Technical Procedure for Photomicrography

1.0 Purpose – To provide guidelines for producing and preserving photomicrographs for casework in the Firearms Section.

2.0 Scope – This procedure applies to all cases examined in the Firearms Section which result in an identification.

3.0 Definitions

- **Identification** – A comparison conclusion of sufficient agreement of individual characteristics.
- **Photomicrograph** – A photograph taken through a microscope.

4.0 Equipment, Materials, and Reagents

- Comparison microscope, including attached digital camera
- Leica Application Suite (LAS) software
- Photomicrograph templates

5.0 Procedure

5.1 Procedural Background for the Use of Photomicrography in Firearms Identification

5.1.1 Photomicrographs are used to document the characteristics which are used to make a microscopic identification and/or for an examiner's future recollection of an identification. Photomicrographs are intended for documentation purposes only, and shall not be used for comparison, verification, or conclusions. In cases where photomicrographs are used in court, the examiner should explain the limitations.

5.1.2 Firearm examiners do not use photomicrographs to make comparisons and reach conclusions for the following reasons:

5.1.2.1 A photomicrograph is a two-dimensional image of a three-dimensional object.

5.1.2.2 Photomicrographs can be altered.

5.1.2.3 Photomicrographs often contain insignificant detail which may be misinterpreted by people not trained in firearm identification.

5.1.2.4 Visual data in photomicrographs, particularly when highly magnified, may be misinterpreted by people not trained in firearm identification.

5.1.2.5 Photomicrographs provide an incomplete representation of the entire comparison process. A photomicrograph is still and freezes the hairline. An actual comparison is very dynamic, and continuous movement of the hairline is an integral part of the examination process.

5.1.2.6 The human eye has a greater tolerance to light variations than photography.

5.1.2.7 Digital cameras and their display devices lack the resolution to portray all that is seen by the eye.

5.1.2.8 Bubble jet, inkjet, laser and color-dye sublimation printers are not capable of providing sufficient resolution to capture the detail necessary to interpret individual characteristics present on a bullet, cartridge case, or shotshell when printing digital images.

5.1.2.9 A photomicrograph limits the field-of-view from what the examiner sees through the eyepieces of a comparison microscope.

5.1.2.10 Many comparisons deal with multiple areas over a large portion of the surface of the evidence and a photomicrograph is unable to pick up these related areas.

5.1.2.11 The incorrect interpretation of a photomicrograph may adversely impact one or both parties in a criminal case.

5.1.3 Due to these inherent limitations in the use of photomicrographs, the following language shall be contained on each photomicrograph produced by the Firearms Section for casework in the North Carolina State Crime Laboratory:

5.1.3.1 This photomicrograph was created for documentation purposes only as it is a two-dimensional representation of a three-dimensional object and therefore does not fully and completely depict what was viewed through the comparison microscope. **Do not use this photomicrograph for comparison or to draw conclusions as to whether items were or were not fired by the same firearm or whether marks were or were not produced by the same tool.**

5.2 Production of Photomicrographs

5.2.1 Photomicrographs shall be taken of the area(s)/detail from which an identification conclusion was made.

5.2.1.1 At least two (2) photomicrographs shall be produced.

5.2.1.1.1 A representative overall photomicrograph of one identified item shall be produced. This item may be a test fire or an evidence item. This allows the supporting documentation of the detail used for identification to be chronicled using one item as long as the detail described or depicted is representative of that seen on subsequent items.

5.2.1.1.2 A close-up photomicrograph containing the identified item in 5.2.1.1.1 shall be produced to represent the individual detail from which the identification conclusion was drawn and shall be taken at a higher magnification than the overall photomicrograph.

5.2.1.1.2.1 The number of photomicrographs shall be determined by the Forensic Scientist based on his/her training and experience and based on the nature of the evidence and the identification.

5.2.1.2 The particular area(s) of detail used to make an identification shall be indicated with a yellow circle, oval, square, and/or rectangle.

5.2.2 The Firearms Section currently utilizes Leica Application Suite (LAS) software in conjunction with a comparison microscope and digital camera. This software shall be used to produce any necessary photomicrographs.

5.2.3 The LAS software allows for the use of a template for labeling photomicrographs. The template shall be applied prior to producing the final photomicrograph to preclude the creation of an unidentified photomicrograph.

5.2.3.1 The labels contained within the photomicrograph shall include the following:

5.2.3.1.1 The language found above in 5.1.3.1;

5.2.3.1.2 The appropriate laboratory case number(s);

5.2.3.1.3 The item number(s) of the item(s) in the photomicrograph; and

5.2.3.1.4 The initials of the Forensic Scientist producing the photomicrograph.

5.2.3.2 For cross reference cases, the following guidelines will apply:

5.2.3.2.1 All case numbers shall be listed in the heading.

5.2.3.2.2 The case number of the particular item depicted shall appear with the item number in parentheses.

5.3 Preservation of Photomicrographs

5.3.1 Once a photomicrograph is produced, the photomicrograph and its associated data files shall be saved and imported into the appropriate Case Record Object Repository in Forensic Advantage. A statement to this effect shall be added to the notes.

5.3.1.1 Suggested wording: Photomicrographs depicting the detail used to effect an identification were taken and are included in the Case Record Object Repository.

5.3.2 When called to testify in court, the Forensic Scientist shall print a copy of any and all photomicrographs in a particular case using a color photo printer and standard 8x10 or larger photo paper.

5.3.2.1 Printing photomicrographs on non-photo quality paper using a typical office printer may degrade the image.

5.4 Standards and Controls – N/A

5.5 Calibration – N/A

5.6 Maintenance – For comparison microscope maintenance information, see the Firearms Section Technical Procedure for Instrument and Equipment Calibration and Maintenance.

5.7 Sampling – N/A

5.8 Calculations – N/A

5.9 Uncertainty of Measurement – N/A

6.0 Limitations – See 5.1.2.

7.0 Safety – N/A

8.0 References

Hatcher, Jury, and Weller. *Firearms Investigation, Identification, and Evidence.* Harrisburg, Pennsylvania: Stackpole Books, 1957.

Heard, Brian J. *Handbook of Firearms and Ballistics: Examining and Interpreting Forensic Evidence.* Chichester, West Sussex, England: John Wiley & Sons Ltd., 1997.

Leica Microsystems. *Leica FS C Operating Manual*. 2003.

Leica Microsystems. *LAS Software.*

Roberts, J. L. "Photography of Identifications: Professionalism or Personal Preference?" *AFTE Journal* Spring 1991: 694 - 697.

9.0 Records

- FA Case Record Object Repository

10.0 Attachments – N/A

Revision History		
Effective Date	Version Number	Reason
06/25/2021	6	**Header** and throughout– corrected to reflect organizational change. Change throughout – removed "and Tool Mark" Change throughout – changed "unit" to "section" **3.0** – added term "Identification" **5.1.3** – added "by the Firearms Section". Updated **5.2.1.1.2** Updated **5.2.1.1.2.1** Removed old **5.2.2.1**. **5.2.3.1.3** removed "designation" Added new **5.2.3.2**, **5.2.3.2.1**, and **5.2.3.2.2**. New **5.3.1.1** – Updated wording to reflect current language generated in worksheets. **8.0** – Removed old 4th reference.