



VIRGINIA DEPARTMENT OF FORENSIC SCIENCE

EVIDENCE HANDLING & LABORATORY CAPABILITIES GUIDE

TRACE EVIDENCE: EXPLOSIVES

Contact Information

If you have any questions concerning the Trace Evidence laboratory examination capabilities or evidence handling procedures, please call the Training Section or the Trace Evidence Section at the Forensic Laboratory that services your area.

<u>Laboratory</u>	<u>Section Contact</u>	<u>Phone Number</u>
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EXPLOSIVES AND EXPLOSIVE RESIDUES OVERVIEW

Analysis for explosives or explosive residues may include commercial, military, or improvised explosive devices. Explosives are generally classified as either low or high.

Low explosives are primarily used as propellants and are designed to generate large volumes of gas. They have a pushing, rather than a shattering effect and must be properly confined and ignited to explode, as in a pipe bomb. Examples of low explosives are black powder, black powder substitutes, smokeless powder, flash powder, match heads, and fireworks powder. Low explosives can be ignited with a flame.

High explosives detonate and do not need to be confined to explode. They are designed to shatter and destroy. Examples include initiating explosives such as mercury fulminate and lead azide; commercial explosives such as Tovex, ANFO, and dynamite; and military explosives such as TNT, RDX, and C-4. Primary high explosives are extremely sensitive to shock, friction, flame, and/or heat and are often packaged as blasting caps. Primary high explosives are **HAZARDOUS**. Secondary high explosives are relatively insensitive to shock, friction, flame, and/or heat. They must be initiated with a shock wave, often produced by a primary high explosive.

Improvised Explosive Devices (IEDs) can be constructed with a variety of common filler materials such as black powder, black powder substitutes, powder from fireworks, match heads, and chlorate/sugar mixtures. Containers most frequently encountered are threaded metal or PVC pipe nipples with end caps; however, the function and design possibilities are virtually unlimited. Nails or other sharp metal objects may be added as shrapnel.

Bottle bombs are constructed by confining expanding gases in a capped plastic bottle such as a soda or water bottle.

CAPABILITIES AND SERVICES

Identification of IED components and construction to include measurements, initiating mechanism, analysis of explosive fillers and residues, labeling, markings, and intended function

Identification of unconsumed low explosive powder

Identification of high explosives

Analysis of bottle bombs

COLLECTION GUIDELINES

ITEM - Intact, Live Explosive Devices

METHOD - USE EXTREME CAUTION. The lab will not accept live explosive devices.

DISCUSSION - Either qualified individuals in your agency or an agency that will assist such as the Virginia State Police or the Bureau of Alcohol, Tobacco, Firearms & Explosives must render the device safe prior to laboratory submission. State on the Request for Laboratory Examination form (RFLE) how the device was rendered safe.

ITEM - Post-blast or Rendered-Safe Evidence

METHOD – Place fragments with sharp, jagged edges or suspected volatile materials in clean, unused, lined, metal paint cans. Look for materials with porous surfaces near the seat of the blast that may have explosive residues embedded in them. Also, collect comparison samples of porous materials consistent with that found in the suspected explosive-containing samples (e.g., wood, soil, carpet, etc.). If the sample for explosive residues analysis is concrete then the comparison sample would consist of concrete that contains no suspected explosive residues. It is recognized that it is not always possible to obtain comparison samples. Place the porous materials in a clean, unused, lined, metal paint can. Look for wires, clocks, timers, batteries, fuses and wrappers. This type of evidence may be placed in a plastic bag unless there is also a request for latent print processing; if so, use a cardboard box, securing the evidence to eliminate friction within the container.

DISCUSSION - Materials should be packaged in a manner so as not to cause further damage. Volatile materials will evaporate unless placed in an air-tight container. Comparison samples of porous materials assist the lab in determining what interferences may be present from the substrate material itself.

ITEM - Unconsumed Low Explosives

METHOD - Place whole powder in a small container that will protect it from heat, shock, friction, or sparks, such as a pink anti-static plastic bag. The amount needed is no more than two tablespoons. **Do not place black powder, black powder substitutes, smokeless powder, or flash powder in regular plastic bags.**

DISCUSSION - Static electricity from regular plastic bags may cause ignition of the low explosive powders.

ITEM - Undetonated Secondary High Explosives

METHOD - Collect a small sample and package in a glass vial, plastic bag or clean, unused, lined metal paint can. If suspected nitroglycerin-based dynamite, package in a clean, unused, lined metal paint can. Include information from the package or wrapper on the RFLE.

DISCUSSION - Only a small portion of the entire material is necessary for analysis; for example, a one square inch piece from a two pound block of C4 military explosives. These types of secondary high explosives are insensitive to heat and friction.

ITEM – Pyrotechnic Safety Fuse or Detonation Cord

METHOD - Collect no more than approximately a 6 inch piece of fuse or cord, wrap in paper and place in a plastic bag. If a fracture match exam is requested, protect the ends of the fuse or cord and submit the known fuse or cord for comparison.

DISCUSSION – Only a small portion of the entire material is necessary for analysis. The exposed ends tend to leak powder and therefore, wrapping in paper contains the powder.

ITEM - Bottle Bombs

METHOD - Remove any liquid from the bottle. If possible, remove any foil from the bottle and liquid. Package all separately in plastic, such as unused E-Z Mix[®] E-Z View[™] plastic cans. **DO NOT USE METAL.** Glass containers may be used instead of plastic; however, the lid must have no metal and the glass container must not subsequently be placed in a metal can.

DISCUSSION - These materials continue to react when exposed to metal so metal should never be used in packaging.

ITEM – Fireworks

METHOD – Do not submit intact, commercial fireworks unless absolutely necessary. Call the lab prior to doing so. Do submit fireworks that are part of an IED, have been modified, or may have been the source of the filler in an IED. Submit these fireworks as a part of the IED or place them in a clean, unused, lined metal paint can.

DISCUSSION - The Code of Virginia, [§27-95](#), distinguishes between legal and illegal fireworks based upon their function, not their chemical composition. Analysis of fireworks may be important if the firework or its powder is part of a device.

SUBMISSION REMINDERS

NEVER submit live devices or intact blasting caps. Any intact device must be rendered safe by qualified personnel prior to submission.

Merely removing a fuse from a pipe bomb **DOES NOT** render it safe.

Preferred packaging for sharp metal objects or volatile material are clean, unused, lined metal paint cans.

Preferred packaging for bottle bombs is plastic. **DO NOT USE METAL.**

Provide as much information related to the incident on the RFLE as possible: What was the potential target? Can witnesses describe smoke, sound and flash?