OSAC Research Needs Assessment Form

Title of research need: Source Attribution for Post-Blast Residues

Keywords: Explosives, source attribution, probabilistic methods

Submitting subcommittee(s): Fire Debris and Explosives **Date Approved:** 5/12/2017

(If SAC review identifies additional subcommittees, add them to the box above.)

Background information:

1. Description of research need:

Development of methods capable of comparing explosive residues extracted from post-blast debris to a suspected source.

2. Key bibliographic references relating to this research need:

1. Howa J, Lott M, Chesson L, Ehleringer J. Carbon and nitrogen isotope ratios of factory-produced RDX and HMX. Forensic Science International. 2014;240(1):80–7.
2. Benson S, Lennard C, Hill D, Maynard P, Roux C. Forensic analysis of explosives using isotope ratio mass spectrometry (IRMS)—part 1: instrument validation of the DELTA[plus]XP IRMS for bulk nitrogen isotope ratio measurements. Journal of Forensic Sciences. 2010;55(1):193–204.
3. Benson S, Lennard C, Maynard P, Hill D, Andrew A, Neal K, et al. Forensic analysis of explosives using isotope ratio mass spectrometry (IRMS)—part 2: forensic inter-laboratory trial: bulk carbon and nitrogen stable isotopes in a range of chemical compounds (Australia and New Zealand). Journal of Forensic Sciences. 2010;55(1):205–12.
4. Barnette J, Lott M, Howa J, Podlesak D, Ehleringer J. Hydrogen and oxygen isotope values in hydrogen peroxide. Rapid Communications in Mass Spectrometry. 2011;25(10):1422–8
5. Howa J, Lott M, Ehleringer J. Observations and sources of carbon and nitrogen isotope ratio variation of pentaerythritol tetranitrate (PETN). Forensic Science International. 2014;244(1):152–7.
6. Gentile N, Siegwolf R, Delemont O. Study of isotopic variations in black powder: reflections on the use of stable isotopes in forensic science for source inference. Rapid Communications in Mass Spectrometry. 2009;23(16):259–2567.

3a. In what ways would the research results improve current laboratory capabilities?

Currently direct links and associations thereof between explosive residues extracted from post blast debris and a suspected source cannot be made.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Current methods or a knowledge base do not exist. This would be novel research. Future studies could build upon initial results.

3c. In what ways would the research results improve services to the criminal justice system?

Creation of direct links between criminal activity and suspect(s) would dramatically improve the investigation of these events.

4. Status assessment (I, II, III, or IV): I

	Major gap in current knowledge	**Minor** gap in current knowledge
No or limited current research is being conducted	**I**	**III**
Existing current research is being conducted	**II**	**IV**

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Subcommittee Approval date: 5/26/2017

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes ◯ No ◯

2. Does the SAC agree with the status assessment? Yes ◯ No ◯

If no, what is the status assessment of the SAC:

Approval date: 12Feb2018 [SAC voted yes to both questions]

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)