OSAC Research Needs Assessment Form

Title of research need: Comprehensive GSR persistence study

Keywords: GSR, particulate size, secondary transfer, persistence

Submitting subcommittee(s): GSR **Date Approved:** 11/28/16

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

Background information:

1. Description of research need:

There have been numerous studies regarding the rate of loss of GSR particulates from surfaces such as skin and clothing, but few comprehensive peer-reviewed works or meta-data analyses. There is a need to understand the rate of particulate loss as a function of particulate size to determine the feasibility and viability of searching for smaller particulates and sub-micron particulates. The cost/benefit of utilizing these particulates in terms of information gained vs. scanning time needs to be understood as does the relative probative value of smaller particulates (<1μm).

2. Key bibliographic references relating to this research need:

[1] R. E. Berk, S. A. Rochowicz, M. Wong and M. A. Kopina. Gunshot Residue in Chicago Police Vehicles and Facilities: An Empirical Study. *J. Forensic Sci.* **2007**, *52*, 838.

[2] O. Dalby, D. Butler and J. W. Birkett. Analysis of Gunshot Residue and Associated Materials-a Review. *J. Forensic Sci.* **2010**, *55*, 924.

[3] Z. Brozek-Mucha. Chemical and Morphological Study of Gunshot Residue Persisting on the Shooter by Means of Scanning Electron Microscopy and Energy Dispersive X-Ray Spectrometry. *Microsc. Microanal.* **2011**, *17*, 972.

[3] S. Charles and N. Geusens. A Study of the Potential Risk of Gunshot Residue Transfer from Special Units of the Police to Arrested Suspects. *For. Sci Int.* **2012**, *216*, 78.

[4] M. I. Szynkowska, A. Parczewski, K. Szajdak and J. Rogowski. Examination of Gunshot Residues Transfer Using ToF-SIMS. *Surf. Interface Anal.* **2013**, *45*, 596.

[5] J. French, R. Morgan and J. Davy. The Secondary Transfer of Gunshot Residue: An Experimental Investigation Carried out with SEM-EDX Analysis. *X-Ray Spectrom.* **2014**, *43*, 56.

[6] Z. Brozek-Mucha. On the Prevalence of Gunshot Residue in Selected Populations - an Empirical Study Performed with SEM/EDX Analysis. *For. Sci Int.* **2014**, *237*, 46.

[7] M. Grima, R. Hanson and H. Tidy. An Assessment of Firework Particle Persistence on the Hands and Related Police Force Practices in Relation to GSR Evidence. *For. Sci Int.* **2014**, *239*, 19.

[8] J. French and R. Morgan. An Experimental Investigation of the Indirect Transfer and Deposition of Gunshot Residue: Further Studies Carried out with SEM-EDX Analysis. *For. Sci Int.* **2015**, *247*, 14.

[9] T. J. Hannigan, S. D. McDermott, C. M. Greaney, J. O'Shaughnessy and C. M. O'Brien. Evaluation of Gunshot Residue (GSR) Evidence: Surveys of Prevalence of GSR on Clothing and Frequency of Residue Types. *For. Sci Int.* **2015**, *257*, 177.

[10] L. Ali, K. Brown, H. Castellano and S. J. Wetzel. A Study of the Presence of Gunshot Residue in Pittsburgh Police Stations Using SEM/EDS and LC-MS/MS. *J. Forensic Sci.* **2016**, *61*, 928.

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

The results will guide evolution in laboratory practice as the results dictate. For example, the data could be incorporated in a future revision of ASTM 1588 that increases the efficiency and efficacy of SEM characterization of stub samples.

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

The results would assist the subcommittee in developing modifications of laboratory practice and procedure; these changes will be data-driven.

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

The data will be directly applicable to improving the efficiency and efficacy of laboratory analysis of GSR.

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: 11/21/16

(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: 11/28/16

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