E11 Survivability of Explosive Residue on Improvised Explosive Device (IED) Components Subjected to an Underwater Detonation

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After attending this presentation, attendees will better understand the viability of explosive residue after a detonation in the water column and how the amount of time in the water may degrade the ability to detect explosive residue as well how different materials will adsorb different amounts of explosive residue.

This presentation will impact the forensic science community by assisting attendees in gaining a better understanding of the effects from the maritime environment and will help improve the protocols supporting the collection of post-blast residue.

This study was conducted to better understand the persistence of explosive residue after a detonation in the water column. Additionally, the effect of the elapsed time in water on the ability to detect explosive residue as well how different materials will adsorb different amounts of explosive residue will be demonstrated. The intent of this study is to evaluate current operating procedures to ensure investigators have the most current information available to them concerning best practices in evidence collection and preservation, as well as to maximize their efforts during an often limited timeframe of access to a post-blast scene.

This research is based on the premise that explosive residues will survive in a maritime environment. This was an empirical study with assistance provided by the Federal Bureau of Investigation (FBI), the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), and Naval Surface Warfare Centers (NSWC). IEDs were detonated in an explosive test pond, then allowed to remain submerged in fresh water for specific periods of time. The goal was to analyze the post-blast debris to ascertain if submersion in water had any effect on the ability to recover and identify post-blast residues and, if so, to identify trends showing any degradation of recoverable residue based upon length of time submerged.

The FBI and ATF laboratories played a significant role in the analysis and identification of the explosives using both gas chromatography/mass spectrometry and liquid chromatography/mass spectrometry. Explosive residue was identified on all of the devices that were detonated. Explosive residue could be recovered from various witness materials tested; however, this testing was unable to establish a relationship between degradation of explosive residue versus time submerged.

This research illustrated that it was possible to identify explosive residue recovered from various types of witness material exposed to a detonation in the maritime environment, with the ideal time to collect residue being within one hour of detonation. Identification of explosive residue was also possible after 120 hours of water submersion after detonation, but the detectable amount of residue was greatly reduced. This information will be useful to investigators who are tasked with responding to maritime explosive incidents by establishing a timeline for evidence collection that would still result in a reasonable probability of successful recovery of explosive residue.

Underwater CSI, Maritime IED, Post-Blast

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