OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:	Consistency of GSR Patterns and Examiner Evaluation of Distance Determination GSR Patterns
Keywords:	Muzzle-to-target distance determination; Gunshot Residue, bracketing, distance determination, range estimation

R&D Need Rank: Low, Medium, High	Medium	**SAC Approved Date:**	9/3/2025

Submitting subcommittee(s): Firearms & Toolmarks

Research Need Summary:

The purpose of these research needs is to build a stronger scientific foundation for forensic science standards. The information provided herein will help to evaluate and strengthen existing standards, and/or fill any standards related gaps. In the space below, please provide a brief narrative of the need to be addressed. This should include:

- The identity of any specific standards that would be affected/improved/evaluated
- A discussion on gaps that exist within the standards or standards related gaps that need to be filled
- How this work would fill those gaps
- An overview of any current or past research efforts that may be relevant to this effort
- A discussion regarding how this research might improve current laboratory capabilities and/or forensic services within the criminal justice system
- Any relevant references

This research need has two parts: the first is to evaluate the use of a standard process for creating known distances in performing muzzle-to-garment distance determinations. This would then be used to study and better characterize the amount of variance observed between gunshot residue patterns when known variables (e.g., target material, ammunition, muzzle-to-target distance, firearm) are unchanged. The second is to evaluate the variance of examiner interpretations and reporting of distance determinations with the goal of standardizing bracket ranges for reporting muzzle-to-target distances.

References (not intended to be a comprehensive list on this topic):

- Crego, L, Distance Determination Results When Utilizing the Same Make, Model and Barrel Length Firearms, AFTE Journal, 2011, Vol. 43, No. 4
- Nichols, R., Gunshot Proximity Testing: A Comprehensive Primer in the Background, Variables and Examination of Issues Regarding Muzzle-to-Target Distance Determinations; AFTE Journal, 2004, Vol. 36, No 3
- Smith, R, Differences in Smokeless Propellant Grain Morphology: Predictable Effects on Muzzle-to-Target Distance Determination; AFTE Journal, 2015, Vol. 47, No. 3
- SWGGUN Guidelines for Gunshot Residue Distance Determinations, AFTE Journal, 2012, Vol. 44, No. 4

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.