OSAC Research Needs Assessment Form

Title of research need: Validation of origin and cause determination protocols

Keywords: Validity, reliability, origin, cause

Submitting subcommittee(s): Fire/explosion investigation **Date Approved:** 1/28/16

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

Background information:

1. Description of research need:

Reliability and validity studies need to be conducted on current methodologies used to determine origin and cause. New methodologies could also be proposed and tested. Existing guidance in NFPA 921 does not fully address uncertainty, repeatability, and limitations associated with current methodologies used to determine origin and cause. There is a need for comprehensive statistically sound assessments of current methodologies.

2. Key bibliographic references relating to this research need:

- NFPA (2002) Recommendations of the Research Advisory Council on Post-fire Analysis – A White Paper. Fire Protection Research Foundation, Quincy, MA.
-NAS (2009). Strengthening Forensic Science in the United States: A Path Forward. National Research Council: Washington, D.C.
-NFPA 921 (2014). Guide for Fire and Explosion Investigations. NFPA: Quincy, MA.
-NFPA 1033 (2014). Standard for Professional Qualifications for Fire Investigator. NFPA: Quincy, MA.
-Cox, A (2013). Origin Matrix Analysis: A systematic methodology for the assessment and interpretation of compartment fire damage. Fire and Arson Investigator, 64(1) 37-47.
-Gorbett G, Morris S, Meacham B, Wood C (2015). A New Method for the Characterization of the Degree of Fire Damage to Gypsum Wallboard for Use in Fire Investigations. Journal of Forensic Sciences (60), S193-S196, doi: 10.1111/1556-4029.12616
-Mealy C, Gottuk D (2011). Full-Scale Validation Tests of a Forensic Methodology to Determine Smoke Alarm Response. Fire Technology (47) 275-289, doi: 10.1007/s10694-010-0154-0
-Gorbett G, Meacham B, Wood C, Dembsey N (2015). Structure and Evaluation of the Process for Origin Determination in Compartment Fires. DOI 10.1007/s10694-015-0553-3.

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

The research would quantify uncertainty, repeatability, and limitations associated with current methodologies used to determine origin and cause. The research could lead to more consistent and accurate methodologies.

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

The research would provide the scientific underpinnings to the subcommittee to allow a credible proposal to be submitted to the NFPA 921 and NFPA 1033 technical committees to enhance future editions of those documents.

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

Previous examples in fire investigations have led to erroneous conclusions and convictions owing to poor methodologies (*Texas v. Willingham*; *New York v. Villabos, et al.*). There is a lack of research on the validity of current methodologies. The research results will improve the reliability and scientific credibility of incendiary fire determinations.

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: 1/28/16

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

SAC

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

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

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

Approval date: 5/6/2016

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