CRITERIA FOR ACCEPTANCE OR REJECTION IN THE IDENTIFICATION OF PROPELLANTS AND EXPLOSIVES

I. Propellants or explosives that are found intact

A. Low explosives (Propellants)

The material in question should be characterized physically and chemically. Physical characteristics such as general appearance, color, morphology, presence of markers, homogeneity, presence of catalysts such as metal, particle size, and ignition susceptibility should be documented. Chemical characterization should be performed and documented by at least two or more of the following methods:

- PLM
- Spot Tests
- FTIR
- TLC
- SEM/EDAX
- XRF
- XRD
- GC or GC/MS

The number of methods for chemical characterization will vary depending on the type of propellant encountered.

If the physical and chemical characteristics do not correspond to the formulation of known propellants then no identification should be made.

B. High Explosives

High explosives usually fall within four different categories (organic, dynamite, blasting agents, slurries or emulsions, and primary or initiating). The question high explosive material should be characterized physically and chemically. Physical characteristics such as general appearance, color, morphology, presence of markers, prills, or microballoons, consistency, homogeneity, presence of catalysts such as metal, particle size, and ignition susceptibility should be documented. Chemical characterization should be performed and documented by at least two or more of the following methods:

- PLM
- Spot Tests
- FTIR
- TLC
- SEM/EDAX
- XRF
- XRD
- GC or GC/MS

The number of methods for chemical characterization will vary depending on the type of high explosive encountered.

1. The following tests document the identification of an organic explosive such as RDX or PETN:
    a. Visual and Microscopic - describe color, consistency, and general appearance.
    b. Chemical Analysis - the sample is examined by IR or XRD or chromatographic techniques such as TLC, GC, or GC/MS.
    c. Matrix or Binder - When appropriate, the polymeric matrix and/or plasticizer should be identified using IR.

2. The following tests document the identification of dynamite:
    a. Visual and Microscopic - describe color, consistency, presence of prills, sulfur particles, and fillers.
    b. Chemical Analysis - Organic nitrate esters are confirmed by an organic solvent extract analyzed by TLC, IR, GC, or GC/MS. The identity of the inorganic salts and sulfur (if present) are confirmed by appropriate methods such as spot tests, IR, SEM/EDAX, or XRD.

3. The following tests document the identification of blasting agents, slurries and emulsions:
    a. Visual and Microscopic - describe color, consistency, and general appearance.
    b. Chemical Analysis - Oxidizers are identified by IR, TLC, XRD, SEM/EDAX, and spot tests. The sensitizer, if present, is typically an amine salt, aluminum powder, or microballoons. The identity of the amine salt is established using IR, TLC, GC, GC/MS or XRD. The metal powder is identified by SEM/EDAX, XRD, or spot tests. Microballoons, either polymeric or glass, are isolated from the explosive matrix and identified by PLM and IR (if polymeric). The fuel if present, is typically a petroleum distillate which is identified by GC OR GC/MS.
4. The following tests document the identification of primary or initiating explosives:
    a. Visual and Microscopic - describe color, consistency, and general appearance.
    b. Ignition Susceptibility Test - when appropriate, a very small piece is ignited and burning characteristics are described.
    c. Chemical Analysis - IR or XRD is sufficient to identify most primary explosives

If the physical and chemical characteristics do not correspond to the formulations of known high explosives, then no identification should be made.