

# **Standard for the Organization and Operation of Fire Investigation Units**

*Fire & Explosion Investigation Subcommittee  
Crime Scene/Death Investigation Scientific Area Committee  
Organization of Scientific Area Committees (OSAC) for Forensic Science*



## **OSAC Proposed Standard**

# **Standard for the Organization and Operation of Fire Investigation Units**

Prepared by  
Fire & Explosion Investigation Subcommittee  
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### **Disclaimer:**

This document has been developed by the Fire & Explosion Investigation Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science through a consensus process and is *proposed* for further development through a Standard Developing Organization (SDO). This document is being made available so that the forensic science community and interested parties can consider the recommendations of the OSAC pertaining to applicable forensic science practices. The document was developed with input from experts in a broad array of forensic science disciplines as well as scientific research, measurement science, statistics, law, and policy.

This document has not been published by a SDO. Its contents are subject to change during the standards development process. All interested groups or individuals are strongly encouraged to submit comments on this proposed document during the open comment period administered by the SDO.

## Chapter 1 Administration

- 1.1 **Scope.** This standard contains minimum requirements related to the organization and operation of fire investigation units (FIU).
- 1.1.1 This standard applies to both public and private FIUs. Private sector FIUs may have different requirements with respect to risk exposure, information management, conflicts of interest, confidentiality, and responsibility to the public.
- 1.2 **Purpose.** The purpose of this standard shall be to improve the quality of the work product of FIUs by specifying requirements for organizations including resources, personnel qualifications, and quality assurance programs.
- 1.3 The phrase *fire investigation* is used in this document when the context indicates the relevant text refers to the investigation of both fires and explosions.
- 1.3.1 This standard includes requirements for organization, for facilities and equipment, for compliance with safety procedures, for training, certification and education, for origin and cause report content, for document retention, for review and approvals of investigation reports, and for processes and management systems.
- 1.3.2 It is the intent that the policies and procedures required by this document are consistent with accepted industry standards and guidelines. It is not the intent of this document to dictate the specifics of those policies and procedures.
- 1.3.3 This standard is suitable for use in accreditation of FIUs. Nothing in this document shall be construed to require accreditation of any FIU.

## Chapter 2 Referenced Publications

### 2.1 General

#### 2.2\* NFPA Publications

NFPA 1033, *Standard for Professional Qualifications for Fire Investigator*

NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*

\*A.2.2 NFPA 921, *Guide for Fire and Explosion Investigation*

#### 2.3 Other Publications

##### 2.3.1\* ASTM Publications

ASTM E620, *Standard Practice for Reporting Opinions of Scientific or Technical Experts*

ASTM E1188, *Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator*

ASTM E1459, *Standard Guide for Physical Evidence Labeling and Related Documentation.*

ASTM E1492, *Standard Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory*

\*A.2.3.1 Possible additional ASTM standards

### 2.3.2 Government Publications

Federal Rules of Civil Procedure › TITLE V. DISCLOSURES AND DISCOVERY › Rule 26.  
Duty to Disclose; General Provisions Governing Discovery

## **Chapter 3 Definitions**

### 3.1 General

3.1.1 The definitions contained in this chapter shall apply to the terms used in this standard.

3.1.2 Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. Merriam-Webster's Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

### 3.2 Official NFPA Definitions

3.2.1 Scientific Method: The systematic pursuit of knowledge involving the recognition and definition of a problem; the collection of data through observation and experimentation; analysis of the data; the formulation, evaluation and testing of hypotheses; and, where possible, the selection of a final hypothesis. [921, 2017]

3.2.2 Standard Operating Procedure (SOPs): A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions. [1521, 2008]

3.2.3 Standard Operating Guidelines (SOGs): A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely, which can be varied due to operational need in the performance of designated operations or actions. [1521, 2015]

3.2.4 Fire Investigator – An individual who has demonstrated the skills and knowledge necessary to conduct, coordinate, and complete a fire investigation. [1033, 2014]

3.2.5 Fire Investigation – The process of determining origin, cause, and development of a fire or explosion. [921, 2017]

### 3.3 General Definitions

3.3.1 Reliability: The extent to which an experiment, test, or measuring procedure yields the same results on repeated trials.

3.3.2 Validity: The extent to which a conclusion, inference, or proposition is accurate. (OSAC Lexicon)

3.3.3 Verification: Confirmation that a tool, technique, or procedure performs as expected. (OSAC Lexicon)

3.3.4 Quality Assurance Program (QAP): An organized process with the means of preventing mistakes and avoiding problems when delivering services to end users. –

3.3.5 Stakeholder: A person or entity with an interest or a concern in something, especially an organization.

3.3.6 Audit: A systematic and documented process for obtaining records, statements of fact or other relative information and assessing them objectively to determine the extent to which specified requirements are fulfilled.

3.3.7 Non-conforming work: When the activities or the results of the FIUs work do not conform to its own procedures.

3.3.8\* Fire Investigation Unit (FIU). A public or private sector organization performing fire and explosion investigations.

**A.3.3.8** Not applicable to task forces, but applicable to the individual FIUs that make up the task force. It will be applicable to both public and private sector units (including public agencies i.e. fire departments, law enforcement agencies involved in fire investigation, fire marshal offices, and private agencies i.e. consultancy firms, insurance investigation units)

3.3.9 Corrective Action: Improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations.

3.3.10 Root Cause Analysis: An approach for identifying the underlying causes of non-conforming work so that the most effective solutions can be identified and implemented.

3.3.11 End User: A person or entity that could or does receive a service that is intended for or required by this person or entity. An end user can be internal or external to the FIU.

3.3.12 Technical Review: An examination of work product to assess the quality of the investigation, whether its conclusions and opinions are reached through the use of an appropriate methodology and supported by the data, and is within constraints of validated scientific knowledge.

3.3.13 Administrative Review: An examination of work product to assess its conformity with policies and procedures of the FIU.

3.3.14 Certification: An authoritative attestation; specifically, the issuance of a document that states that an individual has demonstrated the knowledge and skills necessary to function in a particular professional field.

3.3.15 Accreditation: Third-party attestation related to an organization conveying formal demonstration of its competence to carry out specific functions.

## **Chapter 4 Management System Requirements**

The FIU shall establish, implement and maintain a management system appropriate to the scope of its activities. The FIU shall document its policies, systems, programs, procedures and instructions to the extent necessary to assure the quality of the investigation. The system's documentation shall be communicated to, understood by, available to, and implemented by the appropriate personnel.

The FIU shall perform and document a management review annually that assesses performance against all requirements of this standard.

### **4.1 Administrative Requirements**

#### **4.1.1 Organizational Structure**

The FIU shall maintain written policies that establish the following:

- Legal basis for the operation of the FIU
- Services that the FIU will provide
- When, where, and how the FIU services will be provided
- When and how to request additional resources from outside entities
- Basic organizational structure
- Functions that FIU members are expected to perform
- Mission statement
- Code of ethics
- Organizational values
- Commitment to provide adequate personnel and support to conduct the organizational mission.
- Commitment to fund and support the professional development of personnel
- Service delivery objectives

The FIU shall evaluate and document its level of service and delivery on an annual basis.

Private sector FIUs have a responsibility to avoid conflicts of interest, have different criteria for right of entry, protecting confidentiality of client information, and requirements for liability insurance. Each of these issues shall be addressed in the organization's written policies.

#### 4.1.2 Personnel Management

The resources and personnel required to provide the level of service(s) shall be determined by the FIU. The FIU shall examine opportunities to utilize all personnel for activities within the standard. The FIU shall have training and continuing education programs and policies to ensure that personnel are trained and that competency is maintained in order to effectively, efficiently, and safely execute all responsibilities. The FIU leader shall coordinate training, maintain training records, and assist in evaluating the effectiveness of the program.

The FIU shall have a standard operating guideline (SOG) for the deployment and staffing levels for fire scene examination.

The FIU shall have policies or procedures for the following:

- Job Duties and Description
- Hiring and development
- Personnel performance evaluations
- Adequate supervision
- Disciplinary procedures
- Non-Discrimination and Harassment Policies
- Training and continuing education
- Human relations development
- Control of information to minimize bias
- Requirements for maintaining a current CV

#### 4.1.3 Facilities and Equipment

The FIU shall provide (or contract with another entity to provide) adequate facilities and equipment to achieve its mission including, where applicable:

- Office space
- Evidence storage (including temporary evidence storage)
- Tools and equipment
- Library (to include digital resources)
- Examination space
- Document storage(to include digital documents)
- IT infrastructure
- Decontamination
- Vehicles
- Building Security
- Access Control
- Inventory System
- Environmental Systems
- Communication Systems
- Maintenance
- Fire Protection Systems

The evidence storage facility shall be operated and maintained according to ASTM E1492, *Standard Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory*. Collection, labeling, and preservation of evidence shall conform to ASTM E1188, *Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator* and ASTM E1459, *Standard Guide for Physical Evidence Labeling and Related Documentation*.

#### 4.1.4 Workload Analysis

The FIU shall develop and maintain a Management Information System (MIS) to support the management of the FIU by providing the leaders with data that indicate the effectiveness of the organization in its programs and procedures.

The MIS shall provide a means of measuring performance outcomes and trends for each the following:

- Active cases, closed cases, and turn-around times
- Resource Evaluation
- Trends
- Benchmarking
- Time accounting and productivity of personnel

#### 4.1.5 Budgeting and Financial Management

The FIU budgetary system shall reflect and support the organization's goals, objectives, and expected outcomes. The FIU or its parent agency shall have a system of accounts for financial administration that includes a record of funds received and expended. The FIU or its parent agency shall follow generally accepted accounting practices.

The FIU or its parent agency shall have policies or procedures for the selection and purchasing of services, equipment and supplies.

#### 4.1.6 Strategic Planning\*

The FIU shall develop a long range strategic plan that shall include goals, objectives, and action plans for the period covered by the plan. The strategic plan shall be reviewed and updated periodically.

\*A.4.1.6 A three year duration for the long range strategic plan with annual updating has been found to be effective.

#### 4.1.7\* Health and Safety

Safety awareness shall be an essential part of employee training

The FIU shall develop policies and procedures, communicated in a *Safety Manual* that addresses the following issues:

- safe operations during investigations
- Personal protection equipment (PPE) including respiratory protection
- heavy equipment operation
- decontamination
- Cancer awareness and prevention
- Medical surveillance

A.4.1.7 For more information see the International Association of Arson Investigators (IAAI) document titled *Fire Investigator Health and Safety Best Practices* (June 15, 2018). See also 29CFR1910 Subpart 1.

#### 4.2 Quality Assurance Program (QAP) Requirements

4.2.1 The FIU shall establish, implement and maintain a QAP that documents policies and procedures that govern how the FIU operates.

4.2.2\* The QAP shall include a *Quality Manual*, quality procedures, technical procedures, forms and records.

**A.4.2.2** Goult R., *Quality System Documentation*, in Peach, R., (Ed.), *The ISO 9000 Handbook*, Irwin, Chicago, 1997, 315.

##### 4.2.2.1 Quality Manual

The Quality Manual addresses how the FIU complies with each requirement of this standard and shall include an organization's mission statement, commitment to and policies to ensure impartiality and independence, confidentiality, organizational structure, and an outline of the organization's goals and responsibilities to each group of stakeholders. The Quality Manual also addresses the Organization's commitment to professional practice and complying with the manual, means of familiarizing the staff with the QAP, and defines the responsibilities and authority of QAP manager.

#### 4.2.3.2 Quality Assurance Principles and Strategies

The FIU shall develop SOPs to include:

##### 4.2.3.2.1 Document Control Procedures that address:

- Unique identification of each document.
- Controlling all documents (internal and external) relating to the QAP.
- Approving and issuing documents (including maintaining a master list) before use.
- Periodically reviewing and updating quality documents.
- Identifying any changes from previous version.
- Ensuring that the current documents are being used and unintended uses of obsolete documents are prevented.

##### 4.2.3.2.2 Records Control Procedures that address:

- What records are within the FIU's contractual and legal requirements, including quality records and case-specific records.
- Storage, protection, retention, and disposition of hard-copy and electronic records.

##### 4.2.3.2.3 Internal Audit Procedures that address:

- Conducting internal audits and implementing findings.
  - The scope of the audit, areas that should be audited, and frequency of audits.
  - Documentation of audits.
- Training of auditors.

##### 4.2.3.2.4 Complaint Procedures that address:

- Receiving, recording, evaluating, validating, and resolving both internal and external complaints.
- Communicating resolution to interested stakeholders.

##### 4.2.3.2.5 Non-conforming work Procedures that address:

- How to identify non-conforming work.
- Responsibilities and authorities for the management of non-conforming work
- Response to non-conforming work based on frequency and impact identified by the FIU.

##### 4.2.3.2.6 Corrective actions procedures that address:

- Taking corrective action when non-conforming work or faults in the QAP have been identified.
- Performing a root cause analysis on the non-conforming work to identify areas where this may occur and implement corrective actions.
- Reviewing the effectiveness of the corrective action.
- Retaining records of the corrective actions, root cause, and actions taken.

#### 4.2.3.2.7 Subcontracting Services

- The FIU shall be responsible for the quality of the services provided by subcontractors
- The FIU shall have written requirements for the qualifications of subcontractors.
- The FIU shall maintain records of qualifications of subcontractors that were used.
- The FIU shall maintain records of what services were provided by subcontractors for each investigation.

4.2.3.3\* Technical Procedures: Instructions for carrying out specific tasks (May be separate from the main body of the QA manual).

The FIU shall have procedures for standardized practices and methods used by the unit (SOPs / SOGs). These shall include the application of the scientific method to the following tasks:

- (1) scene processing and documentation
- (2) collecting, processing, and preserving evidence
- (3) interviewing and interrogation
- (4) origin determination to include arc mapping, fire patterns, fire dynamics, and witness information
- (5) cause determination to include identification of first fuel(s), heat source(s), and oxidizer, and
- (6) report writing.

Each policy shall have instructions for performing the task safely, documentation, analysis and interpretation, and reporting. SOPs and SOGs shall be based on published industry methods and peer reviewed journals.

\*A.4.2.3.3 NFPA 921 and NFPA 1033 include examples of industry methods. Other standards include ASTM E678, *Standard Practice for Evaluation of Scientific or Technical Data* ASTM E860, *Standard Practice for Examining And Preparing Items That Are Or May Become Involved In Criminal or Civil Litigation*, ASTM E1188, *Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator*, and ASTM E1459, *Standard Guide for Physical Evidence Labeling and Related Documentation*

#### 4.2.3.4 Quality Records and Forms

The FIU shall maintain and use forms and records that facilitate the collection and preservation of information and document the FIU's compliance with its written procedures.

## **Chapter 5 Personnel Qualifications**

### **5.1 Job Description**

The duties, responsibilities, and authorities of members of a FIU shall be defined and documented.

#### **5.1.1 Requisite Knowledge**

All fire investigators shall maintain the requisite knowledge as specified in NFPA 1033. Other personnel assisting in critical tasks related to the fire investigation shall maintain education, training, licensing, or certifications specific to their job tasks.

### **5.2 Education and Training**

The FIU shall have procedures for training, continuing education, and providing funding and support for annual education and training to remain current on the requirements listed in NFPA 1033 and the methods and procedures adopted by the FIU.

5.2.1 All personnel assigned to the FIU shall have a minimum of a high school diploma or GED.

5.2.2 Training and education records shall be maintained for FIU personnel. This shall include a current CV for each investigator.

5.2.3 FIU personnel shall demonstrate competency in their respective tasks before conducting independent work. This competency shall be documented.

5.2.3.1 Management shall develop and implement a method for the periodic evaluation of competency of FIU personnel.

#### **5.2.4 Continuing Professional Development**

All fire investigators have an ongoing need to remain current in their field. FIUs shall provide support and opportunities for continuing professional development. Fire investigators are expected to undergo a minimum of twenty four hours of training every year. Training can be either face-to-face interaction with an instructor, distance learning, or computer-based. Training shall be consistent with areas called out in NFPA 1033 and shall be relevant to the FIUs mission.

5.3 Certification. FIU management shall encourage its employees to obtain certifications (or professional designations) in their respective disciplines. Certifications shall be awarded by an accredited organization.

## **Chapter 6 Reporting of Results**

6.1 The FIU shall determine when a report may be necessary. Generally, public sector FIUs are required to prepare a report. This may not be the case for private sector FIUs.

6.1.1 A report can take several forms, depending on end user requirements, the nature of the hypothesis to be reported, and the forum in which it will be presented.

6.1.2\* All written reports shall conform to ASTM E620, *Standard Practice for Reporting Opinions of Scientific or Technical Experts*.

\***A.6.1.2** The documentation of the data and information relative to the investigation should follow ASTM E 1020, *Standard Practice for Reporting Incidents that May Involve Criminal or Civil Litigation*.

6.1.3 The written report shall reflect the application of the Scientific Method. The report shall describe all pertinent data collected and how it was analyzed. It shall identify the hypotheses developed from the data, how the hypotheses were tested, and why hypotheses were rejected or accepted. The report shall contain the investigator's opinions and conclusions in a clear, delineated section. The report shall also state the basis or bases for each opinion and conclusion.

6.1.4 Reports prepared for use in federal civil litigation shall conform to the requirements of FRE Rule 26. Reports prepared for use in other forums (state courts, mediation, arbitration, criminal trials) shall conform to their specific requirements.

6.2 If a report is not prepared then the case documents shall be sufficiently detailed so that a report can be prepared at a later date. Case documents shall outline the background and all pertinent information needed to prepare a report at a later date, including the identification of necessary photographs and the reason why a report was not written.

### 6.3 Supplemental reports

6.3.1 If new data or information is developed that causes opinions to change or evolve, the end user shall be notified in a timely manner. The reason for the change or supplement shall be documented and, if necessary, a supplemental report shall be prepared.

### 6.4 Reporting to other agencies

6.4.1 Public sector FIUs shall coordinate with the fire department to ensure that NFIRS reports have been accurately filled out or amended.

6.4.2 In the event that the FIU determines that the cause of the fire was incendiary, those results shall be communicated to the appropriate law enforcement agency.

6.4.3 In the event that the FIU identifies a continuing hazard with a product or a service, the appropriate entity (e.g Consumer Product Safety Commission, National Highway Traffic Safety Administration, or National Transportation Safety Board) shall be notified.

## **Chapter 7 Reviews**

### **7.1 Technical reviews**

\*A.7.1 For a detailed discussion of technical reviews please see NFPA 921.

7.1.1 The FIU shall have a procedure for technical reviews of work product for all written reports.

7.1.2 The technical review is an evaluation of the sufficiency of a case record with regard to the tests that were conducted, the observations and conclusions contained in the report and to ensure that there is appropriate sufficient basis for the scientific conclusions.

7.1.3 The scope of the technical review shall ensure the following, at a minimum:

7.1.3.1 Results, opinions, and interpretations are accurate, properly qualified and supported by the case record.

7.1.3.2 Conformance with applicable policies and procedures

7.1.3.3 Written report contains all required information

7.1.3.4 Results are scientifically valid

7.1.4 A person performing the technical review shall be qualified as a fire investigator and technically competent in the areas specific to the scenario. The person performing the technical review cannot be an author of the report.

7.1.5 The technical review procedures shall include provisions for a resolution of disagreements.

7.1.6 The FIU shall develop a policy to review expert witness testimony.

## **7.2 Administrative reviews**

7.2.1\* An administrative review shall be conducted to determine whether all of the steps outlined in an organization's quality management system have been followed and whether all of the appropriate documentation is present in the file.

**\*A.7.2.1** An administrative review is one typically carried out within an organization to ensure that the investigator's work product meets the organization's quality assurance requirements. For a detailed discussion of administrative reviews please see NFPA 921.

7.2.2 The FIU shall have a procedure for administrative reviews of work product.

7.2.3 An administrative review shall be conducted before any final report is released to an end user. An administrative review shall include a check for typographical or grammatical errors.

## **Annex B: SOGs / SOPs Structure**

SOPs and SOGs should follow a standard structure.

**Title:** The title should be concise but complete enough to identify the subject at hand.

**Introduction:** An introduction is generally not necessary but may be added if the FIU determines that an explanatory statement is necessary for the proper understanding of the SOP or SOG.

**Scope:** Include in the scope information relating to the purpose of the SOP or SOG.

**Reference Documents:** Any time an SOP or SOG refers to another document, list those documents in the reference document section. Do not list documents unless they are specifically referred to in the SOP or SOG.

**Definitions:** A definition section may be necessary for terms of art that may be misconstrued if not clearly defined in the document.

**Safety:** Identify safety hazards that may be encountered during the procedure described in the SOP or SOG, and describe methods to mitigate or eliminate the safety hazard.

**Procedure:** Include in proper sequence detailed directions for performing the operation. Describe in detail the successive steps for the procedure, grouping related operations in logical divisions. Use sub-headings if they will help the organization of the material. Make the procedure concise, to the point, and easily understandable.

**Deployment:** Describes the circumstances in which this procedure may be required.

**Documentation:** Describe in detail any data that is expected to be generated from the procedure. If standard forms are available, this is the section where they should be identified.

**Record Keeping:** Describe the FIUs policy for record keeping and retention for the documentation that arises out of the use of the procedure.

**Report:** State in the report section the detailed information expected as a result of the procedure.

**Amendments:** A unique identifier, revision number, approver, and an approved date should also be included.

Additional information may be found at [www.process.st/sop-templates/](http://www.process.st/sop-templates/)