

SPECIAL COMMUNICATION

John J. Lentini,¹ B.A.

ASTM Standards for Forensic Sciences

REFERENCE: Lentini, J. J., "ASTM Standards for Forensic Sciences," *Journal of Forensic Sciences*, JFSCA, Vol. 40, No. 1, January 1995, pp. 146-149.

ABSTRACT: Since 1989, ASTM Committee E 30 on Forensic Sciences has been formulating voluntary consensus standards for the forensic sciences. This Special Communication is a report on the accomplishments of E 30, and on plans for the production of additional standards in the near future.

KEYWORDS: forensic science, standards, American Society for Testing and Materials

ASTM (American Society for Testing and Materials) Committee E 30 on Forensic Sciences began actively formulating standards for both laboratory procedures and professional practices after a reorganizational meeting which took place in conjunction with the AAFS meeting in Las Vegas in 1989. Since that time, the Committee has grown to approximately 250 members, and has promulgated approximately 20 voluntary consensus standards through the ASTM system.

The ASTM system is a true consensus system, in that one person voting negative can block the adoption of a standard. Until the negative vote is withdrawn, or ruled "nonpersuasive" by a $\frac{2}{3}$ majority of the Committee, the standard may not go forward. Balloting takes place at three levels: the Subcommittee level, the Main Committee level, and the Society level. Stringent balloting requirements are followed each step of the way.

The members of E 30 obviously believe in the utility of standard methodologies, and will continue to promulgate voluntary consensus standards. In addition to the 20 standards that have been adopted, there are a dozen or so in the pipeline, and there is a recognized need for dozens more.

The impetus for standardization comes from several directions. Laboratories seeking accreditation can refer to Standard Test Methods for their written procedures, rather than re-inventing the wheel. Bodies that administer examinations for certification of individuals can have a body of knowledge from which to draw their examination materials. And, competent individuals performing valid tests will have an authoritative source to lend credibility to their conclu-

sions, and to question the credibility of improper or invalid methodology.

Regardless of a scientist's beliefs on standardization, it is the belief of the Committee that forensic scientists would be best served by learning what standards are out there, prior to being faced with them on the witness stand.

Committee E 30 has a structure similar to that of the Academy, with Subcommittees for each of the Academy's disciplines. Only three of the Subcommittees have been active over the last few years, however: Criminalistics, Questioned Documents, and Engineering. Additionally, a Terminology Subcommittee has been set up to put together a Standard Forensic Science Terminology, and to review the terms used in the standards put forth by the other Subcommittees.

The Criminalistics Subcommittee has taken eleven standards through the entire ASTM process, including Society balloting. Two of these are general standards, ASTM E 1459, *Standard Guide for Physical Evidence Labeling and Related Documentation*, and E 1492, *Standard Practice for Receiving, Documenting, Storing and Retrieving Evidence in a Forensic Science Laboratory*. E 1492 is the most general of the standards under E 30's jurisdiction, and is printed at the end of this communication.

The first group of standards promulgated by the Criminalistics Subcommittee dealt with fire debris. These standards were adapted from the *Guidelines for Laboratories Performing Chemical and Instrumental Analyses of Fire Debris Samples*, promulgated by the International Association of Arson Investigators (IAAI) Forensic Science Committee in 1988. Because some standardization had already taken place in this field, the adoption of E 1387, *Standard Test Method for Flammable or Combustible Liquid Residues in Extracts from Fire Debris by Gas Chromatography*, was the first standard taken through the entire ASTM process by E 30.

The "Apparatus" section of E 1387 is typical of E 30 standards. Neither the type of gas chromatograph, the type of column, nor the temperature program is specified. Instead, a test mixture is specified, and the standard requires only that whatever equipment and program is selected, it be able to resolve the test mixture.

Likewise, in a standard promulgated for gunshot residue analysis, no instructions are given as to how to run the SEM. Instead, the SEM method in use must be capable of identifying a specified test object.

In addition to the fire debris Test Method, six Standard Practices dealing with the preparation of fire debris samples have been adopted, including all of the commonly utilized sample preparation techniques. A *Standard Guide for the Analysis of Fire Debris*

Received for publication 15 May 1994, accepted for publication 28 June 1994.

¹Chairman, ASTM Subcommittee E 30.01 on Criminalistics; Applied Technical Services, Inc., Marietta, GA

TABLE 1—ASTM Committee E 30 on Forensic Sciences. Adopted standards.

<i>Standards with General Application</i>	
E 1459	Standard Guide for Physical Evidence Labeling and Related Documentation
E 1492	Standard Practice for Receiving, Documenting, Storing and Retrieving Evidence in a Forensic Science Laboratory
<i>Standards for Forensic Engineering, Soon to Have General Application</i>	
E 620	Standard Practice for Reporting Opinions of Technical Experts
E 678	Standard Practice for Evaluation of Technical Data
E 860	Standard Practice for Examining and Testing Items That Are Or May Become Involved in Products Liability Litigation (The next edition of this standard will drop the reference to Products Liability)
E 1020	Standard Practice for Reporting Incidents
E 1138	Standard Terminology of Technical Aspects of Products Liability Litigation (This standard expires in 1994 and will be replaced with a general Forensic Science Terminology)
E 1188	Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator
<i>Criminalistics Standards</i>	
<i>Fire Debris Analysis</i>	
E 1385	Standard Practice for Separation of Flammable or Combustible Liquid Residues from Fire Debris Samples by Steam Distillation
E 1386	Standard Practice for Separation of Flammable or Combustible Liquid Residues from Fire Debris Samples by Solvent Extraction
E 1387	Standard Test Method for Flammable or Combustible Liquid Residues in Extracts from Samples of Fire Debris by Gas Chromatography
E 1388	Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples
E 1389	Standard Practice of Cleanup of Fire Debris Sample Extracts by Acid Stripping
E 1412	Standard Practice for Separation and Concentration of Flammable or Combustible Liquid Residues from Fire Debris Samples by Passive Headspace Concentration
E 1413	Standard Practice for Separation and Concentration of Flammable or Combustible Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration
E 1618	Standard Guide for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry
<i>Gunshot Residue</i>	
E 1588	Standard Guide for Gunshot Residue Analysis by Scanning Electron Microscopy/Energy Dispersive Spectrometry
<i>Paint Analysis</i>	
E 1610	Standard Guide for Forensic Paint Analysis and Comparison
<i>Questioned Documents Standards</i>	
E 444	Standard Descriptions of Scopes of Work Relating to Forensic Sciences for Questioned Document Area
E 1422	Standard Guide for Test Methods for Forensic Writing Ink Comparison

Extracts by Gas Chromatography/Mass Spectrometry (ASTM E 1618) has also recently been adopted, as has a *Standard Guide for Paint Analysis and Comparison* (ASTM E 1610).

There are eight additional standards in the Criminalistics Subcommittee of E 30 that are pending, that is, they have been through at least one ballot. These include three Test Methods for drugs, Cannabis, Cocaine, and Benzodiazepines; a Test Method for the detection of sugars; and a *Forensic Science Terminology*.

Additionally, the Criminalistics Subcommittee has under development: Test Methods for all classes of drugs, a *Practice for*

Evidence Collection Procedures in Sexual Assault Investigations, a *Practice for the Reconstruction or Re-enactment of Incidents*, and a *Practice for the Digestion of Hair Prior to DNA Analysis*.

Most of the adopted Criminalistics Subcommittee standards have been widely accepted, especially the fire debris analysis standards. The ASTM methods were quickly seized upon by private laboratories competing for fire debris analysis business, and these standards are in the hands of all competent attorneys who deal with fire cases. An analyst who does not choose to use the ASTM methods will almost certainly have to explain why not upon cross examination.

The Engineering Subcommittee within E 30 has several standards under its jurisdiction, and these standards are likely to be broadened to include all of the forensic sciences. These standards deal with the reporting of opinions, evaluating technical data, examining and testing items which may become the subject of litigation, reporting incidents, and collecting information and physical evidence. It is likely that these standards will have application to the criminalistics disciplines, as well as the engineering disciplines.

The other active Subcommittee within E 30 is E 30.02, the Subcommittee on Questioned Documents, which has so far promulgated two standards: a *Standard Description of Scopes of Work for Questioned Document Examiners*, and a *Standard Guide for Test Methods for Forensic Writing Ink Comparison*. A *Standard Guide for the Reporting of Opinions in Questioned Document Examination* is under development.

One of the major concerns of E 30 is that standardization not inhibit the development of better methods for analysis. For this reason, each ASTM standard is adopted for a period of five years, at which time, it is considered for review and revision. ASTM E 1387, the fire debris analysis standard, is up for revision this year, and the Criminalistics Subcommittee is seeking input from interested persons.

Any knowledgeable person may have input into an ASTM standard. Certainly, ASTM membership will ensure that an individual is kept abreast of developments and has a vote at the various levels of balloting, but membership is not requisite to have input into the standards. The membership of E 30 is well aware of the fact that standardization is not universally accepted by the forensic science community, but we see its acceptance growing. Those of us who use ASTM standards on a regular basis are aware of the benefits which they can offer, especially when methodology is challenged.

Because of the rigorous balloting procedures, ASTM standards serve the role of defining the consensus within the forensic science community for a particular type of practice or analysis.

ASTM standards are available individually from ASTM, 1916 Race Street, Philadelphia, PA 19103 (average cost is \$12.00), or they may be purchased as a group. All of Committee E 30's standards are published in Volume 14.02 of the Annual Book of ASTM Standards. The cost of Volume 14.02 is \$129.00, but it should be noted that a free volume is available annually to anyone who joins ASTM. Annual dues are \$65 for an individual membership. Joining the Committee will ensure that you receive notification of any pending standards which may affect your practice (and save you \$64.00 on the purchase of standards).

The members of ASTM Committee E 30 on Forensic Sciences invite you to join us in the continuation of our work to bring voluntary consensus standards to the forensic sciences.



Designation: E 1492 – 92

Standard Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory¹

This standard is issued under the fixed designation E 1492; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice describes procedures and techniques for protecting and documenting the integrity of physical evidence with respect to suitability for scientific testing, and admissibility as evidence in criminal or civil litigation.

2. Summary of Practice

2.1 Physical evidence is provided with a traceable paper trail documenting the chain of custody and processes to which the evidence has been subjected.

3. Significance and Use

3.1 Prior to its presentation in court, a foundation must be established showing how evidence was collected, who collected the evidence, where it was collected, who has had custody of the evidence, and when changes of custody have occurred.

3.2 If the procedures outlined in this practice are followed, the chain of custody with respect to the evidence while it is in the custody of the forensic laboratory will be protected.

4. Procedure

4.1 *Identifying the Evidence:*

4.1.1 When evidence from a particular incident is first brought to the laboratory, assign it a unique numeric or alphanumeric case number, and use that case number to identify the submitted evidence and all subsequent items of evidence submitted from the same incident or case.

4.1.1.1 Record case numbers in a permanent laboratory record along with the following information: case number, date the case was opened, and the submitter of the evidence.

4.1.1.2 If delivered in person, identify the person delivering the evidence and record that person's name in the record of the chain of custody.

4.1.1.3 Maintain a record of the chain custody. Include in the record at least the following information: case number, item number, description, person submitting the evidence, person receiving the evidence, and date the evidence was received.

4.1.2 If requested, provide a signed evidence receipt to the submitter.

4.1.3 When a case number is assigned, create a case file identified by the case number.

4.1.4 In addition to the case number, identify each

container or piece of evidence with a sequential item number.

4.1.5 In the event evidence which is received is other than as stated on the container or accompanying documents, or if the condition of the evidence is not as stated on the container or accompanying documents, document and photograph the evidence and packaging, and notify the client or submitting agency as soon as possible.

4.1.6 Retain packing material necessary to maintain the chain of custody or which may be relevant to the integrity of the evidence.

4.2 *Documentation of Testing Procedures:*

4.2.1 Each individual laboratory shall maintain a current record identifying what evidence is in the laboratory for analysis, its current status, and the date the evidence is removed from the laboratory.

4.2.2 Whenever practical, retain in a case file all notes, test data, and other documentation generated during the inspection of the sample. Otherwise, keep summary information or photocopies of original notes in the case file and refer to the location of the original documentation.

4.2.3 Retain copies of reports generated as the result of the examination or inspection of evidence in the case file.

4.3 *Alteration of Evidence:*

4.3.1 Do not alter a piece of evidence any more than is absolutely necessary to obtain a valid analysis.

4.3.1.1 It is recognized that there are some types of analyses which require the consumption or substantial alteration of the evidence. Carefully document such consumption or alteration of the evidence.

4.3.2 Whenever possible, and when the accuracy of the analysis will not be affected, maintain an adequate portion of the evidence for testing by other methods or other laboratories.

4.3.3 Package samples in containers, and store in a manner which will maintain the sample in the same condition in which it was submitted to the laboratory.

4.3.3.1 Different types of samples have different container requirements. The individual analyst is responsible for ensuring that the sample is properly packaged.

4.3.3.2 When requested, the laboratory staff shall provide instructions to the submitter in proper methods of packaging evidence.

4.3.3.3 A laboratory employee competent to evaluate the material shall determine whether improper packaging has diminished or destroyed the value of the material for laboratory analysis.

4.3.3.4 In the event that an item is submitted to the laboratory that may have no apparent, or diminished, value as evidence, or for laboratory analysis, the laboratory shall

¹ This practice is under the jurisdiction of ASTM Committee E-30 on Forensic Sciences and is the direct responsibility of Subcommittee E30.01 on Criminalistics. Current edition approved August 15, 1992. Published November 1992.

 **E 1492**

take the necessary steps to preserve the chain of custody of that item. Notify the submitter as soon as practical.

4.3.3.5 In the event that the material has value for laboratory analysis, the laboratory shall be responsible for ensuring that the evidence is properly packaged and labeled at the time of submission.

4.4 Storage:

4.4.1 Protect and store evidence in an orderly, traceable, and retrievable fashion and in a manner which preserves the integrity of the evidence.

4.4.2 Secure the evidence storage area from unauthorized entry.

4.4.3 Maintain adequate records for all evidence placed in the evidence storage area.

4.4.4 Establish procedures for routine maintenance of the contents of the evidence storage area.

4.4.4.1 When evidence is first placed in the evidence storage area, specify procedures for eventual removal. These procedures shall ensure that after a reasonable period of time, the submitting agency is contacted requesting instructions for disposition of the evidence.

4.5 Removal of Evidence:

4.5.1 When evidence is to be removed from the laboratory for return to the submitter, for presentation in court, or for disposal, make appropriate entries in laboratory records.

4.5.1.1 The person receiving the evidence from the laboratory shall be properly identified and shall sign and date a receipt for the evidence. Maintain the signed receipt in the case file.

5. Keywords

5.1 change of custody; evidence documentation; evidence labeling

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 1916 Race St., Philadelphia, PA 19103.