

Main Charge Examinations

1 Scope

These procedures describe the process for main charge examinations and apply to explosives and hazardous devices caseworking personnel who examine main charges to determine identifying and functionality information.

2 Introduction

An energetic material is a material that can undergo an exothermic chemical reaction and release thermal energy. For our purposes we will use the term “energetic material” to refer to high explosives and low explosives. An explosive is a material that can undergo exothermic chemical reaction that results in a rapid expansion of the reaction products into a volume much greater than that originally occupied by the explosive. These reaction products can be solids or gases. As the reaction products expand into a larger volume, they perform mechanical work on their surroundings.

High explosives are *designed* to be initiated by shock and function by detonation. High explosives are commonly used in the commercial blasting and military sectors. Examples of high explosives include trinitrotoluene (TNT), dynamite, and emulsions. Low explosives are *designed* to be initiated by flame and function by deflagration. Low explosives can be further subdivided into propellants and pyrotechnics. Propellants are energetic materials *designed* to produce a controlled release of gas that can be used to propel objects. Propellants are commonly used in guns and rockets. An example of a propellant is smokeless powder. Pyrotechnics are energetic materials designed to mainly produce heat, light, and sound. Examples of pyrotechnic materials include thermite, black powder, and flash powder.

Note that the difference between high and low explosives is functional rather than fundamental. Many high explosives can also deflagrate if initiated by flame and many high energy propellants can detonate if shock-initiated.

Energetic materials can be utilized as the main charge explosive in an improvised explosive device (IED). Should bulk explosive material be recovered after the explosion of a main charge, it may be possible to determine manufacturing information. This data can provide the investigator lead information which can facilitate the identification of the subject(s) and/or group responsible for constructing the device.

3 Equipment/Material/Reagents

Below is a list of items that can be used to examine main charge explosives and their post-blast remains. The explosives and hazardous devices individual should choose the most appropriate items based on the nature of the evidence.

- Personal Protective Equipment (e.g., lab coat, eye protection, full face shield, gloves)
- Hand tools (e.g., tweezers, pliers, utility knife)
- Cleaning materials and disinfectants (e.g., cloths, bleach, rubbing alcohol)
- Stereomicroscope (various magnifications)
- Ruler (e.g., standard 12 inch length)
- Micrometer
- Caliper
- Pillboxes, glass containers, static-proof plastic bags
- FBI Laboratory Explosives Reference Tool (EXPeRT) Database
- Reference texts, manuals, manufacturers' literature, and known materials are maintained in the Explosives library. Additional reference information can be obtained from direct contact with manufacturers and distributors.

4 Standards and Controls

Not applicable.

5 Sampling or Sample Selection

Not applicable.

6 Procedures

These procedures are implemented as part of the overall examination process outlined in the Device Examinations Standard Operating Procedure (SOP). Refer to the Safety section of this SOP before starting any examinations.

Explosives and hazardous devices personnel will:

6.1 Before any examinations are conducted, ensure that the item(s), as well as its container(s) and packaging, have been appropriately marked in accordance with the FBI *Laboratory Operations Manual (LOM)* (i.e., item number, initials, and full Laboratory number, when practicable).

6.2 Ensure care is taken not to obliterate any identifying marks which have been previously placed on the item(s), or obliterate any microscopic marks of value.

6.3 Visually examine the item for any trace evidence that could be of value. This type of evidence could include, but not limited to the following: hairs, fibers, blood, paint, or other particles.

6.3.1 If the trace evidence is to be examined or preserved, contact the appropriate unit and determine if the material should be removed. Record the presence of the material by means of

notes, sketches, or photographs before it is removed.

6.4 Note the physical characteristics of the main charge through visual/microscopic examination. Physical measurements should be taken as well to aid in determining as many of the following attributes as possible:

- Construction characteristics
- Manufacturer
- Brand
- Type
- Special properties (e.g., physical condition, modifications, functionality, packaging present, date/plant/shift code, improvised or commercial)

6.5 If possible, determine the manufacturer, brand, and type by searching the EXPeRT database, explosive reference files, manufacturers' literature, and/or reference or known materials collection. Identifications or associations are made by comparison of observable/measurable physical characteristics with those provided in the above reference/literature materials.

7 Calculations

Not applicable.

8 Measurement Uncertainty

Not applicable.

9 Limitations

Refer to the Limitations section in the Device Examinations SOP and Appendix B of the Explosives and Hazardous Devices Report Writing Guidelines SOP.

10 Safety

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

10.1 Explosives should be protected from sources of heat, shock, friction, and electrostatic discharge (ESD). Should explosives be accidentally initiated, they have the capability of inflicting personal injury or death. Therefore, they should be handled with care. Personnel will follow the below guidance regarding the handling of explosives:

10.1.1 Explosives can be extremely sensitive to heat, shock, friction, and ESD. Ensure that

samples of these products are contained within static-proof plastic bags or other suitable containers.

10.1.2 No more than 5 grams of explosives will be sent to the FBI Laboratory for examination.

10.1.3 When not under examination, explosives will be stored in approved, explosion-proof containers (e.g., explosive magazine).

10.1.4 Explosives will be shipped in Department of Transportation (DOT) approved containers (e.g., MK663 containers)

10.1.5 Bulk explosives and initiators will not be examined at the same time or placed in close proximity to each other.

10.1.6 Appropriate facial protection (e.g., eye protection, full face shield) be worn when handling explosives.

10.2 Protective gloves (e.g., latex, nitrile) must be worn when handling items that have been possibly exposed to blood, tissue, or other bodily fluids. Gloves will prevent exposure of personnel to possible hazardous material on the items and prevent DNA from being transferred to the items.

10.3 Items potentially containing blood or other body fluids will be soaked in a 2.5% bleach solution or other suitable disinfectant following discussions with personnel that may conduct other examinations of the items

11 References

FBI Laboratory Division

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.

Explosive Devices SOPs, Federal Bureau of Investigation, Laboratory Division, latest revisions.

Other

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Thurman, J.T., Practical Bomb Scene Investigation, 2nd Edition, CRC Press, 2011

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0	07/07/2006	Original Issue to follow QATU formatting and ASCLD/LAB-International requirements
1	10/02/2017	Administrative changes for grammar, clarity, and conformance to revised QAM and LOM. Removed references to the Explosives Unit to applicability to those conducting explosives and hazardous devices related examinations. Deleted Calibration section since it is not required. Updated Limitations section to refer the reader to the Device Examination SOP and Appendix B of the Explosives and Hazardous Devices Report Writing Guidelines SOP. Updated references.

Approval

Redacted - Signatures on File

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