Response to the STRP Final Report
2022-S-0002

Standard Practice for the Identification of Compounds Related to Organic Gunshot Residue (OGSR) by Gas Chromatography-Mass Spectrometry (GC-MS)

Scientific and Technical Merit

1.1 Consensus View – The STRP finds this draft standard to be scientifically and technically sound to establish minimum requirements for the qualitative identification of organic compounds typically associated with the discharge of a firearm (organic Gunshot Residue or OGSR) using gas chromatography-mass spectrometry (GC-MS). The draft standard describes the analytical criteria for a GC-MS assay including typical target compounds and quality assurance and quality control procedures. Example instrumental operating procedures are included which will be useful to forensic science service providers (FSSPs). A detailed table in the standard describes typical target analytes and includes target ions and references. The draft standard is limited to the analytical methodology and compound identification. It does not describe or address interpretation of the analytical results for an analyst to render a conclusion or opinion with respect to the presence or absence of OGSR

This document is not designed to aid in the rendering an opinion on the presence or absence of OGSR, just the identification of compounds that are related to OGSR.

Human Factors

2.1. Consensus View –The standard, as revised, provides significant and valuable procedures for reducing potential biases. Much of this work is done by articulating clear criteria for examiners to consider when evaluating, documenting, and interpreting results. By specifying appropriate criteria for these critical steps, the standard appropriately mitigates subjective judgments to reduce the potential for cognitive biases that may influence conclusions.

While most sections of the standard provide criteria for evaluation and interpretation that are sufficiently specific to reduce cognitive biases and other human factors concerns, there are some exceptions. One remaining concern is Section 8.3.2.5 (background subtraction). A previous comment flagged this section but did not offer specific guidance on a proposed revision. The STRP suggests revisions to this section that: (1) specify the conditions or specific criteria for examiners to address when deciding whether background spectral subtraction is appropriate; and (2) either specify a validated procedure or provide normative references on validated methods for selecting appropriate background control samples and performing spectral subtraction.

Regarding Section 8.3.2.4. (background subtraction), we have updated the language in this section to “When blank subtraction is performed, use the blanks described in 9.2.2.”

The directive in sections 8.3.2.3 and 8.3.2.4 are vague (e.g., “generally agree”, “majority”, “similar”). If it is not feasible to assign specific values (such as the 5% criteria for low abundance ions), explanations are vital. Analysts must clearly explain in their notes why they are or are not considering differences (e.g., missing or extra peaks or % relative abundance differences) between the certified reference material (CRM) and known spectra as part of compound identification.

Regarding 8.3.2.3. and 8.3.2.4. have been updated to remove any vagueness. These sections now read as follows:

8.3.2.3. The fragmentation patterns and relative abundance of target ions in the mass spectra of the unknown sample and the reference OGSR sample must not have unexplainable differences across the majority of the ions.

8.3.2.3.1 Analysts must document reasons for considering or not considering differences between the spectra.

8.3.2.4. When blank subtraction is performed, use the blanks described in 9.2.2.

Criteria for Selected Ion Monitoring (SIM) analysis (such as # ions) should be spelled out if the scope of the analysis is to include SIM methodology

Criteria for Selected Ion Monitoring analysis has been provided in the note for Table 1, where we indicate that SIM should be performed using all target ions provided in Table 1.

Quality Assurance

3.1. Consensus View – The STRP believes that quality assurance and quality control procedures are properly addressed in Section 9 of this standard.

The committee agrees with the STRP panel

Scope and Purpose

4.1. Consensus View – The STRP believes that the scope and purpose of the standard is clearly stated.

The committee agrees with the STRP panel

Terminology

5.1. Consensus View – The STRP believes that all relevant terminology is clearly defined in the draft standard.

The committee agrees with the STRP panel

Method Description

6.1. Consensus View – The STRP believes that the draft standard provides sufficient information in the method description. Concerns regarding compound identification procedures are described in Human Factors.

The committee agrees with the STRP panel. The committee has updated the document to reflect the Human Factors comments.

Report Results

7.1. Consensus View – This topic was not applicable to this draft standard. It does have a “Records” section that describes what data and information is to be recorded and stored. The STRP believes this section is adequate given the scope of the draft standard.

The committee agrees with the STRP panel