

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need: Validation of Origin and Cause Determination Protocols

Describe the 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, reliability, and limitations associated with current methodologies used to determine origin and cause. There is a need for comprehensive statistically sound assessments of current methodologies.

Keyword(s): Validity, reliability, origin, cause

Submitting subcommittee(s): Fire & Explosion Investigation **Date Approved:** March 10, 2021

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

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

Yes. NFPA 921 speaks to a number of techniques but does not completely address uncertainty and limitations.

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

No.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

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 (2021). 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.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at <https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest>? Is your research need identified by NIJ?

No.

5. In what ways would the research results improve current laboratory 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.

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

See Number 5.

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

More reliable and accurate methodologies will enhance the basis of conclusion make regarding origin and cause.

8. 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.