Explosives Contamination Prevention Procedures

1 Purpose

This document sets forth the procedures for explosives contamination prevention and supplements the requirements of the FBI Laboratory *Quality Assurance Manual (QAM)* and the *Laboratory Operations Manual (LOM).*

As with all trace analysis, the importance of taking preventative measures to ensure that contamination does not occur is critical with explosives examinations. These measures need to be followed in cases involving both explosives residues as well as bulk materials. Every circumstance is unique and requires expert judgment. Several measures are employed to ensure that transfer and contamination do not occur in casework.

Submissions from multiple locations (e.g., a post-blast crime scene and the subsequent search of a subject's residence) should be physically separated from each other until after the explosives residue examinations and other trace evidence examinations (e.g., hairs, fibers) have been completed. If items from searches of multiple locations are submitted to the FBI Laboratory in a single container, an evaluation will be made by the explosives chemistry and/or explosives and hazardous devices examiner, in consultation with the trace evidence examiner(s), regarding the manner in which to proceed and any subsequent limitations regarding the significance of the analytical results.

2 Scope

These procedures apply to caseworking personnel conducting work in explosives chemistry and explosives and hazardous devices analysis who examine or handle evidence or known energetic materials.

3 Equipment/Materials/Reagents

Equivalent equipment, materials, and reagents may be substituted as needed.

3.1 Equipment

- Heat sealer

3.2 Materials

- Disposable filters
- Disposable gloves (nitrile or latex)
- Disposable plastic syringes
- Heat-seal bags

- Kraft paper
- Laboratory coat (freshly laundered or disposable)
- Metal cans
- Paper towels
- Safety glasses
- Sticky mats
- Various disposable glassware and plasticware

3.3 Reagents

- Isopropyl alcohol (70% commercial product)

4 Procedures

4.1 Evidence Breakdown

Appropriate personal protective equipment (PPE) (e.g., laboratory coat, disposable gloves) will be worn by personnel during the breakdown process. Items to be examined for explosives residues and/or other trace evidence will remain in their original containers.

Items to be examined for explosives residues or trace evidence will only be photographed outside of its original packaging after the completion of all appropriate chemical or trace analyses unless there are unusual circumstances precluding this requirement. If photographs must be taken before explosives residue or trace evidence examinations are conducted, the camera and the area around it must be thoroughly cleaned and appropriate control samples will be taken before the items are removed for photography.

When it is determined that explosives residue examinations are to be conducted on an item, the following procedures will be used to prevent contamination.

4.1.1 If the primary evidence container is not opened, the item(s) should remain in this packaging and be taken to the explosives chemistry examiner. If breakdown, safety check, or multi-discipline visual exam needs to be conducted where the container must be opened, this should be performed with the explosives chemistry examiner and/or chemist in the explosives trace room, when possible. Otherwise, the handling of the evidence should be recorded (e.g., check-in notes, case notes, Communication Log) to allow for the identification of potential sources of contamination.

4.1.2 If an item(s) is removed from the original container for repackaging, the specimens must be transferred to an appropriate new container (e.g., glass vial, heat-sealable bag, metal can). During the transfer, clean disposable gloves must be worn and the evidence will be placed directly into the clean container without coming in contact with any other surfaces.

4.1.3 Bulk and trace evidence examinations will be conducted on appropriately prepared work surfaces (see sections 4.2 and 4.3) covered with clean, disposable paper. The work surface

covering will be replaced, at minimum, upon completion of the evidence breakdown process for each submission. This procedure will be used for each new submission. At no time should explosive residues evidence be placed upon an improperly prepared work surface.

4.2 Preparation of Laboratory Work Surfaces

Laboratory work surfaces will be prepared in the following manner for evidence designated for explosives chemistry examinations. Personnel will:

4.2.1 Wear appropriate PPE (e.g., safety glasses, laboratory coat, disposable gloves) and clean the work surfaces with isopropyl alcohol (IPA). The applied volume of the solution should be kept to a minimum to sufficiently clean the work surface for examination. A new disposable paper towel will be used to wipe the surface.

4.2.2 Cover the work surfaces with a disposable material such as kraft paper.

4.3 Preparation of Explosives Trace Rooms

Separate areas have been designated for residue and bulk explosives chemistry examinations. An area with limited access has been dedicated for residue analysis (explosives trace room). Sticky mats have been placed at the threshold of these rooms to minimize the possibility of contamination. Personnel utilizing these areas must sign a logbook to record the date and laboratory number associated with the evidence being analyzed within the room.

The following procedure will be followed before removing any evidence from its packaging for analysis in the explosives trace rooms. The explosives chemistry examiner or chemist will:

4.3.1 Wear appropriate PPE and clean the work surfaces with an IPA solution. The applied volume of the solution should be kept to a minimum to sufficiently clean the work surface for examination. A new disposable paper towel will be used to wipe the surface.

4.3.2 Cover the work surfaces with a disposable material such as kraft paper.

4.3.3 Collect appropriate negative control samples as referenced in the Explosives Residue Analysis SOP.

4.3.4 Wear a new disposable laboratory coat (Tyvek or equivalent) and clean disposable gloves (clean room gloves preferable when handling evidence) prior to examining evidence items. Disposable supplies such as glassware/plasticware, syringes, and filters will be used when available and appropriate.

4.3.5 Change laboratory coat and gloves and clean work surfaces between examinations, as necessary.

4.4 Personal Hygiene

Personnel conducting examinations within laboratory space are expected to wear clothing free of

explosive(s). In particular, clothing must be changed after performing work on the explosives range and before entering any areas in the laboratory in which evidence containing explosives residue is stored, processed, and/or examined. It may also be necessary for personnel to shower or bathe in order to remove any potential contamination from hair or skin and wash other items such as glasses, watches.

Firearms will not be worn while working in the explosives trace room.

5 Safety

Safety protocols, contained within the FBI Laboratory Safety Manual, will be observed at all times.

Standard precautions will be taken for the handling of all chemicals, reagents, and standards including standard universal precautions for the handling of biological and potentially hazardous materials. Refer to the FBI Laboratory Safety Manual for proper handling and disposal of all chemicals. Personal protective equipment will be used when handling any chemical and when performing any type of analysis.

6 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Explosives Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, Explosives, latest revision.

Rev. #	Issue Date	History
0	07/07/2006	Original Issue to follow QATU formatting and ASCLD/LAB-*International* requirements.
1	05/09/2011	Removed the use of bleach as a cleaning solution and replaced with isopropyl alcohol throughout document. Updated should to will in sections 2, 4.1, 4.3, 4.3.1, and 4.3.4. Clarified cleaning requirements if photographs must be taken in section 4.1. Changed documented to recorded in section 4.1.1. Corrected numbering error in section 4.3. Clarified section 4.3.1 regarding negative control. Updated sections 4.2.1 and 4.3.2 regarding type of disposable laboratory coats. Added FBI Laboratory Safety Manual to section 5. Updated references in sections section 6.
2	10/02/2017	Administrative changes for grammar and clarity. Removed references to the Explosives Unit to applicability to those conducting explosives chemistry, fire debris, and explosives and hazardous devices examinations. Updated sections 1 and 2. Updated and reorganized section 3. Specified explosives residues in section 4.1 and presence of a chemist during opening of containers in section 4.1.1. Added use of disposable material to section 4.2.2. Added section 4.3.1 on PPE and cleaning process. Added collection of negative controls in section 4.3.3. Updated safety information in section 5. Updated references in section 6.

Approval

Redacted - Signatures on File

QA Approval

Redacted - Signatures on File

Developing and Validating Technical and Chemical Procedures

1 Purpose

This document sets forth the procedures for method development and validating technical and chemical procedures and supplements the requirements of the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM)*.

2 Scope

These procedures apply to caseworking personnel conducting explosives chemistry, fire debris, and explosives and hazardous devices analyses who develop new methods and validate new technical and chemical procedures.

3 Procedures

3.1 Method Development

Validation starts after a method is acquired or developed. If a method needs to be developed in the EU (including the modification of an acquired method), the method development will be a planned activity. Method development is the acquisition and evaluation of test data for the determination of conditions and/or limitations of a novel method to achieve consistent results.

Method development plans will be recorded and approved according to the *LOM Practices for Developing Methods and Validating Technical Procedures*. The *Explosives Development and Validation Plan and Review Form* (Appendix A) will be used to record the method development plan and review.

3.2 Validation Study

Validation is the process for determining whether specified requirements are adequate for intended use. The validation of an analytical procedure is referred to as a validation study in the EU. The performance characteristics that are evaluated during a validation study will be based on the scope of the analytical procedure. The validation study must be completed, reviewed, and approved prior to the procedure's first use in casework, except as noted within this procedure.

A validation plan for a technical or chemical procedure will be recorded and evaluated for approval according to the *LOM Practices for Developing Methods and Validating Technical Procedures*. A validation study for a chemical procedure must additionally meet the requirements outlined in the *LOM Practices for Validating Chemical Procedures*. These

requirements may be adjusted based on the scope of the procedure and professional judgment (e.g., safety considerations, differences in sample matrices, availability of reference materials).

Validation studies of applicable, non-chemical procedures (e.g., physical property measurements) will be limited to the accuracy as listed in section 3.2.1 of this document.

3.2.1 Performance Characteristic for Measurement of a Physical Property

- Accuracy

3.2.1.1 Accuracy

Accuracy is the closeness of an analytical result to its true value and is affected by systematic error (bias) and random error (precision). The accuracy of a physical property measurement can be determined by comparison of that measurement result with the true value. At a minimum, ten measurement replicates of a reference material with a known physical property value are made. The accuracy is calculated as the percent difference of the average measured value from the known value. In most instances, the preferred accuracy is ±15% or less, but larger values may be unavoidable and are acceptable if accompanied by proper justification.

3.3 Method Development and Validation Review and Records

Method development plans and/or validation studies including a validation summary will be recorded and reviewed according to the *LOM Practices for Developing Methods and Validating Technical Procedures*. The approvals by the Unit Chief(s) and appropriate Technical Leader will be recorded on the *Explosives Development and Validation Plan and Review Form* and when applicable, *Validation of Chemical Procedures Review Form* (7-267). The completed review form(s) will be maintained with the validation file.

Previously validated procedures that will be used in a new facility will be approved according to the *LOM Practices for Developing Methods and Validating Technical Procedures*.

In extreme situations (e.g., court mandates) when a validated procedure must be used prior to being formally written and reviewed (i.e., issued), it is permissible to use the validated procedure for casework provided that the same steps for sample preparation and instrumental parameters used during the validation are also used for the analysis and there is clear, written documentation of the steps that were taken to generate the results. In these instances, at a minimum, the validation data will be technically reviewed by the appropriate Technical Leader prior to using the validated procedure for casework. This will be treated as a minor or major deviation, as appropriate, according to the *LOM Practices for Authorizing Deviations*.

Method development and validation records will be maintained within the validation file (e.g., on unit bookshelves, in electronic format, in the related case notes with respect to case-specific validation).

When a validation study has been performed for what is most likely to be a one-time analysis, a validated procedure can be applied in casework without the issuance of a standard operating procedure. In these instances, the following criteria will be met:

- A validation plan will be created and approved by the appropriate Technical Leader using the *Explosives Development and Validation Plan and Review Form*, and approved prior to commencing validation.
- Step-by-step instructions for the analysis and a summary of the validation performed will be prepared and retained with the validation records.
- The validation records will be reviewed and approved by the appropriate Technical Leader and Unit Chief(s). This will be recorded on the *Explosives Development and Validation Plan and Review Form* and when applicable, the *Validation of Chemical Procedures Review Form*.
- A copy of the review form(s) and a copy of the step-by-step instructions will be retained in the case notes for the affected case.
- The validation records will be stored in a central location in the validation file.
- If the procedure is performed routinely, a standard operating procedure will be prepared or it will be incorporated into a standard operating procedure. Required reviews and approvals will be obtained before issuance of the new procedure.

3.4 Competency Testing on Newly Validated Analytical Procedures

Caseworking personnel must successfully complete a competency test on a newly validated analytical procedure prior to applying the procedure to casework. Competency tests are not required when new instrumentation is implemented for the same purpose. This test will demonstrate that applicable personnel can accurately perform the procedure. For personnel that were involved in the validation process, the Unit Chief(s) and the appropriate Technical Leader may approve the validation work to serve as demonstration of competency. The successful completion of a competency test, or the approval to use validation work in lieu of a competency test, will be recorded in the employee's training records.

3.5 Procedure Modifications

Modifications and/or deviations from a procedure will be authorized and recorded according to the *LOM Practices for Authorizing Deviations*. The *LOM Practices for Validating Chemical Procedures* will be followed when procedures are modified from validated chemical procedures.

3.6 Minor Deviations

To maintain consistency when other personnel are faced with the same or similar analyses, all minor deviations to standard operating procedures will be recorded in accordance with the *LOM Practices for Authorizing Deviations*. At a minimum, the record will include the title of the

document (or unique identifier), issue date and/or revision number, and the specific requirement(s) from which a minor deviation is sought, a statement of the specific deviation, and the name and initials or the signature of the approver and the date of the authorization. Additionally, the FBI Laboratory number associated with the minor deviation, the analyte(s) that were targeted, the date of the minor deviation, the personnel that performed the minor deviation, the personnel that approved the minor deviation, the name of the procedure affected, and any additional relevant information. This will allow for centralized review of minor deviations on an annual basis without accessing case files.

4 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Rev. #	Issue Date	History
2	03/02/2018	Removed sentence in section 3.2 regarding validation studies for unknowns. Modified section 3.4 regarding when competency tests are required.
3	12/16/2019	Removed SAU Chief from approval lines. Updated validation definition to comply with LOM. Added to section 3.1 and 3.2 to distinguish method development and validation.

Approval

Redacted - Signatures on File

Explosives Chemistry Technical Leader — Date: 12/13/2019

Explosives and Hazardous Devices Technical Leader — Date: 12/13/2019

Fire Debris Technical Leader — Date: 12/13/2019

Explosives Unit Chief — Date: 12/13/2019

QA Approval

Quality Manager — Date: 12/13/2019

Appendix A: *Explosives Development and Validation Plan and Review Form*

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Open Proficiency Testing Procedures

1 Purpose

This document sets forth the procedures for open proficiency testing and supplements the requirements of the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM) Practices for Open Proficiency Testing*.

2 Scope

These procedures apply to caseworking personnel conducting analyses in the explosives chemistry, fire debris, and explosives and hazardous devices categories of testing. The Explosives proficiency test program encompasses both internal and external proficiency testing.

3 Procedures

3.1 Proficiency Tests

All proficiency test examinations, reviews, evaluations, and participant feedbacks are recorded in Forensic Advantage (FA). Examiners and technicians will follow the requirements for conducting proficiency tests in FA as provided in the *LOM Practices for Open Proficiency Testing*.

3.1.1 Explosives Chemistry – and Fire Debris Analysis

Each explosives chemistry and fire debris examiner and technician must complete one open proficiency test annually in each category of testing in which they routinely perform casework. Each technician will perform the analytical portion of his/her proficiency test after the normal consultation with an examiner. The technician will perform a complete range of analytical work on the proficiency test commensurate with his/her training. The technician will furnish an examiner with all the notes, instrument printouts and any other analytical data. The technician will complete an external provider's results form to the extent for which he/she is trained. Explosives chemistry and fire debris examiners will complete all sections of the external provider's results forms for proficiency tests conducted by that examiner.

3.1.2 Explosives and Hazardous Devices

Each explosives and hazardous devices examiner and technician must complete one open proficiency test annually in each category of testing in which they routinely perform casework. Each technician will perform the analytical portion of his/her proficiency test after the normal consultation with an examiner. The examination process includes inventory and sorting of

specimens, photography, evidence examination, and case records. Each examiner/technician will contribute to the final product by conducting one or more of the described tasks which are performed as a part of routine casework.

When an examiner and technician are working together, each person must record his/her participation by placing his/her initials on each page of the laboratory notes. If multiple technicians are working together on a proficiency test, the technician responsible for memorializing the analysis of the evidence in the laboratory notes will provide the first set of initials in a series of initials. Technicians who participate in functions other than note preparation will initial after the note preparer technician's initials. The second set of initials indicates that all technicians working on the proficiency test have reviewed the notes and agree with their accuracy (e.g., ABC/DEF, where ABC prepared the notes and DEF inventoried, sorted, and photographed the evidence). To indicate review and concurrence with the data memorialized in the notes, the examiner will initial each page in an area separate from the technician(s).

The technician will furnish the examiner with all of the notes and related records. The examiner will evaluate this material and complete the Test Results portion of the *Explosives Open Internal Proficiency Test Results Form* (Appendix A). The examiner may attach additional pages of text that would constitute the results of examinations for a typical forensic report.

3.1.4 Testing Areas and Frequency

The following categories of testing will be tested according to the stated frequency:

Category of Testing	Frequency	Source
Explosives (Chemistry)	Annually	External
Fire Debris (Flammables)	Annually	External
General Physical and Chemical Analysis (Explosives and Hazardous Devices)	Annually	Internal

3.1.5 Proficiency Tests

As appropriate, proficiency tests will be purchased by the Explosives Unit (EU), prepared in the EU, by an Explosives and Hazardous Devices Examiner, or prepared by another approved individual.

Each qualified examiner will participate in a minimum of one external proficiency test per year in the category of testing for which approved external tests are available. Note: External testing is currently limited to the explosives chemistry and fire debris because these are the categories of testing for which there are approved external tests.

If an approved external test is not available for a particular category of testing, an internally designed and prepared test will meet the annual proficiency testing requirement.

3.1.5.1 Purchased Test Samples

The Proficiency Test Representative (PTR) of the EU will distribute, evaluate and record proficiency tests for his/her unit, respectively.

External proficiency tests in the explosives chemistry and fire debris categories of testing will be approved and purchased according to the *LOM Practices for Open Proficiency Testing*.

The external samples will be given a unique identifying number by the appropriate PTR that will include the last two digits of the year of the test and other numbers appropriate for distinguishing it from other unit tests. This number will be verified by another person in the unit. The test will be performed as directed by the test provider.

3.1.5.2 Unit Prepared Test Samples

The applicable Technical Leader will approve an individual, other than a qualified examiner or technician in the category of testing, participating in the preparation of test samples, if that individual is not qualified in the category of testing. If approval is not granted, another candidate will be chosen.

These tests will be prepared and approved according to the *LOM Practices for Open Proficiency Testing* and this document. Following the preparation and validation of the internally prepared proficiency tests, the validated results will be maintained by the PTR.

3.1.5.2.1 Test Design for Internally-Prepared Test Samples

The test design options for the explosives and hazardous devices proficiency test are detailed in Appendix B.

3.1.5.2.2 Sample Preparation Record Keeping for Internally Prepared Test Samples

Refer to the *LOM Practices for Open Proficiency Testing* for information that must be included on the *Explosives Open Internal Proficiency Test Preparation Form* (Appendix C) for the preparation of explosives and hazardous devices proficiency tests.

3.1.6 Distribution

The PTR will personally deliver a proficiency test and accompanying letter (see section 3.1.7) to the examiner or technician. The person receiving the test will sign and date an acknowledgment receipt of the proficiency test. This receipt will be kept with the proficiency test file (physical packet or in FA) for that examiner or technician. If the test is to be taken by the technician, the examiner will provide the direction normally given in routine casework.

3.1.7 Due Date

The time limit for external proficiency tests will be determined by the provider. Internal proficiency tests will have a time limit of ten weeks. The PTR will prepare a letter, at the time of the test distribution, indicating that a proficiency test is being administered. The due date will be included in the letter accompanying the proficiency test and recorded in FA. Extensions to the due date for internal tests may be granted by the PTR or the UC. Any due date extension will be documented in FA.

3.1.8 Technical Review

All proficiency tests will be technically reviewed in the same manner as casework as described in the Explosives Quality Assurance Manual – Procedures for Preparing Reports and Retaining Case Records. For all tests, the technical review will be recorded in FA. If the reviewer is participating in the same test distribution, the PTR will ensure that the reviewer has completed his/her portion of the test prior to performing a review.

3.1.9 Administrative Review

All proficiency tests will be administratively reviewed by the Unit Chief or designee. For all tests, the administrative review will be recorded in FA. If the reviewer is participating in the same test distribution, the PTR will ensure that the reviewer has completed his/her portion of the test prior to performing a review.

3.1.10 Records

EU will maintain the records, as appropriate, associated with the completed proficiency tests as set out in the *LOM Practices for Open Proficiency Testing*. The records will be maintained as follows:

- Completed *Explosives Open Internal Proficiency Test Preparation Form*
- Signed receipt for the proficiency test
- Administrative and examination records
- Data submitted to the test provider for external tests
- Completed *Explosives Open Internal Proficiency Test Results Form* (
- Results and evaluation notices from the test supplier, if purchased, when applicable

3.1.11 Review and Evaluation of Test Results

All proficiency test results will be evaluated by the PTR and recorded in FA. The evaluation will be reviewed with the Unit Chief and/or Technical Leader. If the PTR is being tested, the Unit Chief or Technical Leader will perform the evaluation of the PTR's results. Upon completion of the evaluation, the participant will be notified to review the evaluation in FA.

Any proficiency testing discrepancy identified by the PTR, Unit Chief, or Technical Leader will be reported in writing, at the time of detection, to the FBI Laboratory Proficiency Test Program Manager (PTPM). Each participant must respond in writing to any discrepancy identified by the PTR, affected Unit Chief(s) or Technical Leader as noted in the evaluation. These comments, including any suggested corrective action, are to be included in the permanent proficiency test file for the participant.

3.1.12 Corrective Action

In the event that a proficiency test results in an error requiring corrective action, the Technical Leader will follow procedures described in the *LOM Practices for Open Proficiency Testing*.

4 Safety

Explosives are inherently dangerous and should only be handled by qualified individuals.

5 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Explosives Quality Assurance Manual, Procedures for Preparing Reports and Retaining Case Records, Federal Bureau of Investigation, Laboratory Division, Explosives, latest revision.

Rev. #	Issue Date	History
5	10/02/2017	Administrative changes for grammar and clarity. Removed and/or modified references to the Explosives Unit. Modifications added to account for FA practices. Replaced the term arson with "fire debris" or "fire debris analysis" in 3.1.1, 3.1.4, and 3.1.5.1. In section 3.1.5.2, replaced "designee" with "Technical Leader." Removed "and Review" from the title of Appendix A form and reference to it throughout the document. Removed the review signatures box from the Appendix A Results form. Deleted Appendix D (EU PT Evaluation Form).
6	12/16/2019	Removed references to SAU. Removed SAU Chief from approval lines.

Approval

Redacted - Signatures on File

Explosives Chemistry Technical Leader — Date: 12/13/2019

Explosives and Hazardous Devices Technical Leader — Date: 12/13/2019

Fire Debris Technical Leader — Date: 12/13/2019

Explosives Unit Chief — Date: 12/13/2019

QA Approval

Quality Manager — Date: 12/13/2019

Appendix A: *Explosives Open Internal Proficiency Test Results and Review Form*

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Appendix B: *Internal Proficiency Test Design for Explosives and Hazardous Devices*

1 Purpose

In the category of testing of General Physical and Chemical Analysis (Explosives and Hazardous Devices), an examiner and technician will be requested to conduct examinations in order to identify the device components, their characteristics, and function within the device, as appropriate.

2 Preparation

An internal explosives and hazardous devices proficiency test consists of one of the following:

2.1 Positive Test

Improvised explosive devices (IEDs) will be constructed by qualified explosives and hazardous devices examiners and/or technicians. The devices will be initiated in a containment vessel and/or rendered safe with an appropriate tool/disruptor. The fragments will be collected and distributed to the test participants for analysis. The device can also be provided to the test participants in its original condition; however no live explosives or explosives components that present a danger to the test participants can be present. If the participants require an explosives chemistry examination result in order to complete the test, then that result will be provided to the test participants as part of the test. The test should be designed to test the proficiency of the participants in identifying device components, their characteristics, and determining their role in the functioning of the device, using one or more of the device-related standard operating procedures (SOPs), as appropriate.

Tests may also be prepared by using inert, explosives-related items (e.g., detonators, detonating cord, grenade bodies) from the FBI Laboratory's explosives reference files and submitting those to the test participants for appropriate analysis. If the participants require an explosives chemistry examination result in order to complete the test, then that result will be provided to the participants as part of the test. The test should be designed to test the proficiency of the participants in identifying the items and their characteristics using one or more of the device-related SOPs, as appropriate.

2.2 Negative Test

Hoax IEDs, also known as hoax bombs, will be constructed by qualified explosives and hazardous devices examiners and/or technicians. The hoax bomb will be distributed to the test participants in its original condition or in a fragmented state due to the use of a render safe procedure (RSP) with an appropriate tool/disruptor. The test should be designed to test the proficiency of the participants in identifying the hoax bomb components, their characteristics,

and determining their role in the device, using one or more of the device-related SOPs, as appropriate.

2.3 Packaging for Distribution

Internal proficiency tests should be packaged as typical evidence submissions before being submitted to a test participant for analysis.

Appendix C: *Explosives Open Internal Proficiency Test Preparation Form*

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Verification of Reagents and Solvents

1 Purpose

This document sets forth the procedures regarding verification and records of reagents and solvents and supplements the requirements in the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI *Laboratory Operations Manual (LOM)*. These procedures are to be used in conjunction with the Performance Monitoring Protocols (PMPs) for individual instruments and the Standard Operating Procedures (SOPs) for analysis of evidence.

2 Scope

These procedures apply to caseworking personnel conducting work in explosives chemistry and fire debris analysis who use reagents and solvents in casework.

3 Equipment/Materials/Reagents

The equipment, materials, and reagents used to verify a reagent or solvent will depend upon the nature of the substance (e.g., mobile phase, pH paper). Since most of these verifications will be performed following an established explosives chemistry SOP, the equipment, materials, and reagents required for such verifications will be listed within the SOP used as well as in the Instrument Parameters and Reagent Preparation SOP.

4 Standards and Controls

Test strips and colorimetric tests (e.g., pH paper, peroxide test strips, water finding paper, colorimetric test kits) will be tested with appropriate positive and/or negative controls, as appropriate, prior to use on evidence.

5 Procedures

5.1 Purchasing Reagents and Solvents

Reagents and solvents will be purchased following the procedures for purchasing services and supplies as outlined in the Explosives Quality Assurance Manual Administrative Structure and Operating Guidelines.

5.2 Verification of Reliability

The reliability of reagents and solvents must be verified prior to, or in concurrence with casework. This may be completed in any of the following ways:

- Follow the reagent verification instructions given in the SOP for the particular analysis in which the reagent is used, when available.
- Perform the analysis using suitable standards, controls, and/or blanks and evaluate the outcome.
- Conduct a measurement of a specific chemical property (e.g., pH, presence of peroxide).
- Evaluate solvents used for extractions or dilutions to ensure they are free of contaminants and interferents.

The reagent reliability verification data will be kept within the instrumentation or mobile phase log or examination records.

For mobile phases, at the time of preparation or upon first use, a testmix and a blank are analyzed using the new mobile phase. The new mobile phase should give the expected results. A copy of the testmix analysis will be initialed and placed in the instrument Quality Assurance/Quality Control (QA/QC) log.

When a new reagent does not give the desired results upon the analysis of a testmix and a blank, refer to the specific instrument's PMP to troubleshoot the system. After troubleshooting, if it appears the instrument is performing within acceptable parameters, re-analyze the testmix and the blank.

5.3 Labeling

5.3.1 Internally-Prepared Mobile Phases

Mobile phases prepared and used by explosive chemists will be recorded in a mobile phase or reagent preparation log. The log will contain the following information:

- Reagent name
- Preparation date
- Initials of preparer
- Name, manufacturer, and lot number of each component
- Expiration date, if applicable
- Initials of tester
- Whether the mobile phase worked as expected

Refills of mobile phase reservoirs containing deionized water only (e.g., ion chromatographs) do not need to be logged.

The following information will be placed on a stock container of a mobile phase prepared:

- Reagent name written in entirety
- Preparation date
- Initials of preparer
- Expiration date, if applicable

5.3.2 Solvents

The following information will be placed on solvent bottles upon opening the first time.

- Date opened
- Initials of opener (e.g., Op'd 6/01/16 *ABC*)

5.4 Expiration

The expiration date for reagents and solvents is determined by the expiration date provided by the manufacturer or determined by the individual PMP or SOP describing its preparation. Reagents and solvents may be used past their expiration dates provided that appropriate steps are taken with every use to demonstrate and re-verify their reliability. This may be accomplished by the analysis of standards, blanks, controls, and/or internal standards.

6 Safety

Safety protocols, contained within the FBI Laboratory Safety Manual, will be observed at all times.

Standard precautions will be taken for the handling of all chemicals, reagents, and solvents including standard universal precautions for the handling of biological and potentially hazardous materials. Refer to the FBI Laboratory Safety Manual for proper handling and disposal of all chemicals. Personal protective equipment will be used when handling any chemical and when performing any type of analysis.

Refer to the PMP for the specific instrument for additional safety information.

7 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Explosives Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, Explosives, latest revision.

Explosives Standard Operating Procedures: Chemistry, Federal Bureau of Investigation, Laboratory Division, latest revisions.

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Rev. #	Issue Date	History
3	03/31/2017	Administrative changes for grammar and clarity. Updated sections 1 and 2. Updated section 3 for consistency with the Verification of Reference Materials SOP. Added section 4. Sections 4.4 to 4.7 on procurement of supplies, record of supplies, storage, and evaluation of distributors moved to the *Verification of Reference Materials* SOP and referenced in section 5.1. Section 5.2 modified and various methods added as bullets. Mobile phase verification procedure listed. Section 5.3.1 added. Section 5.4 Expiration information modified. Removed sections 6, 7, and 8. Changed *Explosives Unit* to *FBI Laboratory Safety manual.*
4	10/02/2017	Updated for clarity including specificity for fire debris. Administrative changes for grammar, clarity, and conformance to revised QAM and LOM. Removed references to the Explosives Unit to applicability to those conducting explosives chemistry and fire debris examinations. Updated title of Explosives QAM document referenced in section 5.1. In section 5.3.1, added requirements for initials of tester and whether the mobile phase worked as expected. Also in section 5.3.1, added written in entirety to reagent name for stock containers. Deleted good laboratory practice paragraph from section 5.3.1 and added PMP reference to section 5.4. Deleted Appendix A (Critical Supplier Assessment Form) and moved it to Explosives QAM Administrative Structure and Operating Guidelines.
5	10/04/2018	Administrative changes for grammar and clarity. Added bullet in section 5.2 regarding solvent evaluation. Changed case notes to examination records in section 5.2.

Approval

Redacted - Signatures on File

Explosives
Unit Chief Date: 10/03/2018

Scientific Analysis
Unit Chief Date: 10/03/2018

TL Approval

Explosives Chemistry
Technical Leader Date: 10/03/2018

Redacted - Signatures on File

QA Approval

Quality Manager Date: 10/03/2018

Records of Items Used As Known Materials

1 Purpose

This document sets forth the procedures regarding records of items used as known materials and supplements the requirements in the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM*).

2 Scope

These procedures apply to case working personnel conducting work in explosives chemistry, fire debris analysis, and explosives and hazardous devices who use known materials in casework.

3 Definitions

3.1 Known Material

The term "known" refers to knowing the source of a material and has no relationship to knowledge of a property (e.g. homogeneity, chemical property, physio-chemical) of that material as required for a reference material.

Known materials can be used during the examination of energetic materials and explosive device components (such as detonators, detonating cord, and batteries). Known materials do not have to be verified. The same analytical examinations will be performed on all items, regardless of the source.

Known materials usually fall into one of the following categories:

- Commercial products: Items that can be purchased by the general public (e.g., pyrotechnics, batteries, clocks).
- Manufacturer's samples: Samples that are acquired directly from the manufacturer (e.g., detonators, detonating cord).
- Other sources: Samples acquired from sources (e.g., other government agencies, other laboratories).
- Reference collection samples: Samples from the above sources for reference collections/databases established by an FBI Laboratory unit(s) (e.g., Smokeless Powder Database, Detonator Database).

3.2 Reference Collection

A reference collection includes data or materials of known origin or property, which are maintained for identification, comparison, or interpretation purposes. Reference collection items will be fully recorded, uniquely identified, and properly controlled.

There is no requirement for measurement traceability of reference collection items/materials. However, reference collection items must be traceable. The history of each item must be known and recorded.

4 Procedures

4.1 Records for Known Materials

Most commercial products have a trade name, the name of the manufacturer, the product size (e.g., 100-foot roll, 2.5 oz.), and possibly a lot number and expiration date on the label. Retain the original label with the product when possible.

The following information (if available) will appear either on the outer container into which the product is placed for storage, on a tag/label attached to the product or recorded in the Explosives Reference Tool (EXPeRT) database or the Explosives Reference File (ERF) (or equivalent). A unique identifier will relate a product to a database entry.

- Full name of product
- Name of manufacturer/distributor
- Size of product and type of container (e.g., 12 oz. can, 16 oz. bottle)
- Lot number
- Expiration date, if applicable

Optional Information:

- Date of acquisition
- Initials of purchaser/acquirer
- Name and address of the place where obtained
- Name of contact at the manufacturer/distributor
- Any other relevant information that characterizes the sample

4.2 Use of Known Materials

Known materials may be maintained and used for identification, comparison, or interpretation purposes or for research and evaluation of instrumentation and equipment.

At the time of use, include the relevant information from the label or cite the database's unique identifier in the case notes.

4.3 Storage of Known Materials

The known material will be stored following manufacturer's recommendations.

Known materials that have been diluted in a solvent should be stored in a refrigerator unless indicated otherwise by the manufacturer or analytical standard operating procedure.

Dry chemicals will be stored according to manufacturer recommendations.
All known materials should be stored in a central location and made available to others in an FBI Laboratory unit(s).

4.4 Transportation of Known Materials

When a known material (which is deemed a Department of Transportation (DOT) hazardous material), is shipped or transported outside the FBI Laboratory, the preparer will ensure that the material is packaged in accordance with DOT shipping regulations, as appropriate. When a commercial shipper is used, such as FedEx, the individual responsible for packaging the known material will comply with all regulations set forth by DOT and the commercial shipping company, as appropriate. When a known material is transported by FBI vehicle or aircraft, the material will be packaged appropriately to prevent the possibility of breakage, contamination, or other alterations to the material.

5 Limitations

Limitations may be specific to a particular known material (e.g., if the known material has an expiration date, if the manufacturer changes the formulation of their product).

6 Safety

Safety protocols, contained within the FBI Laboratory Safety Manual, will be observed at all times. This manual also contains information on the proper handling and disposal of all chemicals.

Standard precautions will be taken for the handling of all chemicals, reagents, and standards. Some of the chemicals may be carcinogenic. Personal protective equipment will be used when handling any chemical and when performing any type of analysis.

The handling of some explosive materials is hazardous due to potential ignition by heat, shock, friction, impact, or electrostatic discharge. Personnel should work with small quantities of material (such as a few grams) and properly store larger quantities in approved containers.

7 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Rev. #	Issue Date	History
2	10/02/2017	Administrative changes for grammar and consistency. Removed references to the Explosives Unit to applicability to those conducting explosives chemistry, fire debris, and explosives and hazardous devices examinations. Clarified reference collections items in section 3.2.
3	12/16/2019	Removed SAU Chief from approval lines. Updated reference collection definition in 3.2 to comply with LOM.

Approval

Redacted - Signatures on File

Explosives Chemistry Technical Leader — Date: 12/13/2019

Explosives and Hazardous Devices Technical Leader — Date: 12/13/2019

Fire Debris Technical Leader — Date: 12/13/2019

Explosives Unit Chief — Date: 12/13/2019

QA Approval

Quality Manager — Date: 12/13/2019

Sampling Procedures

1 Purpose

This document sets forth the sampling procedures for physical evidence and supplements the requirements of the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM)*. These procedures are to be used in conjunction with the Standard Operating Procedures (SOPs) for analysis of evidence.

2 Scope

These procedures apply to explosives chemistry, fire debris analysis, and explosives and hazardous devices personnel who sample physical evidence that will have an effect on the validity of forensic examinations.

3 Equipment/Materials/Reagents

Refer to the appropriate explosives analysis SOP for a list of equipment, materials, and reagents needed.

4 Procedures

Physical evidence submitted to explosives chemistry, fire debris, and explosives and hazardous devices personnel for analysis routinely consists of bulk materials. Bulk materials can be further categorized as either liquid or solid.

Sampling is defined as the selection of a sample for testing according to a procedure. The approach to sampling can be either non-statistical or statistical.

Non-statistical sampling may be conducted on homogenous or heterogeneous items. If an item is determined to be homogenous, the portion analyzed can be representative of the whole item. If an item is determined to be heterogeneous, a portion of each component present in the item will be analyzed to be representative of the item as a whole, as practicable.

Statistical sampling may be conducted on several items to make an inference on a larger group of items (e.g., analyzing 20 out of 100 like items). If this is done, the specific statistical sampling method will be stated.

The following sampling procedures will be used to collect a sample(s) from the larger whole (a single item).

4.1 Liquid

Liquids within manufacturer-sealed containers will not be opened and analyzed unless a technical, practical, or safety reason is stated.

4.1.1 Single Layer

It is important to stir liquid samples adequately to ensure proper mixing. If the item appears to be homogeneous, remove an appropriate quantity of sample for analysis.

4.1.2 Multiple Layers

If the item appears to consist of two or more immiscible liquids, remove an appropriate quantity of each liquid and analyze the components separately.

4.2 Solid

Solids within manufacturer-sealed containers will not be opened and analyzed unless a technical, practical, or safety reason is stated.

4.2.1 Homogeneous Samples

If visual examinations (to include microscopic examinations) indicate that the item is homogenous, remove an appropriate quantity of sample for analysis.

4.2.2 Heterogeneous Samples

If visual examinations (to include microscopic examinations) indicate that the item is heterogeneous, attempt to separate and remove appropriate quantities of the individual components to analyze separately. A heterogeneous sample may also be analyzed according to specific extraction procedures. Refer to the appropriate explosives analysis SOP that best categorizes the sample to be analyzed.

When smaller amounts of a non-homogeneous, bulk material are submitted for analysis, the sample may be homogenized with a mortar and pestle, as applicable.

5 Safety

Safety protocols contained within the FBI Laboratory Safety Manual will be observed at all times.

Standard precautions will be taken for the handling of all chemicals, reagents, and standards including taking standard universal precautions for the handling of biological and potentially

hazardous materials. Refer to the FBI Laboratory Safety Manual for proper handling and disposal of all chemicals. Personal protective equipment will be used when handling any chemical and when performing any type of analysis.

The handling of explosives is potentially hazardous due to possible ignition by heat, impact, shock, friction, or electrostatic discharge. Personnel should work with minimum quantities of explosives (such as a few grams) that are appropriate for the analysis and properly store larger quantities in approved containers.

6 Limitations

If inconsistent results are obtained during the analysis of the samples, further portions may need to be analyzed. Individual component analyses of complex, heterogeneous mixtures may not be representative of the item as a whole.

7 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Rev. #	Issue Date	History
1	10/02/2017	Removed references to the Explosives Unit to applicability to those conducting explosives chemistry, fire debris, and explosives and hazardous devices examinations. Administrative changes for grammar and consistency. In section 1, added use of SOP for analysis of evidence. Added definitions of sampling and sample selection from QAM and clarified what to do in each instance. In section 5, changed Explosives Unit Safety Manual to FBI Laboratory Safety Manual.
2	12/16/2019	Removal of section 4.3. Title changed to sampling only. Revisions throughout for homogeneous vs. heterogeneous materials and statistical vs. non-statistical methods. Added definition of sampling to comply with LOM. Removed SAU Chief from approval lines. Separated Explosives Chemistry and Fire Debris TL signatures.

Approval

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Explosives Chemistry Technical Leader — Date: 12/13/2019

Explosives and Hazardous Devices Technical Leader — Date: 12/13/2019

Fire Debris Technical Leader — Date: 12/13/2019

Explosives Unit Chief — Date: 12/13/2019

QA Approval

Quality Manager — Date: 12/13/2019

Verification of Reference Materials

1 Purpose

This document sets forth the procedures regarding storage and verification of reference materials and supplements the requirements in the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM)*. These procedures are to be used in conjunction with the Performance Monitoring Protocols (PMPs) for individual instruments and the Standard Operating Procedures (SOPs) for analysis of evidence.

2 Scope

These procedures apply to case working personnel conducting work in explosives chemistry and fire debris analysis who use reference materials in casework.

3 Equipment/Materials/Reagents

The equipment, materials, and reagents used to verify a reference material will depend upon the nature (e.g., organic/inorganic, polar/nonpolar, solid/liquid) of the substance. Most of these verifications will be performed following an explosives chemistry or fire debris SOP. The equipment, materials, and reagents required for such verifications will be listed within the SOP used as well as in the Explosives Instrument Parameters and Reagent Preparation SOP.

4 Standards and Controls

Standards and controls referenced in this document are acquired, purchased, or synthesized.

5 Definitions

5.1 Reference Material

A material, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties.

5.2 Certified Reference Material

Reference material, characterized by a metrologically valid procedure for one or more specified properties, accompanied by a reference material certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability.

6 Procedures

6.1 Opening a New Reference Material

When opening reference materials for the first time, it is good laboratory practice to record the following information directly on the container:

- Date opened
- Initials of the person opening the container
- Expiration date, if applicable

6.2 Synthesis of a Reference Material

When a suitable reference material is not available from a vendor it may be necessary to synthesize it (e.g., peroxide based explosives). The following information will be recorded and maintained in the validation file:

- Name of synthesized reference material
- Procedure or notes used to synthesize the material
- Date of synthesis
- Initials of the person who synthesized the material
- Lot number, if applicable
- Storage instructions, if applicable
- Verification of identity data

When used in casework, cite the database's unique identifier or record the following information in the examination records for the case in which it was used:

- Name of synthesized reference material
- Date synthesized
- Lot number, if applicable

Note that detailed synthesis procedures, notes, and/or recipes of explosives may be considered "Law Enforcement Sensitive." Refer to applicable classification guides for proper marking of this information.

6.3 Verification of a Reference Material

All chemical reference materials must have their identities verified prior to, or in concurrence with, use in casework. Certified reference materials do not require further verification. For all other reference materials, only one sample per manufacturer's lot number of the reference material must be verified prior to use. Subsequent reference materials from the same lot will be considered as having the same verification as the original.

If the reference material will be used for quantitative work, then the purity of the reference material must also be verified prior to, or in concurrence with casework. The following lists the steps necessary to perform verifications:

6.3.1 Identity Verification (Qualitative)

The following techniques can be used to verify the identity of the reference material:

- Fourier Transform Infrared Spectroscopy (FTIR)
- Gas Chromatography with Mass Spectrometry (GC/MS)
- Gas Chromatography (GC) with electron capture (ECD) or flame ionization detectors (FID)
- High Performance Liquid Chromatography (HPLC) with applicable detector(s)
- High Resolution Mass Spectrometry (e.g., OrbiTrap)
- Ion Chromatography (IC) with conductivity detector
- Ion Chromatography with Mass Spectrometry (IC/MS)
- Liquid Chromatography with Mass Spectrometry (LC/MS)
- Raman spectroscopy
- Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy (SEM/EDS)
- Solids Probe Mass Spectrometry (SP/MS)
- Ultra Performance Liquid Chromatography with Mass Spectrometry (UPLC/MS)
- X-ray diffraction (XRD)

For each instrumental technique, refer to the appropriate PMP and the Explosives Instrument Parameters and Reagent Preparation SOP for instrument usage procedures, parameters, and reagent preparation information. Prior to sample analysis, the PMP for the instrument must be followed to conduct a Quality Assurance/Quality Control (QA/QC) check to verify the instrument's reliability and reproducibility from analysis to analysis. Instrumentation not listed above may be used, provided it is shown to be in proper working order prior to use.

Reference materials supplied with a Certificate of Analysis (or equivalent) will be verified by at least one technique. Results must compare favorably with a previously analyzed reference material, reference data, or literature, as necessary.

Synthesized reference materials and reference materials not supplied with a Certificate of Analysis (or equivalent) will be verified by at least two techniques (including at least one spectroscopic technique). Results must compare favorably with a previously analyzed reference material, reference data, or literature, as necessary.

When the identity verification is complete, the data will be maintained on the respective instruments, in the case file, or be printed and filed in the validation file.

Example: A GC/ECD testmix component of nitroglycerin (with a Certificate of Analysis) purchased from a new vendor will be verified by an instrumental technique such as GC/ECD. It may then be used as a reference material to compare against an unknown evidence item.

Example: A reagent grade chemical of strontium nitrate (without a Certificate of Analysis) is purchased for use as a reference material for the very first time. It will be analyzed by two techniques (including at least one spectroscopic technique) such as FTIR and XRD to verify its identity prior to being used as a reference material to compare against an unknown evidence item.

6.3.2 Purity Verification (Quantitative)

If an item needs to be quantitated, the following steps will be used to verify the purity of the reference material. Verification of the purity of a reference material will be performed after the identity verification and prior to quantitative use.

A variety of techniques may be used to confirm the purity/concentration of the reference material. Only one technique is needed. Acceptable techniques for purity verification include:

- Gas Chromatography with applicable detector(s)
- Liquid Chromatography with applicable detector(s)

Prior to use, verify that the instrument is in proper working order by following the instrument's PMP. When the purity verification is completed, the applicable data and instrumental parameters will be printed and filed in the validation file.

6.3.2.1 Gas Chromatography (GC) and Liquid Chromatography (LC)

An individual will:

- Accurately dilute the reference material to an appropriate concentration in an appropriate solvent (e.g., 100 ppm for GC/MS and 1-10 ppm for LC/MS and HPLC).
- Accurately dilute a previously verified reference material of the same analyte, a previously calibrated deuterated analog, or a reference material of the same

analyte from a different lot, to the same concentration in the same solvent as used for the new reference material.

- Analyze the new diluted reference material solution with appropriate instrumental parameters. The file parameters should include the name of the supplier, the lot number of the reference material, and your initials. The analysis should be performed at least three times and the average area of the peak obtained.
- Following the same instrumental parameters, analyze the previously verified material solution, the deuterated material solution, or the solution of the reference material from a different lot. (Optionally, a calibration curve of multiple points of the older reference material may be used to determine the purity of the new reference material.)
- Comparison of the average areas from the two reference materials allows for calculation of the concentration (and thus the purity) of the new reference material, taking into account a degree of analytical error.
- Print the applicable data and the instrumental parameters and file in the validation file.

6.4 Reference Material Verification Discrepancies

6.4.1 Discrepancies in Identity

Discrepancies in the structural identity of a reference material following qualitative testing will be discussed with the manufacturer and, if necessary, actions will be taken to obtain another reference material. If the material is retained, the container will be labeled with information indicating the discrepancy.

6.4.2 Discrepancies in Purity

It should be noted that the use of quantitative positive controls are effective in verifying the concentration of a reference material. The use of such controls allow for the verification of the stability of a reference material after the initial qualitative testing.

If the purity verification of a reference material results in an average purity within ±5% of the listed purity, the listed purity will be used in preparing future calibrators or controls from this reference material. Discrepancies in the purity of a reference material greater than ±5% of the listed purity will result in the assignment of an approximate purity value (or concentration) to the material. This new purity (or concentration) will be recorded on the container and used in preparing future calibrators or controls from this reference material.

6.5 Reverification of Reference Materials

The expiration date for reference materials is determined by the expiration date provided by the manufacturer or determined by the individual SOP (or other applicable document) describing its

preparation. Reference materials may be reverified and have their expiration dates extended by the initial expiration timeframe or used past their expiration dates provided that appropriate steps are taken with every use to demonstrate and re-verify their reliability.

6.6 Use of Reference Materials

Reference materials may be used for analysis or comparison in casework and/or evaluation of instrumentation and equipment.

At the time of use, include the relevant information from the label or cite the database's unique identifier in the examination records.

6.7 Storage of Reference Materials

The reference material will be stored following manufacturer's recommendations.

Reference materials that have been diluted in a solvent will be stored in a refrigerator unless indicated otherwise by the manufacturer or PMP.

Dry chemicals will be stored according to the manufacturer recommendations, if possible.

All reference materials should be stored in a central location and made available to others in the unit.

6.8 Transportation of Reference Materials

When a reference material (which is deemed a Department of Transportation (DOT) hazardous material), is shipped or transported outside the FBI Laboratory, the preparer will ensure that the material is packaged in accordance with DOT shipping regulations, as appropriate. When a commercial shipper is used, such as FedEx, the individual responsible for packaging for the reference material will comply with all regulations set forth by DOT and the commercial shipping company, as appropriate. When a reference material is transported by FBI vehicle or aircraft, the material will be packaged appropriately to prevent the possibility of breakage, contamination, or other alterations to the material.

6.9 Reference Material Records

All Certificates of Analysis (or equivalent) will be stored in the validation file. Qualitative verification data, purity verification data, and any other records necessary to properly characterize the reference material will be stored in the validation file.

7 Limitations

Limitations may be specific to a particular reference material (e.g., if the reference material has an expiration date, if the manufacturer changes the formulation of their product).

The limitations associated with these procedures are dependent on the instrumental techniques used to determine the identity and purity of reference materials. In general, the listed techniques will be sufficient for these determinations when performed as described.

8 Safety

Safety protocols, contained within the FBI Laboratory Safety Manual, will be observed at all times. This manual also contains information on the proper handling and disposal of all chemicals.

Refer to the PMP for the specific instrument for additional safety information. Standard precautions will be taken for the handling of all chemicals, reagents, and standards. Some of the chemicals may be carcinogenic. Personal protective equipment will be used when handling any chemical and when performing any type of analysis.

The handling of some explosive materials is hazardous due to potential ignition by heat, shock, friction, impact, or electrostatic discharge. Personnel should work with small quantities of material (such as a few grams) and properly store larger quantities in approved containers.

9 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Explosives Standard Operating Procedures: Chemistry, Federal Bureau of Investigation, Laboratory Division, latest revisions.

Instrument Operations Manuals for the specific models and accessories used.

McLafferty, F. W., Stauffer, D. B., *The Wiley/NBS Registry of Mass Spectral Data,* John Wiley and Sons: New York, 1989.

O'Neil, M. J. (Ed), *The Merck Index,* 15th ed., Royal society of Chemistry. Royal Society of Chemistry: Cambridge, U.K., 2013.

Pfleger, K., Maurer, H., Weber, A., *Mass Spectral and GC Data of Drugs, Poisons, Pesticides, Pollutants, and Their Metabolites,* 2nd ed., VCH: Weinheim, Germany, 1992.

Pouchert, C. J., *The Aldrich Library of Infrared Spectra* 2nd ed., Aldrich Chemical Co., 1975.

Rev. #	Issue Date	History
5	10/04/2018	Changed case notes to examination records in sections 6.2 and 6.6. Added location-specific PMP references to section 6.3.1. Added SAU IOG reference and modified IOSS reference. Deleted CU Procedures for Estimating Measurement Uncertainty reference.
6	12/16/2019	Changed line spacing after section 6.9. Added database reference to 6.2. Removed SAU Chief from approval lines. Removed unit references to PMPs. Updated definition of certified reference material to comply with LOM.

Approval

Redacted - Signatures on File

Explosives Chemistry
Technical Leader Date: 12/13/2019

Explosives Unit Chief Date: 12/13/2019

QA Approval

Quality Manager Date: 12/13/2019

Administrative Structure and Operating Guidelines

1 Introduction

The Explosives Unit (EU) is assigned to the Terrorist Explosive Device Analytical Center (TEDAC) section of the FBI Laboratory.

1.1 The EU is composed of a Unit Chief, a Management and Program Analyst, a Senior Explosives Scientist, Chemist-Forensic Examiners, Physical Scientist-Forensic Examiners, Supervisory Special Agent Forensic Examiners, Chemists, Physical Scientists, and contract staff as necessary.

1.2 This document describes the work conducted by personnel in explosives chemistry, fire debris, and explosives and hazardous devices, defines chain-of-command, and establishes general responsibilities and duties. This document also specifies procedures for personnel matters, post-qualification training and continuing education requirements, services and supplies purchasing, and equipment calibration and maintenance.

2 Scope

These procedures apply to caseworking personnel conducting work in explosives chemistry, fire debris analysis, and explosives and hazardous devices analysis.

3 Explosives Unit Mission Statement

The EU provides forensic-based technical and operational support for the examination of evidence associated with bombing matters through application of investigative case experience, education, specialized training, and research.

4 Explosives Unit Organizational Structure

The EU is administratively divided into two sub-groups: Chemical Analysis (includes explosive chemistry and fire debris) and Explosives and Hazardous Device Analysis.

The Chemical Analysis sub-group is composed of a Supervisory Special Agent Forensic Examiner, a Supervisory Chemist-Forensic Examiner, Chemist-Forensic Examiners, and Chemists.

The Explosives and Hazardous Device Analysis sub-group is composed of Supervisory Special Agent Forensic Examiners, Physical Scientist-Forensic Examiners, and Physical Scientists.

Additional positions that do not fall into a previously listed sub-group include the Unit Chief, a Management and Program Analyst, and a Senior Explosives Scientist.

The current EU organizational chart is posted on the FBI BUNET.

5 Responsibilities

5.1 Unit Chief

A Unit Chief is responsible for the overall coordination of case examinations occurring within his/her unit, and ensures the management of programs, budget, and staffing. Each Unit Chief ensures adherence to FBI Laboratory policies, practices, and procedures for quality assurance, case reviews, and personnel matters.

5.2 Management and Program Analyst

A Management and Program Analyst is responsible for administrative tasks and the management and assessment of unit program operations and projects. In addition, this position plans, develops, and conducts program analyses, identifies inefficiencies, evaluates performance measures, and provides recommendations to management, when necessary. A Management and Program Analyst also manages the unit budget and financial matters by developing budget estimates and justifications and ensures unit funds are used appropriately. A Management and Program Analyst may also assist with time and attendance records, travel logistics, property inventory, and other duties as assigned.

5.3 Senior Explosives Scientist

A Senior Explosives Scientist is also referred to as Senior Scientist. The duties and responsibilities of the position include coordinating, planning, directing, and managing research and development in the field of explosives and serving as a liaison with outside organizations.

5.4 Chemist Forensic-Examiner/Physical Scientist-Forensic Examiner/Supervisory Special Agent Forensic Examiner

A Chemist-Forensic Examiner, Physical Scientist-Forensic Examiner, and Supervisory Special Agent Forensic Examiner are also referred to as a Forensic Examiner or Examiner. Examiners are responsible for examining evidence, reporting results, and testifying to results. Examiners also manage programs and personnel, participate in operational deployments, and provide training.

5.5 Chemist/Physical Scientist

Physical Scientists are also referred to as technicians. Chemists and Physical Scientists are equivalent to a technician as defined in the FBI *Laboratory Operations Manual (LOM)*. Technicians are responsible for assisting examiners in the examination and processing of evidence and assisting in unit program initiatives.

5.6 Contract Staff

Contract staff; also referred to as Contractors, are employed on a contractual basis based on unit needs. These individuals can perform examiner, technician, or administrative personnel functions. Contractors conducting casework must work in accordance with the FBI Laboratory's quality system including successful completion of an appropriate FBI Laboratory training program and annual proficiency testing.

5.7 Technical Leaders

A Technical Leader is designated for each of the following explosives-related categories of testing: explosives chemistry, fire debris, and explosives and hazardous devices. Each Technical Leader is responsible for his/her category of testing across units and/or laboratory locations. Each Technical Leader is accountable for all technical operations within his/her category of testing.

5.8 Program Managers

Program Managers are examiners who coordinate and are responsible for designated programs in addition to their examiner duties. Programs include quality assurance, proficiency testing, and various training programs, among others.

6 Post-Qualification Training Requirements

Additional training is required of qualified personnel who have already met their initial training requirements under the following circumstances:

6.1 The employee has been on extended leave and re-training will be deemed necessary at the discretion of the employee's Unit Chief, immediate Supervisor, or the appropriate Technical Leader.

6.1.1 Employees will be required to review the training materials for his/her category(ies) of testing and pass a requalification test prior to resuming casework. The review may include supervised laboratory work.

6.2 A deficiency has been identified that could affect the quality of an employee's work. Deficiencies requiring remedial training may be identified during technical and/or administrative reviews, audits, quality control checks, or in the process of proficiency testing.

6.2.1 The Unit Chief and Training Program Manager will develop a remedial training plan. Employees will be required to review the training materials for his/her category(ies) of testing and pass a requalification test prior to resuming casework. The review may include supervised laboratory work. In addition, the practices described in the LOM – Practices for Open Proficiency Testing and/or the LOM – Practices for Addressing a Nonconformity must be followed, as appropriate.

6.3 A new procedure is being implemented. This includes use of a new instrumental technique or analysis procedure and not necessarily new methods on existing instrumentation.

6.3.1 When a new procedure is put in place, the standard operating procedure (SOP) must be reviewed by the applicable employees. As needed, training can be provided by vendors of newly acquired instrumentation or software. All appropriate employees must pass a competency test that includes the new procedure prior to using it in casework.

6.4 An employee is training to become qualified in an additional category of testing.

6.4.1 The appropriate Technical Leader and Training Program Manager will inform the employee of the training requirements and the types of testing that the employee must successfully complete to become authorized to perform examinations in the additional category of testing.

7 Continuing Education

Continuing education and associated recordkeeping are required of qualified individuals and individuals that maintain equipment. These requirements supplement the FBI Laboratory Quality Assurance Manual (QAM).

7.1 Continuing Education Requirements

A minimum of eight hours of continuing education is required each fiscal year. These requirements may be met by attending an in-service training, conference, or seminar, completing web-based training, reading a book, participating in a workshop, attending a course provided by an instrument manufacturer, visiting an explosive manufacturing plant or other forensic laboratory, or any other option approved by the Unit Chief or an immediate Supervisor. For individuals who are proficiency tested in the explosives chemistry, fire debris analysis, or explosives and hazardous devices categories of testing, it is recommended that at least four of the eight hours be technical in nature and relate to job performance.

7.2 Continuing Education Records

7.2.1 Virtual Academy (VA)

The VA is the single, official, centralized recordkeeping system for all FBI employee training completion records. Training records for the continuing education requirement will be stored in Virtual Academy when practicable.

8 Purchasing Services and Supplies

These requirements supplement the FBI Laboratory QAM.

8.1 Approval and Purchasing of Services and Supplies

The Unit Chief will review and approve all requests for services and supplies prior to ordering for his/her unit. The request will be forwarded to individuals with purchasing authority who will prepare a *Requisition for Supplies and Equipment* (FD-369), Automated Requisition Tool (ART) entry, or other appropriate records for all services and supplies. Supplies (to include reference materials) must comply with specifications defined within a specific SOP.

8.2 Receipt of Supplies

When supplies are received, the individual receiving the supplies will compare what was received against the original *Requisition for Supplies and Equipment* or other appropriate records to ensure that the correct item(s) was received. Invoices and/or receipt will be provided to the purchasing individual as necessary.

The packaging of the supplies received will be inspected to note damage or tampering.

Upon receipt of a newly purchased chemical reference material, the date and receiver's initials will be recorded on the Certificate of Analysis (or equivalent), if available, and placed in the validation file.

8.3 Storage of Supplies

Supplies will be stored in appropriate storage locations (e.g., acids are stored in an acid safe storage cabinet). Specialized storage conditions (e.g., refrigeration), as required by the manufacturer of the item, will be met when practicable.

8.4 Evaluation of Critical Suppliers

A new supplier of critical consumables, supplies, and services will be evaluated upon first use in the unit. The *Explosives Critical Supplier Assessment Form* (Appendix A) will be used to record the evaluation. The completed forms will be maintained in the unit file.

A list of approved suppliers of critical consumables, supplies, and services will be maintained by the unit. If a critical consumable, supply, or service does not meet requirements, the Technical Leader will be notified.

If a critical supplier, whether new or already approved, consistently fails to meet the requirements of the analysis SOP, a new critical supplier will be identified and evaluated. A critical supplier that demonstrates a history of unacceptable performance will be removed from the approved suppliers list.

9 Equipment Calibration and Maintenance

These requirements supplement the FBI Laboratory QAM and the LOM – Practices for the Calibration and Maintenance of Equipment. These procedures apply to examinations and subsequent reported results where the estimation of measurement uncertainty is requested by the contributor or is expressed in jurisdictional or statute requirements. Estimation of measurement uncertainty will be provided for quantitative measurement results that have a significant impact on the final test result.

- Quantity of a substance
- Concentration of a substance

9.1 Equipment Requiring Calibration

The following equipment utilized by explosives chemistry, fire debris, and explosives and hazardous devices personnel requires calibration, as the equipment calibration has been deemed to be significant to the measurement results and when applicable, associated measurement uncertainty:

- Balances
- Calipers and micrometers
- Pipettes
- Weights used in intermediate checks

Only calibrated EU equipment (e.g. calipers, micrometers) will be used for examinations at a non-FBI Laboratory controlled space. The examinations performed and the equipment used will be recorded in the examination records.

The following equipment does not require calibration, as the equipment calibration has been demonstrated to not be significant to the measurement result and associated measurement uncertainty:

- Volumetric glassware (e.g., volumetric flasks)
- Multimeters

9.2 Reference Standards

Mass reference standards (weights) are used for intermediate checks of balance calibrations. In this usage, the weights will be referred to as working measurement standards. These weights are not used to calibrate balances. Refer to the Performance Monitoring Protocol (PMP) for balances for more information.

Non-significant measurements on balances do not require a calibration check.

9.3 Calibration Interval

Calibrations are performed as required in the LOM – Practices for the Calibration and Maintenance of Equipment at the following intervals:

Equipment	**Calibration Interval**
Balances	Annually
Calipers and micrometers	Annually
Pipettes	Annually
Weights used in intermediate checks	Annually

Calibrations are performed to manufacturer's specifications by a service provider that is ISO/IEC 17025 accredited for the specific calibration type, to include field calibrations when appropriate.

9.4 Maintenance Interval

Maintenance of equipment and instrumentation is performed as required according to the LOM – Practices for the Calibration and Maintenance of Equipment. The following maintenance is performed on a predetermined schedule:

Equipment	**Maintenance Interval**
Microscopes	Annually

Maintenance of explosives chemistry equipment and instrumentation is described in the appropriate Instrument Maintenance Protocol or PMP.

10 Data Archiving Procedures

The Chemnet Instrument Data Archiving Protocol will be followed for archiving data files from networked computers and instruments.

10.1 Computers Not Connected to Chemnet

All data may be maintained on computer hard drives until space has become too limited to allow additional files to be stored. Periodic checks will be made by personnel to review remaining hard drive space and to remove and archive data files older than six months if necessary. Data files may be archived to an external hard drive, DVD, or Blu-Ray discs (or equivalent).

11 Minor Deviations

All minor deviations will be approved and recorded. Refer to the LOM – Practices for Authorizing Deviations and the Explosives Quality Assurance Manual – Developing and Validating Technical and Chemical Procedures section on Minor Deviations for additional information.

12 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Explosives Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Chemistry Unit Instrument Operation and Systems Support SOPs, Federal Bureau of Investigation, Laboratory Division, Chemistry Unit, latest revisions.

Rev. #	Issue Date	History
3	12/16/2019	Removed all references to SAU. Removed sections 3.2, 4.2, 5.6, 7.2.2. Renumbered sections 1, 3, 4, and 5. Added Supervisory Chemist-FE to section 4. Removed unit references to PMPs.
4	03/02/2020	Addition of equipment use in non-FBI controlled space to section 9.1

Approval

Redacted - Signatures on File

Explosives Chemistry Technical Leader — Date: 02/28/2020

Explosives and Hazardous Devices Technical Leader — Date: 02/28/2020

Fire Debris Technical Leader — Date: 02/28/2020

Explosives Unit Chief — Date: 02/28/2020

QA Approval

Quality Manager — Date: 02/28/2020

Appendix A: *Explosives Critical Supplier Assessment Form*

Redacted - Form on File

FBI Approved Standards for Technical Testimony and Report Language for Explosives and Hazardous Devices Analysis

1 Purpose

This document provides examples of the conclusions and opinions that are approved for reporting examination conclusions and offering expert opinion statements during testimony by examiners who conduct explosives and hazardous devices examinations in the FBI Laboratory. These examples are not intended to be all inclusive and may be dependent upon the precedent set by the judge or locality in which a testimony is provided. These examples are not intended to serve as precedent for other forensic laboratories and do not imply that statements by other forensic laboratories are incorrect, indefensible, or erroneous. The examiner may choose the appropriate wording used to express conclusions and opinions based on the nature of the evidence examined.

2 Scope

This document applies to examiners who prepare *Laboratory Reports* (7-1, 7-1 LIMS, 7-273, 7-273 LIMS), and/or provide expert witness testimony in explosives and hazardous devices. This document does not apply to employees who provide fact witness testimony.

3 Responsibilities

3.1 The examiner will ensure that a *Laboratory Report* complies with the statements contained within this document, when applicable.

3.2 The examiner will ensure that his/her testimony is consistent with the standards contained within this document, when applicable.

4 Statements for FBI Explosives and Hazardous Devices Examinations Laboratory Reports and/or Expert Testimony

4.1 Component Recognition

An examiner may report and/or state that a component of an improvised explosive device (IED) has been recognized if the examiner has assigned general attributes, or class characteristics, to that item. The characteristics of the components that predicate recognition must be recorded in the case notes.

Example: “Present within the evidence is a damaged, metallic fragment that is visually consistent with the skin of a nine-volt battery.”

Example: “Present within the evidence is a cylindrical object whose visual characteristics and measured, physical characteristics are consistent with those from the individual cells of a nine-volt battery.”

4.2 Component Identification

An examiner may report and/or state that a component of an IED has been identified as a specific commercial product if the examiner has determined the *potential* commercial or manufacturing sources of the component from a forensic examination of the item. The characteristics of the components that predicate identification must be recorded in the case notes.

Example: “Present in the evidence is one nine-volt battery labeled ‘Raycell.’ ”

Example: “Present in the evidence is one nine-volt battery that bears markings consistent with those used on Raycell batteries.”

4.3 Confirmed Component Source

An examiner may report and/or state that the commercial or manufacturing source of a component has been definitively determined or confirmed if the source of the component has been corroborated through direct communications with the distributor or manufacturer. Such communications must be recorded in the case notes and Communication Log and stated in the *Laboratory Report*.

Example: “Consultation with sales representatives of Joe’s Electronics Shack determined that the switch present in the evidence was distributed by their store located at 1234 Hank Stuart Square, Dunlevy, VA 21100.”

Example: “Consultation with technical representatives from the Raycell Corporation determined that the nine-volt battery present in the evidence was manufactured by the Raycell Corporation on January 20, 1987 at their manufacturing plant in Swisher, TN.”

4.4 Company Identifications

An examiner may report and/or state the company that is assigned a particular trademark, barcode, Underwriters Laboratory (UL) listing code, etc., by reference to an appropriate, reliable source. The source of the information must be recorded in the case notes.

Example: “The trademark ‘HEAL-AID’ on the submitted item is visually consistent with the trademark assigned to the Kurt & Kuprik Company line of adhesive bandages.”

Example: “Printed on Item 1 were the letters ‘TKJ’ in a circle and ‘E91666.’ These markings are visually consistent with the markings used on electronic components by the Keidi Jaman Corporation located in Taiwan.”

4.5 IED Component Associations

An examiner may report and/or state that an association has been made between multiple IED components based on their visual and/or physical properties and construction materials and characteristics. These comparisons are limited to the construction and class characteristics of the components, and as such, are not individualizing. The characteristics that predicate associations must be recorded in the case notes.

Example: “The metal fragment present in the evidence is visually consistent with the skin of the batteries recovered from the search of the suspect’s residence.”

Example: “The metal fragment present in the evidence shares certain visual and physical characteristics with the skin of the batteries recovered from the search of the suspect’s residence. These characteristics are listed in Table 1. Figure 1 depicts the specimens that were compared.”

Example: “A comparison examination was made between the homemade switch present in the evidence and a homemade switch recovered from the suspect’s residence. These switches bear indistinguishable class characteristics. The switches are depicted in Figure 1 and their characteristics are summarized in Table 1.”

4.6 Inconclusive Component Recognition or Identification

An examiner may report and/or state that an inconclusive result has been reached if the determination has been made that that there is insufficient quality and/or quantity of corresponding information such that the examiner is unable to recognize or identify a component.

Example: “A conclusive determination as to the source of the metallic fragment present in the evidence could not be made.”

Example: “The metallic fragment present in the evidence could not be conclusively identified.”

4.7 IED and IED Component Exclusions

An examiner may report and/or state that an exclusion has been made if the determination that the construction/class characteristics of two or more IEDs or IED components are not the same because there is sufficient quality and/or quantity of information in disagreement. The characteristics that predicate exclusions must be recorded in the case notes.

Example: "The metallic fragment present in Item 1 was not visually and physically consistent with the metallic fragments present in Item 25."

Example: "The metal fragment present in the evidence does not share visual and physical characteristics with the skin of the batteries recovered from the search of the suspect's residence."

Example: "Forensic examinations performed on the IED recovered from the bank and the IED recovered from the suspect's residence revealed dissimilar construction characteristics."

4.8 IED Determination

An examiner may report and/or state that the components present in the evidence are those of a complete or partial IED. If a partial IED is present, the examiner must report and/or state what components are missing. An examiner may also report and/or state how the missing components can be procured and the availability of such components in the marketplace.

Example: "Present in the evidence are the fragmented components of an improvised explosive device (IED), also referred to as a homemade bomb. The components consist of…"

Example: "Present in the evidence are some of the fragmented components of an improvised explosive device (IED), also referred to as a homemade bomb. The components consist of…, however, a switch could not be conclusively identified. Various types of switches are widely available to the public in a variety of retail outlets and on the Internet."

4.9 Destructive Device Determination

An examiner may report and/or state that the components present in the evidence are those of a destructive device since this term is commonly utilized within the field of explosives and hazardous device analysis to refer to an IED or homemade bomb.[1]

Example: "Present in the evidence are the fragmented components of an improvised explosive device (IED), also referred to as a homemade bomb, or destructive device."

4.10 IED Function Determination

An examiner may report and/or state how the components present in the evidence could be logically combined to make a functioning IED. An examiner may also report and/or state how a missing component of the IED could be logically combined to manufacture a complete IED, as well as the ease or difficulty involved in such a process.

[1] 26 U.S.C. § 5845(f) and 18 U.S.C. § 921(a)(4), 2013.

Example: "The most logical functioning for this IED would be that of a victim-operated device. Mechanical pressure is applied to the switch, causing current from the battery to flow to the detonator, causing its explosion, and subsequently the explosion of the main charge."

Example: "The most logical functioning for this IED would be that of a victim-operated device. A particular action of the victim when applied to a switch, would cause current from the battery to flow to the detonator, causing its explosion, and subsequently the explosion of the main charge. A switch could not be conclusively identified in the evidence. Various types of switches are widely available to the public in retail outlets and on the Internet. The contacts of the switch would have to be connected to the red and green wires shown in Figure 1 for the IED to function properly. An individual familiar with the use of hand tools, in particular wire cutters and pliers, could attach the red and green wires to the contacts of an appropriate switch."

4.11 IED Associations

An examiner may report and/or state that an association has been made between multiple IEDs based on their visual and/or physical properties and construction materials and characteristics. These comparisons are limited to the construction materials and characteristics of the IEDs, and as such, are not individualizing. The characteristics that predicate associations must be recorded in the case notes.

Example: "The IEDs examined in the evidence shared similar construction characteristics and could have been constructed by the same individual or by multiple individuals using similar instructions. These characteristics are listed in Table 1. Figures 1 - 10 depict the IEDs and specific components that were compared."

Example: "The IEDs examined in the evidence shared indistinguishable construction characteristics and materials. These similarities indicated that the IEDs were most likely either constructed by the same individual or by multiple individuals using identical instructions, materials, and construction techniques."

4.12 Production Processes

An examiner may report and/or state the production process used to manufacture an explosives-related item when the physical characteristics present on the item permit such an inference and the examiner has an understanding of the production process.

Example: "Due to the physical characteristics of the yarn windings, the detonating cord appeared to have been manufactured on a spinning-type machine."

4.13 Damage and/or Injury from Explosives and IEDs

An examiner may report and/or state that the explosion of an IED or explosive could cause damage to the surroundings, personal injury, or death.

Example: "The explosion from an IED of this type could cause damage to surrounding objects, injury, or death to personnel in the vicinity."

Example: "The explosion of the bulk explosive recovered from the suspect's residence could cause property damage, personal injury, or death."

4.14 General Observations of Explosive Damage

An examiner may report and/or state that the damage observed on evidence is consistent with the damage from a low or high explosive.[2] The damage characteristics must be recorded in the case notes.

Example: "The damage observed on the fragmented metal pieces was visually consistent with high-explosive damage."

4.15 Extensive Damage to IED Components Caused by an Explosion

If the examiner has determined that the explosion and/or fire resulting from the functioning of an IED caused extensive damage, such as severe fragmentation, charring, or alterations to the IED components, the examiner may not report, state, or imply that a conclusive determination of the exact construction characteristics and functionality of the IED were made. However, the examiner may report and/or state the most logical construction characteristics and functioning mechanism of the IED if the forensic examinations permit such an inference.

Example: "Conclusive determinations regarding the exact construction and functioning characteristics of the IED could not be made due to the extensive damage to its components caused by the explosion."

Example: "The exact construction and functioning characteristics of the IED could not be determined due to the extensive damage to its components caused by the explosion; however, the most logical functioning of the IED would be that of a victim-operated device."

4.16 Extensive Damage to IED Components Caused by a Render Safe Procedure

If the examiner has determined that the explosion and/or fire resulting from a render safe procedure has caused extensive damage, such as severe fragmentation, charring, or alterations to the IED components, the examiner may not report, state, or imply that a conclusive determination of the exact construction characteristics and functionality of the IED were made. However, the examiner may report and/or state the most logical construction characteristics and functioning mechanism of the IED if the forensic examinations permit such an inference.

[2] A low explosive is an energetic material designed to rapidly burn, or deflagrate. A high explosive is an energetic material designed to detonate.

Example: “Conclusive determinations regarding the exact construction and functioning characteristics of the IED could not be made due to the extensive damage caused to its components by the render safe procedure utilized by local bomb squad personnel.”

Example: “The exact construction and functioning characteristics of the IED could not be determined because of the extensive damage caused to its components by the explosion due to the render safe procedure used by the bomb technician on-site; however, the most logical functioning of the IED would be that of a victim-operated device.”

4.17 Identification of Chemical Substances and Explosives

An examiner may report and/or state the identification of a particular chemical substance or explosive only if the examiner qualifies the statement by referencing that the analysis was performed by an explosives chemistry examiner. Typically, for purposes of testimony, the explosives chemistry examiner is called to testify before the explosives and hazardous devices examiner to provide this foundation.

Example: “Chemical analysis of Item 1 revealed the presence of Trinitrotoluene (TNT). For detailed information on the chemical analysis conducted, see the FBI Laboratory Report for Laboratory number 2015-00565-3, dated February 1, 2015, and authored by Joseph Johnson.”

Example: “Explosives chemistry examinations performed by Joseph Johnson of the Explosives Unit and reported on February 1, 2015 under Laboratory number 2015-00565-3, revealed the presence of Trinitrotoluene (TNT) on Item 1.”

5 Statements Not Approved For FBI Explosives and Hazardous Devices Examination Testimony and/or Laboratory Reports

5.1 Production Sources Based on Component Markings

An examiner may not report and/or state that a particular company was the definitive source of an item based solely on the markings present on it.

For example, the item may have been counterfeited; therefore, the presence of a trademark does not necessarily imply that the particular company using that trademark produced it. However, an examiner may report that particular markings on evidence are visually consistent with the markings used by a particular company by reference to an appropriate, reliable source. See Section 4.4. The source of the information must be recorded in the case notes.

5.2 Conclusive Identifications from Partial Markings on Components

An examiner may not report and/or state that a conclusive identification of an item was made when the examiner has determined that there exist absences or alterations of specific

manufacturer or other unique markings on items of evidence that do not permit such a conclusion. If required, the examiner could confirm the commercial or manufacturing source of the component through direct communications with the distributor or manufacturer. See section 4.3.

For example, in the absence of other identifying information, an examiner could not report and/or state that the presence of the markings "R c l " on a damaged battery indicate that it was conclusively identified as a "Raycell" battery. However, the examiner could report and/or state that the partial markings share common visual characteristics, or similarities, with the markings on "Raycell" batteries, if that is the case.

5.3 Exclusion of All Other Sources

An examiner may not report and/or state that an item originated from a commercial source to the exclusion of all other sources unless the component's distributor or commercial manufacturer has confirmed this. See section 4.3.

For example, clothespins are a widely produced item. An examiner may not report and/or state that a clothespin from an IED must have originated from a box of clothespins found in the search of a suspect's residence, however, an examiner can report and/or state that the clothespins shared common visual and/or physical characteristics, or similarities, if that is the case.

For example, in the absence of representatives from the Raycell Corporation confirming that Raycell manufactured a battery present in the evidence, the following statement is not allowed:

Example: Present in the evidence was a damaged battery manufactured by the Raycell Corporation.

5.4 Analytical Methodologies for Chemical Substances and Explosives Identification

An examiner may not report and/or state the analytical methodologies utilized by explosives chemistry examiners to identify a particular chemical substance or explosive unless specifically directed to do so by the court. Under this direction, the examiner must make clear to the court that they are not a trained chemist, may not be able to properly identify or explain the analytical methodologies utilized, and that the chemical analysis was performed by an explosives chemistry examiner.

For example, the following statement is in general not allowed:

Example: "Trinitrotoluene (TNT) was identified on the item by gas chromatography/mass spectrometry."

However, this statement would be allowed under the court's direction:

Example: "Your Honor, I am not a trained chemist and cannot explain the analytical methodologies used to identify the explosive. The examination was performed by an explosives chemist in the Terrorist Explosive Device Analytical Center and his report identified Trinitrotoluene on the item by using gas chromatography/mass spectrometry."

5.5 Conclusive Determination of Explosive from Damage Observations Only

An examiner may not report and/or state a conclusive determination as to the exact chemical composition of an explosive based only on the observed damage to components or the environment. See Section 4.14. For example, the following statements are not allowed:

Example: "The damage observed on the fragmented metal pieces was caused by the explosion of the high-explosive Trinitrotoluene (TNT)."

Example: "The damage observed to the structural columns of the building was caused by the explosion of the plastic explosive Composition C-4."

5.6 Conclusive Determination of Explosive Characteristics from Damage Observations Only

An examiner may not report and/or state a conclusive determination as to the exact explosive characteristics of an explosive based only on the observed damage to components or the environment. See Section 4.14. For example, the following statements are not allowed:

Example: "The damage observed on the fragmented metal pieces was caused by the explosion of an explosive with a density greater than 1.0 g/cm^3."

Example: "The damage observed to the structural columns of the building was caused by the explosion of an explosive with a detonation velocity greater that 4.0 km/s."

Example: "The damage observed to the transfer girder of the building was caused by the explosion of an explosive with a mass of 1000 pounds".

5.7 Legal Destructive Device Determination

An examiner may not report and/or state that the components present in the evidence are those of a destructive device *as specifically defined in the legal statutes* since this determination is not one of forensic science and is within the purview of the jury.

Example: "Present in the evidence are the components of a destructive device as defined in Title 18 of the United States Code at Section 921 (a) (4)."

Example: "Present in the evidence are the components of a destructive device as defined in Title 26 of the United States Code at Section 5845 (f)."

5.8 Weapon of Mass Destruction Determination

An examiner may not report and/or state that an IED or the components thereof constitute a "weapon of mass destruction" (WMD) since this is not a term utilized in the field of explosives and hazardous device analysis.[3] If the court requests that the examiner opine on this matter, the examiner must make clear that the term WMD does not have a technical definition in their discipline, and may provide clarification to the court as to the destructive potential of the IED.

For example, the following statement is in general not allowed:

Example: "Present in the evidence are the components of an improvised explosive device (IED), also referred to as a homemade bomb, or weapon of mass destruction (WMD)."

However, the statement below would be allowed under the court's request:

Example: "Your Honor, the term 'weapon of mass destruction,' or 'WMD,' does not have a technical definition in our discipline and is not a term we utilize in our discipline. Therefore I cannot determine based on technical data if an item is a WMD; however, it is my opinion that the components of the IED that I analyzed, if properly assembled and initiated, would make an effective weapon and its explosion would be capable of producing great damage and loss of life."

5.9 Calculations Pertaining to Evidence

An examiner may not report or testify to the results of calculations pertaining to evidence that is presented for the first time to the examiner in the courtroom. The examiner will respectfully decline to perform such calculations on the grounds that such work requires technical verification. However, the examiner may provide estimates that are based on prior analyses conducted.

6 Laboratory Report Reviews

The content of an Explosives and Hazardous Devices *Laboratory Report* will be reviewed per the Explosives Quality Assurance Manual Procedures for Preparing Reports and Retaining Case Records and the Explosives and Hazardous Devices Report Writing Guidelines procedures ensuring compliance with the statements in this document.

7 Testimony Reviews

Testimonies will be reviewed in accordance with the FBI *Laboratory Operations Manual (LOM) Practices for Testimony Related Activities*. The review will ensure compliance with the statements in this document.

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[3] The legal definition of a weapon of mass destruction can be found at 18 U.S.C. § 2332(a) (c), 2013.

8 References

ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories, International Organization for Standardization, Geneva, Switzerland, 2017.

ISO/IEC 17025:2017 - Forensic Science Testing and Calibration Laboratories Accreditation Requirements (AR 3125), ANAB, Milwaukee, WI, April 29, 2019.

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Procedures for Preparing Reports and Retaining Case Records, Federal Bureau of Investigation, Laboratory Division, Explosives Quality Assurance Manual, latest revision.

Explosives and Hazardous Devices Report Writing Guidelines, Federal Bureau of Investigation, Laboratory Division, Explosives Standard Operating Procedures: Devices, latest revision.

Rev. #	Issue Date	History
2	10/02/2017	Administrative changes for grammar and clarity. Removed and/or modified references to the Explosives Unit. Deleted sections 3.3 and 3.4. Changed or to and in section 4.3 regarding case notes and Communication Log.
3	12/16/2019	Updated SOP title in section 7. Updated references.

Approval Redacted - Signatures on File

Explosives Unit Chief Date: 12/13/2019

TL Approval

Explosives and Hazardous
Devices Technical Leader Date: 12/13/2019

FBI Approved Standards for Scientific Testimony and Report Language for Explosives Chemistry and Fire Debris Analysis

1 Purpose

This document provides examples of the scientifically-supported conclusions and opinions approved for reporting examination conclusions and offering expert witness opinion statements during testimony by examiners who conduct explosives chemistry and fire debris examinations in the FBI Laboratory. These examples are not intended to be all inclusive and may be dependent upon the precedent set by the judge or locality in which a testimony is provided. These examples are not intended to serve as precedent for other forensic laboratories and do not imply that statements by other forensic laboratories are incorrect, indefensible, or erroneous.

2 Scope

This document applies to examiners who prepare *Laboratory Reports* (7-1, 7-1 LIMS, 7-273, 7-273 LIMS), and/or provide expert witness testimony in explosives chemistry and fire debris analysis. This document does not apply to employees who provide fact witness testimony.

3 Responsibilities

3.1 The examiner will ensure that a *Laboratory Report* complies with the statements contained within this document, when applicable.

3.2 The examiner will ensure that his/her testimony is consistent with the standards contained within this document, when applicable.

4 Statements Approved for FBI Explosives Chemistry and Fire Debris Analysis Testimony and/or Laboratory Reports

For more detailed guidance on explosives chemistry and fire debris report writing, see the Explosives Chemistry and Fire Debris Report Writing Guidelines procedures.

1. The examiner may report analytical findings and/or state opinions/conclusions about the presence or absence of a targeted chemical or product (e.g., explosives, explosive precursors, explosive reaction products, ignitable liquid residues, general unknowns).

2. The examiner may report and/or state opinions as to the identification or chemical classification (if identification was not achieved) of a substance. The examiner may also

report and/or state the general properties and potential uses of the substance or class of substances.

3. The examiner may report and/or state an opinion that the conclusions apply to the entirety of an item (or a percentage of the item) when there is a reasonable assumption of homogeneity of the item or an appropriate sampling plan was used.

4. The examiner may report results of examinations and/or state opinions/conclusions regarding a chemical comparison that was performed between items, provided that the opinions/conclusion are supported by the appropriate chemical analyses.

5. The examiner may report and/or state a determined quantity of a substance (e.g., weight, volume, purity, concentration) when a validated quantitative method was used. The reported/stated quantity will include an associated estimated measurement uncertainty and confidence level.

6. The examiner may report and/or state an opinion about an estimated quantity of a substance (e.g., weight, volume, purity, concentration) when a validated quantitative method was not used, as long as the method(s) used is reliable for such estimation and it is clearly stated that the estimate is not the result of a validated quantitative method.

7. The examiner may report and/or state the limitations of his/her examinations and opinions.

8. The examiner may report and/or state general explosive science terms and principles.

5 Statements Not Approved For FBI Explosives Chemistry and Fire Debris Analysis Testimony and/or Laboratory Reports

1. The examiner may not state or imply that two chemicals, chemical mixtures, or chemical products originated from the same source to the absolute exclusion of all other sources.

2. In cases involving comparisons of items, an examiner generally may not report and/or state an opinion about the exact source of a chemical or material. However, there may be instances when this is acceptable (e.g., chemical ‘tags’ were incorporated in the sample(s), entire population of comparison item was tested).

3. An examiner may not report or testify to legal hazardous device determinations or to the potential resultant damage from explosives and/or hazardous devices.

6 Laboratory Report Reviews

The content of an explosives chemistry and/or fire debris *Laboratory Report* will be reviewed per the Explosives Quality Assurance Manual Procedures for Preparing Reports and Retaining Case Records and the Explosives Chemistry and Fire Debris Report Writing Guidelines standard operating procedures ensuring compliance with the approved statements in this document.

7 Testimony Reviews

Explosives chemistry and fire debris testimonies will be reviewed in accordance with the FBI *Laboratory Operations Manual (LOM) Practices for Testimony Related Activities*. The review will ensure compliance with the statements in this document.

8 References

ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories, International Organization for Standardization, Geneva, Switzerland, 2017.

ISO/IEC 17025:2017 - Forensic Science Testing and Calibration Laboratories Accreditation Requirements (AR 3125), ANAB, Milwaukee, WI, April 29, 2019.

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Procedures for Preparing Reports and Retaining Case Records, Federal Bureau of Investigation, Laboratory Division, Explosives Quality Assurance Manual, latest revision.

Explosives Chemistry and Fire Debris Report Writing Guidelines, Federal Bureau of Investigation, Laboratory Division, Explosives Standard Operating Procedures: Chemistry, latest revision.

Rev. #	Issue Date	History
2	10/02/17	Modified title. Administrative changes for grammar and clarity. Removed and/or modified references to the Explosives Unit. Deleted sections 3.3 and 3.4.
3	12/16/19	Updated SOP title in section 7. Updated references. Removed SAU Chief and QA from approval lines. Separated Explosives Chemistry and Fire Debris TL signatures.

Approval

Redacted - Signatures on File

Explosives Unit Chief Date: 12/13/2019

TL Approval

Explosives Chemistry Technical Leader Date: 12/13/2019

Fire Debris Technical Leader Date: 12/13/2019

Procedures for Preparing Reports and Retaining Case Records

1 Purpose

This document sets forth the procedures for preparing, reviewing, and issuing an FBI *Laboratory Report* (7-1, 7-1 LIMS, 7-273, 7-273 LIMS), and retaining case records for Forensic Advantage (FA) and legacy cases. It also supplements the requirements in the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM).*

2 Scope

These procedures apply to explosives chemistry, fire debris, and explosives and hazardous devices personnel who generate case records and/or prepare or issue *Laboratory Reports*. These procedures also apply to examiners who perform verifications of identifications and associations, conduct technical reviews, and conduct administrative reviews.

3 Case Records

A case file consists of the administrative and examination records for a given case. It is a compilation of case records, requests for examinations, photographs, technical records, and other pertinent communications and information. These records (physical or electronic) will be retained in the FBI files and include records in an electronic format (uploaded to Sentinel) or in physical format (1A or 1C package), as appropriate.

3.1 Administrative Records

3.1.1 Administrative records are notes (e.g., when only administrative information is included), forms, printouts, charts, and other records that **do not** pertain to the conclusions of the examinations performed.

3.1.2 The following are defined as administrative records:

- Request for examination (or reference to serial in Sentinel)
- FA Case Report
- FA Case Record Report
- FA Case Communication Log
- FA Case Record Communication Log
- *Activity and Communication Log* (7-245)
- *Examination Plan* (7-262, 7-274)
- Chain-of-Custody Log (FA, 7-243, 7-243a)
- Secondary Evidence Inventory

- *Shipping Invoice* (7-264 LIMS)
- Check-in notes (when only administrative information is included)
- ECU Search Slip
- *Laboratory Worksheet* (7-2)

3.2 Examination Records

3.2.1 Examination records are notes, forms, analytical instrument printouts, charts, and other records that **do** pertain to the conclusions of the examinations performed.

3.2.2 The following are defined as examination records:

- Check-in notes (when relevant evidence information is included)
- Case notes
- Instrument printouts, including operating conditions (parameters, including instrument checklist)
- Calculations, graphs, charts
- Photographs
- Printouts of electronically submitted evidence
- References
- *Laboratory Report* copies
- Explanation and authorization for any minor deviations from Standard Operating Procedures (SOPs) or a *Major Deviation Request* (7-258), if applicable.

3.2.3 Each examination record must include the initials of the person who processed, analyzed, and/or examined the evidence; the date of the examination, analysis, or processing activity; initials of the examiner indicating that each page was reviewed and he/she agrees with the content of the page; and the Laboratory number.

3.2.4 Electronic examination records will be uploaded into the appropriate Object Repository in FA by the creator if unclassified and practicable. Multiple individuals may prepare an electronic examination record if each individual's initials are present next to the portions of the record where they conducted work. Generally, check-in notes are stored in the Case Object Repository and case notes and analysis results are stored in the Case Record Object Repository.

The examiner will "Approve" the record in the Object Repository. If the record was created by a technician, the examiner's approval indicates his/her review and agreement with the content.

3.3 Retaining Case Records

3.3.1 Physical and electronic supporting records will be prepared and retained according to the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining

Records for Legacy Cases and LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA).

3.3.2 Administrative and examination records, together or separately, will be accounted for in their totality and that totality will be recorded for physical 1A(s)/1C(s).

FA will be used to account for all FA-generated electronic digital administrative and examination records included in a Case or Case Record. This electronic file will be serialized in Sentinel.

For physical records, one of the following methods must be used for proper accounting:

- Number each page of the administrative and examination records sequentially, indicating the last page in some manner.
- Number the pages of the administrative and examination records in the form "page __of__." This may be done for each section.
- On the 1A envelope, write a description of the type and number of administrative or examination records present.

3.3.3 A "chart" refers to a single page. A chart may have more than one display of data on it but is counted as one page. When information is on two sides of a piece of paper, this counts as two pages.

3.4 Abbreviations Used in Case Records

3.4.1 The *Abbreviations Used in Explosives Chemistry, Fire Debris, and Explosives and Hazardous Devices Case Records* (Appendix A) contains a list of abbreviations within the fields of explosives, chemistry, and fire debris, that are commonly used by explosives chemistry, fire debris, and explosives and hazardous devices personnel. Any other abbreviations that are not expected to be readily recognized will be defined upon first use within each case file. Abbreviations that are expected to be readily recognized may be used without defining them.

4 Case Review

A review of a *Laboratory Report*, as described in the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases and the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA), encompasses three types of review: verifications of identifications and associations, technical review, and administrative review.

4.1 Verification of Identifications and Associations

Verification of identifications and associations is defined as a comparison of physical and/or chemical traits that results in repeatable similarities between the items with a coexistent lack of meaningful differences.

4.2 Technical Review

Technical reviews and verification of identifications and associations, if applicable, will be conducted when a *Laboratory Report* contains examination results. The technical review and verification of identifications and associations will be combined into a single review process and will be conducted in accordance with the QAM and LOM practices.

The technical review and verification of identifications and associations will be conducted by a technical reviewer who is authorized in the category of testing being reviewed. Any physical case records will be delivered to the reviewer or scanned and transferred electronically.

The technical review will determine if:

- The examinations and supporting case records conform to appropriate technical procedures and applicable portions of the QAM, LOM, appropriate explosives documents, and technical procedures.
- The appropriate examinations have been performed.
- The examiner's conclusions are consistent with the data records, are within the limitations of the discipline/category of testing, and are supported by the applicable FBI Approved Standards for Scientific Testimony and Report Language (ASSTR).
- The *Laboratory Report* is accurate and there are sufficient supporting records for the results and/or conclusions of the *Laboratory Report*.
- Verification of identification and association has been completed and properly recorded, when such a conclusion has been reached.
- Associations are put into the appropriate context in the *Laboratory Report*.
- The *Laboratory Report* contains all the required information.

The technical reviewer will also ensure that manual calculations, data transcriptions, and data reductions relevant to examinations are systematically checked for accuracy. Additionally, the technical reviewer will independently verify identifications or associations by reviewing or examining relevant information, which may include items of evidence, data, charts, photographs, etc. The completion of both the technical review and the verification of identifications and associations will be recorded as a "Technical Review".

For FA cases, a technical reviewer will be selected in FA. Upon completion of the technical review, the reviewer will record his/her agreement with the examination process in FA by completing the review.

For legacy cases, the technical review will be recorded on a copy of the *Laboratory Report* as described in the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases. A copy of the legacy *Laboratory Report* with the technical review signature will be maintained in the FBI Laboratory file.

Exceptions to the review recordkeeping process listed above will be when an administrative closeout report will be issued and no physical examination of the evidence has been conducted. In this case, only an administrative review will be performed.

If examinations have not been conducted or were canceled on evidence received prior to any examinations commencing, the authorized evidence management person managing the case will prepare a *Laboratory Report* as described in LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases and the LOM Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA). A technical review will not be required on this report.

For discontinued examinations, the affected examiner will prepare a *Laboratory Report* as described in LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases and the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA).

Information regarding canceled or discontinued examinations will be recorded according to LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases and the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA).

Technical or scientific discrepancies identified during a technical review will be addressed in accordance with the LOM – Practices for Resolution of Scientific or Technical Disagreement.

4.3 Administrative Review

All *Laboratory Reports* will be administratively reviewed. This review may be conducted in conjunction with the technical review.

An administrative review will be conducted by the issuing examiner's Unit Chief, appropriate Technical Leader, or other examiner qualified in the category of testing. Any physical case records will be delivered to the reviewer or scanned and transferred electronically.

For FA cases, an administrative reviewer will be selected in FA. Upon completion of the administrative review, the reviewer will record his/her approval of the *Laboratory Report* in FA by completing the review.

For legacy cases, the administrative review will be recorded on a copy of the *Laboratory Report* as described in the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases. A copy of the legacy *Laboratory Report* with the administrative review signature will be maintained in the FBI Laboratory file.

These records signify approval for uploading the *Laboratory Report* to Sentinel.

If the issuing examiner's Unit Chief is qualified and authorized in the category of testing, he or she may conduct the technical review, verification of identifications and associations, and the administrative review.

4.4 Multiple Examiner *Laboratory Reports*

When an Explosives and Hazardous Devices Laboratory Report is being issued and results from another examiner(s) must be included, the Explosives and Hazardous Devices examiner will identify each examiner's results and include a statement that includes the FBI Laboratory number and Case Record number of the other examiner's report, the examiner's name, and the date of his/her report as described in the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases or the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA), as appropriate. Each contributing examiner will be an approver in Sentinel, acknowledging agreement with his/her results as reported.

5 Expedited Results

Expedited or partial results of an examination(s) may be disseminated with the required dissemination information to the contributor prior to issuing a *Laboratory Report*. Refer to the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases or LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA), as appropriate, for required dissemination information.

The following expedited or partial results of an examination(s) do not need to be confirmed by another qualified examiner prior to dissemination:

- Negative results
- Presumptive results

6 Uploading to Sentinel

After the appropriate reviews have been completed, the issuing examiner will ensure that his/her *Laboratory Report* and supporting records are uploaded to Sentinel.

When an Explosives and Hazardous Devices *Laboratory Report* includes results from another examiner, refer to section 4.4 regarding multiple examiner *Laboratory Reports* for the Sentinel upload process.

If a case requires immediate issuance of a *Laboratory Report* in the issuing person's absence, a major or minor deviation will be requested as described in the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases or the LOM – Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA), as appropriate.

7 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Rev. #	Issue Date	History
3	10/04/2018	Administrative changes for grammar and clarity. Condensed section 3.3 and made references to LOM. Removed "qualified" from technical reviewer requirement in section 4.2. In sections 4.2 and 4.3, removed specific review language and referenced LOM and changed record maintenance from 1A/1C package to FBI Laboratory file. Added abbreviations to Appendix A.
4	12/16/2019	Removed technical review requirement from section 4.2. Added abbreviations to Appendix A. Removed SAU Chief from approval lines.

Approval

Redacted - Signatures on File

Explosives Chemistry Technical Leader Date: 12/13/2019

Explosives and Hazardous Devices Technical Leader Date: 12/13/2019

Fire Debris Technical Leader Date: 12/13/2019

Explosives Unit Chief Date: 12/13/2019

QA Approval

Quality Manager Date: 12/13/2019

Appendix A: *Abbreviations Used in Explosives Chemistry, Fire Debris, and Explosives and Hazardous Devices Case Records*

→	to, into, transferred to
(-)/-	negative
(+)/+	positive
(?)	indicates uncertainty
∅	absent
~	possible
=	consistent with, to the limit of the specific examinations performed
abs	absent
ace	acetone
ack	acknowledge, acknowledgement
Al	aluminum
amt	amount
AN	ammonium nitrate
ANFO	ammonium nitrate fuel oil
APCI	atmospheric pressure chemical ionization
API	atmospheric pressure ionization
appear	appearance
arb	arbitrary
AS	autosampler
assoc	associated
ATB	appears to be
ATR	attenuated total reflectance
AUSA	Assistant United States Attorney
ave, avg	average
AWG	American (standard) wire gauge
batt	battery(ies)
bl	blue
blk	black
bkg	background
BP	black powder
bpb	brown paper bag
BPS	black powder substitute
Br	brass
br, brn	brown
brt	bright
BSE	backscatter detector
CAN	calcium [carbonate] ammonium nitrate
CB	circuit board

CD	command detonation
CEXC	Combined Explosives Exploitation Cell
char	characteristic(s)
chem	chemical
CHP	concentrated hydrogen peroxide
CI	chemical ionization
clr	color(ed)
CND	could not determine
comp	composition
conc	concentrated
cond	conductivity
cont	continuous
cont	control
con't/cont'd	continued
conv	conversation
COTS	commercial off the shelf
CP	cordless phone
cps	counts per second
CTA	cotton tipped applicator
CTG	cartridge
CW, c/w, con/w	consistent with
D, D, Dia, diam	diameter
DADP	diacetone diperoxide
DAP, DAPh	diamyl phthalate
DB	double-base
DBP, DBPh	dibutyl phthalate
DCDA	dicyanodiamide
DEHP, DEHPh	diethylhexyl phthalate
dens	density
DEP, DEPh	diethyl phthalate
det	detonator
det [cord]	detonating [cord]
detc'd	detected
dia	diameter
DIBP, DIBPh, IBPH	diisobutyl phthalate
DIPP, DIPPh	diisopentyl phthalate
dil	diluted
discont	discontinuous
dist, distr	distribution
dk	dark
DMDNB/DMNB	dimethyldinitrobutane
DMP, DMPh	dimethyl phthalate
DNN	dinitronaphthalene

DNT	dinitrotoluene
DOT	Department of Transportation
DPA	diphenylamine
DPP, DPPh	diphenyl phthalate
DTMP	dual tone multi frequency
EC	Electronic Communication
EC	ethyl centralite
ECD	electron capture detector
EDTA	ethylenediaminetetraacetic acid
EDAX	brand name for energy dispersive X-ray spectrometer
EDX, EDS	energy dispersive X-ray spectroscopy
EFP	explosively formed projectile
EGC	eluent generator cartridge
EGDN	ethyleneglycol dinitrate
EI	electron impact
EIP, EIC	extracted ion profile/chromatogram
EISL	evidence interim storage locker
elec	electrical
elim	elimination
env	envelope
EOD	Explosives Ordnance Disposal
ESI	electrospray ionization
ESR	evidence storage room
ETN	erythritol tetranitrate
EtOH	ethanol
EU	Explosives Unit
EUC	Explosives Unit Chemistry
evid	evidence
exp	expiration
exp, expl	explosive
EXPeRT	Explosives Reference Tool
FID	flame ionization detector
fil	filter
FPS	feet per second
frag, frg	fragment(s)
freq	frequency
FRS	family radio service
FST	flame susceptibility test
FTIR	Fourier Transform Infrared
GC	gas chromatography
gen char	general characteristics

GMRS	general mobile radio service
gr, grn	green
grad	gradual, graduated
GSM	global system for mobile communications
GWS	glass well slide
H	height
HC	homemade circuit
HCB, HMCB	homemade circuit board
HE	high explosive
Hex	hexane
HME	homemade explosive
HMTD	hexamethylenetriperoxide diamine
HMX	cyclotetramethylene tetranitramine
HP	hydrogen peroxide
HPD	heavy petroleum distillate
HPLC	high pressure liquid chromatograph
HS	headspace
HT	high-temperature
hvy	heavy
I	item
IC	integrated chip
IC	ion chromatography
ID	identification
IE	improvised explosive
IED	improvised explosive device
IL	ignitable liquid
IL	illegible
ILR	ignitable liquid residue
inc	include
inc	inconclusive
incorp	incorporated
indust	industrial
insol	insoluble
insuff	insufficient
IP	In-processing
IPA	isopropyl alcohol
IR	infrared
IRAM	improvised rocket assisted munition
irr	irregular
IS	internal standard
JEOL	brand name for scanning electron microscope

K, kn, KN	known [item]
KES	keyless entry system
L	left
L	length
lat	lateral
LC	liquid chromatography
LE	low explosive
LED	light emitting diode
lg	large
LPD	light petroleum distillate
LRCP/T	long range cordless phone/telephone
lt	light
lim, ltd	limited
LTQ	brand name for liquid chromatograph/mass spectrometer (linear trap quadrupole)
LVFC	limited value for comparison
LVIED	large vehicle improvised explosive device
Macro	macroscopic
mag	magnification
MC	methyl centralite
MDP	medium petroleum distillate
mech timer	mechanical timer
$MeCl_2$, MeCl	methylene chloride
med	medium
MEK	methyl ethyl ketone
MEKP	methyl ethyl ketone peroxide
MeOH	methanol
MHN	mannitol hexanitrate
Micro	microscopic
min	minimum
misc	miscellaneous
mito	mitrochrondrial [DNA]
mkd	marked
mod	moderate
MS	mass spectrometry
MSA	methanesulfonic acid
MSD	mass selective detector
Msg	message
Mscope, scope	microscope
mtDNA	mitochrondrial DNA
mult, multi	multiple

m/z	mass to charge ratio
m&p	mortar and pestle
NA	not analyzed
NA, N/A	not applicable
NB	nitrobenzene
NC	negative control
NC	nitrocellulose
nDNA	nuclear DNA
NDPA	nitrodiphenylamine
neg	negative
NG	nitroglycerin
NI	negative ion
NIST	National Institute of Standards and Technology
NM	nitromethane
nom	nominal
NQ	nitroguanidine
NSFC	not suitable for comparison
NSFCP	not suitable for comparison purposes
NSFSCP	not suitable for significant comparison purposes
NT	nitrotoluene
num	number
occ	occasional(ly)
op'd	opened
or, org	orange
P	pistol
part	particle(s)
PB	pill box
pc(s)	piece(s)
PC	positive control
PC	potassium chlorate
PCB	printed circuit board
PD	police department
PETN	pentaerythritol trinitrate
PFTBA	perfluorotributylamine
pg	page
PI	positive ion
PIR	passive infrared
pkgd, pkg'd	packaged
PMR	personal mobile radio
pos	positive
PP	pressure plate

PPC	potassium perchlorate
prep’d	prepared
prox	proximal
PS	polystyrene
Q	questioned [item]
RDX	cyclotrimethylene trinitramine
recv'd, rcv'd, rec’d, rec	received
R, rt	right
RC	radio controlled
rd, rnd	round
re	regarding
Ref	reference
Ref	reflective
rel	relative(ly)
ret’d	returned
RI	refractive index
R/S	representative sample
RS	rifle/shotgun
R-Salt	cyclotrimethylene trinitrosamine
RSP	render safe procedure
RT	retention time
RX	receiver
S	suspect
SAM	standard accelerant mixture
SB	single-base
SCR	silicon controlled rectifier
S/D, S&D	similarities and differences
SE	secondary evidence
sec ev, sec evid	secondary evidence
SEI	secondary electron detector
SEM	scanning electron microscopy
sev	several
SFC	suitable for comparison
Shav	shaving
SHN	sorbitol hexanitrate
sig, signif	significant
SIM	single-ion monitoring
slt	slight
sm	small
SN, S/No, S#	serial number
SNR	signal to noise ratio

sol	soluble, solubility
SP	smokeless powder
SPE	solid phase extraction
spec	specimen
SPME	solid-phase microextraction
ss	single strand
SS	spot size
ssteel	stainless steel
std	standard
TATP	triacetone triperoxide
TB	triple-base
TBEP	tributoxyethyl phosphate
TC, TELCAL	telephone call
TCR	transistor controlled relay circuit
TCU	tinned copper
TE	tamper evident [tape]
Telcal, telcall	telephone call
temp	temperature
TIC	total ion chromatogram
TM	testmix
TNT	trinitrotoluene
tpi	threads per inch
TPU	timing and power unit
TSQ	brand name for gas chromatograph/tandem MS/MS mass spectrometer (triple stage quadrupole)
TST	Thermal susceptibility test
TT	test tube
TX	transmitter
UN	urea nitrate
unID	unidentified
unk	unknown
unobs	unobserved
UPLC	ultra performance liquid chromatography, ultra-high performance liquid chromatography
v	very
V	victim
V	volt
vac	vacuum
var	variation, variable
VBIED	vehicle borne improvised explosive device
VCW	visually consistent with

VF	vacuum filter
v thn	very thin
W	width
wht	white
wt	weight
XPN	xylitol pentanitrate
XRD	X-ray diffraction
XRPD	X-ray powder diffraction
xtr	extract/extraction
ztb	zip-top bag

Procedures for Evidence Handling

1 Purpose

This document sets forth the procedures for handling evidence for Forensic Advantage (FA) and legacy cases and supplements the requirements in the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI Laboratory *Operations Manual (LOM).*

2 Scope

These procedures apply to caseworking personnel conducting work in explosives chemistry, fire debris analysis, and explosives and hazardous devices analysis who are involved in case assignment and conducting examinations of evidence.

3 Procedures

3.1 Receiving Evidence

Evidence management personnel are responsible for initiating submissions, assigning Laboratory numbers, and delivering evidence to a unit. The evidence will generally be delivered to an Evidence Storage Room (ESR). Transfers will be recorded on the *Chain-of-Custody Log* (7-243, or 7-243a) or in Explosive Reference Tool (EXPeRT), as appropriate, for a legacy case. For an FA case, transfers will be recorded in FA. When evidence is stored in the Evidence Interim Storage Locker (EISL), specific evidence storage locker (ESL), refrigerator, or freezer, it will be noted appropriately. Drug and valuable evidence will be directly transferred to caseworking personnel for storage in the drug and valuable safe. If a piece of evidence is too bulky, or there are too many items to be stored in an evidence storage locker, the evidence may be placed in an examination room and properly secured.

At times, evidence is received directly from the field. Evidence transfers occurring in the field where FA is not available will be recorded on a *Chain-of-Custody Log* (7-243) or other appropriate form. At the FBI Laboratory, evidence transfers will be recorded on the *Chain-of-Custody Log* (7-243, 7-243a), or in EXPeRT, as appropriate, for legacy cases and for FA cases, transfers will be recorded in FA.

An appropriately trained employee (typically evidence management personnel) will receive the evidence and initiate a submission to obtain a Laboratory number.

3.2 Case Assignment

The Unit Chief will ensure that the submission information is reviewed and that cases are assigned to the appropriate examiners based on the category of testing (e.g., explosives chemistry, fire debris, explosives and hazardous devices) involved in the request. For legacy cases, the records will be placed into the assigned examiner's mailbox. For FA cases, the Case or Case Record will be assigned in FA. When necessary, evidence management responsibilities will be assigned according to the practices described in the *LOM Practices for Assigning Cases and Conducting Examinations*.

3.3 Handling Evidence

To accept or handle evidence, personnel must have successfully completed the specific requirements for handling evidence as outlined in their training manual. To be assigned a case, an examiner must be technically qualified and authorized in the appropriate category of testing.

3.4 Drug and Valuable Evidence

All drug and valuable evidence, at the end of each working day, will be sealed and stored in a specifically-designated safe. This evidence will not be stored overnight in an open area, for example, an examination room.

3.5 Evidence Transfers for Legacy Cases

For legacy cases, the transfer of evidence between evidence management personnel and personnel in a category of testing (e.g., device examiner managing the case to an explosives chemistry examiner) will be recorded on the *Chain-of-Custody Log* (7-243) or in EXPeRT, as appropriate. Personnel within the same category of testing will use the *Chain-of-Custody Log Continuation Page* (7-243a) to record intraunit transfers of evidence, if necessary (e.g., transfers between chemistry examiner and a chemist). The *Chain-of-Custody Log Continuation Page* (7-243a) will be retained in the examiner's 1A.

3.6 Breaking Down (Inventorying) and Identifying Evidence

After a case is assigned and the evidence is delivered, the evidence container(s) and/or packaging will be opened, when practicable, and the contents broken down (referred to as "inventory" for legacy cases) and described. Check-in notes will be prepared upon breakdown and may be recorded in FA or recorded in writing and maintained with the FBI Laboratory file.

The evidence received will be compared against the itemized listing in the request for examination (e.g., Laboratory Examination Request (LER) (FD-1121), Request for Laboratory Examination (RFLE), Electronic Communication (EC) (FD-1057), *TEDAC Item Submission Form* (7-275)), Chain-of-Custody Log (FA, 7-243, or 7-243a), or other appropriate record. If

anything is missing or if items are present which are not listed as being delivered, it will be brought to the attention of evidence management personnel.

If any evidence container(s) and/or packaging is damaged or in an unsealed condition, it will be recorded in the check-in notes or case notes. The decision to proceed with evidence processing and analysis will be dependent on the circumstances of the case, the nature of the packaging, and determined by the assigned examiner. If examinations will not be conducted, evidence management personnel will be notified.

Check-in notes will be prepared to record the type and nature of the packaging of the submitted item(s). If the primary packaging is not sealed but examinations will still be conducted, the lack of a seal(s) will be noted in the check-in notes or case notes and the packaging will be sealed upon completion of examinations.

3.6.1 Safety Check

A safety check must be completed during the breakdown process for all explosives-related evidence (not required for fire debris evidence). A safety check is designed to ensure that all explosives-related evidence has been packaged properly and will not pose a hazard during the breakdown or examination process. The performance of this inspection by appropriately trained personnel, including relevant notes, will be recorded in the Case Communication Log in FA or on the *Activity and Communication Log* (7-245) for legacy cases.

3.7 Subdivided Evidence

During the breakdown process or examination, personnel may subdivide an item of evidence as necessary. The subdivided item will be transferred to new evidence packaging and given a unique identifier beginning with the item identifier from which it originated followed by a sequential number (e.g., Item 1-1 for FA, Q1.1 for legacy). Further subdivision of an item already subdivided will follow the same pattern using an additional sequential number.

For legacy cases, subdivided items will be listed on the *Laboratory Worksheet* (7-2). For legacy and FA cases, subdivided items will be referred to in the *Laboratory Report*.

3.8 Secondary Evidence

Secondary evidence is a material derived from an examination process on an item of evidence (e.g., prepared microscope slides, pill boxes containing scraped debris, vials containing extracts or c-strips). It is not an individual item submitted by a contributor and could not have been assigned an item identifier through the evidence breakdown process.

When secondary evidence is created, a new item identifier will be generated and recorded on the *Explosives Secondary Evidence Log* (Appendix A). The *Explosives Secondary Evidence Log* will

be retained as described in the *LOM Practices for Assigning Cases and Conducting Examinations*.

For legacy cases, secondary evidence does not need to be added to the *Laboratory Worksheet* (7-2), but it must be recorded on the *Explosives Secondary Evidence Log*. Transfer of the secondary evidence will be recorded on the *Chain-of-Custody Log* (7-243 or 7-243a).

For FA cases, secondary evidence will be added as a separate item as described in the *LOM Practices for Assigning Cases and Conducting Examinations*. The "For Analysis" box will be checked to ensure that the secondary evidence item appears on the *Laboratory Report*. The secondary evidence item description will include the name of the discipline or category of testing and the number and type of secondary evidence (e.g., "Explosives Chemistry Secondary Evidence [2 glass vials]"). If additional secondary evidence is generated from the same submission after the *Explosives Secondary Evidence Log* has been created and an item number assigned, the *Explosives Secondary Evidence Log* can be checked out of FA and updated to reflect the updated totals.

3.9 Preservation of Evidence

Personnel will at all times be aware of the need to protect the evidence for examinations that may be conducted by examiners of other caseworking units and to preserve the integrity of each item by protecting it from loss, cross-transfer, contamination, or deleterious change. These individuals, through their training, will be knowledgeable of the proper sequence in which examinations need to be conducted. If an examiner receives evidence that should be examined by another discipline or category of testing first, or receives evidence after being processed by another discipline or category of testing that prevents an examination from being conducted, evidence management personnel will be notified.

Listed below are general guidelines for evidence preservation. If there is any question, or if an unusual circumstance arises, consultation with other examiners assigned to the case, or the appropriate Unit Chief, will be occur before beginning any examinations.

3.9.1 Perishable Evidence: Perishable evidence (e.g., biological specimens, food items, some explosives, fire debris residues) will be refrigerated or frozen prior to analysis. Soil samples for ignitable liquid residue analysis should be frozen or refrigerated to reduce microbial degradation.

3.9.1.1 Digital thermometers are connected to all refrigerators and freezers which store evidence. These thermometers are monitored by an electronic temperature monitoring system managed by FBI Laboratory instrument operations personnel. The electronic temperature monitoring system will collect and maintain temperature information, and appropriate personnel will be notified if a temperature reading is outside of typical refrigerator/freezer settings. These personnel will determine the cause of the fluctuation and will coordinate maintenance or replacement of the refrigerator/freezer as necessary.

3.9.1.2 When the electronic temperature monitoring system is unavailable for more than one calendar month, a thermometer will be monitored at least once per calendar month by a unit employee and recorded on the *Refrigerator and Freezer Monitoring Log* (Appendix B) attached to the refrigerator or freezer.

3.9.2 Trace Evidence: Appropriately trained trace evidence personnel should open and collect appropriate trace evidence prior to other examinations being conducted.

3.9.3 Firearms: FBI qualified firearms instructors may render firearms safe. If one is not available to perform this task, the assistance of appropriately trained Laboratory personnel will be requested.

3.9.4 Documents: If indented writing examinations will be conducted, personnel will protect the evidence from any action that might impart (or transfer) impressions onto the evidence, including the use of initials to place the evidence under proper seal. If necessary, the evidence will be placed into an additional container to protect it from impressions.

3.9.5 Latent Fingerprints: Personnel will preserve latent fingerprint evidence by wearing gloves (cotton or nitrile, as appropriate) when handling the evidence and by limiting the types of examinations to those that will not obliterate possible latent fingerprints. A latent print examiner can be requested to come to the unit to perform a visual examination of a piece of evidence to determine if any latent prints are visible and to note its location so it is not affected by other examinations.

3.9.6 DNA Evidence: Evidence to be examined for DNA should be handled carefully to prevent additional and/or loss of DNA. The use of appropriate personal protective equipment (e.g., lab coat, gloves, mask) minimizes the chance of transferring DNA to the evidence. For items to be heated during examinations, contact DNA personnel to have the item swabbed prior to heating.

3.10 Evidence Under Active Examination

Evidence under active examination, which is not a drug or valuable, may be left unsealed, as long as the area in which it is located has limited access and is secured at the end of each day. A sign (e.g., an “Evidence Do Not Disturb” sign) indicating that evidence is under examination will be placed by the evidence and be clearly visible.

Evidence may be under active examination for a period of up to six months. After six months, the evidence will be reevaluated to determine if active examinations are continuing. A notation of this evaluation will be recorded in the case notes by the individual who conducted the reevaluation.

3.11 Redacted

3.11.1.8 Redacted

3.11.2.5 Redacted

4 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Rev. #	Issue Date	History
2	10/02/2017	Administrative changes for grammar and clarity. Removed references to the Explosives Unit to applicability to those conducting explosives chemistry, fire debris, and explosives and hazardous devices examinations. In section 3.2 removed paragraph about Explosives Unit Request Coordinator assignments and referred to LOM for evidence management assignments for explosives cases. Added last three paragraphs to section 3.6. In section 3.8, added that the evidence management group may also maintain the original secondary evidence log, that the secondary evidence log may be copied to the Case Record Object Repository, and added the last paragraph. In section 3.9, added notifying evidence management personnel for evidence to be examined by another discipline first or when exams are prevented. Added the Scientific Analysis Unit Instrument Operations group to section 3.9.1.1 and removed information about refrigerators/freezers. Referred to Trace Evidence Unit and Scientific Analysis Unit Trace Evidence Group personnel in section 3.9.2. Redacted
3	12/16/2019	Revised 3.9.1.1 and 3.9.2 to remove unit names. Revised 3.11.3. Removed SAU Chief from approval lines. Separated Explosives Chemistry and Fire Debris signatures.

Approval

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Explosives Chemistry Technical Leader — Date: 12/13/2019

Explosives and Hazardous Devices Technical Leader — Date: 12/13/2019

Fire Debris Technical Leader — Date: 12/13/2019

Explosives Unit Chief — Date: 12/13/2019

QA Approval

Quality Manager — Date: 12/13/2019

Appendix A: *Explosives Secondary Evidence Log*

Redacted - Form on File

Appendix B: *Explosives Refrigerator and Freezer Monitoring Log*

Redacted - Form on File

Field Swabbing

1 Purpose

This document sets forth the procedures for conducting field swabbing and supplements the requirements of the FBI Laboratory *Quality Assurance Manual (QAM)* and the FBI *Laboratory Operations Manual*.

A common technique for collecting explosive residue samples in the field is by swabbing evidence, surfaces, and other items that are considered too large to send to the laboratory for analysis. These procedures detail the preparation of swab kits and describes the collection of residue swabs at post-blast scenes and other explosives-related search sites. These procedures do not describe the collection of explosive residue by other means such as soil samples, or vacuuming, the collection of evidence items containing residues, or the collection of precursor chemicals or bulk explosive samples.

2 Scope

These procedures apply to caseworking personnel conducting explosives chemistry and explosives and hazardous devices analyses who are involved in swabbing for explosive residue.

3 Equipment/Materials/Reagents

Equivalent equipment, materials, and reagents may be substituted as needed.

3.1 Equipment

- Heat sealer

3.2 Materials

- Ballpoint pens
- Cotton balls
- Cotton-tipped applicators
- Disposable forceps
- Disposable gloves (without powder preferred)
- Evidence Response Team (ERT) Evidence Collected Item Log (FD-886)
- Evidence tape
- Glass jars, 2 ounce
- Glass scintillation vials
- Heat-sealable bags (nylon preferred)
- Permanent markers, thick and thin
- Rigid containers (plastic box, paint can, cardboard box)
- Surgical drape or kraft paper

- Tyvek suits and boot covers
- Zip-top bags, various sizes

3.3 Reagents

- Isopropyl alcohol (70% commercial product)

4 Procedures

4.1 Swab Kit Preparation

4.1.1 The following steps for preparing a swab kit is an example only. Swab kits may be prepared in a manner to fit the needs of the planned swabbing activity (e.g., swabbing of surfaces at a suspected improvised explosives clandestine laboratory, swabbing for explosives residue at a post-blast vehicle bombing scene).

4.1.2 Kits must be prepared in advance, in an explosive-free area, and protected from contamination. All items will be handled while wearing disposable gloves.

4.1.3 Clean work surfaces thoroughly with an isopropyl alcohol solution or other appropriate solvent. Cover the clean work surface with a disposable material such as a surgical drape or kraft paper.

4.1.4 The recommended composition of a small-size swab kit is as follows:

Administrative supplies:

- 1 Ballpoint pen
- 1 Thin permanent marker
- 1 Thick permanent marker
- ~2'x2' Surgical drape or kraft paper
- 10' Evidence tape
- 24 Zip-top bags, 3"x5"

Personal Protective Equipment (PPE):

- Several Tyvek suits (in individual heat sealed bags)
- 10 pair Nitrile gloves

Swabbing and sampling supplies:

- 3 2-ounce glass jars containing 10 cotton balls each
- 10 Cotton-tipped applicators
- 12 Disposable plastic forceps
- 24 Small glass vials (scintillation vials)

4.1.5 All swabbing and sampling supplies (e.g., forceps, cotton-tipped applicators, glass vials) can also be grouped and sealed in zip-top bags within the kits for added protection against contamination. An alternate method to protect the materials in smaller search kits would be to

place items in a rigid container or heat-seal the entire swab kit in a vapor proof, heat-sealable bag (nylon preferred).

4.2 Swabbing Procedures

4.2.1 General Information

4.2.1.1 Refer to the FBI Laboratory ERT 12-Step Process for Scene Processing; swabbing should not be performed as a stand-alone process.

4.2.1.2 If safe to do so, swabbing and the collection of other trace evidence (e.g., hairs, fibers, DNA, latent fingerprints) should be conducted prior to the handling or collection of any bulk explosive or chemical materials (solids or liquids) or larger items of evidence (e.g., clothes, documents, weapons).

4.2.1.3 When feasible, disposable forceps will be used to handle swabs at all times.

4.2.1.4 Dry swabs (e.g., cotton balls, cotton-tipped applicators) will be used to collect explosive residue. Do not moisten swabs.

4.2.1.5 If possible, two individuals will conduct residue swabbing; one to perform the swabbing ("Collector"), and the other to carry supplies, open containers, and hold onto the collected, packaged swabs ("Assistant").

4.2.1.6 It is recommended that Bomb Technicians do not conduct residue swabbing due to the high probability of contamination from their clothing, especially if they have already performed a safety sweep.

4.2.1.7 A location should be selected to stage swabbing supplies and lay down the surgical drape or kraft paper to provide a clean work surface. Ideally it should be near where swab samples will be collected.

4.2.1.8 Once opened, the remaining items in the exposed swab kit cannot be used for evidence collection at other scenes because they may be contaminated.

4.2.1.9 When recommended guidance from this procedure cannot be followed (e.g., Tyvek not worn, forceps not used), it will be recorded and include the reason(s).

4.2.2 Personal Protective Equipment

4.2.2.1 Individuals conducting swabbing will wear appropriate PPE.

4.2.2.2 Disposable gloves are mandatory for swabbing operations; when practicable, Tyvek suits and boot covers will be worn.

4.2.2.3 The individual(s) will put on one pair of gloves first, then a Tyvek suit, then either change his/her gloves, or put on a second pair over the first.

4.2.2.4 All PPE should be donned prior to any search or swabbing procedures, and disposed of properly on scene (e.g., trash, biohazard).

4.2.2.5 Gloves will be changed often (e.g., soiled, damaged).

4.2.2.6 All PPE will be changed when search locations change (especially important when doing a remote search after working at a post-blast scene), and new control and comparison swabs will be taken (refer to sections 4.2.3 and 4.2.4 in this document).

4.2.3 Control Swab Collection

4.2.3.1 Control swabs will be collected prior to entering the search site.

4.2.3.2 New forceps will be used to remove one swab from the container and to directly put the swab into a small vial labeled with "swab control".

4.2.3.3 The Collector's and Assistant's PPE/clothing will be swabbed with separate swabs, rubbing the swabs over their gloved hands, front torso, and sleeves of their Tyvek suit (or if suits are unavailable, whatever clothing will be worn at the scene). These swabs will be placed into a vial labeled with "clothing/glove control" and the Collector's or Assistant's name (or initials), as appropriate.

4.2.3.4 Additional control swabs will be taken, as appropriate (e.g., work surface).

4.2.3.5 All control swab vials may be placed into a single evidence bag and entered into evidence.

4.2.4 Comparison Swab Collection (when practicable)

4.2.4.1 It is helpful for the FBI Laboratory to have an idea of what chemicals are originally present in the environment where the swabbing is taking place.

4.2.4.2 The Collector will swab an area of the scene that is reasonably expected to have been protected from the explosion, or, if in a possible synthesis location, an area that is not expected to have had chemicals mixed, cooked, or stored there.

4.2.4.3 The area swabbed should be one that would be exposed to the same general conditions as the area in question (e.g., same cleaning practices; same exposure to the weather, fertilizer, road salt, or other chemicals).

4.2.4.4 The number of comparison swabs will vary by scene and incident.

4.2.4.5 Each comparison swab will be placed in a vial labeled with "comparison" and include a description of the location swabbed.

4.2.5 Evidence Swab Collection

4.2.5.1 Swabs will be used to remove residues from items exposed to an explosion or

containing possible explosives-related residue (if the item itself cannot be submitted) using a circular rubbing motion.

4.2.5.2 Multiple swabs of the same item/area may be placed into the same vial. If the swabbed area does not leave a visible residue on the swab, it is good practice to collect a second swab and place into the same vial.

4.2.5.3 The best areas to swab are smooth, non-porous surfaces (e.g., metal, glass, painted wood, stone, plastic) that do not appear to be burned.

4.2.5.4 Surfaces facing the explosion are more likely to retain residues (e.g., street signs, light poles, adjacent vehicles, metal gates).

4.2.5.5 Swab areas are likely to have been touched by suspects, but keep in mind the possible destruction of other potential evidence such as latent prints or DNA.

4.2.5.6 If more than one large container of swabs is used, a "swab control" must be taken from each container (repeat step in section 4.2.3.2 of this document).

4.2.6 Labeling and Packaging

4.2.6.1 It is acceptable to simply label and close the vials while on scene, and seal with evidence tape after all swab collection is completed (this reduces the need to use tape at the search location).

4.2.6.2 Vials may be enclosed (individually or in small groups) in a zip-top bag for added protection or grouping; the bag will be sealed with evidence tape and initialed.

4.2.6.3 If more than one vial is included in the same outer bag or package, each vial must be individually sealed and labeled.

4.2.6.4 The evidence tape should not cover or obscure the labels on the vials.

4.2.6.5 Each vial or outer bag/container will be labeled with the appropriate information such as item number, description, location, date, Case ID, and the Collector's and when applicable, Assistant's or witness' names and initials.

4.2.6.6 All swabs, including controls and comparisons, will be recorded on the Evidence Collected Item Log.

4.2.6.7 Evidence (e.g., swabs, clothing) from different search locations will be packaged in separate containers and protected from breakage and cross-contamination.

4.2.6.8 For shipping, sample vials will be packaged in sturdy containers (e.g., paint can, box with packing material) to protect them from being damaged.

5 Limitations

Many extraneous factors could affect the residue remaining at a search location, such as weather, length of time before processing, and people in the area.

6 Safety

Safety protocols, contained within the FBI Laboratory Safety Manual, will be observed at all times.

Standard precautions will be taken for the handling of all chemicals including standard universal precautions for the handling of biological and potentially hazardous materials. Refer to the FBI Laboratory Safety Manual for proper handling and disposal of all chemicals. Personal protective equipment will be used when handling any chemical.

The handling of some explosive materials is hazardous due to potential ignition by heat, shock, friction, impact, or electrostatic discharge. Personnel should work with small quantities of material (such as a few grams) and properly store larger quantities in approved containers.

Crime scenes and search scenes related to explosion or explosives investigations can contain hazardous chemicals and devices. All search participants should be aware that secondary explosive devices, live ammunition, bulk explosives, and other hazards may be present at a scene. It is best practice for a Bomb Technician (or other qualified explosives expert) to perform a safety sweep of the entire scene prior to entry of evidence collection personnel.

7 References

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

ERT 12 Step Process, Federal Bureau of Investigation, Laboratory Division, Evidence Response Team Unit, latest revision.

Evidence Collected Item Log, Federal Bureau of Investigation, Laboratory Division, Evidence Response Team Unit, latest revision.

Rev. #	Issue Date	History
0	07/07/2006	Original Issue to follow QATU formatting and ASCLD/LAB-*International* requirements.
1	11/26/2007	Administrative changes for grammar. Changed section 7.1.3 from optional to mandatory. Addition and removal of items from section 7.1.7. Added sections 7.1.8, 7.1.9, and 7.2.2.1. Changed section 7.2.6.1 to an optional step. Updated references.
2	10/02/2017	Administrative changes for grammar and clarity. Removed and/or modified references to the Explosives Unit (EU). Updated sections 1, 2, and 3. Removed sections 4, 5, and 6. Revised swab kit preparation instructions in new section 4.1. Revised swabbing procedures in new section 4.2.

Approval

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