B66 Burning Down the House: The Biometric Recovery of Latent Prints and Blood in Arson Crime Scenes

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Learning Overview: After attending this presentation, attendees will have a better understanding of the feasibility and value of collecting latent print and blood trace evidence when dealing with fire and arson investigations and offer insight into the best practices for evidence recovery. It is anticipated that the findings will dispel any myths that intense heat from fire will likely destroy blood and latent print biological and physical trace evidence. The effect of exposure to heat and ability to obtain biometric evidence from "the recovery zone" should not be overlooked.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing framework for recovery of the biometric evidence after exposure to heat when investigating fire and arson casework. The presented information will improve understanding of the effect of heat on the recovery of biometric evidence.

The first objective for this investigation was to determine if the distance to high temperatures in a fire plays a significant role in obtaining evidence from the materials and containers used to initiate the fire, or arson. The second objective was to determine if the materials used to create a fire significantly impacts the collection of the related blood and latent print evidence. The third objective investigated the impact of exposure time to elevated temperature and the ability to recover the stated forensic evidence. It was felt that there would be a significant difference in ability to recover blood evidence. However, it was also felt that the difference for latent prints collected from the materials used by an arsonist would not be significant. Results will be presented based on the recovered latent print and blood evidence. Possible DNA profiles and related information will be discussed.

Several tests were conducted in this study based on varying distances to the fire heat source (propane torch) temperatures and the ability to recover latent prints and blood evidence. The exhibits were exposed to the heat source at 18 inches and 3400 degrees, 22 inches at 2720 degrees and 24 inches at 1700 degrees Fahrenheit. In each test, a control group not exposed to the heat source was included. The latent prints were detected by silver metallic dusting powder. Blood was detected using the Kastle-Meyer presumptive test with phenolphthalein reagent. Materials testing positive for blood were analyzed for DNA after collection with a moistened cotton swab.

The first research objective concluded that while fingerprints were recoverable from all the exhibits, the presumptive blood test was only negative on the aluminum substrate. This may be explained by the ability of the metallic aluminum substrate to retain heat longer than the glass or plastic. All the controls (not exposed to heat) were positive for the blood and latent print evidence. An interesting finding was that fingerprint evidence became etched into the metallic surface from the exposure to high temperatures. The second objective indicated that the recovery of evidence was impacted by the nature of the materials possibly used to contain inflammable substances used to create the fire. The third objective indicated that exposure time played a significant role in the recovery of biometric data (fingerprints, blood and DNA). Duration time did not significantly impact fingerprint recovery (100%), but recovery of blood evidence was markedly reduced (75%) dependent on the exposure time.

These results encourage practitioners to recognize the importance of not overlooking the possible recovery of latent fingerprint and blood evidence from fire-arson investigations. Exposure to elevated temperatures in our study did not impact recovery on glass, plastic and metallic substrates (containers) of latent prints. Even blood evidence was located on these objects by presumptive tests, although not on the metallic substrate, probably due to superheating preventing recovery. This raises the possibility of obtaining probative DNA profiles from some arson exhibits, linking to possible suspects.

Fire-Arson, Fingerprints, DNA