

# FEU08 – SOP for Serial Number Restoration of Obliterated Stampings in Various Metal Surfaces

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### 1. Scope

- 1.1. This procedure employs chemical reagents and specialized techniques to assist in restoring and visualizing an obliterated stamping.

### 2. Background

- 2.1. To establish the practices for documenting the examination of firearm evidence to conform to the requirements of the Department of Forensic Sciences (DFS) Forensic Science Laboratory (FSL) *Quality Assurance Manual*, the accreditation standards under ISO/IEC 17025:2005, and any supplemental standards.

### 3. Safety

- 3.1. For proper handling of firearm see the *FEU01 - SOP for the Safe Handling of Firearms*.
- 3.2. Ensure proper ventilation is provided. Proper eye protection will be worn at all times during the examination. PPE, including gloves, will be worn at all time during the examination. Clean up the work area upon completion of the examination and ensure that no acid has spilled around the work area. Place trash in proper receptacles. Ensure the bottles containing the acids are stored appropriately.

## 4. Materials Required

4.1. Polishing tools; Fine grit sandpaper; Magnifying glass; Cotton swabs; Magnets; Digital camera; Latex/Nitrile gloves; Safety glasses; Laboratory coat; Stereo zoom binocular microscope (magnification range 10X-20X minimum)

4.2. Use distilled water or de-ionized water in preparation of the below-listed reagents:

4.2.1. Fry's Reagent (Ferrous Metals)

90 grams Cupric Chloride ( $\text{CuCl}_2$ )

120 ml Hydrochloric Acid (HCl)

100 ml water ( $\text{dH}_2\text{O}$ )

4.2.2. Turner Reagent (Ferrous Metals)

2.5 grams Cupric Chloride ( $\text{CuCl}_2$ )

40 ml Hydrochloric Acid (HCl)

25 ml Ethyl Alcohol

30 ml water ( $\text{dH}_2\text{O}$ )

4.2.3. Davis' Reagent (Ferrous Metals)

5 grams Cupric Chloride ( $\text{CuCl}_2$ )

50 ml Hydrochloric Acid (HCl)

50ml water ( $\text{dH}_2\text{O}$ )

4.2.4. 25% Nitric Acid (Non-Ferrous Metals)

25 ml Nitric acid ( $\text{HNO}_3$ )

75 ml water ( $\text{dH}_2\text{O}$ )

4.2.5. Acidic Ferric Chloride (Non Ferrous Metals)

25 grams Ferric chloride ( $\text{FeCl}_3$ )

25 ml Hydrochloric Acid (HCl)

100 ml water ( $\text{dH}_2\text{O}$ )

4.2.6. Ferric Chloride (Non Ferrous Metals)

25 grams Ferric chloride ( $\text{FeCl}_3$ )

100 ml water ( $\text{dH}_2\text{O}$ )

4.2.7. 10% Sodium Hydroxide (Non Ferrous Metals)

10 grams sodium hydroxide (NaOH)

90 ml water (dH<sub>2</sub>O)

4.2.8. Phosphoric/Nitric Acid (Non Ferrous Metals)

98 ML 85% Phosphoric Acid (H<sub>3</sub>PO<sub>4</sub>)

2 ml concentrated Nitric Acid (HNO<sub>3</sub>)

or

50 ml Phosphoric Acid (Concentrated)

3 ml Nitric Acid (Concentrated)

4.2.9. Additional solutions can be used for electrolytic etching and can be located in the FEU Chemical Preparation Book.

## 5. Standards and Controls

5.1. Not applicable

## 6. Calibration

6.1. Not applicable

## 7. Procedures

7.1. Preparation of Reagents and Test Media

7.1.1. When a reagent is prepared, the following information must be recorded on the *FEU Chemical Preparation Log*: Date prepared, examiner/technician's initials, name of reagent.

7.1.2. Reagent solutions should be prepared in a manner consistent with the Material Data Sheet provisions regarding acids and bases located in the FEU Chemical Preparation Book. For disposal of chemicals used for these procedures refer to the Guideline for Hazardous Waste Management in the FEU Chemical Preparation Book which includes guidelines for Hazardous Waste, copies of which are located in the FEU Serial Number Restoration area.

## 7.2. Chemical Restoration

- 7.2.1. Inventory evidence to be examined and mark the firearm in such a way as to allow for any future recognition or identification.
- 7.2.2. Photograph the area to be restored.
- 7.2.3. Examine area for any partial characters that may be visible. Document the steps used and observations made during the examination to ensure full retention of information that will not be retrievable once polishing and restoring are started.
- 7.2.4. Polish and clean the obliterated surface area.
- 7.2.5. Determine the metal composition. Preparation and restoration techniques chosen by the examiner/technician, as well as the order, in which they are performed, will vary according to metal composition, type, and severity of obliteration.
- 7.2.6. Apply the appropriate chemical reagent to the metal surface using a cotton swab. The chemical reagent should be applied by swiping the cotton swab in one direction. Pause several times during this process and examine the area being processed with an appropriate magnification to determine if any results are apparent. If possible, photograph any results, since they made fade.
- 7.2.7. After applying the appropriate chemical reagent, apply water on the area to clean off any metal that has been displaced by the reagent. This allows for easier viewing of the surface. The surface should then be dried with an absorbent material.

## 8. Sampling

- 8.1. Not applicable

## 9. Calculations

- 9.1. Not applicable

## 10. Uncertainty of Measurement

- 10.1. When quantitative results are obtained, and the significance of the value may impact the report, the uncertainty of measurement must be determined. The method used to determine the estimation of uncertainty can be found in the *FSL Quality Assurance Manual – Estimation of Uncertainty of Measurement (Section 5.4.6)*.

## 11. Limitations

- 11.1. Using the chemical restoration procedure does not necessarily mean that the restored or partially restored characters will be permanently visible upon completion of the examination. The restored or partially restored characters may not be visible at some point following the chemical application. Therefore, it is recommended that the characters are photographed immediately and any characters that become visible are recorded.

## 12. Documentation

### 12.1. Serial Number Restoration Worksheet

12.1.1. The *Restored Serial Number Worksheet* will be used for all obliterated serial numbers to include restored, unrestored and partial restoration. This worksheet shall also be used in situations where the make and/or model of the firearm has been obliterated along with the serial number.

12.1.2. All results will be documented in the serial number restoration section and the additional information section as needed. The examiner/technician will initial and date in conjunction with the reviewer.

### 12.2. Firearms Control Page

12.2.1. In addition to the *Serial Number Restoration Worksheet* the examiner/technician shall go to the *Firearms Control Page* and document any results from the examination in the "additional Firearm Information" section.

### 12.3. Case Review Worksheet

12.3.1. A *Case Review Worksheet* is required when a *FEU Report of Results* is completed.

12.3.2. The *Case Review Summary Sheet* must include the following:

12.3.2.1. The examiner/technician reviewing the findings initials and date

12.3.2.2. Any item examined by examiner/technician confirming results

12.3.2.3. Comparison between different cases will be listed as follows

12.3.2.4. Reviewers initials, Items (Ex: I#4 thru #8).

### 12.4. FEU Chemical Preparation Log

12.5. Firearms Examination Section Restored Serial Number for Tracing

12.5.1. A copy of the *Serial Number Restoration Worksheet* for Tracing will be completed at the end of each examination and placed in the E-Trace Log Book located in the intake area. The ATF will pick up monthly (or as needed) and complete the serial number trace (E-Trace). The results are returned upon completion by mail and fax. All results will be entered into the appropriate electronic case jacket within the case database.

12.6. *FEU Report of Results*

## 13. References

- 13.1. Bureau of Alcohol, Tobacco, Firearms and Explosives Firearm Serial Number Structure Guide 2009
- 13.2. Bureau of Alcohol, Tobacco, Firearms and Explosives Firearm Serial Number Restoration Training Guide (current revision)
- 13.3. FEU Chemical Preparation Book
- 13.4. DFS Health and Safety Manual (Current Version)
- 13.5. *Forensic Science Laboratory Quality Assurance Manual* (Current Version)
- 13.6. *FSL Departmental Operations Manuals* (Current Versions)
- 13.7. *FSL Laboratory Operations Manuals* (Current Versions)
- 13.8. *FEU01 - SOP for Safe Handling of Firearms* (Current version)