | <b>Spores/m3</b> | <b>% of Total</b> |
| <u>Ascospores</u>                   | 1                | 22               | 2.0               |                  |                  |                   |
| <u>Aspergillus/Penicillium type</u> | 9                | 200              | 17.6              |                  |                  |                   |
| <u>Basidiospores</u>                | 25               | 556              | 49.0              |                  |                  |                   |
| <u>Cladosporium sp.</u>             | 15               | 333              | 29.4              |                  |                  |                   |
| <u>Smuts/Myxomycetes/Periconia</u>  | 1                | 22               | 2.0               |                  |                  |                   |
| <b>Totals</b>                       | <b>51</b>        | <b>1,133</b>     | <b>100</b>        |                  |                  |                   |
| <b>Background Debris</b>            | <u>1</u>         |                  |                   | NA               |                  |                   |
| <b>Comments:</b>                    | 01723480         |                  |                   |                  |                  |                   |
| <u>None</u>                         |                  |                  |                   |                  |                  |                   |
| <b>Comments:</b>                    |                  |                  |                   |                  |                  |                   |
| <u>None</u>                         |                  |                  |                   |                  |                  |                   |

Interpretation is left to the company and/or persons who conducted the field work. Variation is an inherent part of biological sampling. The presence or absence of a few genera in small number should not be considered atypical. A substantial increase of one or two spore types which are inconsistent with and non-reflective of the outside distribution of spore types is usually indicative of an indoor mold reservoir. The spores of *Aspergillus* and *Penicillium* (and others such as *Paecilomyces* and *Acremonium*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted. Background debris is an indication of the amount of non-biological material present on the slide (dust in the air) and is graded from 0 to 5 with 5 indicating the largest debris concentrations. It is important to modify sample volume to account for dust differences. The Background Debris score is also an indication of visibility for the analyst where higher scores relate to increased difficulty in reading the slide. Concentrations from areas with a "4-5" should be regarded as minimal counts where concentrations may be higher than those reported. Results from "4-5" debris samples are provided for your convenience, but should be considered estimates only, and are more qualitative than quantitative.

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Reporting Date: 3/19/2010

Surface Fungal Contamination: Laboratory Analysis

| Sample ID                                   | A                      |  |                 |          |                    |
|---|------------------------|--|-----------------|----------|--------------------|
| Sample Location                             | Floor Joist            |  |                 |          |                    |
| Background Debris observed in entire sample | Spore Type             | Description of fungal structures present | Growth category | Comments | General Impression |
| Amorphous material, free spores             | <u>Aspergillus sp.</u> | <u>Sporulating structures</u>            | A               | None     | <u>Mold growth</u> |

The following adjectives in decreasing sequence are used to describe various categories of growth. These descriptions are subjective and are based on the aerobiologist's experience and observation of the sample.

- A. **Massive:** fungal structures cover the entire sample or viewed area in more than layer.
- B. **Numerous:** one layer of fungal structures covers the entire sample or viewed area.
- C. **Many** fungal structures cover 25% to nearly 90% of the viewed area.
- D. **A few:** fungal structures are consistently detectable and countable, and cover up to 25% of the view area
- E. **A trace:** fungal structures are detectable when carefully examined by one analyst, but may be missed by another analyst
- F. **No obvious fungal growth**

Interpretation is left to the company and/or persons who conducted the field work. Variation is an inherent part of biological sampling.



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**Mold Spore Descriptions for Common Fungi**

| Mold Type                    | Description of Fungi  |
|------------------------------|---|
| Alternaria sp.               | Alternaria can exist on a wide variety of substrates from carpets and window frames to soil and plants. It is known to be allergenic and can cause Type I allergies and Type III hypersensitivity pneumonitis. It may also cause nasal and subcutaneous lesions and infections in immunocompromised individuals. Its toxic effects have not been well studied.  |
| Ascospores                   | Ascospores are frequently found indoors on damp substrates. Ascospores are a very large group of spores that contain many genera and species. The majority of Ascospores do not cause pathogenic disease, but some examples do exist. They are known allergens and these effects vary widely between genus and species of each Ascospore. Toxigenic effects also vary widely within this group.   |
| Aspergillus/Penicillium type | The spores of <i>Aspergillus</i> and <i>Penicillium</i> are very hard to distinguish from one another under a microscope. Therefore, they are generally classified as <i>Pen/Asp</i> types. These spore types are very common and can occur on a wide range of substrates such as cellulose, soil, carpet, paint and food. Water requirements vary widely between species. Spores belonging to the genus <i>Aspergillus</i> tend to have more serious health effects than those seen by <i>Penicillium sp.</i> spores. The allergenic effects seen by these spores include: Type I allergies; Type III hypersensitivity pneumonitis and others. Some species are known to produce potent toxins called aflatoxins. <i>A. fumigatus</i> causes allergic bronchopulmonary aspergillosis and allergic fungal sinusitis. Members of this genus cause a disease called Aspergillosis. The disease displays itself in the form of an invasive infection, colonization, toxicoses or allergy. Species within this genus are opportunistic pathogens, and may cause infection in individuals with compromised immune systems. <i>Penicillium sp.</i> is known to cause keratitis, external ear, respiratory and urinary tract infections. Severe and invasive diseases are usually associated with immunosuppressed hosts. Many species grow at body temperature. Many toxins are generated by this genus, however, the effects of these toxins are not well researched at this time. |
| Basidiospores                | Basidiospores compose a very diverse community of fungal spores. They come in a wide variety of shapes, sizes and colors. These spores are capable of causing "dry rot" which grows and destroys the structural wood of buildings. They are common causes of allergenic health effects including: Type I allergies, Type III hypersensitivity pneumonitis, and mushroom culture hypersensitivity. Opportunistic infections are caused only on rare occasions. Some Basidiospores have been found to produce toxins, although the effects of these toxins on human health are not well researched.   |
| Bipolaris/Drechlera sp.      | <i>Drechlera</i> and <i>Bipolaris</i> spores look very similar under a microscope. Therefore, these spores are generally categorized as <i>Drechlera/Bipolaris</i> type spores. <i>Drechlera</i> and <i>Bipolaris</i> are capable of occurring on a wide variety of substrates. The most common health effects are allergenic and include Type I allergies. These spores are the most commonly reported cause of allergic fungal sinusitis. They can cause infections in the eye, bones, aorta, sinuses, lung, brain and skin and only occasionally causes phaeohyphomycosis, including keratitis, sinusitis, and osteomyelitis. No toxins are known at this time.  |
| Botrytis sp.                 | <i>Botrytis sp.</i> is generally found in or near household plants. These spores are capable of causing allergenic effects such as Type I allergies, Type III hypersensitivity pneumonitis, and Winegrower's lung. It has been found to cause pathogenic diseases such as keratomycosis on very rare occasions. There are no known cases of human infection. There are no toxins known at this time.  |
| Cercospora sp.               | <i>Cercospora sp.</i> is most commonly found as a parasite on higher plants. The health effects of this spore are not well documented or studied. There has only been one report of human infection caused by <i>Cercospora sp.</i> This occurred in Indonesia in 1957.   |
| Chaetomium sp.               | <i>Chaetomium sp.</i> is very commonly found on damp sheetrock and paper or cellulose-containing materials. The most common allergenic effects are Type I allergies. This spore is commonly considered a contaminant. It has been occasionally implicated in pathogenic health effects such as systemic and cutaneous phaeohyphomycosis, and it is the rare cause of nail infections. <i>Chaetomium sp.</i> is capable of producing mutagens and toxins in specific circumstances. However, the effects of these toxins on human health have not been well researched.  |
| Cladosporium sp.             | <i>Cladosporium sp.</i> occurs on many substrates including textiles, wood and window sills. It is also capable of growing on refrigerated foods. It is the most common outdoor fungus. <i>Cladosporium sp.</i> is the common cause of allergenic health effects such as Type I allergies and Type III hypersensitivity pneumonitis. Causes chromoblastomycosis. This is generally non-pathogenic, but can cause chromoblastomycosis in tropical and sub-tropical climates. <i>Cladosporium sp.</i> has been found to produce some toxins, however, the effects of these toxins on human health have not been well researched.  |

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**Mold Spore Descriptions for Common Fungi (continued)**

| Mold Type                             | Description of Fungi   |
|---------------------------------------|--|
| Curvularia sp.                        | <i>Curvularia sp.</i> is capable of occurring on a variety of substrates. The most common health effects are allergenic and include Type I allergies and allergic fungal sinusitis. Is an agent of opportunistic infections of the cornea and the sinuses. It can occasionally cause onychomycosis, ocular keratitis, sinusitis, pneumonia cerebral abscess, and disseminated infection in those patients who are immunocompromised. No toxins are known at this time.   |
| Epicoccum sp.                         | <i>Epicoccum sp.</i> is capable of occurring on a variety of substrates that include paper, textiles and insects. The most common health effects are those that cause allergies such as Type I allergies. It has not been known to cause infections in humans or animals.  |
| Nigrospora sp.                        | <i>Nigrospora sp.</i> is generally found in decaying plant material and soil. The most common health effects seen from these spores are allergenic effects displayed as Type I allergies. There are no known toxins at this time.  |
| Pithomyces sp.                        | <i>Pithomyces sp.</i> is found growing on paper or on dead grass. The allergenic effects of this spore have not been well studied. It is commonly considered a contaminant, but has not been implicated in human infection. <i>Pithomyces sp.</i> is capable of producing toxins only in very specific circumstances, however, the effects of these toxins are not well known.   |
| Rusts                                 | Rusts must have living plant material available to them in order to grow. Therefore, Rusts are not found in the indoor environment unless their host plants are present. They are only found on living plant materials such as grass, flowers, and trees. The most common health effects seen from these spores are allergenic effects displayed as Type I allergies. There are no known toxins at this time.  |
| Smuts, Periconia sp., and Myxomycetes | These spores are hard to differentiate from one another under a microscope and are therefore grouped together during identification. They are generally found on a variety of substrates such as logs, stumps and dead leaves. The only occasionally occur indoors. The most common health effects seen from these spores are allergenic effects displayed as Type I allergies. There are no known toxins at this time.  |
| Stachybotrys sp.                      | <i>Stachybotrys sp.</i> is found frequently on wet materials containing cellulose such as wallboard and paper materials. It commonly produces allergenic health effects such as Type I allergies. There have been no reports of human infection. Some species produce a potent toxin that is lethal to animals eating contaminated forage. Inhalation or percutaneous absorption has caused mild symptoms in humans ranging from dermatitis and cough to rhinitis and itching or burning in the oral cavity and nasal passages. <i>Stachybotrys sp.</i> is known to produce toxins, however, the effects of these toxins on human health are still being researched. |
| Torula sp.                            | <i>Torula sp.</i> is commonly found indoors on cellulose containing materials. It produces Type I allergies. There have been no reports of human infection. <i>Torula sp.</i> is capable of producing toxins in specific circumstances, although the effects of these toxins are not well known at this time.  |
| Trichoderma sp.                       | <i>Trichoderma sp.</i> is commonly found indoors on paper, tapestries, and wood. It can elicit Type I allergies and Type III hypersensitivity pneumonitis. It has been implicated in infections of immunocompromised patients. <i>Trichoderma</i> is known to produce toxins, although, the effects of these toxins on human health are not well understood.   |
| Ulocladium sp.                        | <i>Ulocladium sp.</i> can be found on gypsum, paper, paint, and straw materials. It requires a large source of water. The most common health effects are allergenic effects and these are generally displayed in the form of Type I allergies. It has been implicated in phaeohiphomycosis and in rare subcutaneous tissue infections. There are no known toxins from this spore at this time.   |
| Zygosporae                            | Zygosporae are found on a wide variety of substrates including spoiling food. They most commonly cause Type I allergies and Type III hypersensitivity. Zygosporae are the principal agent that causes zygomycosis. This generally occurs in patients who are immunocompromised. There are no known toxins caused by zygosporae at this time.   |

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### Mold Spore Description of Health Effects

Molds and other fungi may adversely affect human health through three processes: 1) allergy; 2) infection; and 3) toxicity.

**Allergenic effects.** The most common health issues attributed to biological pollutants are allergies. It is clear that fungi produce highly allergenic proteins that have been identified as contributors to the symptoms of asthma and hay fever. Persisting allergy problems can leave the immune system in a weakened state causing an individual to become susceptible to other infections if it is left untreated for extended periods of time.

**Pathogenic effects.** Mold can also cause pathogenic effects which often consist of skin infections and very rarely pose a serious threat to healthy individuals. Most pathogenic molds are also opportunistic which means that severe reactions are generally seen only in those patients who have suppressed immune systems. It is important for these people to be made aware of the risks involved with exposure to opportunistic fungal spores.

**Toxicogenic effects.** The toxic effects of fungi are perhaps some of the most serious. All fungi release chemical substances called mycotoxins that vary in toxicity. These chemicals produce a variety of health effects including mucous membrane irritation, rashes, dizziness, nausea, and birth defects. All population groups can be affected by mold toxins.

**It is important to emphasize the fact that the most common health effects related to molds are allergies. Pathogenic and toxic effects develop rarely and under very specific circumstances, however the public should be aware of this possibility**