



Scientific & Technical Review Panel Final Report for OSAC 2022-S-0017 Standard Guide for Microspectrophotometry in Forensic Fiber Analysis

Organization of Scientific Area Committees (OSAC) for Forensic Science





STRP Final Report OSAC 2022-S-0017 Standard Guide for Microspectrophotometry in Forensic Fiber Analysis

Organization of Scientific Area Committees (OSAC) for Forensics Science
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Report Summary:

The Scientific and Technical Review Panel (STRP) for “Standard Guide for Microspectrophotometry in Forensic Fiber Analysis” 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 7, 2022, and concluded with this STRP final report. The panel reviewed the draft standard and prepared comments for the [Trace Materials Subcommittee | NIST](#).

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 “Standard Guide for Microspectrophotometry in Forensic Fiber Analysis” (draft standard) clearly documents that color is an inherent and highly discriminating property of fibers and that colorimetric measurements are a valid and useful component of a forensic fiber examination. The instrument and methodology described allows measurements of absorption in the visible wavelength range to be made on fiber samples in an objective and reproducible way, including suitable guidance on selection of instrumental parameters, and adequate descriptions of protocols for verifying proper and consistent instrument function. The draft standard suitably places the described methodology within the overall context of a forensic fiber examination, outlining both techniques which provide information about fiber composition and other techniques which can be used for comparing and measuring color/dye content of fibers. The draft standard also provides guidance on the use of spectral measurements acquired using microspectrophotometry in comparing fiber samples and reporting conclusions, including limitations of the technique.

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 believes that this draft standard adequately addresses issues related to human factors and performance. The standard explicitly recognizes the relevance of human factors such as experience, training, and proficiency, and the

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need to conduct consistent or similar analytical parameters to evaluate data and to compare spectra. The methods described provide objective measurement of the color of samples. In addition, the standard makes it clear that this is only one part of a multi-analytical approach used in the analysis of fibers and cannot be relied upon as the sole means of determining possible source attribution.

2.2. Consensus View - The STRP also believes that human factors are further considered in additional documents such as *OSAC 2022-S-0029 Standard Guide for Interpretation and Reporting in Forensic Comparisons of Trace Materials*, which must be used to guide the examiner in reaching appropriate conclusions after conducting this analysis and reporting findings.

2.3. 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. Instrument performance, interpretation of data, and required documentation are discussed in various sections. The draft references standards including ASTM E3255 and E620, which discuss quality assurance and report writing, respectively. ISO 17025 is also referenced in the draft. We have become aware that a quality assurance document for the trace evidence discipline will be published in the future, which will be more robust in the quality assurance guidelines for trace evidence Forensic Science Practitioners.

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 - The STRP views the language set forth in the scope and purpose to be well defined for use as a standard guide for a competent forensic science

practitioner, clearly delineating that this document/technique is intended to be used as one part of a larger pool of techniques. With this audience in mind, the proposed language and terminology of the document is appropriate for the specified purpose and scope.

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 defines appropriate terms with specialized meaning within the application of microspectrophotometry to fiber evidence. The STRP notes that while the terminology and definitions are appropriate for the intended audience of this draft standard (i.e., forensic science practitioners), the terminology and definitions may not be inherently familiar to a non-expert.

5.2. Consensus View - The STRP believes that this Standard Guide would benefit from the addition of the definition of “exclusionary difference” in the Terminology Section (Section 3). The following OSAC Preferred Term for Exclusionary Difference (08/02/2022) should be used: “A difference in one or more characteristics between compared items that is sufficient to determine that the compared items did not originate from the same source, are not the same substance, or do not share the same composition or classification. NOTE: What is sufficient depends on the performance and limitations of the method used on the material in question.”

5.3. Minority View - None

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 considers the draft standard to meet the method description requirement. This is based on the observation that the standard provides a cogent description of the rationale for performing the testing (sections 4.3 and 5.1-5.2). It provides a clear rationale for the standard (section 5.3) and describes conditions that may impact the results or limit their value (section 5.4). The draft

standard provides a useful description of the required sample preparation and handling (section 6), and a detailed description of the performance checks required (section 7). Section 8 of the document provides essential information on the components of the optics and detection systems comprising the instrument and their optimization. Section 9 provides substantial guidance on conducting the measurements. Section 10 provides useful guidance for interpreting the results of the measurements. The STRP verified that the standard minimizes ambiguity while leaving the document sufficiently flexible to be of value for use with a wide range of microspectrophotometric instrumentation. The overall level of detail is also sufficient to make it useful and instructive to practitioners.



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 - The STRP has found the measurement methods detailed in this guide to be sufficiently well described and scientifically sound but notes that the interpretation and reporting guidelines provided are quite broad (e.g., 11.1 details necessary to support the interpretations). In combination with ASTM E620 *Practice for Reporting Opinions of Scientific or Technical Experts*, the guidance provided in Section 10 for comparison and interpretation of data is well laid out for a competent forensic science practitioner in what details can support their interpretations, but the standard does not adequately define “exclusionary differences”. If the OSAC Preferred Term of “Exclusionary Differences” is added to Section 3 Terminology, the interpretation and reporting will also then be scientifically sound and sufficiently well described.

- 8/2/2022 OSAC Preferred Term for Exclusionary Difference: *A difference in one or more characteristics between compared items that is sufficient to determine that the compared items did not originate from the same source, are not the same substance, or do not share the same composition or classification.* NOTE: What is sufficient depends on the performance and limitations of the method used on the material in question.

7.2. Minority View - None

