Fungal Remediation in a Storm-Damaged School

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INTRODUCTION

An unusual weather condition called a microburst caused considerable wind and water damage on September 7, 1998 (Labor Day) in Central New York. The microburst was described as a condition, which consisted of a warm and cold air mass colliding, causing a rapid downdraft of the cold air mass into the warm air mass. The resulting microburst winds were focused in a small width area that ravaged through several Central New York communities, and caused extensive damage to trees, building structures, and contributed to several deaths. A high school building in Syracuse, New York received damage to the roof structure from this microburst, which allowed water to infiltrate into administration offices, classrooms, cafeteria, library, and locker room areas. The school was scheduled to open for student occupancy for the new scholastic school year the week following Labor Day; however, the storm damage caused a delay. School administration were not only concerned about repairing the storm damage, but were also concerned about fungal growth on water-soaked surfaces and the potential for airborne generation of fungal-related agents within the school building.

To meet this challenge, the school district identified and assembled 11 specialty contractors to focus on all aspects of damage to quickly assess the damage and formulate a plan to fix theproblems and provide a safe environment for the students and faculty members (see schedule chart).

A sampling program to evaluate levels of airborne fungi and affected surfaces was provided, along with recommendation for cleanup objectives and building re-occupancy. The ACGIH publication "Guideline for the Assessment of Bioaerosols in the Indoor Environment" was used as a reference standard for airborne fungi levels. Surface wipe sample results were used to evaluate cleanup efforts by comparing sample results from storm-affected areas to sample results from unaffected areas.

A visual damage assessment associated with potential health risks from fungal agents was conducted by a team consisting of the county health department, School district management, architects, and an industrial hygienist. Schoolroom areas not included in the building renovation process that presented visible water intrusion were placed in an air-monitoring program. Also, recommendations were provided for removal of items with water damage.

FUNGAL SAMPLE COLLECTION

Sampling consisted of multiple sample events for airborne, surface fungi levels, and one bulk sample event for carpeting. The first series of sample collections consisted of forty-two air samples and seventy-five surface wipe samples. Airborne sample results indicated eight room areas exceeded the ACGIH guideline of fungi levels exceeding one-half the outdoor level and four room areas exceed the ACGIH level of 1,000 colony forming units per cubic meter of air. Renovation and cleaning activities were recommended for the room areas where fungi levels exceeded the guideline.

Air samples were collected over a five-minute time period with a single-stage Anderson impactor at a sample flow rate of 28 liters per minute. Collection media consisted of potato dextrose agar in a Petri dish.

Surface wipe samples were collected over a 1 to 4 square inch area with swab kits supplied by P&K Microbiology Services, Inc. Cornmeal and malt extract agars were used for laboratory sub-culturing of the wipe samples.

Bulk samples consisted of one square inch of carpeting placed in a plastic bag and provided to the laboratory for sub-culturing on cornmeal and malt extract agars.

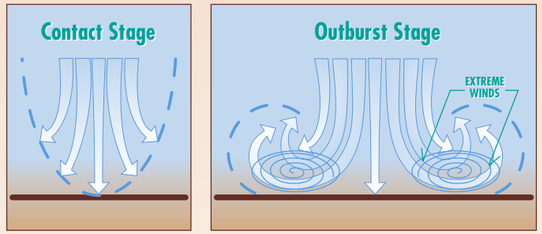
REOCCUPANCY CRITERIA

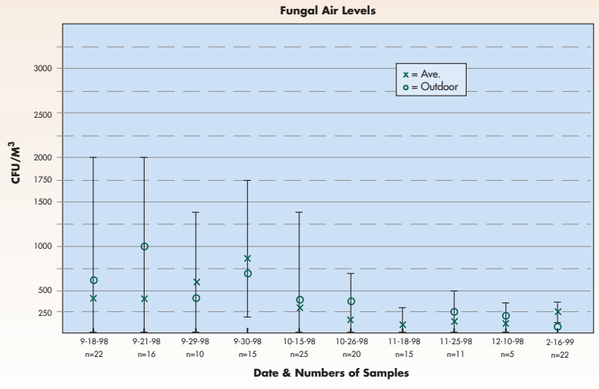
School Administration, County Health Department representatives industrial hygiene, and clean-up contractors provided recommendations to establish the following student reoccupancy criteria consisting of:

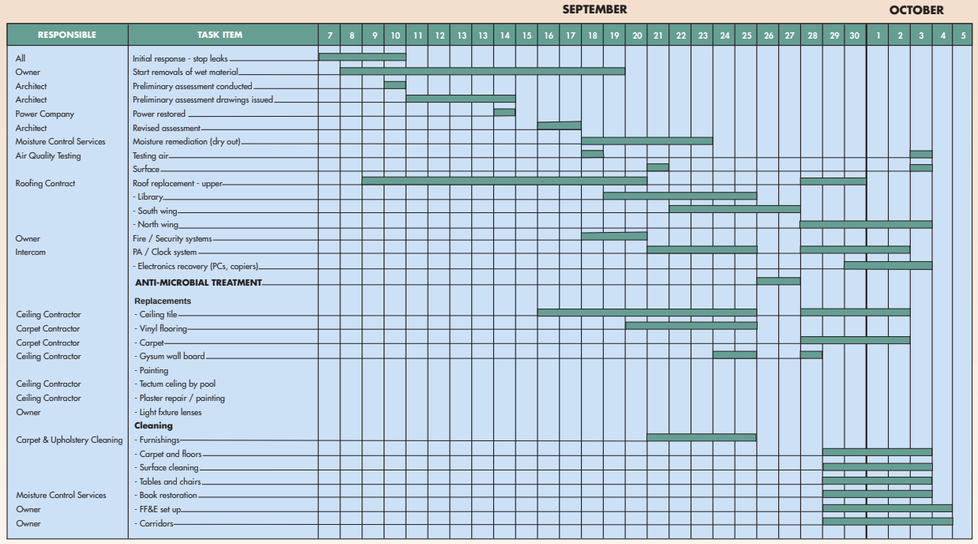
- Areas likely to contain elevated levels of fungi, which are accessible, by students should either be cleaned and disinfected or the materials should be removed and replaced.
- Floor and wall surfaces onto which new carpeting or sheeting is to be placed should be prepared for installation consistent with normal construction practices and caution to prevent the redistribution of construction dust into adjacent areas.
- Dust and debris should be removed from the building by a thorough vacuuming.
- Prior to reinstallation of carpeting and ceiling tiles, the building should be inspected for the presence of areas of residual moisture.
- Carpeting, ceiling tiles and removed materials should be replaced.
- Following a thorough vacuuming, all horizontal and vertical surfaces should be cleaned with a mixture of surfactant/disinfectant suitable for institutional application in a school building.
- Reestablish normal operation of the heating, ventilating, and air-conditioning system.
- Following completion of cleanup and renovation activities resample the air and selected surfaces within the School for the presence of fungi.

MICROBURST DOWNBURST LESS THAN 2.5 MILES IN DIAMETER

A downburst is a strong downdraft which includes an outburst of potentially damaging winds on or near the ground. If the diameter of the downburst is less than 2.5 miles, it is calledmicroburst. The diagrams below depict the evoluation of a microburst.







IINITIAL PROJECT COMPLETION

Storm damage repair and cleaning was completed by the scheduled date of October 4, 1998. An inspection of the School on October 4, 1998 by representative from School District Administration, the Architects, Cleaners, and O' Brien & Gere Industrial Hygiene determined the School was acceptable for student occupancy. The County Health Department conducted a separate inspection on October 5, 1998 and also determined the school was acceptable for occupancy.

In addition, the County Health Department requested periodic air and surface sample events over a five-month time period, to provide a continual monitoring of conditions within the School.

CONCLUSIONS

Subsequent sample events were conducted at approximately two-week intervals, over a five-month time period. Airborne and surface wipe fungi sample levels continued on a downward trend over this time period. Airborne levels in a locker room reached a plateau level of 300 to 450 CFU/M^3 which was determined no to be of concern and is characteristic for thatenvironment. Sample events were therefore discontinued in February 1999.