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January 9, 2015

Mr. Brian Carey
Town of Stratford
550 Patterson Avenue
Stratford, CT 06615

RE: Indoor Air Quality Investigation at Shakespeare Theater, 1850 Elm Street in Stratford

Dear Mr. Carey:

INTRODUCTION

AMC Environmental, LLC was requested to perform an indoor air quality (IAQ) assessment in response to a concern regarding possible microbial growth at the Shakespeare Theater located at 1850 Elm Street in Stratford, CT. The investigation performed on November 24, 2014 included a visual inspection of the basement and the main floor (stage area), air sampling for non-viable bioaerosols and surface sampling

The AMC assessment is based upon our awareness and knowledge of Standards, Guidelines and References published by ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers), AIHA (American Industrial Hygiene Association), ACGIH (American Conference of Governmental Industrial Hygienists), IICRC (Institute of Inspection, Cleaning and Restoration Certification), and IAQA (Indoor Air Quality Association).

There are no specific protocols or regulations regarding sampling for bioaerosols. We know that some bacteria and fungal spores can only trigger health effects when they are alive (viable), others are able to produce allergenic/asthmatic reaction when no longer living (non-viable). Therefore, the sampling protocol we employ uses non-culturable (spore trap) sampling initially and if they indicate further definition, we would return to obtain culturable samples.

Culturable sampling allows for the differentiation of Aspergillus and Penicillium (speciation when required). It also provides counts indicative of how many spores are viable and present in the air and can be used to provide a bacterial count.

Culturable sampling methods require that the spores in the air are alive, survive the sampling process, germinate on the sampling media, and compete well with other species present on the growth media. Culturable sampling does not indicate the presence of non-viable spores, which may also be capable of producing allergies or irritation. Culturable sampling requires seven to ten days for incubation after the sampling has taken place.

Spore trap samplers are capable of capturing all spores and particulate matter in the air. Consequently, it is possible to characterize problem environments where spores are present but either are no longer viable or are species that do not culture well (i.e., Stachybotrys). These are two situations where culturable sampling techniques, if used alone, may miss a potential IAQ problem. Spore trap samples are analyzed by direct microscopy and the results can be available within hours.

While many fungal spores have a unique morphology and are identifiable by direct microscopic examination, others do not and are more difficult to identify. These latter types must be counted in broader spore groups.

BACKGROUND

General

Fungi thrive on water damaged cellulose rich materials in buildings such as wood, sheetrock paper, ceiling tiles, cellulose containing insulation backing, and wallpaper. Carpeting may also provide host materials deposited in the carpet piles. Extended saturation time from water intrusion and/or consistently high levels of humidity in conjunction with these materials; provide fertile ground for the proliferation of fungi. Fungi are a natural part of the environment and are present throughout the world at ambient airborne levels. Moisture problems in buildings can increase the levels of airborne fungi by several orders of magnitude, from hundreds to tens of thousands of times greater than ambient. Inhalation of elevated levels of airborne fungi can precipitate an allergenic or toxic response and occasionally infection in an otherwise healthy individual. High levels of fungi in an indoor environment are of particular concern in areas where immune compromised individuals are housed. The health effects associated with exposure to elevated levels of fungi can be divided into four general categories: infection, toxicosis, allergy and irritation.

Since fungi and bacteria are ubiquitous in nature and may vary from day to day, indoor air is generally considered acceptable **IF**:

1. The indoor counts are lower than the outdoor counts.

2. The organisms present in the indoor sample are similar to the outdoor sample.

3. The predominant organism found in the indoor sample is the same as the predominant organism in the outdoor sample.

4. The indoor sample does not reveal any organisms that are capable of producing any toxigens.

We define these conditions as "normal fungal ecology" that is the typical fungal background types and concentrations of molds typically found in non-water damaged, environmentally well-maintained structures, and reflective of the ecological and climatic elements of the geographical region in which the building is located.

Areas of obvious visual fungal growth are a concern since spores can become airborne and therefore enter the respiratory system. There is no acceptable level of visual growth. Porous surface materials must be decontaminated where possible or disposed. Hard surfaces may be decontaminated unless there is evidence that the fungal growth has penetrated the surface; in such case the material that cannot be decontaminated should be disposed.

OBSERVATIONS AND INTERPRETATION OF ANALYTIC RESULTS

The assessment was in response to concerns regarding possible microbial growth due to the building being unused and vacant for more than 20 years. It was reported and documented in previous assessments that the building has a history of roof leaks that has resulted in long term water intrusions and suspect microbial growth.

Lower Level

The visual inspection of the Lower Level of the theatre found significant evidence of suspect fungal growth on sheetrock walls in the and on some doors of the rooms. On the day of the assessment, there was also a pungent musty odor present throughout the Lower Level.

The results of the non-viable fungi air sample obtained from the basement documented elevated levels of Aspergillus/Penicillium fungal spores (see Analytical Results). As a generally accepted guideline, indoor air samples are acceptable if the fungi levels documented are similar in type and in concentration as those in the control sample (obtained outside of the building). Based on this commonly used industry guideline, the analytical results from the basement indicated **unacceptable** levels of airborne fungi. Please note that sensitized individuals and individuals who have been identified as allergenic, asthmatic or have suppressed immune systems may be affected at any level.

In addition, a swab sample was obtained from the basement door. The swab sample documented high levels of surface fungal spores. Therefore, the surface sample obtained from the basement door is considered to be **unacceptable**.

Main and Upper Levels

Visible evidence of suspect fungal growth was found on a section of wood paneling. In addition, there was visible evidence of water staining on flooring as well as boxes and other contents of the building. This water staining is believed to be a result of water intrusions from a failure in the roofing system. However, it was reported that the building had a complete roof replacement within the last 10 years and therefore the source of the water intrusions have been eliminated. However, there appears to be some type of intrusion near the stage area.

The results of the non-viable fungi air sample obtained from the Stage area documented levels of airborne fungi that were below concentrations that were documented outside. However, since the weather and ambient air temperature on the day the sample was collected was cold and dry, the environmental factors did not favor the development of fungal spores. Evidence of standing water and water staining in the area of stage could be a contributor to future mold growth during times of the year when the ambient air temperature would create a humid indoor environment.

RECOMMENDATIONS

Based upon our observations and the analytic results, we recommend that the following remediation should be implemented to better assess this building and to restore normal fungal ecology.

- Visible evidence of suspect fungal growth was found on a few components throughout the Lower and Main levels of the building. However, there is significant concern regarding the possibility of fungal growth within wall cavities and other inaccessible areas (behind sheetrock and paneling). Therefore, it is recommended that these areas should be made accessible and thoroughly assessed to determine if visible fungal growth is present prior to the installation of any new materials.
- All non-porous vertical and horizontal surfaces (that will not be discarded) shall be thoroughly cleaned with an EPA registered disinfectant/sanitizer that is designed to kill fungi and control fungal, bacterial, and viral growth. In addition, all areas should be vacuumed with a unit equipped with a high efficiency particulate air (HEPA) filter (HEPA vacuumed).
- Air scrubber(s) equipped with a high efficiency particulate air filter (HEPA) should be set up and operating before any other remediation activity.
- Remove the bottom sheetrock walls or wood paneling in the areas of fungal growth throughout the Lower Level changing rooms and adjacent areas. Sheetrock, wood paneling, ceiling tiles, etc. that are found to have visible evidence of suspect fungal growth in other areas of the building should also be removed and discarded.
- Remove and dispose all affected insulation within the wall cavities and above the suspended ceiling.
- An EPA registered broad-spectrum fungicide should be applied in accordance with the manufacturer's recommendation upon conclusion of the sanitizing/disinfectant process. This will inhibit the re-blossoming of fungi.
- The area should be cleaned and decontaminated following the IICRC's 520 Mold Remediation Standard and the EPA publication Mold Remediation in Schools and Commercial Buildings.

***** Please note that any disturbance of building materials will require a full NESHAP inspection in accordance with 40 CFR Part 61, subpart M. A full interior/exterior NESHAP inspection and TCLP sampling would be approximately $25,000 - $35,000. This price does not include any hazardous materials remediation that might be associated dependent upon inspection results.***

Upon completion of the recommendations mentioned above, and prior to the installation of replacement materials, these areas should be re-inspected. Surface and non-viable air samples may be obtained to assure that normal fungal ecology has been achieved.

The Interpretations and Conclusions are based upon observations and information available to AMC Environmental, LLC at the time the service was rendered. The conclusions in this report are professional opinions based upon the findings, analytic results, and industry guidelines.

The investigation and report is limited to bioaerosols, other issues may be present that were not included in the investigation.

Please do not hesitate to contact me should you have any questions.

Report Prepared by

Jason Pringle
Certified Microbial Consultant
Attachments

REFERENCES

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New York City Department of Health Bureau of Environmental & Occupational Disease Epidemiology. Guidelines on Assessment and Remediation of Fungi in Indoor Environments. 1998.

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ANALYTICAL RESULTS