A. Purpose:

1. To perform comparative examinations of fired ammunition components with the use of a microscope. In order for an examiner to identify an item of fired evidence back to the firearm that produced it, a microscopic comparison with a comparison microscope must be performed. The comparison microscope allows the examiner to place the evidence on one side of the microscope and the known standard on the other side. This procedure may also be used to compare two unknown pieces of fired evidence together to determine if they were made by the same firearm.

B. Responsibility:

1. It is the examiner's responsibility to be familiar with the functioning of the comparison microscope before conducting these types of examinations.
2. It is the examiner's responsibility to conduct and record the results of his or her examination by written word, drawings, or photo documentation.

C. Safety:

1. The examiner will consider the use of gloves, and other types of personal protective devices, when examining cartridge cases that have potentially come into contact with bio-hazardous materials.

D. Procedure:

1. The procedure steps below do not have to be performed in the order listed; however, all steps must be considered and/or addressed:
   a. Select the correct objective (magnification) setting and ensure that the objectives are locked in place.
   b. Select the correct set of oculars (eyepieces).
   c. Adjust the illumination (lights) properly. Oblique lighting is usually preferred.
   d. If a firearm is included as part of the evidence, compare the test shots produced from this firearm to determine what macroscopic characteristics are reproducing.

e. Compare the unknown fired evidence to either another piece of unknown fired evidence or to a known standard. Place the unknown fired evidence on the left hand stage and the other piece of evidence (unknown fired evidence or known standard) on the right hand stage.

f. The entire unknown should be considered.

g. If an identification cannot be initially made, the examiner should consider and adjust the following factors:

   i. The angle of lights

   ii. The type of lights

   iii. The need for additional known standards

   iv. The position of the test and/or known evidence

   v. The possibility of needing to clean the firearm

   vi. The possibility that the firearm itself has changed

E. Interpretation of Results:

1. A sufficient correspondence of individual characteristics will lead the examiner to the conclusion that both items (evidence and tests) originated from the same source.
2. An insufficient correspondence of individual characteristics, but a correspondence of class characteristics, will lead the examiner to the conclusion that no identification or elimination could be made.
3. A disagreement of class characteristics or individual characteristics will lead the examiner to the conclusion that both items (evidence and tests) did not originate from the same source.
4. A lack of suitable microscopic characteristics will lead the examiner to the conclusion that the items are not suitable for comparison.
5. All identifications and eliminations based on individual characteristics must be documented by either:

   a. Verification by a second examiner

   b. Photomicrograph showing the area of agreement

   c. Indexing the exact location(s) of the areas of identification and taking extensive notes referencing these indexing marks

F. References:

1. AFTE procedures manual
2. Leica® Application Suite software V3.5.0

G. Appropriate Appendices:

1. Appendix 2 --Calibration Standards
2. Appendix 1 --Worksheets