

Detonating Cord Examinations

1 Scope

These procedures describe the process for detonating cord examinations and apply to explosives and hazardous devices caseworking personnel who examine detonating cord and its post-blast remains to determine identifying and functionality information.

2 Introduction

Detonating cord is a commercially-available explosive component that can be used in improvised explosive devices (IEDs). It is manufactured as a cord that generally consists of a plastic sheath containing a high explosive center, usually pentaerythritol tetranitrate (PETN), enclosed in textiles and waterproofing materials. In commercial blasting operations, detonating cord is typically initiated with a detonator to then assist with the initiation of other explosives. In IEDs, detonating cord may be used either to initiate the main charge explosive or to serve as the main charge itself. Detonating cord is often completely consumed after its proper use; however in some cases it may be possible to recover fragments in a post-blast environment. Examination of detonating cord can sometimes assist in determining its functionality within an IED or provide possible manufacturer 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 detonating cord and its post-blast remains. Explosives and hazardous devices personnel 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

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(s) for any trace evidence and possible end matches that could be of value. This evidence could include, but not limited to the following: hairs, fibers, blood, paint, or other particles. Consult with other units regarding the potential of them performing end match examinations.

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 material by means of notes, sketches, or photographs before it is removed.

6.4 Note the physical characteristics of the cord through visual/microscopic examination. Physical measurements should also be conducted to aid in determining as many of the following attributes as possible:

- Construction characteristics
- Manufacturer
- Brand
- Type
- Explosives present
- Special properties (e.g., physical condition, functionality, modifications made for use in IED)

6.5 If possible, determine the manufacturer, brand, and type by searching the EXPeRT database, Explosives reference files, manufacturers' literature, and/or reference or known materials collection. Identifications 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 Explosives and Hazardous Devices 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 Detonating cord should be protected from sources of heat, shock, and friction. Should detonating cord be accidentally initiated it has the capability of inflicting personal injury or death; therefore, it should be handled with care. Explosives and Hazardous Devices personnel should follow the below guidance regarding the handling of detonating cord:

10.1.1 Detonating cord containing no more than 5 grams of explosives will be sent to the FBI Laboratory for examination.

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

10.1.3 Detonating cord will be shipped in Department of Transportation (DOT) approved containers.

10.1.4 Appropriate facial protection (e.g., eye protection, full face shield) will be worn when handling detonating cord.

10.1.5 Detonating cord and other types of explosive materials and components will not be examined at the same time or placed in close proximity to each other.

10.1.6 Refer to the Electric Detonators Examinations procedure if a detonator is submitted with detonating cord.

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 cleaned with 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

Atlas Powder Company, Explosives and Rock Blasting, Atlas Powder Company, 1987

Gregory, C.E., Explosives for North American Engineers, 3rd Edition, Trans Tech Publications, 1984

International Society of Explosives Engineers, Blasters' Handbook, 18th Edition, 2011

Persson, P.A., Rock Blasting and Explosives Engineering, CRC Press, 1994

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

Rev. #	Issue Date	History
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.
2	12/16/2019	Updated scope. Removed sample selection from section 5. Removed QA Approval line.

Redacted - Signatures on File

Approval

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Date: 12/13/2019

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Date: 12/13/2019