



Engineering Sciences Section – 2008

C32 Sick Building Syndrome

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The goal of this presentation is to help the attendee learn how microbial species can impact human health, and how the building problem causing the health issues can be investigated, diagnosed, and addressed.

This presentation will impact the forensic science community by presenting an emerging area of science and engineering which allows identification and remediation of building problems leading to health impacts.

Sick building syndrome (SBS) refers to a pattern wherein building occupants associate certain sicknesses with spending time in a building. Sicknesses can range from malaise to coughing or allergy type reactions to more serious life threatening diseases associated with loss of life. Those with compromised immune systems are typically at elevated risk.

This presentation will examine several SBS cases. One involves a building which had a microbial impacted duct system and the second involved microbial contamination spread by a malfunctioning humidification system. For these cases, the steps involved in assessing and resolving the issues will be examined.

Demolition was indicated in one of the cases. It was found that there was microbial growth in building walls and in the HVAC duct system. Remediation estimates would total more than the buildings' worth. Occupants were reporting coughing occurring on an ongoing basis. In the second case, an elderly susceptible individual was kept from her residence due to the repeated nature of severe health effects. A leading hospital diagnosed the problem as related to indoor air. The source of the indoor air problem was very difficult to solve and was found to result from a past humidification problem. Other cases will focus on perceived sick building syndrome problems which were more easily resolved.

The causes of SBS will also be examined. These include the need for outside air changes, proper HVAC controls, building envelope design, and building maintenance. The role of HVAC systems will be specifically examined, including the tendency of many temperature driven HVAC systems to "stall" and provide little ventilation. Outside air changes are very important to avoiding SBS, and, two case studies involving over ventilating of building spaces will also be examined. In one case, the building was vacated after SBS symptoms continued for a protracted period.

This case study will be reviewed in detail, including how the case was first presented, and, how previous studies repeatedly failed to discern that the HVAC system setup was the ultimate cause. Renovation of the HVAC system ultimately resolved the problem, and, a new tenant self-reported no further symptoms.

Building envelope problems will also be examined. These problems are among the most difficult to understand, but, their detection can be relatively easy. These typically occur when moisture is trapped in walls, or walls are repeatedly wetted and microbial amplification occurs. Building moisture level criteria used to evaluate these situations will be discussed, along with example building envelope problems found in the field, along with how each was resolved.

Building maintenance issues leading to SBS will also be examined. Particular focus will be on roofing and wall situations which ultimately lead to indoor air impacts. Tips for proper building maintenance will be presented as well. The role of moisture in causing microbial amplification will be examined as well.

The reader will learn how microbial consultants approach the investigation process, how they evaluate specific situations, any how remediation approaches are formulated and implemented. Also examined will be methodologies used to assess microbial test results, along with the different testing methodologies available.

Microbial, Indoor Air, Remediation