

Processing Overview

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Processing Overview

1 INTRODUCTION

- A. The FBI Laboratory Friction Ridge Discipline uses a variety of techniques and procedures to detect latent prints.
- B. The Overview provides overall information addressing processes utilized in the FBI Laboratory Friction Ridge Discipline, to include:
 - o chemicals and reagents used in the processes;
 - o reagent checks;
 - o processing sequences;
 - o preservation of visualized prints; and
 - o hazardous waste management.
- C. Personnel will refer to the specific procedure for each process to obtain detailed information on that process.
- D. Available resources in addition to the judgment of the person conducting the processing (within the bounds of good laboratory technique and quality control) determine what examination procedures are appropriate and/or acceptable for certain circumstances as encountered in the daily forensic casework of the FBI Laboratory Friction Ridge Discipline.

2 SCOPE

These procedures are intended for use by appropriately qualified employees who have received training in the processes and chemicals used to develop latent prints.

3 EQUIPMENT

- A. The significant equipment, materials, or reagents used in each process are listed in the specific standard operating procedure.
- B. Peripheral equipment used for mixing, storing, processing or other routine laboratory activities is implied and determined by the individual.
- C. Unless noted in the individual standard operating procedure, the reagents used in the mixing of processing solutions are American Chemical Society grade or equivalent.
- D. Unless the process specifically requires distilled water, the water used for the standard operating procedure can be distilled, reverse osmosis, deionized, or tap.

4 STANDARDS AND CONTROLS

- A. Control samples show the effectiveness of the reagent.
- B. A control sample will consist of a substance the reagent is expected to react with on a surface appropriate for testing.
- C. Since personnel process in a variety of locations, the availability of materials to create test samples will vary but will be appropriate to what reagent is being tested (e.g. paper with sebaceous/eccrine/other matrix components for porous processes, aluminum dish with sebaceous/eccrine/other matrix components for superglue fuming, blood on an appropriate porous/non-porous substrate for blood processes,

- adhesive side of tape with sebaceous/eccrine/other matrix components for tape processes, or a superglue processed item for cyanoacrylate dyes).
- D. Control samples may be created at the time the reagent is tested or produced en masse for routine testing.

4.1 Reagent Checks

- A. The working solution will be applied to the appropriate control sample.
- B. The individual standard operating procedure for each process will be followed when tests are conducted.
- C. If prints are developed on the control sample, the activity is noted in the appropriate log book or case record (only for offsite work) and the working solution is approved for use in casework.
- D. If prints are not developed on the control sample, a new control sample is processed to determine if the lack of development was due to a faulty control sample.
- E. If prints are developed on the second new control sample, the results will be entered into the appropriate log book or case record (only for offsite work) and the working solution will be ready to be used for casework.
- F. In situations where prints are not developed on the second control sample, the working solution will not be used and the results entered into the appropriate log book or case record.
- G. An attempt will be made to determine the reasons why the solution is not properly working.
- H. No working solution can be used unless it passes the required reagent test.

4.1.1 Cyanoacrylate Check

- A. Every tenth container of cyanoacrylate will be tested at the time of opening prior to being used for processing.
- B. In addition, a control sample must be included anytime the cyanoacrylate fuming process is used outside of a processing chamber as described in that standard operating procedure.
- C. The use of this control strip will be recorded in the case record.

4.1.2 Reagent Checks of Working Solutions at FBI Laboratory Sites

- A. The FBI Laboratory Friction Ridge Discipline tests most working solutions when they are prepared and prior to use, provided it has been 24 hours since the solution was tested.
 - 1. The only exceptions are cyanoacrylate and the working solutions of RAM (combination of fluorescent dyes **R**hodamine 6G, **A**rdrox P133D, and **M**BD), RhoMeOH (combination of fluorescent dyes Rhodamine 6G and MBD in methanol), Ninhydrin, and 1,2-Indanedione-Zinc.
- B. For the Quantico laboratory location, RAM, RhoMeOH, and 1,2-Indanedione-Zinc working solutions are tested when they are first mixed and weekly thereafter while in use.

- C. For the Huntsville laboratory location, RhoMeOH, 1,2-Indanedione-Zinc, and Ninhydrin working solutions are tested when they are first mixed.
 - 1. RhoMeOH, 1,2-Indanedione-Zinc, and Ninhydrin working solutions outside the Biohazard room are tested weekly thereafter while in use.

4.1.3 Reagent Checks of Working Solutions at non-FBI Laboratory Sites

- A. Working solutions that are transported to or prepared at a non-FBI Laboratory site, to include partner laboratories, (e.g., HEAT deployments) must be checked prior to use at the non-Laboratory site.
- B. A control sample must be successfully tested prior to using the reagent in casework.
- C. After the initial successful test, the reagent is checked every 24 hours or if conditions at the location warrant additional checks.
- D. All reagent checks are noted in the case record.

5 PROCEDURE

- A. The **matrix** is defined as the substance that makes up the latent print.
 - 1. The matrix can consist of a single substance, or a combination of substances, which generally includes perspiration or oil from an individual.
 - 2. Other substances, such as blood, grease, paint, dust, and other compounds that allow the friction ridge details to transfer to an object, can also be a matrix.
 - 3. The type and condition of the matrix contributes to determining how an item should be processed for latent prints.
- B. The **substrate** is defined as the surface upon which a friction ridge print is deposited.
 - 1. In general, surfaces on which prints are deposited can be divided into porous, nonporous, and semi-porous categories.
 - 2. The type and condition of the substrate contributes to determining how an item should be processed for latent prints.
- C. To minimize destruction and maximize detection of latent prints, it is necessary to use proper processing techniques and sequences.
- D. Personnel conducting examinations must use appropriate judgment in determining which processes to use, inasmuch as not all processes will be used in every situation.

5.1 Sequences for Various Types of Substrates

- A. The following sections are processing sequences to be used as a guideline when processing items for the presence and development of latent prints.
- B. The lists show the conventional sequence of processing; however, personnel conducting examinations will determine which processes are needed for each particular substrate and matrix combination.
- C. The processes used by personnel are based on the efficiency and limitations of the process, availability of resources, the circumstances of the case, management directives, and the type and condition of the evidence items.
- D. Some processes, such as Small Particle Reagent, are used in very specific circumstances.

- E. When using powders (magnetic or non-magnetic) or powder suspensions (e.g., Alternate Black Powder), the choice of color or process is made by personnel and is based upon establishing suitable contrast with the color of the substrate.
- F. A visual examination is the examination of an item of evidence for friction ridge prints, in sufficient lighting conditions, using the individual's eyes or with the assistance of a magnification device.
- G. Visual examinations are implied for each process listed in the sequences.
- H. Note: Ultraviolet light may be detrimental to DNA examinations.

5.1.1 Porous

- Visual
- Forensic Light Source(s)
- 1,2-Indanedione-Zinc with Forensic Light Source(s) and/or Ninhydrin
- Physical Developer

5.1.2 Non-Porous

- Visual
- Forensic Light Source(s)
- Cyanoacrylate fuming with Forensic Light Source(s)
- Cyanoacrylate dye with Forensic Light Source(s)

5.1.3 Semi-Porous

- Visual
- Forensic Light Source(s)
- Cyanoacrylate fuming with Forensic Light Source(s)
- Magnetic Powder
- 1,2-Indanedione-Zinc with Forensic Light Source(s) and/or Ninhydrin
- Cyanoacrylate dye with Forensic Light Source(s)
- Physical Developer

5.1.4 Blood Stained Items - Porous

- Visual
- Forensic Light Source(s)
- 1,2-Indanedione-Zinc with Forensic Light Source(s) and/or Ninhydrin
- Diaminobenzidine (submersion method) or Amido Black
- Physical Developer

5.1.5 Blood Stained Items – Non-Porous

- Visual
- Forensic Light Source(s)
- Diaminobenzidine (tissue method), Leucocrystal Violet, or Amido Black
- Cyanoacrylate fuming with Forensic Light Source(s)
- Cyanoacrylate dye with Forensic Light Source(s)

5.1.6 Semi-Porous (Latex/Nitrile Glove Type Products)

- Visual
- Forensic Light Source(s)
- Cyanoacrylate fuming with Forensic Light Source(s)
- Magnetic Powder
- Cyanoacrylate dye with Forensic Light Source(s)
- Physical Developer

5.1.7 Adhesive Surfaces

- A. The appropriate processing sequence should be used on the non-adhesive surface, if present.
- B. When processing the non-adhesive side, the integrity of the adhesive side should not be compromised by coming into contact with cyanoacrylate dyes or other solvents.
 1. An appropriate backing should be utilized to protect the adhesive side.
- C. Adhesives affixed to items should be removed prior to processing to prevent damage to the adhesive side and to maximize detection of potential latent prints on the non-adhesive side.
- D. However, cyanoacrylate fuming should be performed on the non-adhesive side of semi-porous and non-porous adhesive items prior to removal.
 - o Note: Fluorescent dye stains may be detrimental to fiber examinations.

5.1.8 Light Colored Adhesive Side

- Visual
- Forensic Light Source(s)
- Alternate Black Powder, Ash Gray Powder, Iron Oxide Powder Suspension (see process document for limitations) or Wetwop™ Black

5.1.9 Dark Colored Adhesive Side

- Visual
- Forensic Light Source(s)
- Ash Gray Powder or Wetwop™ White

5.2 **Preservation**

- A. At the conclusion of each process, all evidence will be examined for friction ridge prints.
 1. Processes and/or examinations conducted and any results will be recorded in the case notes.
- B. If sufficient friction ridge information is not present on an item, personnel conducting the examination may move on to a subsequent process.
- C. If sufficient friction ridge information is present on an item, personnel conducting the examination will ensure that the friction ridge information is preserved, usually through digital capture or photography.

5.2.1 Digital Capture and Photography

- A. The most common method of preserving friction ridge information is through digital capture or photography.
- B. A scale (e.g., a ruler or a measurable item appearing in the image) must be included in each capture, and an identifier tag should also be included if practicable.
- C. If a measurable item is utilized for scale, the appropriate measurement must be taken with an American National Standards Institute/National Institute of Standards and Technology ruler and the measurement recorded in the case record.
- D. Any digitally captured prints will be preserved per the *Digital Images* ([FRD-400](#)).
- E. If processing personnel are requesting the assistance of dedicated image capture personnel for acquiring images, they will do the following:
 - Mark each print, using caution to avoid damaging the evidence or disturbing other potential latent prints.
 - Prepare a written photographic requisition.
 - Examples include electronic request systems, written case note or the *Friction Ridge Discipline Photographic Request form* ([FRD-004](#)).
 - Use appropriate evidence tracking methods.
 - After the evidence is returned, determine if the request has been satisfied.
 - Any issues with returned work will be brought to the dedicated image capture individual's attention to be addressed.
 - Once accurate images have been obtained, move on to a subsequent process as applicable.
- F. Note: Fluorescent compounds will suffer from loss of intensity over time; as such, these prints will be captured as soon as is practicable.

5.2.2 Lifting or Casting

- A. Processing personnel may preserve friction ridge prints by lifting or casting if authorized.
- B. Lifting or casting may be done at any time in the processing sequence.
- C. Prior to lifting or casting, an attempt will be made to capture the friction ridge information photographically or digitally.
- D. All lifts or casts, with the exception of exploratory or test lifts or casts, will be captured photographically or digitally for retention as part of the case record.
- E. If the print(s), as it appears on the lift or cast, is claimed, the lift(s) will be returned to the contributor as secondary evidence.
- F. Any lift or cast with no claimed print(s) will not be retained; however, personnel may return the lift or cast as secondary evidence.
- G. All lifts or casts returned as secondary evidence will be marked with the source, date of capture, and individual who created the lift or cast in addition to the Laboratory number and Item number.

6 SAFETY

- A. Personnel will reference the [FBI Laboratory Safety Manual](#) for appropriate information and for guidance on Laboratory waste management practices and procedures in addition to other topics on laboratory safety.
 - 1. Any questions will be addressed to the appropriate safety personnel.
- B. Processing personnel using any of these procedures must be familiar with the Safety Data Sheets for each chemical used in the process.
- C. Processing personnel will follow universal precautions when handling blood or other potentially infectious materials.
- D. For all processes, processing personnel will wear appropriate laboratory coats, gloves, shoes, and safety glasses.
- E. Additional personal protective equipment specific to a process will be listed in that process's section of the manual.

7 REVISION HISTORY

| Revision | Issued | Changes |
|----------|-----------|--|
| 08 | 07/15/21 | <p>Replace Latent Print Units with Friction Ridge Discipline. Minor wording changes, including specimen to item. Re-organization and re-numbering of sections. Separate out Scope section and rename old Scope as Introduction.</p> <p>Section 3 - Distinguish between significant and peripheral items</p> <p>Section 4.1 - dissected into further subsections. Added clarification on second samples and off site working solutions. Broaden responsibility and added direction on processing sample and added last sentence.</p> <p>Section 4.1.1 - changed from “box” to every tenth container.</p> <p>Section 4.1.3 - added first paragraph.</p> <p>Section 5 - removed “latent print” definition and modified substrate definition to match discipline document.</p> <p>Section 6 - replaced “optimal”, removed Ninhydrin example, and added management directives. Added “with Forensic Light Source(s)” to 1,2-Indanedione-Zinc in each list.</p> <p>Section 6.1 - added “and/”.</p> <p>Section 7.1 - soften tag requirement and clarified digital capture requirements. Generalized the photographic requisition requirement and clarified follow up.</p> <p>Section 7.2 - Added option for test lifts and casts, added “authorized”</p> <p>Replaced Appendix A form.</p> |
| 09 | 5/16/2022 | <p>Reformatted</p> <p>Added RhoMeOH to both sites and removed RAM for Huntsville in Section 4.1.2.</p> <p>Removed Powder from Section 5.1.2 and Section 5.1.5.</p> <p>Added Iron Oxide Powder Suspension to Section 5.1.8.</p> <p>Added A-#1 to Section 5.2.</p> |