A Guide to ASB Standards

September 2024

The Organization of Scientific Area Committees for Forensic Science, or OSAC, was established in 2014, in collaboration with NIST and the U.S. Department of Justice (DOJ) to help the forensic science community establish standards and best practices. These standards, published to the OSAC Registry, are developed in partnership with private standards developing organizations (SDOs).

This document is aimed at helping standards users understand standards on the OSAC Registry, particularly those published by the Academy Standards Board (ASB). In addition to the specific standard appearing on each page, references are drawn from the Manual and Style Guide for ASB Standards, Guidelines, Best Practice Recommendations, and Technical Reports.

ANSI/ASB

ANSI/ASB produces the following document types:

- **Standard:** ANSI/ASB uses the word "standard" as a term of art to mean *only* its documents that set out "*objectively measurable requirements* for a given topic or set of actions." Academy Standards Board, *Manual and Style Guide for ASB Standards, Guidelines, Best Practice Recommendations, and Technical Reports* 001 1.1, 3rd Ed. 2021 (rev. 2022) (emphases added) (hereinafter, "ANSI/ASB Guide"). ANSI/ASB standards must express their requirements "as imperative sentences or stated in 'shall' language" and be capable of being "assessed by one or more forms of conformity assessment procedures," such as accreditation 1.2.1 A.1.1.1.
- **Best practice recommendation ("BPR")**: A BPR "identifies and sets forth the optimal way to carry out an action or actions. A BPR may include choices and the variants between them as a means of demonstrating optimal choices in different circumstances." *Id.* at 1.1.
- **Guideline:** An ANSI/ASB Guideline "provides information and advice on processes and activities contained in a Standard or [best practice recommendation], or guides users on the implementation of a standard or series of standards. A Guideline may include recommendations but *does not* establish best practices." *Id.* at 1.2 (emphasis added). It "is written in 'should' language and is informative rather than directive." *Id.* at 1.2.2. a "Guideline in and of itself is not appropriate for conformity assessment." *Id.* at 1.2.2.
- **Technical reports**: ANSI/ASB technical reports are "explanatory, information-only document[s]." *Id.* at 1.4.

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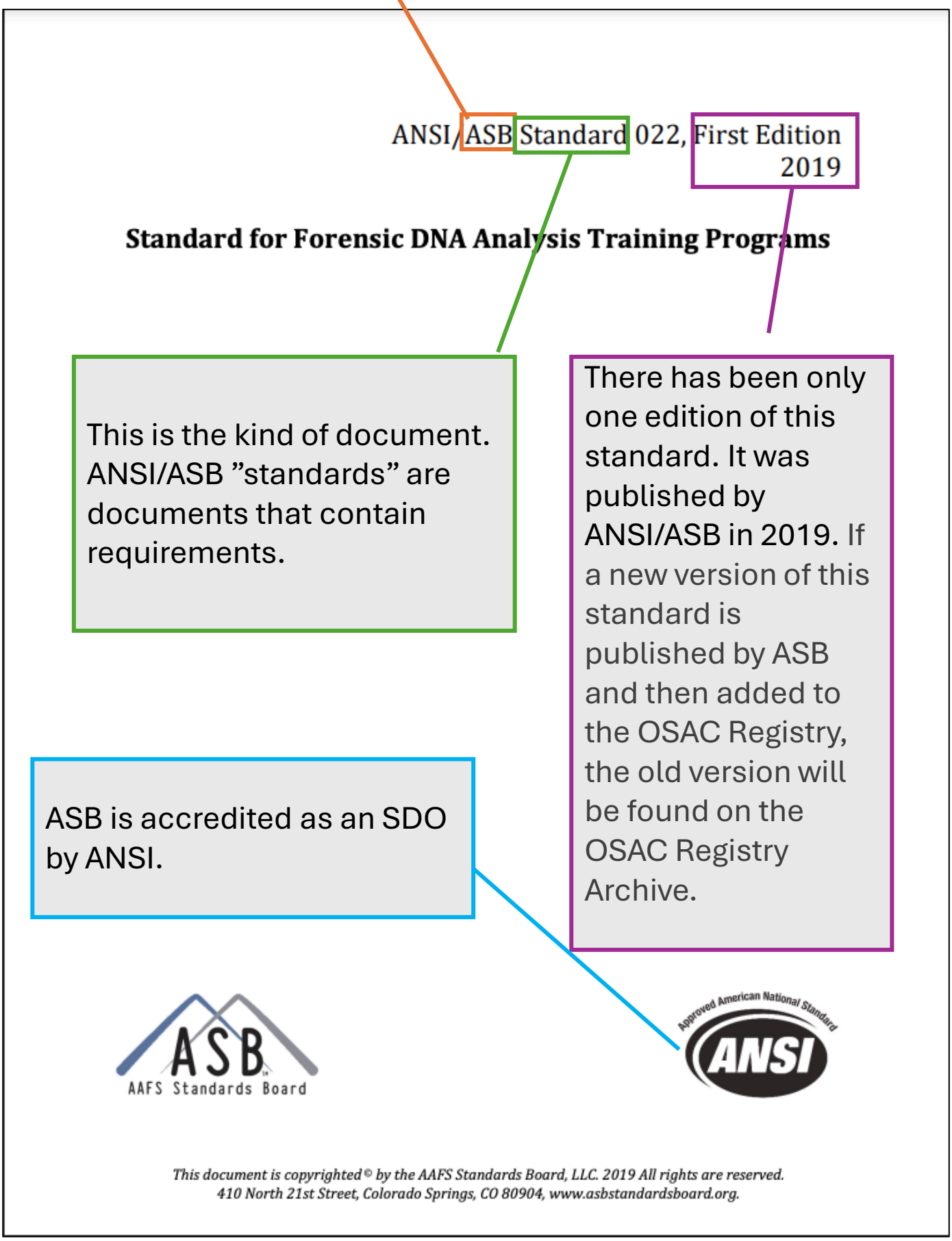
ANSI/ASB Cover page

ASB is the standards developing organization that produced this standard.



This is the kind of document. ANSI/ASB ”standards” are documents that contain requirements.

There has been only one edition of this standard. It was published by ANSI/ASB in 2019. If a new version of this standard is published by ASB and then added to the OSAC Registry, the old version will be found on the OSAC Registry Archive.

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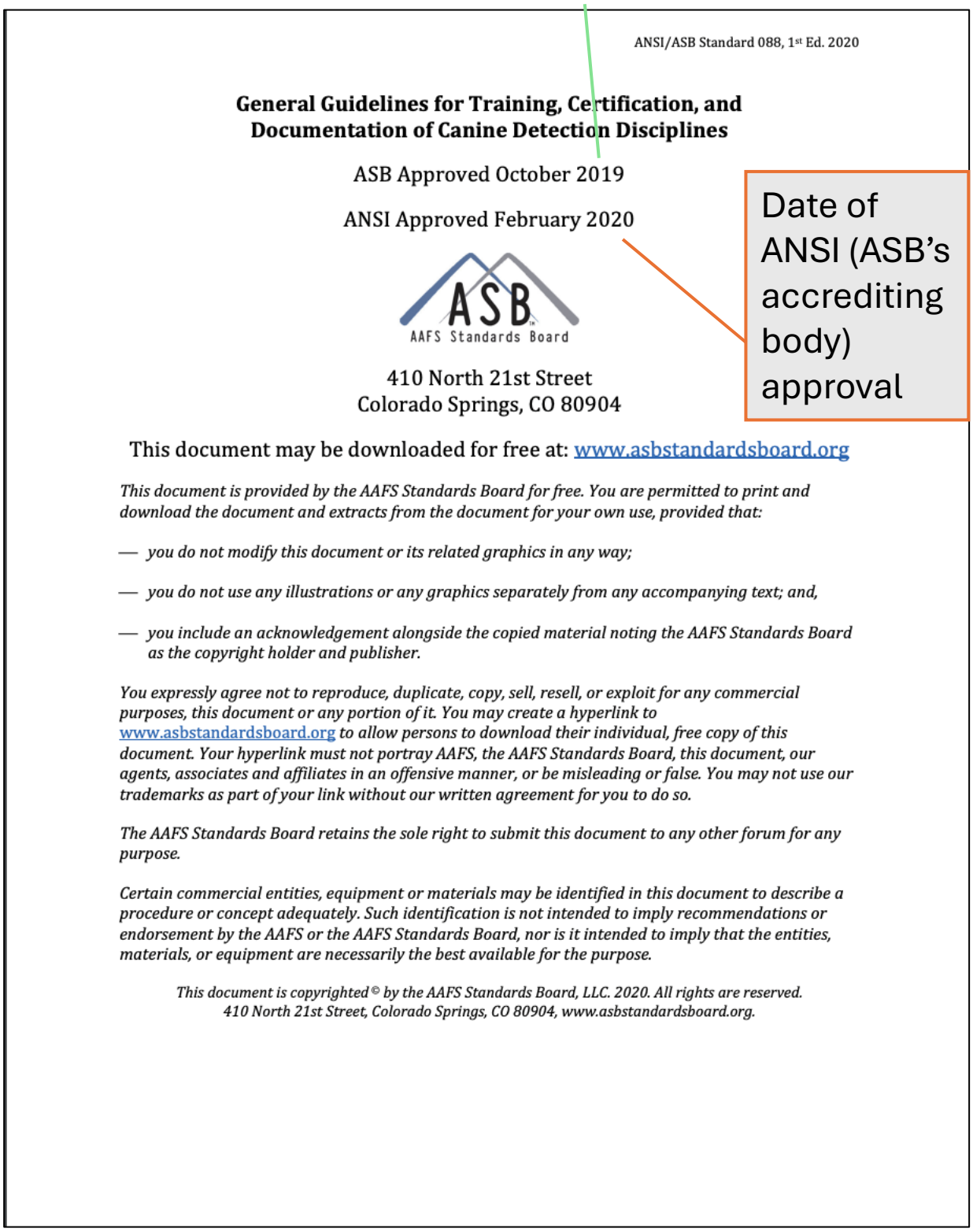
ANSI/ASB Title Page

Date of ASB approval. The date of approval to the OSAC Registry can be found on the OSAC Registry webpage.



ANSI/ASB Standard 088, 1st Ed. 2020

General Guidelines for Training, Certification, and Documentation of Canine Detection Disciplines

ASB Approved October 2019

ANSI Approved February 2020

Date of ANSI (ASB's accrediting body) approval

ASB
AAFS Standards Board

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ANSI/ASB Foreword

The foreword serves to lay out the general scope and goals of the document and the scientific ground it intends to cover. After reading the Foreword, the user should understand the purpose of the document, where it came from, and other documents or materials that are necessary or important for understanding it.

Foreword

This standard defines the minimum requirements for a Forensic DNA Analyst training program for human mitochondrial DNA analysis, interpretation, comparison, statistical evaluation, and reporting. The aim is to provide a framework for training that will result in quality and consistency in the forensic DNA community.

This document is part of a series of training documents under ANSI/ASB Standard 022, *Standard for Forensic DNA Analysis Training Programs*.

This document was revised, prepared, and finalized as a standard by the DNA Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Biology/DNA Biological Data Interpretation and Reporting Subcommittee, the Biological Methods Subcommittee, and the Wildlife Forensic Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

The AAFS Standards Board (ASB) is an ANSI-accredited Standards Developing Organization with the purpose of providing accessible, high quality science-based consensus forensic standards. The ASB is a wholly owned subsidiary of the American Academy of Forensic Sciences (AAFS), established in 2015 and accredited by the American National Standards Institute (ANSI) in 2016. The ASB consists of Consensus Bodies (CB), which are open to all materially interested and affected individuals, companies, and organizations; a Board of Directors; and Staff.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

The foreword may explain where a document was originally drafted. Most documents originate in an OSAC subcommittee, or as here, subcommittees; others may have begun as SWG documents (for example, ANSI/ASB 88, *General Guidelines for Training, Certification, and Documentation of Canine Detection Disciplines, 1st Ed. 2020*),

The foreword may explain how a document is situated compared to others. This standard, for example, is a part of a series. A user looking for more specific requirements for training would know to look at additional standards.

Other standards (for example, ANSI/ASB Standard 017, *Standard Practices for Measurement Traceability in Forensic Toxicology.* 1st Ed. 2018), are foundational, which means more detailed standards are expected to be based on them.

The **Foreword** may also expressly state the other documents that a standard must be read together with (for example, ANSI/ASB Standard 040, *Standard for Forensic DNA Interpretation and Comparison Protocols.* 1st Ed. 2019).

Keywords: *training, human Mitochondrial DNA, interpretation.*

The foreword will include key words, which can help users understand how standards fit together.

ANSI/ASB Scope, References, and Terms & Definitions

The Scope section lays out what "the document does. It is a statement of facts and does not include requirements or recommendations." ANSI/ASB Guide 11.

The scope may also expressly state what the document does not cover, as here. Given the potential overlap between standards covering similar or related scientific techniques or issues, knowing the ostensible limits to a document can be important.

Terms and definitions are critical to the understanding of a standard, even for readers who are otherwise familiar with the scientific terms at issue. Standards and other documents may use terms or define terms differently or at a different level of precision than in the vernacular writ large, and they may be used differently across standards.

Standard for Training in Forensic Serological Methods

1 Scope

This standard provides the general requirements for a forensic serology training program to evaluate body fluids, stains, or residues related to forensic investigations.

This standard does not address training in forensic DNA analysis procedures.

2 Normative References

The document contains no normative references. See Annex A, Bibliography for other references.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1
confirmatory test
A test that is specific for the presence of a body fluid, stain, or residue of interest, and reduces or eliminates false positive results.

3.2
contamination
The unintentional introduction of exogenous materials or substances into a test sample.

3.3
forensic serology
The detection, characterization, identification, and/or typing of body tissues and fluids, either in native form or as stains or residues left at a crime scene using physical methods (e.g. normal and enhanced lighting), biochemical assays, reactions and/or microscopy.

3.4
presumptive test
A screening test that indicates the possible presence of a material of interest. A positive presumptive test result does not constitute the identification of that material. A negative presumptive test indicates that the material of interest was not detected; it is not confirmation of its absence. Presumptive tests are sensitive but not specific and can lead to false positive results.

3.5
technical designee
The designated individual in the laboratory who has technical responsibility.

4 Requirements

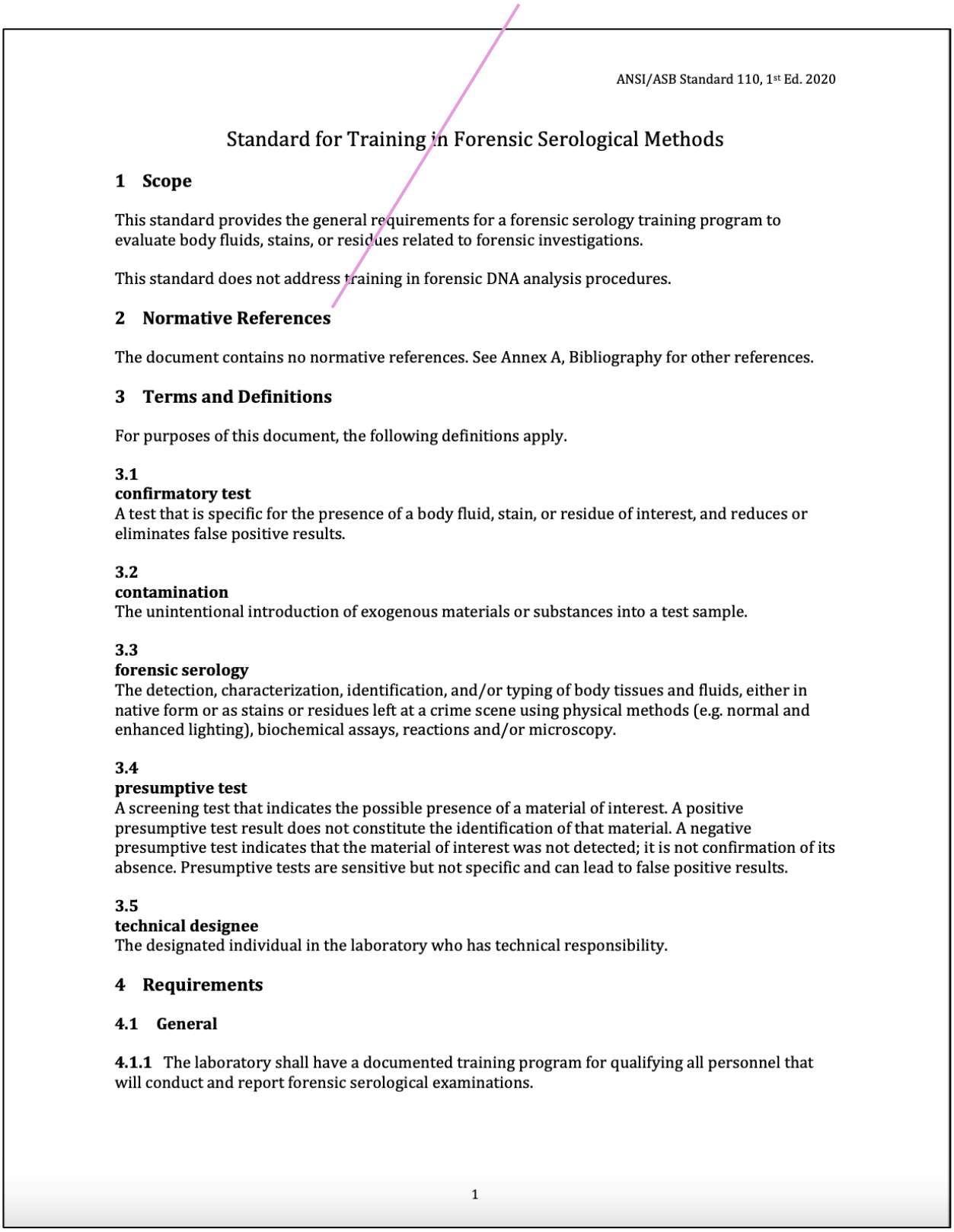
4.1 General

4.1.1 The laboratory shall have a documented training program for qualifying all personnel that will conduct and report forensic serological examinations.

ANSI/ASB Normative References

Although the Foreword will often contain some information about the array of standards against which a document is to be read, the most critical references are found in the Normative Reference section.

While other references may be important or helpful for a fuller understanding, "[n]ormative references . . . are *indispensable* for the application of the document, i.e., the document cannot be implemented without them." ANSI/ASB Style Guide 12.1 (emphasis added). A standard thus must be read in conjunction with anything listed as normative, such as a reference or annex. Failing to read the normative documents alongside the document could lead to misinterpretation. For an example, see ANSI/ASB 023, *Standard for Training in Forensic DNA Isolation and Purification Methods*. 1st Ed. 2020 and its normative reference, ANSI/ASB 022, *Standard for Forensic DNA Analysis Training Programs*. 1st Ed. 2019.



ANSI/ASB Standard 110, 1st Ed. 2020

Standard for Training in Forensic Serological Methods

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4 Requirements

4.1 General

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1

ANSI/ASB Recommendations

3.7
lift
An adhesive or other medium used to capture and preserve an impression.

3.8
oblique lighting
Illumination from a light source that is at a low angle of incidence, or even parallel, to the surface of the item. (Also known as **side lighting**.)

3.9
wet origin impression
An impression formed under wet conditions including impressions consisting of residues of blood, grease, mud and other wet substances.

4 Recommendations

4.1 Equipment

The following equipment may be used.

a) Electrostatic Lifting Device (ESLD).

b) Large sheets or rolls of electrostatic lifting material to conduct blind searches.

c) Light sources of sufficient type and intensity to allow for detection of impressions.

NOTE Light sources may include natural light, incandescent light, fiber optic, fluorescent light sources, flashlights, or alternate light sources of varying wavelengths.

d) Materials for physical and chemical enhancement.

The core of an ANSI/ASB Best Practice or Guideline will be found after Terms and Definitions. It may have a formal "Recommendations" header.

4 Written and Oral Opinions

4.1 Written expert toxicological opinions regarding the interpretation of analytical toxicology findings should not be part of the basic analytical toxicology report. A separate expert report should be used to convey such opinions.

4.2 Written expert toxicological opinions should include a comment that states that the opinions may be subject to change based upon new information that becomes available (e.g., case history, additional analytical testing, new research findings and publications, etc.).

4.3 An expert toxicological opinion, whether written or oral, should:

a) be expressed in a clear, coherent manner;

b) be based on established scientific principles and foundations;

c) be based on the totality of information available, including case history, observations, circumstances, and other relevant information, and not based solely on analytical results;

d) include information on case specific documents and records reviewed;

e) have references that support the opinion[1];

f) clearly state any assumptions made; and

g) clearly state any known limitations of the opinion

5 Expert Toxicological Opinions and Testimony

5.1 General

5.1.1 See the *SWGTOX Standard for Laboratory Personnel* and *SWGTOX Standard for Breath Alcohol Personnel* for recommended education, certification, and training/work experience for providing interpretive opinions related to the results of toxicological tests for court or investigative purposes.

5.1.2 A toxicologist may be asked to express an expert opinion or to testify as a fact or expert witness.

5.1.2.1 Fact witnesses typically testify to the work performed in the laboratory that includes scientific principles, instrumentation, quality assurance procedures, and/or chain of custody.

5.1.2.2 Expert witnesses typically testify to their own interpretation of results and/or opinions.

Other Best Practices or Guidelines may not have the header and proceed directly into the recommendations.

Note the use of the word "should."

ANSI/ASB Technical Reports

The core of an ANSI/ASB Technical Report may include “technical research, findings, terms & definitions, emerging technologies, or techniques.”

Here, the Technical Report summarizes footwear and tire examination practice.

Scope of Work for a Footwear/Tire Examiner

1 Scope

This technical report covers the primary responsibilities, types of examinations, and constituent duties of a footwear/tire examiner for lab management, quality assurance, law enforcement and the judiciary. By omission it describes the types of examination that should not be performed by someone in this role.

2 Normative References

The document contains no normative references. See Annex A, Bibliography for other references.

3 Terms and Definitions

Please refer to terms and definitions included in ASB Technical Report 097, *Terminology Used for Forensic Footwear and Tire Evidence*, First Edition 2019[1].

4 Summary of Footwear or Tire Examination Practice

4.1 Forensic footwear or tire examiners undertake the following tasks: documenting, collecting and preserving footwear and tire evidence, and analyzing and comparing footwear or tire impressions.

4.2 Examiners’ responsibilities include:

— determining the manufacturer, make, or model of the source of a questioned impression;

— comparing questioned impressions;

— determining the manufacturer, make, or model of an item of footwear or tire from an image or video;

— providing expert opinions regarding source conclusions;

— writing reports and providing testimony.

4.3 General duties in this field include:

— detecting footwear or tire impressions;

— preserving footwear or tire impressions;

— collecting and recovering footwear or tire evidence;

— documenting footwear or tire evidence;

[1] https://www.aafs.org/academy-standards-board

ANSI/ASB Requirements

The core of an ANSI/ASB Standard will typically be found in the "Requirements" Section.

Note the use of the word "shall."

3.11
Phase-Shifting Interferometric Microscopy[c]
PSI
Surface topography measurement method whereby an optical microscope with illumination of a known effective wavelength is integrated with an interferometric attachment and produces multiple successive optical images with interferometric fringes from which the profile or areal surface topography image is calculated.

3.12
photometric stereo
Surface topography measurement method in computer vision for measuring the surface normals of a surface by observing that surface under different lighting conditions. Given sufficient independent light sources, the surface normals, and thus surface geometry, can be determined for every position on the surface.

3.13
processed data
Ordinate values that have been processed (e.g., trimmed, filtered, and/or interpolation applied).

3.14
raw data
Ordinate values that come directly from the instrument which have not been manipulated (e.g., trimmed, filtered, and/or interpolation applied).

3.15
reference datafile
A reference measurement of a flat surface (e.g., mirror) which includes the errors and optical aberrations of the measurement system. This data file can be stored and subtracted from all subsequent measurements.

3.16
structured light projection[c]
Surface topography measurement method whereby a light image with a known structure or pattern is projected on a surface and the pattern of reflected light together with knowledge of the incident structured light allows one to determine the surface topography.

3.17
surface profile[c]
Profile that results from the intersection of the real surface by a specified plane.

4 Requirements

4.1 Developmental Validation (Mandatory)

As per ANSI/ASB Standard 063, *Implementation of 3D Technologies in Forensic Firearm and Toolmark Comparison Laboratories*, a developmental validation shall be completed by at least one organization with appropriate knowledge and/or expertise. The developmental validation of imaging hardware typically consists of identifying and citing previously published scientific literature establishing the underlying imaging technology. The methods defined above of coherence scanning interferometry, confocal microscopy, confocal chromatic microscopy, focus variation

ANSI/ASB Annexes

Annex A
(normative)

Requirements – Supporting Information

The following information is provided to aid personnel responsible for developing the validation and any personnel responsible for carrying out the validation. While each of the standards listed shall be addressed in the development and use of the laboratory validation protocol(s), the approaches used, the type of data evaluated, and the details of the protocols will vary between laboratories.

Requirement 4.1.3 - Repeated testing and data analysis are critical to the understanding of variability. While specific requirements for the minimum number of studies and sample sets used for validation studies are not detailed in this standard, the laboratory shall perform sufficient studies to address the variability inherent to the various aspects of DNA testing, data generation, analysis and interpretation of data and user input parameters.

Requirement 4.4 - Software modifications that may impact the analytical process, interpretation, or reported result(s) shall be evaluated as to the extent of the impact to determine whether a validation or performance check is required prior to implementation. All computer programs are subject to code revisions, improvements and release cycles. As such, it is useful to have some concept of which changes made to the software by the developers are likely to have a fundamental impact, and equally how such changes can be recognized. A laboratory does not need to perform additional validation based solely upon changes to software version numbers or build numbers. Additional validation or a performance check shall be based on the list of documented changes provided by the developer that accompany each updated version of the software installed in the laboratory.

Requirement 4.5 - All internal validation and performance check studies shall be documented and retained by the laboratory. Any validation and performance check studies may take a significant amount of time and are likely to result in a considerable amount of documentation output material. It is incumbent upon any laboratory performing these studies to retain these results for the examination and evaluation by third parties. The results should be documented in such a way that the performance checks and validations can be reproduced and decisions made on the basis of these studies documented. Laboratories shall have a summary statement of the sample types of which the developer used to for their developmental validation.

Requirement 4.6 - The laboratory shall have a mechanism to record the software settings that are used each time an analysis is performed. Probabilistic genotyping software usually has a number of settings that are either specific to a laboratory, specific to a case, or specific to a run within a case. The latter may occur when a probabilistic genotyping analysis that incorporates elements of randomness is performed multiple times for the same evidentiary items. Settings may include input parameters specific to the algorithm (such as the probability of dropout, or the number of MCMC burn-in iterations), laboratory specific parameters (such as the distribution parameters for stutter peaks based on historical data from that laboratory), or run specific parameters (such as the number of contributors, or the number of MCMC iterations retained for inference). Any parameter/input in the system that the user can change should be recorded for examination, evaluation and reproduction. The recording of these settings will allow the system to be configured in an identical manner and allow a third party to achieve the same (or similar) outputs. The outputs will generally not be identical unless the same random number seed(s) is/are used.

ANSI/ASB Annexes can be, as here, normative, which means they are necessary for the implementation of the document.

They can also be "informative," which means they may provide useful information but are not required for the implementation of the document.

Annex B
(informative)

Bibliography

This is not meant to be an all-inclusive list as the group recognizes other publications on this subject may exist. At the time these standards were drafted, these were the publications available to the working group members for reference. Additionally, any mention of a particular software tool or vendor as part of this bibliography is purely incidental, and any inclusion does not imply endorsement by the authors of this document.

1] Bright J.-A., I.W. Evett, D. Taylor, J.M. Curran, and J.S. Buckleton. "A series of recommended tests when validating probabilistic DNA profile interpretation software." *Forensic Sci. Int.: Genetics 14*, 2015, pp. 125-131.

2] Coble M.D., J. Buckleton, J.M. Butler, T. Egeland, R Fimmers, P. Gill, et al. "DNA Commission of the International Society for Forensic Genetics: Recommendations on the validation of software programs performing biostatistical calculations for forensic genetics applications." *Forensic Sci. Int.: Genetics 25*, 2016, pp. 191-197.

3] Cowell R.G. "Validation of an STR peak area model." *Forensic Sci. Int.: Genetics 3*, 2009, pp. 193-199.

4] Federal Bureau of Investigation, (latest version) *Quality Assurance Standards for Forensic DNA Testing Laboratories.* [1]

5] Gill P. L., Gusmão, H. Haned, W.R. Mayr, N. Morling, W. Parson, et al., "DNA commission of the International Society of Forensic Genetics: Recommendations on the evaluation of STR typing results that may include drop-out and/or drop-in using probabilistic methods." *Forensic Sci. Int.: Genetics 6*, 2012, PP. 679-688.

6] Greenspoon S.A., L. Schiermeier-Wood, and B.C. Jenkins. "Establishing the limits of TrueAllele® casework: A validation study." *J Forensic Sci., doi* 10.1111/1556-4029.12810. 2015 [Epub ahead of print].

7] Institute of Electrical and Electronics Engineers. IEEE Std 1012-2012 - IEEE standard for system and software verification and validation, 2012;209; http://ieeexplore.ieee.org/document/6204026/.

8] Kelly H., J.-A. Bright, J.S. Buckleton, and J.M. Curran. "A comparison of statistical models for the analysis of complex forensic DNA profiles." *Science & Justice, 54,* 2014, pp. 66-70.

9] Perlin M.W., M.M. Legler, C.E. Spencer, J.L. Smith, W.P. Allan, J.L. Bellrose, et al. "Validating TrueAllele DNA mixture interpretation." *J Forensic Sci 56*, 2011, pp. 1430–47.

10] Steele C.D. and D.J. Balding. "Statistical evaluation of forensic DNA profile evidence." *Annu. Rev. Stat. Appl. 1,* 2014, pp. 361-84.

[1] https://www.fbi.gov/file-repository/quality-assurance-standards-for-forensic-dna-testing-laboratories.pdf/view

How ANSI/ASB Standards Appear on the OSAC Registry

This links to the standard at the standards developing organization.
Note: ASB standards are available for free on the OSAC Registry and ASB website.

This is the date the standard was added to the OSAC Registry.

- ANSI/ASB Standard 022, *Standard for Forensic DNA Analysis Training Programs.* 2019. 1st. Ed. | added September 1, 2020 | OSAC Public Comments | FACTSHEET | CHECKLIST

Public comments received during the OSAC review process can be found here.

This link is to a one-page factsheet produced by the American Academy of Forensic Science highlighting important parts about the standard. More about the factsheets can be found here.

This link is to a checklist produced by the American Academy of Forensic Science that breaks down standard language line by line. More about the checklists can be found here.