Scientific & Technical Review Panel Final Report for OSAC 2022-S-0019 Standard Guide for Forensic Examination of Fibers

Organization of Scientific Area Committees (OSAC) for Forensic Science

STRP Final Report
OSAC 2022-S-0019 Standard Guide for Forensic Examination of Fibers

Organization of Scientific Area Committees (OSAC) for Forensics Science
October 19, 2022

Disclaimer:

This report was produced by an independent Scientific and Technical Review Panel (STRP). The views expressed in the report do not necessarily reflect the views or policies of the U.S. Government. Visit the OSAC website for more information on OSAC's STRP process.

Scientific & Technical Review Panel Members

- David Green (Chair), Lake County Crime Laboratory
- Madeline Ausdemore, Los Alamos National Laboratory
- Simon Cole, University of California, Irvine
- Cary Oien, FBI Laboratory
- Elaine Pagliaro, University of New Haven
- Will Randle, Missouri State Highway Patrol
- Emily Runt, Boston Police Crime Laboratory
- Kristy Sekedat, Michigan State Police

Report Summary:

The Scientific and Technical Review Panel (STRP) for "Standard Guide for Forensic

Examination of Fibers" is an independent panel appointed by the National Institute of Standards and Technology (NIST). A STRP is established with a range of experts to consider how well a standard meets the needs of the forensic science, law enforcement, and legal communities, and to recommend improvements to the standards under review. The STRP appreciates the efforts of Candie Shegogue, Trace Materials Subcommittee member, while serving as the subcommittee liaison to this STRP during the review process.

The STRP began its review process with a kickoff meeting on April 12, 2022, and concluded with this STRP final report. The panel reviewed the draft standard and prepared comments for the Trace Materials Subcommittee.

Report Components:

The STRP reviewed this draft standard against OSAC's *STRP Instructions for Review* which include the following content areas: scientific and technical merit, human factors, quality assurance, scope and purpose, terminology, method description and reporting results. The details below contain a brief description of each reviewed content area and the STRP's assessment of how that content was addressed in the draft OSAC Proposed Standard.

1. **Scientific and Technical Merit:** OSAC-approved standards must have strong scientific foundations so that the methods practitioners employ are scientifically valid, and the resulting claims are trustworthy. In addition, standards for methods or interpretation of results must include the expression and communication of the uncertainties in measurements or other results.

    1.1 Consensus View - The STRP believes the draft "Standard Guide for Forensic Examination of Fibers" clearly documents the basic activities involved in a fiber examination, including evidence handling techniques, sample preparation, microscopical and analytical techniques, and how to evaluate the results of the examination. The draft standard appropriately describes the various microscopical and analytical techniques available to a fiber examiner, providing excellent detail on the strengths and limitations of the various techniques. The visualization of these various techniques and the definition of those techniques that are highly recommended were especially useful (see **Table 2** in the draft standard). The draft standard is thorough, well written, contains suitable references, and provides clear guidance on the conclusions that can be reached in a forensic fiber examination.

    1.2 Minority View - None

2. **Human Factors:** All forensic science methods rely on human performance in acquiring, examining, reporting, and testifying to the results. In the examination phase, some standards rely heavily on human judgment, whereas others rely more on properly maintained and

calibrated instruments and statistical analysis of data.

2.1. Consensus View - The STRP finds that the document appropriately addresses human factors by discussing the importance of mitigating contextual bias and suggesting some measures to do so. The panel suggests that what is described in Section 6.2.2 is better characterized as "contextual information" than "contextual bias." The panel also suggests that the measures described in Sections 6.2.4 and 6.2.5 are not "Precautions to minimize bias," as stated in Section 6.2. Rather, the panel suggests this section follow a different description such as "Measures to correct errors or

problems caused by bias can include:". In the comment period, the panel suggested that examiners performing instrumental analyses might be blinded to the factors listed in Section 11.1.2, but the panel was not unanimous about the practicality or desirability of such a procedure. The panel accepts the subcommittee's explanation that resources would prevent some forensic service providers (FSPs) from adopting the procedures and views the document as acceptable from a human factors perspective. The panel notes, for the record, the existence of these resource constraints that prevent the consideration of what might be a useful procedure.

2.2. Minority View - None

3. **Quality Assurance:** Quality assurance covers a broad range of topics. For example, a method must include quality assurance procedures to ensure that sufficiently similar results will be obtained when the methodology is properly followed by different users in different facilities.

3.1. Consensus View - The STRP believes this draft standard adequately addresses quality assurance. In sections 6 and 10 of the document, the significance of employing a quality assurance program (such as ISO17025) is described, as well as documenting verification and participating in a technical review process. The document also describes the importance of evaluating the unknown sample prior to the known sample and employing less/non-destructive techniques as much as possible in the workflow.

3.2. Minority View - None

4. **Scope and Purpose:** Standards should have a short statement of their scope and purpose. They should list the topics that they address and the related topics that they do not address. Requirements, recommendations, or statements of what is permitted or prohibited do not belong in this section.

4.1. Consensus View - Upon review and discussion, the STRP believes this document appropriately addresses the scope and purpose. This document serves as a guide to ensure interlaboratory forensic fiber examinations are conducted systematically and consistently. The document clearly defines its limitations: it is only intended for fully

trained and competent forensic fiber examiners and does not address all possible safety considerations. The document also provides relevant references for procedures of techniques described within this document.

4.2. Minority View - None

5. **Terminology:** Standards should define terms that have specialized meanings. Only rarely should they give a highly restricted or specialized meaning to a term in common use among the general public.

5.1. Consensus View - The STRP finds that the draft standard clearly defines appropriate terms with specialized meaning commonly employed by forensic fiber examinations. The

document generally balances the need for definitions while avoiding defining commonly used terminology. The STRP recommends using OSAC and ASTM - preferred terms, when available.

5.2. Consensus View - The STRP recognizes that there may be some confusion by some individuals about the terms “technical review” and “verification” as used in the draft standard if those persons are not forensic fiber examiners. This may be especially true since “verification” has specific meanings in other disciplines such as fingerprint analysis. The committee recommends that the standard clarify the meaning of “verification” within the forensic fiber analysis discipline.

5.3. Consensus View - The STRP feels the standard should reference other published standards or the OSAC Lexicon or include a definition, when appropriate, to clarify ambiguous terminology such as “exclusionary differences.”

6. **Method Description:** There is no rule as to the necessary level of detail in the description of the method. Some parts of the method may be performed in alternative ways without affecting the quality and consistency of the results. Standards should focus on standardizing steps that must be performed consistently across organizations to ensure equivalent results. Alternatively, standards can define specific performance criteria that are required to be demonstrated and met rather than specifying the exact way a task must be done. For example, it may be enough to specify the lower limit for detecting a substance without specifying the equipment or method for achieving this limit of detection.

6.1 Consensus View – The STRP believes the proposed standard meets the Method Description requirement. The method provides alternative ways to identify and compare fibers while including minimum requirements that will provide consistency across laboratories. Minimum requirements are stated for the identification of fibers (e.g., 9.4 - stereomicroscope, light microscope, and PLM) and for the comparison of fibers (e.g., 9.4 stereomicroscope, light microscope, PLM, comparison microscopy and one unspecified color comparison technique). At least ten additional techniques are described that may be used for both identification and comparison purposes.

The STRP suggested a revision that was incorporated into the standard that now

appears to be inappropriate. In 8.4.1 “round colorless polyester” was added to colorless cotton and cotton denim as examples of fibers that are so common they are of limited evidential value. While it is understood that round colorless polyester fibers have less evidential value than colored non-round polyester fibers, they have more evidential value than colorless cotton or denim cotton due to variations observed in diameter, amount of delustrant, and refractive indices. Furthermore, round colorless polyester fibers, though common, are less commonly found than cotton. Sections 11.2 and 11.3 do appropriately address concerns regarding fiber discrimination and relevant populations, and how these factors affect the significance of an association. As such, it is recommended that “round colorless polyester” be deleted from 8.4.1.

6.2. Minority View - None

7. **Reporting Results:** Methods must not only be well described, scientifically sound, and comprehensive, but also lead to reported results that are within the scope of the standard, appropriately caveated, and not overreaching.

7.1. Consensus View – Although this draft standard includes sections for Results (Section 10) and Evaluation of the Results (Section 11), it does not include a section on Reporting Results. It is our understanding that a separate standard is being drafted, but not available at this time, titled: Standard Guide for Interpretation and Reporting in Forensic Comparisons of Trace Materials. The document also references ASTM standards related to report writing (E620). Therefore, the STRP believes the draft standard is sufficient at this time without the inclusion of more specific guidance on the interpretation and reporting of opinions.

7.2. Minority View - None