C54 Use of Microscopy in the Sick Building Syndrome Investigations

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The goal of this presentation is to present to the forensic community information about how microscopical analysis can be very useful in the initial stages of a sick building syndrome investigation to help determine the source of the problem.

Sick Building Syndrome investigations often start with building occupant symptoms that may be caused by a wide variety of agents. This presentation will impact the forensic science community by showing the tools of microscopy, polarized light microscopy, electron microscopy, and infrared microscopy and how they can be used with other analytical procedures to more efficiently determine the cause of the problem.

Microscopical analyses are used in conjunction with other procedures to characterize materials collected from building interiors when trying to sort out the various possible reasons that person may feel concerned that a build- ing environment is affecting their health. In a number of studies, light, elec- tron, infrared and raman microscopy techniques have been used singly or in combination to study complaints raised about building safety and healthi- ness. This presentation will describe each type of microscopy, sampling pro- cedures and the types of information that can be obtained. Case studies dealing with dark stains (mold verses soot), glass fibers, allergens, and other particulates will be used to illustrate how microscopy can be very useful in the initial stages of a sick building syndrome investigation to eliminate some agents of concern and to narrow the field of possible answers to what is actually causing the complaint.

One of the case studies to be presented is titled: A Spot Called Ralph. In a Courthouse in South Carolina a mysterious stain appeared in the new carpet. Employees even gave the spot a name – "Ralph". At first it was the size of a half dollar but it grew after cleaning to about 2 square feet. Because of employee concerns, a section of the courthouse was closed while the nature of the spot was determined. Environmental mold specialists initially tested the stain in the carpet and determined that the growing stain was not caused by mold. A section of the stain was cut from the carpet and delivered to a forensic microscopy laboratory for inspection. Analysis by light and scanning electron microscopy showed that the carpet contained a variety of particles typical of the particles often found in office dusts. A sticky substance was also found on the carpet fibers. Infrared microscopy analysis of the sticky material showed that it was consistent with corn syrup. It was theorized that some one spilled a soft drink on the carpet and the stain was caused by office dust particles adhering to the sticky drink residue. Efforts to clean the stain removed the dark office dust particles but did not completely remove the sticky drink residue. In fact, the cleaning efforts spread the sticky residue which collected more office dirt over time and therefore appeared to grow in size. Not surprisingly the newspaper reporter who interviewed the laboratory after the findings were made public was disappointed that the stain called "Ralph" was not something exotic but caused by a spilled soft drink.

In another case study titled: The Itchy Nun, residents of a convent in Oklahoma complained of eye irritation and general itchiness. Glass fibers from the duct insulation were suspected of causing the problem. Air samples collected on polycarbonate filters and examined by light microscopy did not show the presence of glass fibers or other particles that are considered normal irritants. Analysis of particles associated with the duct insulation sent as a ref- erence showed a high concentration of mites. Additional testing for mite antigens was recommended.

Microscopy, Dust Particles, Sick Building Syndrome

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