

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need:

Keyword(s):

Submitting subcommittee(s):

Date Approved:

(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, this research need addresses the persistence of GSR particles, based on their particulate size, detected on surfaces and in the air after discharge of a firearm. There have been numerous studies regarding the rate of loss of GSR particles 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 particles and sub-micron-particles during an automated GSR analysis. The cost/benefit of utilizing these particles in terms of information gained versus SEM/EDS analysis time needs to be understood as does the relative value of sub-micron particles. The applicant must have experience and access to instrumentation using automated GSR software followed by manual confirmation of GSR particles by Scanning Electron Microscopy and Energy Dispersive X-Ray analysis.

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)?

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)

[1] R. Luten, D. Neimke, M. Barth, L. Niewoehner. Investigating Airborne GSR Particles by the Application of Impactor Technology. Forensic Chemistry. 2018, 8, 72.

[2] R. Berk, S. Rochowicz, M. Wong, and M. Kopina. GSR in Chicago Police Vehicles and Facilities: An Empirical Study. J. Forensic Sci. 2007, 52, 838.

[3] O. Dalby, B. Butler, and J. Birkett. Analysis of Gunshot Residue and Associated Materials- A Review. J. Forensic Sci. 2010, 55, 924.

[4] 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.

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

[6] M. Szykowska, A. Parczewski, K. Szajdak, and J. Rogowski. Examination of Gunshot Residue Transfer Using ToF-SIMS. *Surf. Interface Anal.* 2013, 45, 596.

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

[8] 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.

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

[10] 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.

[11] J. Hannigan, S. McDermott, C. Greaney, J. O’Shaughnessy, and C. 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.

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

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

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

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

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

The research results would improve the efficiency and efficacy of laboratory analysis of GSR.

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.