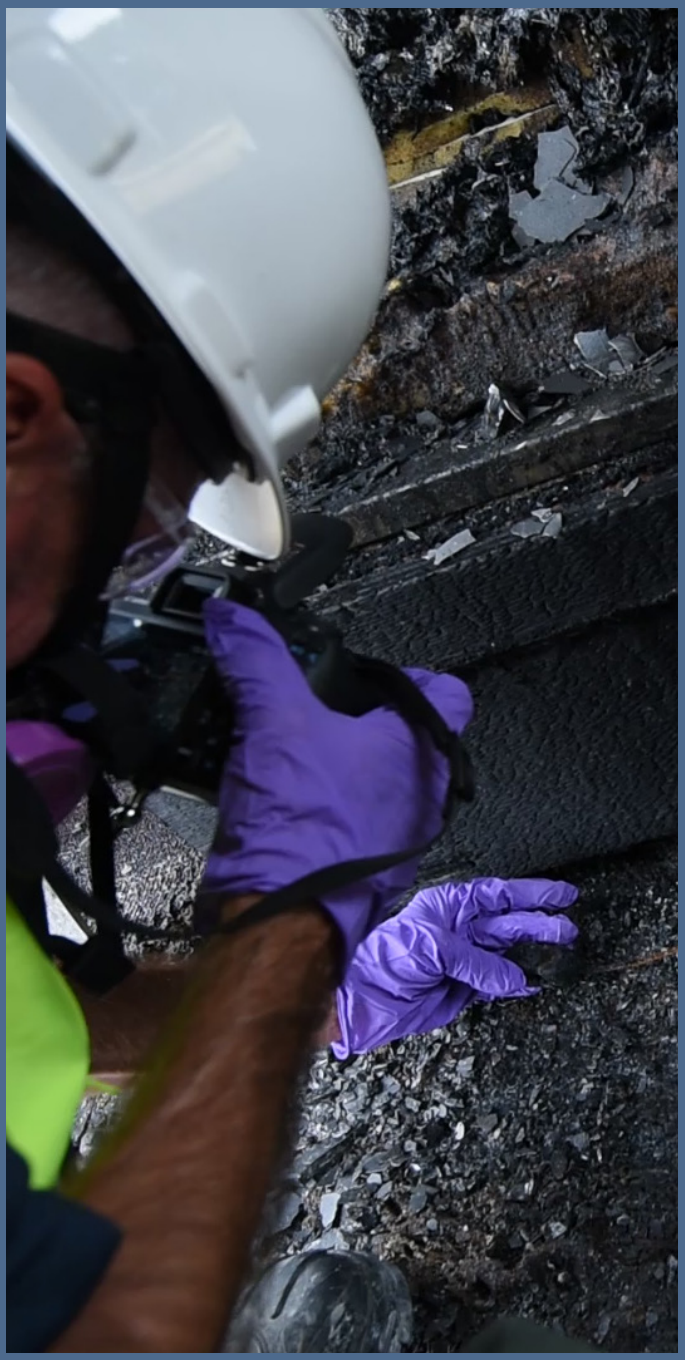

JS|HELD

PERSPECTIVES

Avoiding False Positive Results in Fire Investigations

(2nd Edition)

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

INTRODUCTION

Fire investigators recognize the critical importance of adhering to established protocols and procedures to prevent contamination of samples collected for the purpose of ignitable liquid testing. This testing is frequently employed to ascertain whether accelerants were utilized to ignite or intensify an intentionally set fire. Laboratory analysis of ignitable liquids can result in the denial of claims or lead to arrests and potential incarceration. Consequently, it is essential for investigators to minimize or eliminate the risk of false positive results through the proper recovery and handling of samples intended for laboratory examination.

STANDARD PROCEDURES

Ignitable liquid testing is a process that involves heating a sealed metal can in order to facilitate the off-gassing of volatile components contained within the materials. The resultant fumes from the headspace are extracted and analyzed using a Gas Chromatograph/ Mass Spectrometer (GC/MS) to identify the physical spectra of the components present. These spectra are subsequently compared to established spectra for known ignitable liquids.

As part of the investigative process, evidence samples are collected and placed in sealed cans at the fire scene prior to their transfer to the laboratory for analysis. The laboratory examination aims to identify any ignitable liquids present in the can at the moment of sealing. It is important to note that this examination may also reveal contaminants introduced into the can before sealing. The presence of hydrocarbon contaminants may lead to a positive test result, even in the absence of any ignitable liquid residue within the sample itself. This situation is classified as a “false positive” result.

Given the potential for contamination and the occurrence of false positive results, the NFPA: 921 *Guide for Fire and Explosion Investigations* delineates a section pertaining to contamination. Section 17.4, entitled, “Contamination of Physical Evidence,” outlines recommended procedures to minimize contamination risks. These procedures include:

- Sealing containers promptly upon receipt from the supplier.
- Employing clean, disposable gloves for the handling of each recovered sample.
- Thoroughly cleaning all recovery tools between the collection of samples.
- Refraining from the use of fuel-powered tools and/or equipment within the vicinity of the sampling area.

ADDITIONAL METHODS

One effective procedure for ensuring the accuracy of laboratory results involves sending an empty control sample can to the laboratory. This practice guarantees that no residual substances are present in the can prior to testing. The use of control samples is a recognized and established method for providing an additional layer of verification to the test results. Adhering to these procedures and protocols is crucial for minimizing contamination and the likelihood of false positive results.

REAL-WORLD CASE

During one particular investigation, J.S. Held experts encountered an unexpected false positive result from an exemplar can during a routine laboratory analysis of debris samples. Upon validation that proper protocols had been adhered to by the investigator, we initiated a review of sample evidence cans sourced from multiple locations within the organization, including those from investigators and newly received shipments from the supplier, for further examination.

A total of seven exemplar cans were sent to two independent laboratories, distinct from the original lab that reported the false positive. The tests conducted by both laboratories confirmed the presence of oxidized hydrocarbons in all analyzed cans. This outcome indicated that the cans were delivered from the supplier in a contaminated condition. The laboratories speculated that the cans may have been treated with hydrocarbons as a rust inhibitor during the manufacturing process.

Following this incident, we instituted an additional internal control process that mandates testing of cans from all new shipments received from our suppliers. Additionally,

we have become aware that various governmental agencies have also experienced similar issues with contaminated cans. In its June 10, 2020, *Notice of DFS Policy Change*, the Commonwealth of Virginia's Department of Forensic Science indicated that it had encountered false positive results attributable to contaminated cans and now requires the submission of a control can.

CONCLUSION

Through proper adherence to the procedures and protocols delineated in NFPA 921, including the evaluation of comparison samples, J.S. Held experts successfully identified a contamination issue stemming from our supplier. This timely recognition enabled us to promptly remove the contaminated evidence containers from service and to engage with alternative equipment suppliers. Consequently, we have mitigated the risk of future contamination issues and facilitated faster, positive results.

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MORE ABOUT J.S. HELD'S CONTRIBUTOR

Rachel McColley is a Senior Investigator in J.S. Held's Fire Origin & Cause service line. Rachel has more than eight years in the public sector conducting criminal and fire scene investigations. Prior to joining J.S. Held, she was employed as a fire investigator with the Missouri State Fire Marshal's Office. She has also been employed as a criminal investigator with the Ripley County Sheriff's Department. She has testified in Missouri State Court on both criminal and fire origin and cause. At J.S. Held, Rachel specializes in fire and explosion scene investigations and is responsible for investigating fire and explosion incidents in commercial, residential, industrial facilities, and automobiles.

Rachel can be reached at rmccolley@jsheld.com or +1 314 784 6107.

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