OSAC Research Needs Assessment Form

Title of research need: Research and Evaluation of Storage Conditions for Archiving Extracts from Fire Debris Samples

Keywords: Fire debris, evidence preservation, activated carbon

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:

Preserving activated carbon extracts from fire debris samples for reanalysis by the defense or prosecution is currently accomplished by archiving (1) a portion of the activated carbon strip used for sample extraction or (2) re-adsorption of the analytical sample on the activated carbon strip by solvent evaporation. The effects of storage conditions and storage time on the reproducibility of the original analytical sample are not well characterized. Research is needed to determine the impact of storage conditions and times on the reproducibility of analytical results. The results of the research should be a recommendation for storage conditions and maximum storage time. Proposals should address methodology, analytical figures of merit, and statistical data analysis to be performed in support of the recommendations.

2. Key bibliographic references relating to this research need:

[1] Deng Z-y, Lu Z-b, Tian G-h, Liang G-f. Ignitable liquids extraction method for fire debris analysis: research on the adsorption using activated charcoal fiber. Xiaofang Kexue Yu Jishu. 2004;23:404-6.
[2] Edgington T, Natu A, Arnold L, Leclerc NR, Maurer S, Marx S. Adsorbent materials for extending produce shelf life. BASF Corporation, USA . 2016. p. 60pp.
[3] Oh K-J, Park D-W, Kim S-S, Park S-W. Breakthrough data analysis of adsorption of volatile organic compounds on granular activated carbon. Korean J Chem Eng. 2010;27:632-8.
[4] Hsieh C-T, Chen J-M. Adsorption energy distribution model for VOCs onto activated carbons. J Colloid Interface Sci. 2002;255:248-53.
[5] Sandercock, P.M.L. Retention of Gasoline and Diesel Fuel Samples of Charcoal: Evaluation of Long Term Preservation of Peetroleum Residues, Canadian Soc of Forensic Sci, 1997; 30(4): 219-224.

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

The research would substantiate a current laboratory practice or point to deficiencies in a current practice. In the latter case, the research would offer advice for development of a best practice for preservation of fire debris evidence on activated carbon strips.

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

Current practice is based on phenomenological observations from repeated measurements. While no quantitative study has been published, numerous individual re-evaluations of carbon strips that have been stored at room temperature in sealed vials have occurred, confirming the original analytical conclusion.

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

The results will provide a scientific and statistical basis for a current laboratory practice and ensure sample viability for reanalysis by both the prosecution and defense.

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

	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 (Yes) NO (NO)

2. Does the SAC agree with the status assessment? Yes (Yes) NO (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.)