

**A. Purpose:**

Distance determination can be conducted when muzzle-to-target distance becomes a question. This is accomplished through visual examination and chemical processing of a piece of evidence.

**B. Responsibility:**

Assigned unit staff or analysts competent in distance determination.

**C. Safety:**

Personal protective equipment (PPE), such as lab coat and gloves, shall be used when handling evidence, preparing chemicals and when chemically processing such items.

**D. Procedure:****a. Visual Examination**

- i. Tag or otherwise mark the item being examined with the case number, the date, and the analyst's initials.
- ii. Document the condition of the evidence using the appropriate worksheet (DD-SOP-1.1, DD-SOP-1.2, or QR FA-13, QR FA-14). Photographs and sketches are acceptable. Include a scale in photographs.
- iii. Locate any suspect bullet holes and number accordingly. Inspect each hole. A stereomicroscope will aid in this examination.
  1. Attempt to identify the morphology of any gun powder particles found.
  2. Note the condition of the suspect bullet hole, including smoke, soot, bullet wipe, ripping/tearing, and burning/singeing.
  3. Include how far these artifacts are from the hole.

**b. Infrared Imaging**

- i. An infrared (IR) camera and/or IR filter may be used on dark or patterned clothing to remove background "noise" and assist in visualizing smoke, soot, or bullet wipe around a suspect bullet hole.
- ii. The use of IR equipment cannot replace chemical testing for distance determination, nor can it definitely identify dark areas as lead or other gunshot residues.
- iii. Refer to equipment user's manual for operational instruction.

**c. Chemical Processing**

- i. The Modified Griess test is performed to detect the presence of nitrites.
- ii. The sodium rhodizonate test is performed to detect the presence of lead.
- iii. Test shots may be conducted using 9" x 9" 100% cotton twill jean or material similar to the evidence material.
  - 1. Distances of test shots shall be at the discretion of the examiner.
  - 2. The actual firearm and same/similar brand of ammunition shall be used for testing.
- iv. Reagent preparation and chemical testing shall be conducted in accordance with the instructions provided in DD-SOP-2, DD-SOP-3 and DD-SOP-4.
- v. Quality control results will be indicated in the notes.
- d. Interpretation of Results
  - i. The size and density of the resultant gunshot residue or shot patterns on evidence items and on test shots are the principal factors used in ascertaining the distance between the muzzle of the weapon and the evidence items.
- e. Disposition of Testing Media
  - i. Processed testing material such as Modified Griess paper and/or test shots shall be retained in the laboratory for storage.
  - ii. Once dried, these items shall be packaged, sealed, sub-itemized in JusticeTrax, and stored in an appropriate area in the Unit.

**E. References:**

- 1. FBI syllabus "Gunpowder and Gunshot Residue Handbook"
- 2. Hess, Philip A. and Poole Leslie L., "The Validation of Inkjet Photographic Paper for Use with the Modified Griess Test," AFTE Journal, Vol. 37, no. 3, Summer 2005, pp 213 – pp 223.
- 3. Fuji IS-1 IR camera manual (located on the S:/ drive)