



PERSPECTIVES

Avoiding False Positive Results in Fire Investigations

Our perspectives feature the viewpoints of our subject matter experts on current topics and emerging trends.

INTRODUCTION

Fire investigators are all aware of the need to follow protocols and procedures to prevent contamination of samples collected for ignitable liquid testing. Ignitable liquid testing is often used to identify if there were accelerants used to ignite or intensify an intentionally set fire. Laboratory verification of ignitable liquids can lead to denial of claims or arrest and potential incarceration. For investigators, it is imperative to reduce or eliminate the possibility of false positive results through proper recovery and handling of samples collected for laboratory analysis.?

STANDARD PROCEDURES

Ignitable liquid testing involves heating a sealed metal can to cause volatile components within the materials to off gas. The resulting headspace fumes are extracted and passed through a Gas Chromatograph /Mass Spectrometer (GC/MS) to identify physical spectra of the components. These spectra are then compared to known spectra for ignitable liquids.

As such, evidence samples are collected and placed in sealed cans at the fire scene before being forwarded to the lab for analysis. The laboratory testing will identify ignitable liquids that are present in the can at the time it is sealed at the fire scene. This may include contaminants that are introduced into the can prior to sealing. Any hydrocarbon contaminants would cause the sample to test positive, even though the sample itself may not contain any ignitable liquid residue. This is defined as a “false positive” result.

Because of the potential for contamination and false positive results, *NFPA 921: Guide for Fire and Explosion Investigations* contains a section regarding contamination. Section 17.4 Contamination of Physical Evidence outlines procedures for minimizing contamination. These procedures include:

- Sealing containers as soon as they are received from the supplier
- Wearing clean, disposable gloves for each sample recovered
- Properly cleaning all recovery tools between samples
- Not utilizing gas fired equipment in the area of sampling

ADDITIONAL METHODS

Another procedure for ensuring the accuracy of lab results is to send an empty exemplar can to the laboratory as a control sample. This ensures that no residue is present in the cans prior to testing. Use of a control sample is a recognized method for providing an additional layer of verification to test results. Adhering to these procedures and protocols helps to minimize contamination and the occurrence of false positive results.

REAL-WORLD CASE

During a recent investigation, we were surprised to get a false positive result on an exemplar can during a routine lab analysis of debris samples. After immediately confirming that proper procedures had been followed by the investigator, sample evidence cans were pulled from multiple locations within the company, both from investigators and from new shipments from the supplier for testing. A total of seven exemplar cans were sent to two different independent laboratories, which were different from the original lab that identified the false positive result. All the cans, from all three labs, tested positive for oxidized hydrocarbons. This verified that the cans were being received from the supplier in a contaminated state. It was hypothesized by the labs that the cans had been treated with a hydrocarbon as a rust inhibitor during the manufacturing process.

Since this incident, we have added an additional internal control process of testing cans from all new shipments received from our suppliers. Further, we have also learned that various governmental agencies have also encountered contaminated cans. In its June 10, 2020 *Notice of DFS Policy Change*, the Commonwealth of Virginia’s Department of Forensic Science advised that they have experienced false positives due to contaminated cans and are “effective immediately” requiring the submission of a control can.

CONCLUSION

Through proper adherence to procedures and protocols outlined in NFPA 921, including comparison samples, we were able to identify a contamination issue from our supplier. This allowed us to react quickly, remove the contaminated

evidence containers from service, and identify new equipment suppliers, preventing future contamination issues and false positive results.

ACKNOWLEDGMENTS

We would like to thank Stuart Morrison, PE, IAAI-CFI for providing insight and expertise that greatly assisted in this research.

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