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DHS Science and Technology Directorate

Chemical Forensics Program – Providing Law Enforcement with New Forensic Tools for the Investigation of Chemical Attacks

Responding to the Chemical Attack Threat

The Department of Homeland Security (DHS) Chemical Forensics Program (Chem FP) is increasing the nation's preparedness for potential criminal and terrorist chemical threats by providing new chemical sample collection and forensic analytical techniques. New collection techniques provide more effective ways to collect and preserve samples from incident scenes and other suspect sources. New forensic analytical techniques provide sample matching and attribution capabilities - the means to compare intercepted or collected samples with each other and determine their source (people, places and other events). The timely provision of this forensic information assists investigators in identifying the perpetrators and preventing follow-on or copycat events. The Chem FP serves as a focal point for U.S. Government (USG) chemical forensics studies to characterize and attribute the various synthesis and production methods for the large number of Chemical Threat Agents (CTA), including chemical warfare agents, toxic industrial chemicals and other toxins.

Objectives and deliverables focused on customer needs

The mission of the Chem FP is to develop and maintain a robust and enduring national technical chemical forensics capability for the collection, preservation and forensic analysis of CTAs and associated evidence for comprehensive and timely support of terrorism and criminal investigations. Collection and analytical tools and techniques developed by Chem FP must be admissible in federal court and must comply with the Federal Rules of Evidence and the Supreme Court-mandated *Daubert* standard, which requires: 1) testable hypotheses, 2) methods and interpretation based on peer-reviewed products, 3) an understanding of error rate that incorporates standards and controls and 4) general acceptance by the relevant scientific community. Chem FP deliverables (standard operating procedures, reports and scientific journal articles) directly address these four criteria.

Full engagement of customers and USG partners

The principal Chem FP customer is the FBI due to its primary jurisdiction over acts of terrorism, including weapons of mass destruction. The Chem FP closely interacts with its customers and end-users, which include DHS components (Customs and Border Protection, Infrastructure Protection, Office of Intelligence and Analysis [OI&A], U. S. Secret Service) and partner agencies (FBI, Environmental Protection Agency, Department of Defense). End users help select the annual portfolio of studies by the DHS Chem FP and participate in



monthly Chem FP calls and annual program reviews to provide input.

A comprehensive research portfolio

The Chem FP research activities focus on four areas:

- Determination if high priority CTAs produced by various synthesis methods or procured from various commercial sources contain/retain *chemical attribution signatures* that have value in associating various samples with each other and/or distinguishing how, where and/or by whom the recovered CTA samples were produced and subsequently handled.
- Determination of the environmental factors/effects that can alter *chemical attribution signatures* and affect recoverability.
- Development of optimal techniques and tools for sampling (collecting and preserving) the different types of *chemical attribution signatures* at chemical incident scenes to stabilize the samples and minimize degradation.
- Development of optimal methods and analytical techniques for conducting comprehensive forensic analyses of samples for source determination and association with other samples.

A viable transition strategy

Chem FP deliverables go directly to the customers and end-users. The Chem FP's Technology Transition Agreement (TTA) with the DHS OI&A and two FBI divisions sets forth the provisions for transition of products to these entities. The TTA states that the Chem FP will: 1) support chemical forensic processing infrastructure; 2) conduct prioritized synthesis studies seeking to identify signatures of value for forensic purposes and 3) develop analytical methods for the extraction of signatures at chemical incident scenes. Chem FP deliverables are maintained in electronic format at the DHS Chemical Security Analysis Center for use by the USG for casework and related research projects.



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To Learn More about the Chemical Forensics program, contact
SandT-Chembio@hq.dhs.gov.