A149 Interdisciplinary Sampling and Analytical Methods Utilized for the Confirmation of Contaminants From Non-Routine Fire Debris

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After attending this presentation, attendees will have a better understanding of how alternative sampling and analytical techniques can be used to supplement the current established methods of fire debris analysis. Common validated sampling methods will be discussed as well as case studies demonstrating their applications.

This presentation will impact the forensic science community by illustrating how methodologies from other investigative fields can be adapted to forensic analyses. Such methodologies are well suited for the field of fire investigation.

The utilization of ASTM standard practices and methods for the analysis of fire debris has long been recognized as the method of choice for fire loss investigations. Standard fire debris loss investigations involving routine debris samples have been well served with these sampling and analytical methods. The confirmed presence of an ignitable liquid in the living room of a home can be an indication that the fire was not accidental. However, for a fire loss where source identification for the purpose of assessing liability is necessary, typical fire debris sampling and analytical techniques may not be sufficient to achieve the sensitivity and selectivity required. Such losses may require atypical sample collection and alternative analytical methodologies outside the discipline of fire investigation.

Ongoing research has shown that the application of analytical methods typically reserved for disciplines outside fire investigations (e.g., environmental and industrial hygiene chemistry) can provide additional information that may lead to confirmation of the presence of ignitable liquids or other relevant contaminants in atypical fire debris matrices.

In typical fire debris analyses, the presence of a product or chemical mixture is usually reported and it is not necessary to report the individual compounds identified in the debris. Moreover, the concentrations of the components detected in the debris are rarely addressed when reporting the results of fire debris analyses. When these data are relevant to the investigation, EPA and NIOSH analytical methods can be used to provide specific component identification and quantitative analytical results.

EPA methodologies including: 8015, 8021, 8260, and 8270 and NIOSH Methods 1501 and 1550 are well suited for the detection and identification of low-level concentrations of ignitable liquid components. Benzene, toluene, ethyl benzene, and xylenes (BTEX), as a group of components, are routinely analyzed through EPA and NIOSH methods from soil, water, and air for environmental and industrial hygiene evaluations. Each of the methods presented is a nationally recognized published and validated method.

The use of interdisciplinary analytical methodologies in the evaluation of evidence collected from the fire scene can provide additional insight into the presence of ignitable liquids or contaminants. The environmental and industrial hygiene professions have established analytical methods for recovery of hydrocarbons and other solvents from matrices typically considered non-routine on a fire loss including: water, concrete, soil, surfaces, and air. These matrices are often present at the fire scene and available for sampling by the investigator. The samples of interest may include air conditioner condensate, liquid runoff, floor drain liquids, soot deposits, and other bulk and surface samples.

The use of interdisciplinary sampling and analytical methods can significantly improve the information available to a fire loss investigator. The established environmental and industrial hygiene sampling and analytical methods, by design, can be utilized to detect a wide variety of

compounds that may contribute to or enhance fires. Case studies where alternative sampling and analytical techniques were utilized to investigate fire losses will be presented. In these investigations, additional methodologies were utilized to identify contaminants and establish the source of combustible materials that were associated with fires and fire losses.

Fire Debris, Interdisciplinary Techniques, Analytical Methods

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