

Department of Forensic Science

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**LATENT PRINT
PROCEDURES MANUAL
OF
FORENSIC SCIENCE**

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1 INTRODUCTION

General procedures for evidence examination are usually divided into two categories, those for porous and those for nonporous surfaces. Each category contains an enormous variety of materials with individual properties that may enhance or diminish the effectiveness of a particular technique.

In general, the analysis of items (including the analysis and comparison of latent prints) in a case is limited to the number of items which will yield the most probative information.

- Large evidence submissions will be reviewed by the examiner/supervisor via telephone communication or in-person meetings in order to identify the most probative evidence for the respective case and analysis / comparisons will be limited to those items.
- Determination of probative evidence will be decided based on a number of factors including the type of case, the evidence collected, the number of victims and perpetrators, etc.
- In the event that additional analysis and comparisons are necessary, communication between the assigned examiner and the investigator will occur and be documented per the Quality Manual to facilitate this process.

Visual examination of evidence is the first step in the processing procedure. Visible prints of value for comparison shall be photographed prior to the application of a processing technique. Captured prints will be checked against the original evidence for sharpness, contrast and accurate reproduction of ridge detail. In addition, visual inspection is the mechanism by which processing procedures are selected from observation of the residue, its condition, and composition of the article.

Known fingerprints or palm prints produced from Individual Characteristic Databases (ICDs) are treated as examination documentation in accordance with the Quality Manual (QM). These hard copies may be received from the Central Criminal Records Exchange (CCRE - Virginia State Police), the Federal Bureau of Investigation (FBI), or local law enforcement agencies. They may be in the form of printouts from archived files (digital media) or facsimiles, photographic copies or photographs from CCRE, FBI or local law enforcement agencies' record files. These items are uniquely identified by the State Identification (SID) number, FBI number, or local "Originating Agency's Case (OCA) number" in conjunction with the local "Originating Agency's Identification (ORI) number". The Department of Forensic Science's Latent Print Section does not maintain an ICD.

Short term storage is used when evidence is in the process of examination. The length of time evidence may remain in short term storage will be thirty (30) days. After this time period, evidence must be placed into long term storage according to the QM.

The Department's laboratory facilities provide sufficient environmental conditions to conduct all tests listed in this Procedures Manual with no further consideration required.

Commercially purchased reagents are an approved alternative to laboratory prepared reagents. However, they still must meet the minimum QA/QC requirements for that particular reagent.

Small twist-tie baggie corners, small ziplock baggies (e.g., 1/2" X 1/2", 3/8" X 3/8", etc.) or 1/2 " vials that are submitted in drug cases, will not routinely be processed for latent prints.

At a minimum, the make, model and serial number (if visible) shall be recorded in the notes and on the CoA for all firearms received.

1.1 EXAMINATION DOCUMENTATION

Examination documentation shall include each examination activity conducted, the sequence of those activities, and the result of each. Activities include the development techniques, quality control checks, the preservation technique (lifting and/or digitally capturing), database searches conducted to include the result, source of exemplars, comparisons conducted, and the conclusions reached. Documentation shall be sufficient such that in the absence of the examiner, another competent examiner could evaluate what was done and interpret the data. All

examination documentation shall be recorded using the Mideo LATENTWORKS software as outlined in Section 14 of this manual. Should the instrument computer network which houses the Mideo database be unavailable, it is acceptable for examination documentation to be recorded by hand and entered into the database as soon as possible.

1.1.1 Areas of interest captured shall be uploaded to the Mideo database.

1.1.2 For each latent print image that was analyzed the examination documentation shall include an enlargement of the original image and the clarified/annotated image.

- The large file size setting will be used when generating a PDF of the images.

1.2 LIFTS AND IMAGES

1.2.1 All lifts or images of latent prints for which an analysis, comparison or evaluation is done shall include the following minimum information, either in the photograph or electronically associated with the file.

- Scale
- Laboratory Case Number
- The initials or electronic signature of the examiner and photographer
- Item number and sub item designation, if given, of the article from which the latent was preserved

1.2.2 Latent prints to be digitally captured, either through photography or scanner, shall be indicated by marking, with permanent ink, the item of evidence with a bracket or arch, the item #, and the latent #.

- The P# is the Item # followed by the letter P and the latent #.
- The P# written on the item of evidence is used to identify an area of interest for capture and further analysis; it is not an indication of value.

1.2.3 Images will be checked against the original exhibits for sharpness, contrast, and accurate reproduction of ridge detail.

1.2.4 All lifts, photographs/digital media/images and negatives received from an outside agency will be treated as evidence and returned to the submitting agency.

1.2.5 All lifts and images in the Mideo database of latent prints developed by the Laboratory on items of evidence will be treated as evidence and returned to the submitting agency.

1.2.6 Lifts will be sub-itemed according to the evidence from which they were removed, (e.g., 1A, 1B, etc.). These sub-items will be added to the RFLE and created in LIMS.

1.2.7 Digital media (DM), CD or DVD, containing the original images of latent prints in the Mideo database will be created, treated as evidence and returned to the submitting agency with the evidence. It is not required to include images captured from submitted lift cards on the DM.

1.2.7.1 When latent prints were developed on more than one item, the DM will be returned with the first item on which the latent prints were developed. It is acceptable to return the DM in a different container if necessary due to size constraints. The notes and CoA shall document in which container the DM is returned in.

1.2.7.2 The first DM created will be designated DM1 and subsequent DMs created, for the same case, will be labeled sequentially (DM1, DM2, DM3, etc)

1.2.7.3 The examiner will verify and document in the notes that the appropriate images are on the media prior to returning to the submitting agency.

- 1.2.7.4 The packaging for the digital media shall be sealed and labeled with the FS number, examiner's initials, and a notation that the digital media contains latent prints developed on the following items:_____.
- 1.2.8 The ridge detail on latent lifts or items, determined to be of no value for comparison, does not need to be captured and retained.
- 1.2.9 Legible reproduction of all exemplars used for comparison shall be retained as part of the examination documentation.

1.3 SUBMITTED DIGITAL MEDIA

- 1.3.1 Each employee who receives evidence on non-Commonwealth of Virginia (COV) owned removable media will be issued a separate account with extremely restricted network privileges.
 - 1.3.1.1 Removable media includes, but is not limited to; CD, DVD, SD cards or USB drives. The IT staff should be consulted if assistance is needed related to the definition of removable media.
- 1.3.2 Prior to putting the media into a COV networked computer the examiner will verify the virus signature file on the computer is the latest available from the vendor.
- 1.3.3 The examiner will then log into the network with the restricted account and run a full virus scan on the contents of the media.
- 1.3.4 If the scan indicates that the media is "clean", the employee will log in with their normal user account and proceed with the examination.
- 1.3.5 If the scan indicates the media is "not clean", the examiner will contact the IT staff for guidance.
- 1.3.6 Examination documentation shall include the result of the scan.
- 1.3.7 If multiple images of what appears to be the same ridge detail (e.g., different lighting, different levels of zoom or focus, etc) are present on the submitted media, it is acceptable to select the most suitable image for import into Mideo for analysis.

2 CHEMICAL PROCESSING - POROUS ITEMS

2.1 INTRODUCTION

Porous items such as paper, cardboard, and unfinished wood allow latent print residues to be absorbed into the material allowing for the application of chemical reagent that react with specific compounds found in latent print residue rendering visible ridge detail. The following preparations react with specific compounds in the residue and should be utilized at the discretion of the examiner taking into consideration the type of evidence being processed.

2.2 PREPARATIONS

2.2.1 Ninhydrin

Ninhydrin, or triketo-hydrindene hydrate, is an extremely sensitive indicator of alpha-amino acids, proteins, peptides and polypeptides. The reaction produces a violet to blue-violet coloring of these substances and is effective even with older deposits and/or minute amounts of amino acids. While ninhydrin can be used on any surface, processing normally is confined to porous items which are not water-soaked and do not contain inherent animal proteins.

Ninhydrin is readily soluble in most organic solvents. Working solutions of ninhydrin are governed by the nature of the solvent and the strength of the solution. Concentrations of the ninhydrin solution may vary according to application, but generally a 0.5% to 1.0% weight to volume mixture produces the best results. A 0.5% concentration is recommended for routine porous item processing. Any of the listed solvents may be used at the examiner's discretion. Commercially prepared ninhydrin may be used; no specific preparation is needed.

Recommended Preparation - 0.5% concentration:

2.2.1.1 Petroleum Ether Formula

Chemicals Required

- 10 g Ninhydrin
- 60 mL Methanol
- 80 mL 2-Propanol (Isopropyl Alcohol), 1860 mL Petroleum Ether

Directions

1. Dissolve Ninhydrin crystals in Methanol.
2. Add 2-Propanol to Ninhydrin/Methanol solution and stir.
3. Add Ninhydrin, Methanol, 2-Propanol solution to Petroleum Ether and stir.

2.2.1.2 Acetone Formula

Chemicals Required

- 25 g Ninhydrin
- 4 L of Acetone

Directions

Dissolve Ninhydrin crystals in Acetone.

2.2.1.3 Heptane Formula

Chemicals Required

- 33 g Ninhydrin
- 220 mL Ethyl alcohol (use Absolute Ethanol, DO NOT use Denatured Ethanol)
- 4 L Heptane

Directions

1. Dissolve Ninhydrin in Ethyl alcohol.
2. Remove 220 mL of Heptane from bottle.
3. Add Ninhydrin, Ethanol mixture to Heptane and stir.

2.2.1.4 Test Strips Preparation

Chemicals/Materials Required

- 1 gram Norleucine
- 100 mL warm reverse osmosis (R/O) or deionized (DI) water
- blotter papers

Directions

1. Dissolve Norleucine in R/O or DI water until clear.
2. Saturate blotter papers and air dry.
3. Cut papers in small pieces

2.2.2 Physical Developer

Physical Developer is specifically for the examination of wet or water soaked porous items. This technique utilizes silver nitrate in an unstable ferrous/ferric redox solution in combination with a detergent solution. Unlike the conventional silver nitrate procedure which reacts with the chlorides of palmar sweat, physical developer precipitates silver from the solution to any non-water soluble sebaceous material that is present in a latent print residue. Although this technique was developed for water soaked items it can be used on any porous item, whether water soaked or not.

Since Physical Developer is an immersion process of high sensitivity, the reagent penetrates the porous material to detect any lipids which may be present. This reaction with residue other than palmar sweat increases the usefulness of physical developer as a post-treatment to items processed with ninhydrin. However, Physical Developer cannot be used after the conventional silver nitrate procedure.

2.2.2.1 Stock Detergent Solution

1. Pour 1 L of R/O or DI water into a large beaker containing a large magnetic stir bar previously rinsed with R/O or DI water. Never use tap water for any of the working solutions.
2. Add 2.7 g of n-Dodecylamine Acetate and stir with a magnetic stirrer. If some of the detergent sticks to the weigh boat the weigh boat can be immersed in the solution.
3. Add 4 g of a surfactant. Place the weigh boat in the solution as the surfactant will adhere to the weigh boat.
4. Stir for thirty minutes.
5. Remove the weigh boat(s).
6. Pour the solution into a 1 L glass bottle, transferring any material not yet dissolved. This solution must not be used for at least 24 hours. If solids are present after 24 hours, discard and remix.

*1 L of the stock detergent solution is sufficient to make 25 L of Physical Developer working solution. The Detergent Stock Solution has an indefinite shelf life.

2.2.2.2 Maleic Acid Pre-wash

1. Pour 1 L of R/O or DI water in a 1500 mL beaker.
2. Add 25 g of Maleic Acid and a large magnetic stir bar rinsed with R/O or DI water.
3. Stir with a magnetic stirrer until all solids are dissolved.

2.2.2.3 Silver Nitrate Solution

1. Pour 50 mL of R/O or DI water into a 100 mL beaker.
2. Add 10 g of silver nitrate and stir until dissolved.
3. Stir until dissolved.

2.2.2.4 Buffered Ferrous/Ferric Redox Solution

1. Pour 900 mL of R/O or DI water in a 1500 mL beaker.
2. Rinse a large magnetic stir bar with R/O or DI water and place in the beaker and stir.
3. Add the following chemicals in the order given, making sure each chemical is dissolved before adding the next chemical:
 - 30 g of Ferric Nitrate
 - 80 g of Ferrous Ammonium Sulfate
 - 20 g of Citric Acid
4. Stir until the Citric Acid is dissolved and then stir an additional five minutes.

2.2.2.5 Combining the Component Solutions for Physical Developer

1. To the Redox Solution add 40 mL of the Stock Detergent Solution and stir.
2. Examine the Silver Nitrate Solution to ensure that all solid material has dissolved. Stir again if needed. Add the entire Silver Nitrate solution to the redox/detergent solution and stir for two minutes.

*Steps 1 and 2 must be performed in this order; otherwise the silver will fall out of suspension.

The Physical Developer is now ready for use. This prepares approximately 1 L and should be sufficient to process about one hundred checks. The combined working solution is unstable and cannot be stored and should therefore be prepared on an as needed basis.

2.2.2.6 Polymax Fixer Rinses

Rinse 1: Add four or five drops of Polymax fixer per L of tap water in a glass or plastic tray.

Rinse 2: Prepare a normal photofix solution with tap water in a glass or plastic tray (one part photographic fixer to nine parts tap water).

2.2.2.7 Bleach Solution

Prepare the bleach solution by diluting household bleach at a ratio of 1:1 with tap water

2.2.3 Oil Red O

Oil Red O (ORO) is a fat-soluble dye that is sensitive to the lipid component of latent print residue. Staining with ORO will produce a dark red to brown coloring of lipids and fats on porous surfaces. ORO is insoluble in water, as are the lipids it stains, enabling it to be used on porous items that have been wet. This makes it a viable alternative to ninhydrin, which reacts with water-soluble amino acids.

ORO is moderately soluble in ethanol and methanol. The working solution is non-destructive to the porous item, but use of methanol in the working solution may damage inks or printing on documents. Any pertinent writing or printing should be documented before processing with ORO. A water rinse neutralizes the pH of the porous surface, which prevents weakening and damage.

2.2.3.1 ORO staining solution

Chemicals Required

- 1.54 g Oil Red O powder
- 770 mL methanol
- 9.2 g NaOH (sodium hydroxide)
- 230 mL deionized water

Directions

1. Dissolve ORO powder in Methanol and stir
2. Dissolve NaOH in water and stir
3. Add NaOH solution to ORO solution and stir
4. Filter combined solution and store in brown bottle away from light

2.2.4 DFO (1, 8-Diazafluoren-9-one)

DFO reacts with amino acids in perspiration, and once the reaction is completed, the developed latent prints will fluoresce using an ALS. When sequential processing, DFO should be done prior to using Ninhydrin.

2.2.4.1 DFO Stock Solution

Chemicals Required

- 1 g DFO
- 200 mL Methanol
- 200 mL Ethyl acetate
- 40mL Glacial acetic acid

Directions

Combine the ingredients and stir for approximately 20 minutes or until the DFO is dissolved.

2.2.4.2 Working Solution

Dilute the stock solution to 2L with petroleum ether. Working solution should be a clear gold color. Solution should be kept in a dark bottle.

2.2.5 IND (1,2-indanedione)

IND reacts with amino acids in perspiration, and once the reaction is complete, the developed latent prints will fluoresce using an ALS. When sequential processing, IND should be done prior to using Ninhydrin.

2.2.5.1 IND Working Solution

Chemicals Required

- 2g 1, 2-indanedione
- 70 mL ethyl acetate
- 930 HFE 7100

Directions

Dissolve 2g IND in 70 mL ethyl acetate and 930 mL HFE7100.

2.3 INSTRUMENTATION

2.3.1 Ninhydrin

A humidity chamber or a steam iron may be used to control the heat and relative humidity to accelerate the development of latent prints after processing.

2.3.2 Physical Developer

All glassware and utensils must be dedicated to the technique and reagent contamination must be avoided.

2.3.3 Oil Red O

A shaker table is recommended during staining to ensure the entire item remains immersed.

2.3.4 DFO

A laboratory oven or dry iron is recommended.

2.3.5 IND

A laboratory oven, dry iron, photographic heat press, or hair dryer is recommended.

2.4 MINIMUM STANDARDS AND CONTROLS

This testing procedure must be performed for each working solution at the time the solution is made. Documentation of this process must be done in the form of a reagent log for each batch to include a batch number, established by month/day/year (060404). If additional batches are made on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number must be placed on the original/working container. A performance check shall be completed for each case. The result of the check and the batch number will be included in the examination documentation.

2.4.1 Ninhydrin

Apply the solution to a test strip, allow to air dry and subject strip to heat and humidity. If the test strip turns purple the working solution can be used to process evidence. Reagent shall be stored in a dark bottle and have a shelf life not exceeding one (1) year.

2.4.2 Physical Developer

Make a test strip by placing a print on a porous item similar to the evidence to be processed. Follow the procedure below to process the test strip. If the test print is visualized, the working solution can be used to process evidence. Shelf life (working solution) shall not exceed thirty (30) days.

2.4.3 Oil Red O

Apply a test print using natural sebaceous residue wiped from the forehead or nose to a strip of porous material (white printer paper). Immerse the test strip in the staining solution for up to 90 minutes. If a red to brown print is developed (may only take a few minutes), the staining solution can be used to process evidence. Reagent shall be stored in a dark bottle and have a shelf life not exceeding one (1) year.

2.4.4 DFO

Apply a test print on a porous item similar to the evidence to be processed. Follow the procedure listed below to process the test strip. If the test print is visualized, the working solution can be used to process evidence. Shelf life (working solution) shall not exceed six (6) months.

2.4.5 IND

Apply a test print on a porous item similar to the evidence to be processed. Follow the procedure listed below to process the test strip. If the test print is visualized, the working solution can be used to process evidence. Shelf life of the working solution shall not exceed six (6) months.

2.5 PROCEDURE OR ANALYSIS

2.5.1 Ninhydrin

All applications should be done in a fume hood. The item of evidence should be saturated with solution, which can be accomplished by immersing the evidence in a tray of solution or by applying the solution with a brush or spray bottle.

2.5.1.1 Completely saturate each item to be processed.

2.5.1.2 Remove and allow the item to dry a minimum of 1 hour before application of heat or steam.

2.5.1.3 Place the item in the heat/humidity chamber at no greater than 80 degrees Celsius/176 degrees Fahrenheit and between 60% and 80% relative humidity; or the item may be steam ironed. A certified hygro-thermometer must be utilized to monitor the heat/humidity levels in the chamber.

2.5.1.4 Check the item periodically to monitor the print development. Care should be taken not to saturate the item with water vapor.

2.5.1.5 After a minimum of 12 hours, review the evidence and document any additional prints that developed.

2.5.1.5.1 It is acceptable to deviate from the minimum waiting time if a case requires expeditious processing. The reason for the deviation shall be documented in the notes.

2.5.2 Physical Developer

The procedure for Physical Developer involves three stages; a pre-wash, reagent development, and rinse. Since the working reagent is unstable, a pre-treatment wash is necessary, unless the items to be processed are too fragile, to avoid the introduction of contaminants to the reagent. The rinse stage essentially removes contaminants and stabilizes the reaction.

All equipment associated with the pre-wash and reagent must be dedicated. Trays must be of glass and must be scrupulously clean. Beakers for mixing solutions should be labeled according to the type of solution and should not be used for any other purpose. Plastic or bamboo tongs without serrated edges should be employed for item handling.

Rinse trays can be the plastic photographic type, but must be clean. Physical Developer reacts with even trace amounts of various rubber products so that rubber tipped tongs must not be used. Similarly, certain gloves will leave marks upon the evidence which will attract silver deposits. After the pre-wash any contact of glove to surface must be avoided.

2.5.2.1 Step 1 - Maleic Acid Pre-wash

1. Pour enough maleic acid pre-wash solution in a glass tray to cover the item to be processed.
2. Immerse the item in the solution for five to ten minutes or until bubbles are no longer given off.

2.5.2.2 Step 2 - Physical Developer Solution

1. Pour enough Physical Developer solution in a glass tray to cover the items to be processed.
2. Drain the items of excess pre-wash.
3. Immerse the items in the working solution and gently rock the tray.
4. Keep the items separated and be careful not to crease or handle the items extensively.
5. The processing time will vary and can be as little as one minute or up to twenty minutes. Therefore, the examiner should monitor the development very closely to avoid over processing and obliteration of weaker prints. Remove the item when optimum contrast is observed.

2.5.2.3 Step 3 - Rinse

Two types of rinses are available. The items can be rinsed in a tray of tap water with a constant gentle flow of water into the tray or a two step photofix rinse can be employed.

2.5.2.4 Photofix Rinse

1. After sufficient development in the physical developer solution the item is placed in the rinse 1 solution for 30 seconds.
2. Transfer the item into rinse 2 solution for three minutes.
3. Wash the items in running tap water for three to five minutes.

2.5.2.5 Step 4 - Drying

1. Allow the items to dry while lying flat. The items can be blotted carefully with blotter paper to speed the drying process if the item is not fragile.
2. Prints developed with Physical Developer are relatively stable.

2.5.2.6 Step 5 - Bleach Solution (optional: to be used only when trying to improve the contrast of darker prints).

Only proceed with this step after all prints developed previously have been photographically preserved.

1. Place the item in the bleach solution for two to three minutes.
2. Rinse the item in running tap water for two to three minutes.

2.5.3 Oil Red O

Application of the staining solution should be done in a fume hood. Use of a shaker table is recommended during staining.

2.5.3.1 Immerse each item to be processed in the ORO staining solution. Development should occur within 5 minutes. Latent prints with weak lipid content may take up to 90 minutes to develop. Place the tray with the staining solution and items on a shaker table to ensure immersion.

2.5.3.2 Remove the item from the ORO staining solution and drain.

2.5.3.3 Immerse in a tray of continuously running deionized water to neutralize the pH of the porous substrate.

2.5.3.4 Remove the item from the water and dry completely.

2.5.4 DFO

Application of the solution should be done in a fume hood.

2.5.4.1 Items to be processed may be dipped or sprayed.

2.5.4.2 Once processed with DFO, the item must be dried in an oven at approximately 100 degrees C for 20 minutes.

2.5.4.3 If an oven is not available, a dry iron (steam iron with steam turned off) may be used.

2.5.4.4 View using an ALS with appropriate goggles.

2.5.5 IND

Application should be done in a fume hood.

2.5.5.1 Items to be processed may be dipped, sprayed, or washed with the IND solution.

2.5.5.2 Allow items to dry for minimum of 3 minutes.

2.5.5.3 Apply heat to items using a photographic mounting press, laboratory oven, hair dryer, or dry iron. If using the oven, heat for 20 minutes at approximately 100 degrees C.

2.5.5.4 View using an ALS with appropriate goggles.

2.6 INTERPRETATION OF RESULTS

2.6.1 Ninhydrin

Ninhydrin coloration is not permanent, and while some prints have remained visible for years, others have faded in a matter of days. Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

2.6.2 Physical Developer

Processing of the porous items with Physical Developer is similar to photographic development. Latent prints appear as dark gray images which increase in contrast. The depletion of the working solution is unpredictable due to the inherent instability of the reagent. The failure to produce an image may be due to insufficient or no reactive material present in the item or exhaustion of the chemicals necessary to cause the reaction. Positive controls must be used with each run. Weaker prints may benefit from additional processing with the physical developer solution. The item to be retreated should not be subjected to fixing with photographic fixer and/or bleaching as these treatments will affect the success of the re-treatment.

Articles which appear too fragile for the maleic acid pre-wash, such as charred papers or extremely water soaked items, may be introduced directly into the physical developer working solution. Such evidence should be treated one item at a time and the solution must be checked carefully for the effects of contamination. Usually contamination will precipitate the silver from the working solution in the form of dark reddish brown particles resembling curds. Contaminated solutions must be discarded and the evidence cannot be processed using contaminated solutions.

Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

2.6.3 Oil Red O

Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

2.6.4 DFO

Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

2.6.5 IND

Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

2.7 REFERENCES

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3 POWDERS

3.1 INTRODUCTION

Fingerprint powders are very fine particles with an affinity for moisture throughout a wide range of viscosity. Palmar sweat, grease, oil, and most contaminants that coat the surface of friction ridge skin possess sufficient moisture and viscosity to attract and bind the fine particles together.

Magnetic powders are powder-coated, fine iron filings subject to magnetic attraction.

Fluorescent powders were developed specifically to be luminescent - excited by light sources emitting blue-green light.

3.2 PREPARATIONS

No specific preparations are needed as the powders and materials being used are commercially prepared.

3.3 INSTRUMENTATION

No specific instrumentation is involved in powder processing.

3.4 MINIMUM STANDARDS AND CONTROLS

The Standards and Controls for the Powders consist of insuring that the powders being used are in the proper condition. Powders should not be exposed to high humidity or moisture. Powders may clump if exposed to excessive moisture or contaminants. Moisture content and contaminants may be minimized by keeping the stock container closed as much as possible and using containers with small amounts of powder. This will minimize the moisture content as well as reduce any contamination of the stock container with substances from the item being processed. The date the container is opened is to be used as the batch number, established by month/day/year (060404). If additional containers are opened on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number shall be placed on the original and working container and in the examiner's notes. Shelf life is indeterminable; however, if clumping of the powder is observed, it shall be discarded.

3.5 PROCEDURE OR ANALYSIS

3.5.1 Standard Powders

Only the ends of the brush bristles should be coated with the powder and the brush should be gently tapped several times to remove all but a minimum amount.

With the brush handle in a nearly perpendicular position to the surface, the bristle ends are lightly and delicately moved over the surface. Discoloration of the latent print residue will usually appear immediately. With a fiberglass brush and a proper amount of powder, the print will develop in density with each light pass until no further development can be observed. Even slightly excessive amounts of powder will cause a fill to occur between ridges. This fill must be removed with continued brush strokes until the print is as free of extraneous powder as possible.

Extraneous residue on the surface may cause a general painting effect which obscures friction ridge detail. A lift made of the area can sometimes remove the extraneous material and permit a second application of powder. This second application may offer better contrast between latent print deposit and the background.

3.5.2 Magnetic Powders

Magnetic powder must be applied with a magnetic application device. Wands which contain a movable magnet attract the powder when the magnet is depressed and release the powder when it is raised. Contact between powder and surface is completed without bristles. Excessive powder can sometimes be removed

by passing the magnetic wand without powder near the surface. Since the magnetic attraction holding the iron particles is relatively weak, the supply can be depleted quickly.

3.5.3 Fluorescent Powder

Fluorescent powders are applied in the same manner as standard powders. It is not recommended to make a lift of the latent print but view with a light source. If lifting is desired, process with black powder and then lift.

3.6 INTERPRETATION OF RESULTS

Powder developed latent prints which may be of value for comparison must be properly preserved. Two methods of preservation are normally afforded the powder developed latent: photography and lifting.

Lifting is an approved procedure but caution should be taken when lifting to insure that the lift will be successful. If the lift cannot be made with confidence that it will be successful, the developed friction ridge detail should be photographed prior to lifting.

Lifting can be accomplished with tape or Mikrosil Casting Putty (follow the instructions provided by the manufacturer).

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4 SMALL PARTICLE REAGENT

4.1 INTRODUCTION

Small Particle Reagent (SPR) is an effective procedure for processing wet surfaces. Surfaces, both porous and nonporous, which are wet at the time of latent print deposit or become wet after deposit, seldom retain sufficient water soluble material for conventional processing methods. Nonporous items which have been allowed to dry offer some potential if the deposit contains non-water soluble oily matter, but the drying process lessens the possibility of adequate adhesion for powders.

Molybdenum disulfide is a lipid-sensitive reagent. SPR is very effective in the secondary treatment of cyanoacrylate ester developed prints by adhering to faint prints generally better than powders. Molybdenum disulfide is produced in various particle sizes. Smaller particle size is more effective.

4.2 PREPARATIONS

4.2.1 Surfactant Stock Solution

Dissolve 8 mL of surfactant, such as Photo-Flo or an equivalent, in 500 mL of R/O or DI water. This will make approximately 10 L of working solution.

4.2.2 SPR Suspension - Working Solution

1. Add 10 g of molybdenum disulfide to 50 mL of the surfactant stock solution. Add the molybdenum disulfide slowly and stir continuously.
2. The mixture should be a creamy consistency free of any dry powder.
3. While stirring continuously, add the mixture to 900 mL of R/O or DI water.

4.3 MINIMUM STANDARDS AND CONTROLS

Molybdenum disulfide works by adhering to latent print residue. Place a print on a non-evidentiary item and process with the SPR. This testing procedure must be performed for each working solution at the time the solution is made or when a commercially purchased bottle is opened. Documentation of this process must be done in the form of a reagent log for each batch to include a batch number, established by month/day/year (060404). If additional batches are made on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number must be placed on the original/working container. A performance check shall be completed for each case. The result of the check and the batch number will be included in the examination documentation. Shelf life should not exceed one year.

4.4 PROCEDURE OR ANALYSIS

4.4.1 Immersion Technique

1. Shake the working solution well and place in a shallow tray such as a photographic tray. The tray should be filled until it will cover the item to be processed.
2. Stir the solution again and before each item is placed into the solution.
3. Place the item to be processed in the liquid to lie as flat as possible in the tray.
4. Allow the item to remain in the suspension and the molybdenum particles to settle on the item for approximately 30 seconds.
5. The item is then turned over and again allowed to set for approximately 30 seconds.
6. This procedure is continued until all surfaces have been exposed to the solution.
7. The item is then placed into a tray of clear tap water. The tray can be rocked or a flow of tap water can be established in the tray. The excess SPR will readily be removed.
8. The item is allowed to dry.

4.4.2 Wash Bottle Application

1. Spray a flow of SPR over the surface of the item.
2. Wash the surface with a light to moderate flow of clear tap water.

Larger items may be processed using a wash bottle to spray a flow of SPR over the surface. Generally light to moderate flows of rinse water will not dislodge the molybdenum disulfide particles.

4.5 INTERPRETATION OF RESULTS

Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

SPR lifts easily from dried, processed, nonporous surfaces. Faint prints may benefit from a reprocessing of the item. The intense black color generally facilitates photographic preservation. When SPR is used as a secondary technique after cyanoacrylate ester fuming, the results are sometimes superior to powders in both adhesion and clarity of detail.

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5 CYANOACRYLATE ESTER FUMING

5.1 INTRODUCTION

Cyanoacrylate esters are the active ingredients in the super bond adhesives and are generally available according to the type of alcohols used in manufacturing. Most cyanoacrylates are methyl or ethyl esters. In an atmosphere of relatively high humidity, the cyanoacrylate ester molecules are attracted to print residue and polymerize upon the deposit.

Cyanoacrylate ester fuming is highly effective with nonporous items made of plastics or metal.

5.2 PREPARATIONS

No specific preparations are needed as the cyanoacrylate materials being used are commercially prepared.

5.3 INSTRUMENTATION

Cyanoacrylate Fuming Chambers, Atmospheric and Vacuum

5.4 MINIMUM STANDARDS AND CONTROLS

Non-evidentiary items such as aluminum foil, film leaders, or pieces of plastic bags are acceptable substrates for test print and placed near the evidence in the fuming chamber. Processing should be terminated when test prints have reached optimum development. However, all items should be watched carefully as faster or slower development may occur. The batch number for cyanoacrylate ester will be established by the date opened, such as (060404). If additional bottles are opened on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number must be placed on the working container. A performance check shall be completed for each case. The result of the check and the batch number will be included in the examination documentation. The shelf life is indeterminable and may be used as long as it remains in a semi-liquid state and has a positive reaction with the test strip.

5.5 ATMOSPHERIC CHAMBER

Volatilization of cyanoacrylate ester at normal room temperature is relatively slow but is a viable procedure for evidence processing. Vapors must be contained. A ratio of two drops of adhesive for every gallon of capacity or volume with relatively high humidity is usually effective. Polymerization may be retarded or prevented by low humidity. The addition of a cup of lukewarm water will improve the fuming results. Development time will vary with the temperature, humidity and the substrate being processed.

Application of heat greatly accelerates volatilization. Place the cyanoacrylate ester liquid in an aluminum dish and use a hot plate as the heat source. A cup of warm water may be placed in the enclosure. Volatilization can be very rapid and development may be accomplished. Care must be taken to closely observe the process to insure that the item is not overdeveloped.

5.6 VACUUM CHAMBER

A vacuum chamber using humidity and cyanoacrylate vapors at 37°C is a highly sensitive system to develop latent prints on the inside of polyethylene bags, hand guns, long guns, gas cans, etc. Vacuum chambers are particularly effective on evidence that has a soot or oil film on the surface.

5.7 INTERPRETATION OF RESULTS

Latent prints which may be of value for comparison should be digitally captured. Once the latent prints are recorded, further processing sometimes reveals prints in which polymerization was too indistinct for visual notice or did not occur. Powders and particulate developers are effective and often permit additional photographic and lifting preservation. Small Particle Reagent will sometimes adhere to faint prints when powders will not. Dye application is generally effective after powder, particulate, or SPR application as the liquid dye solution will

normally wash away the particulate remnants. However, vinyl, rubber, oily guns, and hard plastics, especially those used in cash register drawers, may not be receptive to any powder.

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6 DYE STAINS

6.1 INTRODUCTION

Dye staining enhances prints developed with cyanoacrylate ester. The dye stain is applied to the object and visually examined utilizing an alternate light source. Each dye stain listed below will have different preparation steps and optimum viewing parameters.

View the evidence under different wavelengths of light with various goggles to determine which combination provides the best contrast for viewing and capturing the ridge detail.

6.2 PREPARATIONS

6.2.1 Ardrox

Ardrox is a commercially available liquid that can be used undiluted or a working solution can be made as described below.

Working Solution

Combine ingredients in the order listed.

- 2 mL Ardrox
- 10 mL Acetone
- 25 mL Methanol
- 10 mL Isopropyl alcohol
- 8 mL Acetonitrile
- 945 mL Petroleum ether

6.2.2 Basic Yellow 40

Basic Yellow 40 is a commercially available powder that is mixed with a solvent to create a working solution.

Working Solution

Combine the ingredients and continue to stir the solution until all of the powder is dissolved.

- 3g of Basic Yellow powder concentrate
- 1 L of methanol

6.2.3 Rhodamine 6G

The examiner can choose from two preparations of Rhodamine 6G solutions. The preparation chosen is primarily dependent on the reaction of the substrate to the solvent used. Aqueous Rhodamine 6G solutions should be used when methanol or other organic solvents will be destructive to the surface being treated.

If a balance is not available capable of measuring to the accuracy of the below formula, it is acceptable to prepare a stock solution of 0.48 g per L of methanol. A working solution is then prepared by diluting 10 mL of stock solution with 1 L of methanol.

Methanol Working Solution

Combine the ingredients and continue to stir the solution until all of the powder is dissolved.

- 0.0048 g of Rhodamine 6G
- 1 L of methanol

Aqueous Working Solution

Combine the ingredients and continue to stir the solution until all of the powder is dissolved.

- 0.0048 g of Rhodamine 6G
- 1 L of R/O or DI water
- 3-6 drops of a surfactant which allows for a sheeting effect or more even covering of the item with the working solution.

6.2.4 MBD (7-(P-Methoxybenzylamino-4-Nitrobenz-2-Oxa-1,3-Diazole))

Two MBD formulas are available for use. The first does not require the preparation of a stock and working solution; the solution is used as prepared. The second listed formula requires the preparation of a stock solution and working solution described below. The working solution is applied to the item either by spray, immersion, or squirt bottle.

Formula #1

Combine the ingredients and continue to stir the solution until all of the powder is dissolved.

- 0.12 g MBD
- 4 L of methanol

Formula #2

Stock Solution

Combine the ingredients and continue to stir the solution until all of the powder is dissolved.

- 1 g MBD
- 1 L Acetone

Working Solution

Combine the ingredients in the order listed. Do not place on a magnetic stirrer.

- 10 mL MBD stock solution
- 30 mL Methanol
- 10 mL Isopropanol
- 950 mL Petroleum ether

6.2.5 RAM (Rhodamine 6G, Ardrex and MBD 10)

RAM is a mixture of Rhodamine 6G, Ardrex, and MBD 10. RAM has been found to be effective on various colors of nonporous surfaces.

The working solution contains Ardrex, Isopropanol, Acetonitrile, and Petroleum ether, as well as the two stock solutions. The first stock solution contains Rhodamine 6G and methanol and the second stock solution contains MBD and acetone. The RAM solution has been found to be stable for approximately 30

days, after which the solution begins to separate. If the solution has separated, shaking the container holding the solution should usually return the solution back to its working form.

Combine in the order in which they are listed:

Rhodamine 6 G Stock Solution

- 1 g Rhodamine 6G dissolved in
- 1 L Methanol

MBD Stock Solution

- 1 g MBD dissolved in
- 1 L Acetone

Working Solution

- 3 mL Rhodamine Stock Solution
- 2 mL Ardrex
- 7 mL MBD stock Solution
- 20 mL Methanol
- 10 mL Isopropanol
- 8 mL Acetonitrile
- 950 mL Petroleum ether

6.2.6 MRM 10

MRM 10 is a mixture of MBD, Rhodamine 6G, and Basic Yellow and has been found to work well on various colored nonporous surfaces. The working solution contains Methanol, Isopropanol, Acetonitrile, and Petroleum ether as well as three different stock solutions. The first stock solution (A) contains Rhodamine 6G and Methanol. The second stock solution (B) contains Basic Yellow 40 and Methanol. The third stock solution (C) contains MBD and Acetone.

Combine in the order in which they are listed:

Stock Solution A

- 1 g Rhodamine 6G powder dissolved in 1 L of Methanol

Stock Solution B

- 1 g Basic Yellow 40 dissolved in 1 L of Methanol

Stock Solution C

- 1 g MBD powder dissolved in 1 L of Acetone

Working Solution

- 3 mL Stock Solution A
- 3 mL Stock Solution B
- 7 mL Stock Solution C
- 20 mL Methanol
- 10 mL Isopropanol
- 8 mL Acetonitrile
- 950 mL Petroleum ether

6.3 INSTRUMENTATION

High Intensity Ultra Violet Light Source
Alternate Light Source

Proper safety precautions including avoiding skin exposure and proper eye protection with appropriate optical densities must be utilized when operating ultraviolet light sources or alternate light sources. Consult the appropriate user's manuals for the safe use and appropriate eye protection for the specific piece of equipment being utilized.

6.4 MINIMUM STANDARDS AND CONTROLS

The selected dye stains to be used on evidence shall be applied to a test print previously deposited and developed with cyanoacrylate ester. A positive reaction is the observation of ridge detail fluorescing while viewed with an alternative light source. This testing procedure must be performed for each working solution at the time the solution is made. Documentation of this process must be done in the form of a reagent log for each batch to include a batch number, established by month/day/year (060404) when originally opened. If additional containers are opened on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number shall be placed on the original and working container. A performance check shall be completed for each case. The result of the check and the batch number will be included in the examination documentation.

Shelf life:

Ardrox working solution must not exceed six months.

Basic Yellow 40 working solution must not exceed six months.

Rhodamine 6G stock solution is indefinite; working solution must not exceed six months.

MBD stock solution is indefinite; working solution must not exceed six months.

RAM working solution may separate after 30 days; if after stirring or shaking the solution it still separates, a new working solution should be made. The working solution must not exceed six months.

MRM 10 working and stock solutions must not exceed six months.

6.5 PROCEDURE OR ANALYSIS

All applications should be done in a fume hood.

6.5.1 Ardrox

Undiluted Ardrox application

1. Completely cover the item to be processed with Ardrox by immersion or by squirt bottle.
2. Allow the liquid to remain on the item for about ten minutes.
3. Rinse the item under tap water until no yellow color remains.
4. Allow the item to dry and examine with the appropriate light source.

Ardrox working solution application

1. Completely cover the item to be processed with Ardrox prepared solution by immersion or by squirt bottle.
2. Allow the solution to remain on the item for several minutes to insure proper adherence of the Ardrox to the cyanoacrylate developed prints.
3. Examine the item using the appropriate light source without rinsing to determine if background staining has occurred. If not, proceed to step 5.
4. If background staining is observed and prevents adequate photographic preservation expose the item to a light tap water rinse.
5. Allow the item to dry completely and examine with the appropriate light source.

6.5.2 Basic Yellow 40

1. Apply the solution to the item to be processed by immersion, brush method, or squirt bottle.
2. Allow at least one minute for the dye to set.
3. Rinse the item thoroughly under running water. An alternative is to rinse the item in a solution of Kodak Photo-Flo 200 parts water to 1 part Photo-Flo.
4. Allow the item to dry completely and examine with the appropriate light source.

6.5.3 Rhodamine 6G

1. Apply the solution to the item to be processed by immersion or squirt bottle.
2. Allow the item to dry completely and examine with the appropriate light source.

6.5.4 MBD

1. Apply the solution to the item to be processed by immersion or squirt bottle.
2. Allow the item to dry completely and examine with the appropriate light source.

6.5.5 RAM

1. Apply the solution to the item to be processed by immersion or squirt bottle.
2. Allow the item to dry completely and examine with the appropriate light source.

6.5.6 MRM10

1. Apply the solution to the item to be processed by immersion or squirt bottle.
2. Allow the item to dry completely and examine with the appropriate light source.

6.6 INTERPRETATION OF RESULTS

Digitally capture prints for analysis.

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7 BLOOD PROTEIN ENHANCEMENT

7.1 INTRODUCTION

Enhancement of prints believed to be deposited in blood can be done through the application of a solution that results in a color change when in contact with alpha amino acids or proteins present in the blood. The suspected blood on the surface of the object should be dry prior to the processing with the selected solution. Application of a blood protein solution may prevent a serological exam of the evidence after staining.

7.2 PREPARATIONS

7.2.1 Ninhydrin

See Section 2 Chemical Processing – Porous Items

7.2.2 Amido Black

Amido Black is used to enhance prints that have been deposited in blood or other protein based substances. Caution must be used when applying the methanol-based formula to painted surfaces. The formula may destroy the latent print as well as the surface beneath.

Methanol Based working solution

- 2 g Amido Black dye (Naphthol blue black)
- 100 mL Glacial acetic acid
- 900 mL Methanol

Combine the ingredients and mix using a stirring device for approximately thirty minutes until dye is dissolved.

Rinse Solution

- 100 mL Glacial acetic acid
- 900 mL Methanol

Combine the above ingredients.

Water Based Working solution

- 500 mL R/O or DI water
- 20 g 5-Sulfosalicylic Acid
- 3 g Amido Black (Naphthol blue black)
- 3 g Sodium carbonate
- 50 mL Formic Acid
- 50 mL Glacial Acetic Acid
- 12.5 mL Kodak Photo-Flo 600 solution (or equivalent surfactant)

Combine the above ingredients in the order listed using a stirring device to mix well. Dilute this mixture to 1 L using R/O or DI water.

7.2.3 Coomassie Brilliant Blue R250

Chemical Formula

Coomassie Working Solution:

- Dissolve 0.44 g of Coomassie brilliant blue R250 in 200 mL of methanol.
- Add 200 mL of R/O or DI water and 40 mL of glacial acetic acid.

Destaining Solution:

- Mix 200 mL of methanol with 200 mL of R/O or DI water.
- Add 40 mL of glacial acetic acid.

7.2.4 Leuco Crystal Violet

Chemical Formula

Option #1:

- Solution A - dissolve 10g of 5-Sulfosalicylic Acid in 100 ml R/O or DI water.
- Solution B - add Solution A to 400 ml 3% Hydrogen Peroxide.
- Working Solution - add 0.75 g Leuco Crystal Violet dye to Solution B stirring the mixture vigorously.

Option #2:

- Dissolve 10 g of 5-Sulfosalicylic Acid in 500 mL 3% Hydrogen Peroxide.
- Dissolve 3.7 g Sodium acetate and 1.0 g Leuco Crystal Violet dye, stirring the mixture vigorously.

Option #3:

- Purchase premixed "Aqueous Leuco Crystal Violet" kit from approved vendor.

7.3 MINIMUM STANDARDS AND CONTROLS

Make a test print on a non-porous, non-evidentiary item, by placing a small amount of sheep's blood (no human blood) on the item and allowing the blood to dry. Apply the selected solution to the item and if a blue-black stain (violet for Leuco Crystal Violet) is observed, the solution is working properly. Documentation of this process must be done in the form of a reagent log to include a batch number, established by month/day/year (060404). If additional batches are made on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number shall be placed on the working container. A performance check shall be completed for each case. The result of the check and the batch number will be included in the examination documentation.

Shelf life:

Ninhydrin must not exceed one year.

Amido Black and Coomassie Brilliant Blue are indefinite.

Leuco Crystal Violet working solution must not exceed three months, stock solutions must not exceed one year.

7.4 PROCEDURE OR ANALYSIS

7.4.1 Ninhydrin

Ninhydrin can be used on any surface but should primarily be used on porous items. Porous items can be processed with ninhydrin visualizing both blood proteins and other alpha amino acids.

See Section 2 Chemical Processing – Porous Items

7.4.2 Amido Black

Amido black is a permanent procedure which can be used on porous or non-porous surfaces.

All applications should be done in a fume hood.

Application of the methanol based solution can be done by dipping, spraying or using a squirt bottle. Leave the solution on the specimen for approximately 30 seconds to 1 minute, then apply the rinse. These steps can be repeated to improve contrast. Apply the final rinse of R/O or DI or tap water.

Application of the water based solution can be done by dipping or using a squirt bottle. Leave solution on specimen for 3 to 5 minutes, then rinse with tap water. These steps can be repeated to improve contrast.

7.4.3 Coomassie Brilliant Blue

Coomassie may be used to enhance blood prints on porous or non-porous items. Blood prints do not require heat fixing of the proteins although residue must be dry prior to application. Coomassie's Brilliant Blue R250 can be applied after cyanoacrylate fuming in many cases (see McCarthy and Grieve, 1989).

All applications should be done in a fume hood.

Application by immersion:

1. The article is immersed in the staining solution and removed after 2 minutes of agitation.
Note: The working solution should be agitated before evidence application as well as during the immersion process.
2. Immerse the item in de-staining solution. After 1 minute, the solution is agitated until the background discoloration fades.
3. Faint reactions will require a return to the staining solution for longer exposure. Repeated staining and de-staining can be performed until optimum intensity is reached.

Application by squirt bottle:

1. Repeated flows of staining solution can be poured or applied by squirt bottle over large surfaces for about 5 minutes or until maximum contrast is observed. Agitate the working solution before application to the evidence.
2. Apply the de-staining solution.

7.4.4 Leuco Crystal Violet

Aqueous Leuco Crystal Violet can be applied to porous or nonporous surfaces, such as paper, metal, plastics or glass. Aqueous Leuco Crystal Violet is best applied by either submersion or by washing the solution over the surface in question. It is NOT recommended to spray Aqueous Leuco Crystal Violet except in the case of carpeting to observe shoeprints or other marks in blood. The development will begin to occur within 30 seconds. Then, blot with paper towels to remove the excess reagent. Begin by spraying lightly with a fine mist to avoid overdevelopment when used on carpeting.

7.5 INTERPRETATION OF RESULTS

7.5.1 Ninhydrin

The blood prints as well as other protein based prints will be intensified and additional detail not previously visible may be revealed. Coloration is not permanent, and while some prints have remained visible for years, others have faded in a matter of days. Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible.

7.5.2 Amido Black and Coomassie Brilliant Blue

The blood prints will be intensified and additional detail not previously visible may be revealed. Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible. Dried prints which lose contrast may be re-immersed in the second rinse solution and re-photographed.

7.5.3 Leuco Crystal Violet

Other blood enhancement techniques such as Amido Black may be applied after this technique. The use of Aqueous Leuco Crystal Violet followed by Physical Developer is also an option. It is suggested to photograph any latent prints developed with each process before treating the evidence with a new process. The Physical Developer may or may not enhance the bloody latent prints, but it may develop other latent prints. Each chemical reacts with different components of the blood residue.

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8 ADHESIVE SURFACE PROCESSING

8.1 INTRODUCTION

Enhancement of prints deposited on an adhesive surface can be done through the application of a solution that results in a color change when in contact with skin cells or other residues left in the adhesive material as a result of handling. The surface should be visually examined prior to the application of any solution.

8.2 PREPARATIONS

8.2.1 Gentian Violet

Working Solution

- 1 g Gentian Violet
- 1 L R/O or DI water

8.2.2 Sticky side powder

Combine Photo- Flo 200 (or suitable surfactant) with tap water at a ratio of 1:1.

Add Sticky Side Powder or other powder to the solution and stir until the mixture is the consistency of a thin paint.

8.2.3 Wetwop™

No preparation is necessary for this pre-mixed solution.

8.3 MINIMUM STANDARDS AND CONTROLS

Deposit a latent print on the adhesive side of tape or surface similar to evidentiary item. Apply the solution and if ridges appear the solution is working properly. This testing procedure must be performed for each working solution at the time the solution is made. Documentation of this process must be done in the form of a reagent log for each batch to include a batch number, established by month/day/year (060404). If additional batches are made on the same day, add an alpha character to the batch number (060404a, b, c, etc.). The batch number shall be placed on the working container. A performance check shall be completed for each case. The result of the check and the batch number will be included in the examination documentation. Gentian Violet and Wetwop shelf life is indefinite. Sticky side powder should be prepared as needed.

8.4 PROCEDURE OR ANALYSIS

8.4.1 Gentian Violet

Immerse item to be processed in the working solution in a large tray.

Allow the item to remain completely immersed for approximately 30 seconds while agitating.

Remove the item from the working solution and rinse excess stain from the item by washing with a gentle flow of cold tap water.

This process may be repeated until optimum contrast is reached between the prints developed and the background.

8.4.2 Sticky Side Powder or Wetwop™

Immerse item to be processed in the working suspension or paint the mixture on the sticky side of the tape using a soft bristled brush.

Allow the suspension to remain on the item for approximately 10 seconds.

Remove the item from the suspension and rinse excess suspension from the item by washing with a gentle flow of cold tap water.

This process may be repeated until optimum contrast is reached between the prints developed and the background.

8.5 INTERPRETATION OF RESULTS

Photographic preservation of developed prints which may be of value for comparison is essential and must be accomplished as soon as possible. Stained prints which fade as the tape dries may be improved by immersing the tape in a tray of clear water and photographing the prints while the tape is submerged.

8.6 REFERENCES

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9 POSTMORTEM RECORDING OF FRICTION RIDGE SKIN

9.1 INTRODUCTION

The two primary reasons for recording prints of a deceased person are for individualization or for elimination purposes in a criminal investigation. These procedures are intended for use by latent print examiners who have received hands-on training in processing unknown deceased cases. The obtained recorded finger/palm/foot prints will be given to the Medical Examiner Investigator/personnel or a representative from the investigating law enforcement agency for submission to the laboratory.

9.2 SCOPE

These procedures are provided to assist in the recording of friction ridge prints from deceased individuals. Friction ridge prints obtained from unknown deceased individuals may be compared with exemplars or searched in the AFIS or NGI for the purpose of identifications or exclusions.

9.3 EQUIPMENT/MATERIALS/REAGENTS

Acetate
 Acetone
 Alcohol
 Casting material
 Cylinder tube
 Fingerprint brush (small, short bristled)
 Fingerprint cards
 Fingerprint ink
 Fingerprint powders
 Fingerprint spoon
 Fingerprint strips
 Handi-print or rubber lifts (white)
 Inking pad
 Inking roller
 Latex gloves
 Lifting tape (transparent)
 Preservative (such as Metaflow or equivalent)
 Scalpels
 Soap
 Sponge
 White paper

9.4 MINIMUM STANDARDS AND CONTROLS

The minimum standards and controls for the recording of postmortem prints requires the inspection of each area recorded to determine if the detail present is a clear and accurate depiction of the area that is being recorded.

9.5 PROCEDURE

9.5.1 Proper Recording of Inked Prints

Fingerprint ink is applied to the finger using a direct roller application or using a detached glass plate previously coated with ink. The recording is made by using a spatula or spoon with finger block strips or a standard fingerprint card folded for postmortem printing. The spoon device is a curved instrument with slot-type guides to hold a strip of white card stock in place. Once the finger is inked, the spoon is pressed up against the finger. An alternate method simply uses a folded fingerprint card which is rolled around the deceased's inked finger. The recorder uses his or her hand to support and guide the card from the back (This is also applicable to recording inked palm prints).

9.6 ACCEPTANCE OF HUMAN REMAINS

All human remains should be treated as infectious material and Standard Precautions should be exercised. Upon acceptance, the examiner will ensure that biohazard labels are on the containers.

9.7 STORAGE OF HUMAN REMAINS

Human remains must be stored in the refrigerator until appropriate friction ridges are obtained. It is the responsibility of the examiner to ensure that the integrity of human remains is maintained.

9.8 PREPARATION AND RECORDING TECHNIQUES

The examiner will process one finger or body part at a time and exercise all appropriate safety precautions.

Printing of palms/feet is dependent upon the attachment of identifiable fingers/toes and/or the availability of known prints, or as dictated by the circumstances.

The following procedures will be followed:

- If known prints are available for comparison, record as few prints as necessary, from the intact remains and attempt to identify.
- All fingers must be printed if the fingers are not attached to the hand.

9.9 HUMAN REMAINS IN GOOD CONDITION

The following procedures should be followed:

- Examine human remains visually to determine the appropriate methods of obtaining prints.
- If fingers are received detached, place each finger in an appropriately labeled container (one through ten to correspond with the finger number, Item number, Laboratory number and examiner's initials).
- If the hand is received intact and the recording process requires the fingers to be detached, use rib cutters to remove the fingers and place each finger in a separately labeled container labeled with the Finger #, Item number, Laboratory number and examiner's initials.
- Gently clean the remains using a brush and warm water.
- Air dry the friction ridges or blot with paper towels before attempting to print.
- Use the appropriate printing method. Powder the finger and roll the powdered finger on a piece of lifting tape and place on a clean piece of acetate; or, apply ink to the finger and roll the inked finger on a fingerprint card. A fingerprint spoon may be used to facilitate recording.
- Rolled palm method- apply ink to palm, roll palm onto paper and check results.
- Latex Glove method- apply ink to palm and press onto glove covered sponge, pull palm carefully away and apply tape to glove. Remove tape gently from glove and place on white paper.

9.10 DESICCATED HUMAN REMAINS

If the skin has become hardened or wrinkled, the following procedures may be followed:

- Soak the remains in plain or soapy warm water or in a solution comprised of 50% softener (Restorative or equivalent) and 50% preservative (Metaflow or equivalent). Removing the skin from the finger may facilitate the softening of the skin for printing.
- A method to remove wrinkles and restore the remains to the approximate natural size and shape is to inject the friction ridge skin with tissue builder using a disposable syringe.
- Air dry the friction ridges or blot with paper towels before attempting to print.
- Use the appropriate printing method. Powder the finger and roll the powdered finger on a piece of lifting tape and place on a clean piece of acetate or apply ink to the finger and roll the inked finger on a fingerprint card. A fingerprint spoon may be used to facilitate recording.

9.10.1 Alternative Recording Methods

- Use a casting material (Mikrosil or equivalent) to record the friction ridge skin, following manufacturer's recommendations for application of casting material.
- Photograph the friction ridge skin detail.

9.10.2 Macerated Human Remains

Maceration may cause swelling and broadening of the friction ridges; therefore, automated searches may be adversely affected. Maceration may also cause the separation of the epidermis from the dermis. This separation of the two levels is sometimes referred to as "gloving". If the dermis level is being printed, the friction ridge path on the fingers or hands will appear as double rows of dermal papillae.

The following procedures should be followed:

- Gently clean the remains using a brush and warm water.
- Dry the friction ridges before attempting to print. Air dry or blot the friction ridges with paper towels or dry with alcohol or acetone.
- Use the appropriate printing method. Powder the finger and roll the powdered finger on a Handi-print lift and place on a clean piece of acetate or apply ink to the finger and roll the inked finger on a fingerprint card. A fingerprint spoon may be used to facilitate recording.

9.10.3 Alternative Printing Methods for Gloved Skin

- Slip the skin over the examiner's gloved finger and roll the finger in ink or powder the finger and then roll onto the appropriate card or acetate.
- Use a casting material (Mikrosil or equivalent) to record friction ridge skin detail.
- Photograph the friction skin ridge detail.
- If printing the underneath side of the epidermis, the print will be in the reverse position.

9.10.4 Burned or Charred Human Remains

A thorough examination is necessary to determine if the friction ridge skin is intact and can be recorded. Clenching of hands may preserve friction ridge detail.

The following procedures should be followed:

- Remove hardened or partially loose skin by gently twisting.
- Examine underside of the skin for ridge detail.
- Gently clean the remains using a brush and warm water.
- Photograph the friction skin ridge detail.
- Dry the friction ridges before attempting to print.
- Air dry or blot the friction ridges with paper towels or dry with alcohol or acetone.
- Use the appropriate printing method. Powder the finger and roll the powdered finger on a piece of lifting tape and place on a clean piece of acetate or apply ink to the finger and roll the inked finger on a fingerprint card. A fingerprint spoon may be used to facilitate recording.
- If the friction ridge skin has been destroyed by burning, note on the fingerprint card.

9.10.5 Human Remains in a State of Rigor

If the fingers are stiff or rigid, the following procedures should be followed:

- Make a deep cut at the joint with a scalpel to straighten.
- Breaking the finger may destroy friction ridge skin.

- Photograph the friction skin ridge detail.
- Use the appropriate printing method. Powder the finger and roll the powdered finger on a Handi-print lift and place on a clean piece of acetate or apply ink to the finger and roll the inked finger on a fingerprint card. A fingerprint spoon may be used to facilitate recording.

9.10.6 Epidermal Layer Not Present and the Dermal Layer Ridges are Depressed

This condition is possibly caused by moisture loss, but not to the point of being desiccated. Heat and rehydration often have the effect of elevating the existing ridge detail.

The following procedures should be followed:

- If necessary, detach the finger.
- Dry the friction ridges before attempting to print.
- Lightly brush the friction ridges with black fingerprint powder.
- Roll the powdered finger on a piece of lifting tape and place on a clean piece of acetate.

9.11 INFORMATION TO BE PLACED ON CARDS BEARING RECORDED PRINTS

- Examiner's signature/initials
- Laboratory Number
- Item Number

9.12 SEARCHING UNIDENTIFIED PRINTS

Conduct an automated fingerprint and/or palm print search(es) in AFIS/NGI.

9.13 CASE FILE DOCUMENTATION

All case-related work must be documented and retained in the case file. Legible copies must be retained. The original prints shall be returned with the evidence (and noted in the Certificate of Analysis) to the contributing agency.

9.14 DISPOSITION OF HUMAN REMAINS

The following procedures must be followed:

- Ensure biohazard labels are on evidence container(s).
- Ensure that the remains are in leak proof primary and secondary containers.

9.15 LIMITATIONS

Gloved skin is larger than attached skin; therefore, AFIS/NGI searches may be adversely affected. Charred skin is smaller than attached skin; therefore, AFIS/NGI searches may be adversely affected.

9.16 SAFETY

Follow the appropriate safety procedures as described in the Department's Safety Manual.

9.17 REFERENCES

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VIRGINIA
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10 FRICTION RIDGE PRINT EXAMINATION

10.1 INTRODUCTION

Friction ridge print examinations are conducted using the Analysis, Comparison, Evaluation and Verification (ACE-V) methodology, utilizing both qualitative and quantitative analysis. This process is applied regardless of the combination of print types (i.e., unknown versus known, known versus known, or unknown versus unknown).

Friction ridge print examinations are conducted utilizing examination documentation after it has been verified against the original image to ensure it represents the evidence accurately. If additional friction ridge print examinations are required, due to a possible AFIS hit or additional exemplars being submitted or obtained after the evidence has been returned, it is necessary to have the original evidence images resubmitted to ensure examination documentation accurately represents the evidence.

If it is not possible to examine the original evidence images, then examinations may be performed with the examination documentation images existing in the case file after a protocol deviation is approved as outlined in the Quality Manual.

The CoA shall reflect that case file examination documentation was used in instances when the original evidentiary images were not available.

Every latent print captured for analysis, photographed or lifted, shall be designated a number regardless if it is of value for comparison. The designated number shall be a combination of the Item #, the letter "P", and a sequential number.

Examples:

- 671-1P1 indicates one latent print was captured from Item 671-1
- 553-9P1, 553-9P2, 553-9P3 indicates three latent prints were captured from Item 553-9.

The examination documentation shall include the results of the analysis of all designated latent prints and the results of all comparisons, if applicable. It is acceptable to not analyze or compare all prints captured.

Examination documentation must acknowledge the existence of prints of "no value" and also acknowledge the existence and disposition of any captured latent prints which are not analyzed, compared or evaluated.

Consultations between examiners shall be documented and include the specific friction ridge print(s) reviewed, the nature and results of the consultation. The name or initials and date of the consultation will appear in the associated examination documentation. Consultation is a discussion between examiners, generally related to the determination of value or a comparison conclusion.

10.2 ANALYSIS

Analysis includes the assessment of a friction ridge print to determine its suitability by analyzing level one, level two, and level three detail, in addition to any other relevant information such as substrate, transfer medium, development method, deposition and lateral pressures, and anatomical orientation.

Suitability is the determination that there is adequate quality and quantity of friction ridge features in a print for comparison and evaluation purposes.

Possible Analysis conclusions:

- Latent print of value for comparison:

The latent print may be of value for identification or exclusion. Level one detail is discernible but level two details may be limited, not be reliable or reproduced in the exemplar therefore the comparison could result in an inconclusive result.

- Latent print not of value for comparison.

The latent print cannot be identified or excluded due to lack of sufficient, reliable level two detail.

The analysis is conducted and documented, including the conclusion related to value, prior to a comparison.

10.2.1 Examine the print using the Mideo software or a magnifier when necessary.

10.2.1.1 If Adobe Photoshop is utilized to clarify an image, it shall be done via the Mideo software to ensure the changes are tracked appropriately.

10.2.2 Document the analysis by filling in the requested information in the “Analysis Information” section. Document the following information when available:

- Substrate (porous, non-porous, semi-porous, smooth, rough, corrugated, pliable, textured)
- Transfer medium (sweat, blood, paint, dirt, oil, grease, etc.)
- Development method (illumination techniques; physical, chemical processing)
- Transfer conditions (deposition pressure, slippage or twisting, sequence (double-taps or overlays), lateral pressure)
- Preservation method (photography, lifting, live-scan, and ink)
- Anatomical aspects of the skin, to include orientation, condition (warts, scars, etc.), morphology of the hand or foot relative to the shape and contour of the substrate
- Level one detail
 - Overall ridge flow
 - General morphology (presence of incipient ridges, overall size)
 - Can be used for pattern interpretation
 - Can be used to determine anatomical source (finger, palm, foot, toe) and orientation
 - Cannot be used to identify
- Level two detail
 - Individual ridge path
 - Presence of ridge path deviation (ridge ending, bifurcation and dot)
 - Absence of ridge path deviation (continuous ridge)
 - Ridge path morphology (size and shape)
 - Used in conjunction with level one detail to identify
 - Used in conjunction with level one detail to exclude
- Level three detail
 - Structure of individual ridges
 - Shape of the ridge
 - Relative pore position
 - Other specific friction skin morphology (secondary creases, ridge breaks, etc.)
 - Used in conjunction with level one and level two detail to identify
 - Used in conjunction with level one and level two detail to exclude

10.2.3 For prints requiring a more in-depth analysis to determine the suitability for comparison, complete the information following the “Additional Analysis”.

10.2.4 Indicate the orientation of the print with a line, curved or straight, at the top of the print or indicate the orientation using the fieldsets in Mideo.

10.2.5 Required for all latent prints prior to comparison: Document level two detail, as part of the Analysis, in order to determine if the latent is suitable for comparison (“of value for comparison”).

The below listed color scheme shall be utilized for documenting level two detail.

- Green = high level of confidence the feature will exist in the exemplar (high degree of confidence the feature will appear in the same position, shape and type)
- Yellow = a medium level of confidence the feature will be present in the same location, size, shape and type in the exemplar
- Red = a great deal of uncertainty regarding the feature (a very low level of confidence it will appear similarly in the exemplar)
- Orange = used to mark characteristics that were not considered in the Analysis phase, but were used in the Comparison and Evaluation phase. Recommended for highly distorted or low quality prints.

10.2.6 Intentionally recorded known prints require a determination of suitability for comparison, but it is not necessary to complete the “Analysis” information in Mideo or to mark level two detail.

10.3 COMPARISON

10.3.1 If the analysis phase provides indicators as to the probable anatomical area, a comparison with the appropriate area of the known print is initially conducted. In the absence of indicators, all areas of available known prints shall be compared.

10.3.2 Comparison is the direct side-by-side observation of friction ridge detail to determine whether the information in two prints is in agreement or disagreement based upon similarity, sequence, and spatial relationship.

10.3.3 A target group of features is selected and is then searched for in the other print. When similarity with the target group exists, additional arrangements of features are compared between prints in a cyclical or recurring process.

10.3.3.1 If the initial target group is not found, alternative target groups may be selected and compared.

10.3.4 Characteristics used to reach a conclusion that were not marked during the Analysis phase can be marked with an orange annotation (dot, circle, square, etc.). The use of orange indicates the characteristic was not considered in the Analysis phase, but it was used in the Comparison and Evaluation phase.

10.4 EVALUATION

The third step of the ACE-V method wherein an examiner assesses the value of the details observed during the analysis and the comparison steps and reaches a conclusion.

10.4.1 Conclusions that can be reached:

- Identification
- Exclusion
- Inconclusive

10.4.1.1 Identification

10.4.1.1.1 Identification is the conclusion reached when an examiner determines two friction ridge prints are in agreement and that the friction ridge prints originated from the same source.

10.4.1.1.2 A comparison workspace documenting each identification shall be saved in the Common folder.

10.4.1.2 Exclusion

10.4.1.2.1 The determination by an examiner that there is sufficient quality and quantity of detail in disagreement to conclude that two friction ridge prints did not originate from the same source.

10.4.1.2.2 A minimum of two target groups containing level two detail and an anchor point are required and shall be documented on the latent print to conclude an exclusion.

- A target group consists of two or more ridge path deviations (ridge ending, bifurcation and dot).
- An anchor point includes delta, core, anatomical aspect allowing origin determination (i.e., outline of hand or finger, or pattern), or a large field of ridge detail (i.e., hypothenar).

The image containing the groups and the anchor point shall be saved in the Common folder for the case within the MIDEO system and printed using the Clarified image note page. "EXC" shall be included in the file name.

10.4.1.2.3 Level three details cannot be the sole factor in an exclusion decision. Level three details have to be considered in conjunction with level one and level two details.

10.4.1.3 Inconclusive

10.4.1.3.1 An inconclusive decision occurs when an examiner is unable to identify or exclude the source of a print because the corresponding areas of friction ridge detail are absent or unreliable. When a definitive conclusion (identification or exclusion) cannot be reached, the Certificate of Analysis (CoA) shall clearly communicate the reason.

Examples:

- An examiner is unable to identify or exclude due to the absence of complete and legible exemplars (e.g., poor quality fingerprints and lack of comparable areas). The CoA shall contain information requesting better quality exemplars or specific areas of the exemplars for comparison.
- An examiner observes corresponding features that are not sufficient to identify or dissimilar features are observed that are not sufficient to exclude. In either instance the inconclusive conclusion means that the unknown print is neither identified nor excluded as originating from the same source. The CoA shall state that the inconclusive conclusion is due to the quality and quantity of detail present in the latent print, the exemplars or both the print and the exemplars.

10.5 VERIFICATION

10.5.1 Verification is the independent application of the Analysis, Comparison and Evaluation methodology to a friction ridge print by another examiner. All conclusions (identifications, inconclusives and exclusions) must be verified.

10.5.2 Differences in opinions regarding verifications shall be referred to the Section Supervisor. Notification shall be made to the Physical Evidence Program Manager and/or Director of Technical Services. When changes to the comparison conclusions are made, the notes shall reflect the reason for the change of opinion as outlined below in the Blind Verification procedure.

10.5.3 Verifications must be completed prior to communicating the information to the contributor, either verbally or in writing. Additionally, the CoA will not be generated prior to the verification.

10.5.4 Verifications are divided into two categories: "Verification" and "Blind Verification". In a "Verification" the results are known to the verifying examiner. In a "Blind Verification" the verifying examiner does not know the conclusion rendered by the original examiner. The blind verification process is described in detail below.

10.5.5 The Mideo system will randomly select cases requiring blind verification. The examiner will be notified of the category of verification after completing the "Case Status" fieldset associated with the Case Folder data set.

10.5.6 If possible the verification should not be conducted by an examiner that has been solicited for consultation regarding opinions/conclusions or the technical reviewer.

10.5.7 Verification

10.5.7.1 The Examiner will:

- Properly document the conclusion(s) in the case notes.
- Place copies of original images which require verification into the Verification folder.
- Provide the case number to the Verifying Examiner.

10.5.7.2 The Verifying Examiner will:

- Logon to Mideo using his/her examiner account (first initial last name).
- Perform and document an Analysis on all latent print images in the Verification folder, which were compared.
- Perform and document the Comparison and Evaluation of all latent print images, which require verification.
- Save a comparison workspace documenting all identifications in the Common folder.
- For exclusions, the image containing the two labeled groups and anchor point shall be saved in the Common folder. The file name for the image shall contain "EXC" and the letter "V".
- Notify the original examiner when the verification is complete.

10.5.8 Blind Verification

Additional cases may be selected for blind verification at the discretion of the examiner, Section Supervisor or Program Manager.

It is acceptable for the Section Supervisor, after consultation with the Program Manager or Director of Technical Services, to override the requirement for a Blind Verification if extenuating circumstances exist in the case.

See Verifications in the Mideo Casework Software section of this manual for specific examples of cases not requiring blind verification (when it is randomly selected by the system).

10.5.8.1 The Examiner will:

- Properly document the conclusion(s) in the case notes.
- Place copies of original images which require verification into the Verification folder.
- Notify a Supervisor/Group Leader/Designee of the need for a Blind Verifying Examiner if after completion of the Case Status field the system indicates a Blind Verification is necessary.

10.5.8.2 The Supervisor/Group Leader/Designee will:

- Provide the case number to the Blind Verifying Examiner
- Review the conclusion(s) reached by both Examiners utilizing the Verification Notes.
- If the two examiners are in agreement, the reviewer shall add "results in agreement", their initials and the date of the review in the Notes section on the fieldset associated with the Case Folder in Mideo.
- If there is not agreement in the conclusion the Physical Evidence Program Manager and/or Director of Technical Services shall be immediately notified by the coordinating supervisor.

No further work, examinations or discussions between the examiner and verifier should occur until coordinated by the Program Manager.

- Typically, the original examiner and the blind verifier shall participate in a coordinated discussion as to how they reached their conclusion. The extent, manner and format of these discussions are at the discretion of the Program Manager. Results of discussions and conclusions shall be communicated to the Program Manager.
- If agreement is reached the consensus conclusion is reported on the CoA.
 - The reasons or steps (use of different images, clarification techniques, becoming aware of distortion, etc.) taken to reach consensus shall be documented in the examination documentation.
 - When a conclusion is changed, the examiner shall document the specific rationale for the revised opinion.
- If consensus is not reached, an inconclusive result shall be reported on the CoA per the Quality Manual Section 15.
 - The following wording should be used on the CoA:
 - The comparison of *Item 1* and *Item 2* is being reported as inconclusive due to lack of concordant results of duplicate analysis.
- If consensus is not reached, the Physical Evidence Program Manager and/or Director of Technical Services shall assign an examiner to evaluate the evidence to provide a quality assessment of the evidence items compared. The purpose of the evaluation is to provide a recommendation to the Program Manager and/or Director of Technical Services as to the appropriateness of the non-consensus opinions and if both conclusions are scientifically defensible.

10.5.8.3 The Blind Verifying Examiner will:

- Logon to Mideo using his/her "BV" account.
- Perform and document an Analysis of each image in the Verification folder.
- Perform and document the Comparison and Evaluation of each latent print image as necessary.
- Save a comparison workspace documenting all identifications in the BV Notes folder.
- If an exclusion is effected, a copy of the latent print image depicting two target groups and the anchor point used for an exclusion conclusion shall be saved in the BV Notes folder. "EXC", "BV" and the P# shall be in the file name.
- Notify the supervisor/designee when the blind verification is complete.

10.6 REVIEW OF "NO VALUE" LIFTS/IMAGES

10.6.1 A Supervisor, Group Supervisor or Designee shall review all lifts when an examiner concludes there are no prints suitable for comparison on the entire lift. The review shall be documented in Mideo by completing the Reviewer field in the Items Details tab.

10.6.1.1 It is not required to review fragments of ridge detail in a lift that contains a latent print suitable for comparison.

10.6.2 A Supervisor, Group Supervisor or Designee shall review all captured prints that the examiner deemed to be not suitable for comparison (no value for comparison) after Analysis. The review shall be documented in Mideo by completing the Consult/Reviewer filed in the Analysis Information tab.

10.7 REFERENCES

FBI, Standard Operating Procedures for Processes Used to Develop Latent Prints.

SWGFAST, Scientific Working Group on Friction Ridge Analysis Approved Guidelines & Friction Ridge Examination Methodology for Latent Print Examiners.

ISO/IEC 17025-General Requirements for the Competence of Testing and Calibration Laboratories, International Organization for Standardization, Geneva, Switzerland, 2005.

SWGFAST, Standards for Examining Friction Ridge Impressions.

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11 AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM (AFIS)

11.1 INTRODUCTION

Automated Fingerprint Identification System (AFIS) is a laboratory instrument that can be used to perform searches of the Virginia state database of known finger and palm prints. The system is housed and maintained by the Virginia State Police (VSP).

The Next Generation Identification (NGI) system is the FBI's AFIS (formerly IAFIS, Integrated Automated Fingerprint Identification System).

11.2 PROCEDURES

- 11.2.1 Determination of which prints are suitable for AFIS/NGI search is made by the examiner.
- 11.2.2 If a latent print is not searched due to it originating from the same source as another latent print then it is necessary to compare the latent prints to each other, reach a conclusion of identification and have the conclusion verified.
- 11.2.3 No identifications will be made by solely viewing the prints in AFIS; a copy of the known prints must be utilized for this purpose and the subsequent verification.
- 11.2.4 If it is not possible to reach a definitive conclusion while viewing the images in AFIS, the exemplar shall be imported into Mideo and the ACE-V method outlined in Section 10 of this manual shall be followed.
- 11.2.4.1 If the comparison conclusion is inconclusive or exclusion, the CoA shall include the statement listed in section 12.3.6.3 of this manual. The name on the exemplar shall not be included on the CoA.
- 11.2.5 It is acceptable to review only the top ten candidates in the search lists.
- 11.2.6 The following minimal information resulting from AFIS entries will be retained as examination documentation for each latent print searched.
- Printout showing the minutiae, core, axis, delta(s) for each latent print, when possible
 - Printouts of the list of candidates that were reviewed.
- 11.2.7 If a hit does not occur in one database, the other database shall be searched.
- 11.2.8 Latent prints entered into AFIS/NGI that do not result in an identification may be registered in the unsolved latent database.
- 11.2.8.1 If a latent is registered in the database it shall be documented on the CoA.
- 11.2.9 When a registered latent is presented with a potential matching exemplar the case examiner will have the potential identification reviewed, it is acceptable to perform this review on the AFIS or NGI system, and a CoA will be issued communicating the potential identification.
- 11.2.9.1 The TLI/ULR report will be printed and retained with the casefile.
- 11.2.9.2 See section 12 for specific CoA language. The candidate's name shall not appear in the CoA.

11.3 PERFORMANCE CHECK

- 11.3.1 To ensure that AFIS and NGI are working properly, a benchmark print in the same format as the latent print should be run within seven days prior to searching a latent print from casework. The benchmark print will be searched without editing. However, the finger number and pattern type will be utilized as

part of the search criteria. The split screen printout of the latent print and candidate lists demonstrating the hit will be retained in a binder located in the AFIS room/area for the assessment cycle.

- 11.3.2 If the known candidate is not on the candidate list, an additional search will be initiated. If the known candidate does not appear on the second candidate list, a service call will be made to the AFIS Help Desk. The terminal will also be marked as being “Out of Service” to include the date. This will be recorded in the Latent Print Section General Maintenance Log (DFS Document 241-F103). Additionally, the AFIS entries made since the last positive control may need to be researched depending on the identified problem.

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12 REPORT WORDING

12.1 INTRODUCTION

The following report formats will be used to the extent possible when reporting results to ensure consistency within the section. It is recognized that report statements cannot be provided to address all situations; therefore, these statements should be considered example wording to follow. When drafting report wording for evidence types not listed or when specific examples do not appear for a particular type of evidence, look first to existing wording that may be applied to the current situation. If a situation is so unusual that appropriate report wording is not available in the manual, it is expected that the Section Supervisor shall consult with other Section Supervisors for wording that may have been previously applied to the situation, as well as with the Physical Evidence Program Manager and/or the Director of Technical Services.

The Certificate of Analysis (CoA) will include the types of examinations that were conducted to reach the stated conclusions.

12.2 GUIDELINES

12.2.1 **CASE INFORMATION:** Agency name, name of investigating officer, laboratory case number, agency case number, victim(s), suspect(s), and additional information found on the Request for Laboratory Examination form.

12.2.2 **EVIDENCE SUBMITTED:** A listing and description of items as received from an agency.

12.2.3 **RESULTS:** A summary of the pertinent information relating to the examination, analysis and conclusions of Items listed. The Result section of the CoA will be sub-sectioned into the following three parts, as applicable:

12.2.3.1 **PROCESSING AND EXAMINATION:** This section details the processing examinations (e.g., visual, chemical and/or physical) and results for each item. The results shall include the number of latent prints recovered from each item.

12.2.3.2 **ANALYSIS:** This section provides details related to the analysis of latent prints.

12.2.3.3 **COMPARISON RESULTS:** This section details the comparisons and evaluations of the latent prints designated as value for comparison in the Analysis section. This section will be sub-sectioned, as applicable, into: Identification, Exclusion and Inconclusive.

If no latent prints were recovered it is not required to include the ANALYSIS and COMPARISON RESULT section.

If after analysis there are no latent prints of value for comparison it is not required to include the COMPARISON RESULT section.

12.3 WORDING EXAMPLES

12.3.1 The italicized portion in the proposed statements serve as examples and the intent is to utilize the correct item number in the case.

There is no need to further describe the item beyond the number as that information is available in the evidence lists. It is acceptable to include the description again in the processing section if deemed necessary for clarification.

It is not required that the numeral for the number be included in parentheses following the spelled out number.

12.3.2 **PROCESSING AND EXAMINATION:** Statement of the processing performed on the Item(s).

12.3.2.1 The below can be used for an item that was physically and chemically processed:

Item 1 was visually examined and physically and chemically processed.

Item 1 was visually examined, physically and chemically processed, and viewed with an alternate light source.

Item 1 was visually examined, chemically processed, viewed with an alternate light source and then processed with powder.

12.3.2.2 The below can be used for an item that was determined not to be suitable for processing:

Item 1 was visually examined and determined not to be suitable for processing.

12.3.2.3 The below can be used for a submitted lift card or photographs in which a visual exam only was conducted:

Item 1 was visually examined and not used for comparison.

12.3.2.4 The below can be used for resubmitted Digital Media (DM):

Item DM1 was examined and found to contain the following latent prints, which were previously reported to be of value for comparison:

Item 1C Two latent print (1CP1 and 1CP2)

Item 1D One latent print (1DP3)

12.3.2.5 The below can be used for exemplars:

Item 1 was visually examined and not used for comparison.

Item 1 was visually examined and used for comparison.

Fingerprints / palm prints bearing the name *John Doe*, SID#VA000000/ FBI#0000000, obtained from CCRE/FBI were visually examined, preserved and used for comparison.

12.3.3 **PROCESSING AND EXAMINATION RESULTS:** Statement related to the examinations performed as a result of the processing techniques performed on each Item. The below examination statements will directly follow the above processing statements.

12.3.3.1 The below can be used when ridge detail is visible but is of no value for comparison:

No latent prints of value for comparison were observed or developed.

12.3.3.2 The below can be used when no ridge detail is visible:

No latent prints were observed or developed.

12.3.3.3 The below can be used when ridge detail is captured. The number of latent prints captured shall be documented for each item processed:

One latent print was lifted.

Two latent prints were digitally captured.

Five latent prints were lifted and digitally captured.

- 12.3.4 **ANALYSIS:** Result statement for the analysis performed on each latent preserved and documented in the PROCESSING AND EXAMINATION RESULTS section.

- 12.3.4.1 The below can be used for when ridge detail is determined to be of value for comparison:

Item 1 Three latent prints are of value for comparison and have been designated 1P1, 1P3 and 1P5.

If multiple items will be addressed it is acceptable to use the below format:

The following latent prints from the listed items were determined to be of value for comparison and designated as follows:

Item 5 Three prints (5P3, 5P4 and 5P5).

- 12.3.4.2 The below can be used when captured latent prints were determined not to be of value for comparison:

Item 5 The latent prints captured were analyzed and determined not to be of value for comparison.

- 12.3.5 **COMPARISON RESULTS:** Statements related to the comparison results. This section may be divided into three sub-sections –identification, exclusion and inconclusive. If results are not available for a specific sub-section, do not list the category on the CoA.

If no direct comparisons were conducted, do not include this section heading on the CoA.

- 12.3.5.1 **IDENTIFICATION(S):** A listing of all latent prints that have been identified to exemplars.

Latent print 1P3 was identified to the exemplars bearing the name John Doe.

- 12.3.5.2 **EXCLUSION(S):** A listing of all latent prints that have been excluded to exemplars.

Latent prints 2P5, 4P6 and 7P8 were excluded to the exemplars bearing the name John Doe.

- 12.3.5.3 **INCONCLUSIVE(S):** A listing of all latent prints that have not been identified or excluded.

The comparison of the latent prints *1P1, 2P7, 8P9 and 9P1* was inconclusive due to the prints not containing sufficient quality and quantity of friction ridge detail to effect a conclusion of identification or exclusion.

Insufficient quality and quantity of friction ridge details exist in the exemplars to effect a conclusion of identification or exclusion when compared to latent prints *1P2 and 2P3*. Complete, clear exemplars are required to conduct additional comparisons.

Insufficient quality and quantity of friction ridge details exist in latent print *1P5* and the exemplars to effect a conclusion of identification or exclusion when compared to the currently submitted exemplars. If complete, clear exemplars are submitted for comparison, a conclusion of identification or exclusion may still not be possible due to the quality of the latent print.

The comparison of latent print *1P6* to the listed exemplars was inconclusive; it could not be identified or excluded due to the lack of reference points in the latent print to determine the orientation.

- 12.3.6 **AFIS/NGI:** This section shall be included below the COMPARISON RESULTS section if applicable. The specific latent(s), those previously designated with numbers and described to be of value for comparison in the ANALYSIS SECTION, searched shall be included in this section.

- 12.3.6.1 When a search results in an identification the below can be used:

Searches of the state and federal databases were conducted with latent *prints 1P2, 2P3 and 4P5*. A fingerprint card bearing the name *John Doe SID#12345678* was obtained from the *CCRE* and used for comparison.

- 12.3.6.2 When a search does not result in an identification the below can be used:

Searches of the state and federal databases were conducted with latent prints *1P5, 1P6, 1P7, 1P8 and 1P10*. No identifications were effected at this time; however, searches will be conducted automatically as new fingerprints/palm prints are entered into the state and federal databases.

- The statement regarding future searches shall only be used when prints are registered. It is necessary to indicate in which database the prints are registered.

- 12.3.6.3 When the situation as described in Section 11.2.4 of this manual occurs, the below can be used:

A comparison was conducted with latent print *1P5* as a result of the AFIS search, but no identification was effected.

- 12.3.6.4 When an unsolved latent results in a potential identification the below can be used:

A subsequent automated database search was conducted with latent print *1P1* in FS Lab# *XX-XXX* (agency case# *XXXXXX*), and as a result, a potential identification exists. Please contact the examiner listed below for assistance in facilitating the resubmission of evidence if confirmation of this potential identification is necessary.

- 12.3.7 **TERMINUS STATEMENTS:** All reports shall conclude with an applicable statement listed in each of the below sections.

- 12.3.7.1 Statement regarding the status of all latent prints developed/preserved in the case.

One of the following statements, most appropriate for the situation, may be used:

All latent prints of value have been identified.

Item DMI and fingerprints, *including palms*, must be submitted if additional comparisons are required at a later date.

Latent prints exist that are not AFIS quality but are of value for comparison. Please submit fingerprints, if available, for comparison.

Additional ridge detail exists that was not analyzed, compared or searched in a database.

Comparisons to John Doe were discontinued due to the listed identification. Additional latent prints exist but were not compared. If additional comparisons are required please contact the below listed examiner.

- 12.3.7.2 Statements regarding Digital Media (DM) and latent lift cards generated by the Department's Latent Print Section.

The below statements can be used:

The returned digital media, Item *DM1*, contains images of latent prints captured from *Items 1, 4, 10 and 15*. This item of evidence is being returned in *container 5* and should be retained. Should further comparisons be required, Item *DM1* must be resubmitted.

Lift cards containing latent prints *from Items 34, 66, 78, and 99* are being returned in *container 6* and should be retained. Should further comparisons be required the original lift cards and/or Item *DM1* must be resubmitted.

- 12.3.7.3 The following statement shall be used when friction ridge examination results, analysis and/or comparison conclusions were rendered from examination documentation when the original evidence was not available.

Copies of images, which existed as examination documentation, were used in the reported results.

- 12.3.7.4 Disposition of evidence: document in the CoA according to ¶ 16 of the Quality Manual.

12.3.8 **REPORT EXAMPLE:**

Item 1 – plastic bag
 Item 2 – burned cigarette filter
 Item 3 – piece of glass
 Item 3A, 3B, 3C – latent lifts from Item 3 (Item created at this laboratory)
 Item 4 – latent lift card from door
 Item 5 – latent lift card from window
 Item 6 – piece of paper
 Item 7 – fingerprint card bearing the name John Doe
 Item DM1- Digital media containing images from Items 3, 5 and 6, created at the laboratory.

PROCESSING AND EXAMINATION:

Item 1 was visually examined, physically and chemically processed, and viewed with an alternate light source. No latent prints were developed.

Item 2 was visually examined and determined not to be suitable for latent print examination.

Item 3 was visually examined and physically and chemically processed. Three lifts were obtained and designated as Item 3A, 3B and 3C. One latent print from Item 3A, two latent prints from Item 3B, and one latent print from Item 3C were preserved on digital media.

Item 4 was visually examined. No latent prints of value for comparison were present.

Item 5 was visually examined. Three latent prints were digitally captured.

Item 6 was visually examined and chemically processed. Two latent prints were digitally captured.

Item 7 was visually examined and preserved.

ANALYSIS:

The following latent prints from the listed items were determined to be suitable for comparison and designated as follows:

Item 3A Three prints (3AP1, 3AP4, 3AP5)

Item 5 Two prints (5P1 and 5P3)

Item 6 Two prints (6P1 and 6P2)

The additional latent prints captured were examined and determined to be not of value for comparison.

COMPARISON RESULTS:

AFIS/NGI:

Searches of the state and federal databases were conducted with latent print 3AP1. A fingerprint card bearing the name Jane Doe SID#12345678 was obtained from the CCRE and used for comparison.

IDENTIFICATION(S):

Latent prints 3AP4 and 6P1 were identified as the fingerprints of John Doe.

Latent print 3AP1 was identified as the fingerprint of Jane Doe

EXCLUSION:

Latent prints 3AP5 and 5P1 were excluded as the fingerprints of John Doe and Jane Doe.

INCONCLUSIVE:

Insufficient quality and quantity of friction ridge details exists in the exemplars to effect a conclusion of identification or exclusion when compared to latent prints 5P3 and 6P2. Complete, clear exemplars are required to conduct additional comparisons.

Digital Media (Item DM1) containing images of latent prints from Items 3A, 3B, 3C, 5, 6 and 7 is being returned in Container 5, and should be retained. Should further comparisons be required, Item DM1 must be resubmitted.

The latent lift card (Item 3A) is being returned in Container 1, should be retained, and must be resubmitted should further comparisons be requested by your agency.

13 QUALITY ASSURANCE

13.1 INTRODUCTION

- 13.1.1 The purpose of this section is to provide a uniform Quality Assurance Program for the Latent Print Section of the Virginia Department of Forensic Science. It is to establish a baseline or reference point of reliability and system performance.
- 13.1.2 It is expected that the analyst will report any unacceptable or anomalous behavior of any of our analytical systems immediately to their Section Supervisor. It is further expected that appropriate steps which ensure resolution of the issue will follow ASAP and be properly documented.

13.2 REAGENTS

- 13.2.1 Chemicals and solvents used in reagents should be of at least Certified Analytical Reagent ACS grade. Water used in reagent preparation should be reverse osmosis (RO) or deionized (DI), unless otherwise noted.
- 13.2.2 Stock solutions shall be labeled according to the Quality Manual and documented in the Reagent Preparation Log (DFS Document 100-F122).
- 13.2.3 A performance check, ensuring the reagent is working as intended, shall be performed and appropriately documented in the case notes prior to use on evidence.

13.3 POWDERS

- 13.3.1 Powders should be of a homogenous mixture, free of clumps and foreign debris. Contaminated powders shall not be returned to stock containers.
- 13.3.2 Individual hair (or fiber) brushes should be used for different colors or types of powders.

13.4 EVIDENCE HANDLING

- 13.4.1 Evidence packaging and exhibits shall be documented and marked as outlined in the Quality Manual.

13.5 EQUIPMENT

- 13.5.1 Balances
 - 13.5.1.1 Balances shall be calibrated by an outside vendor annually.
 - 13.5.1.2 All balances shall be performance checked quarterly (every three months) for accuracy using Class F or ASTM Class 1 weights.
 - 13.5.1.3 Record the weight displayed on the balance using the Latent Print Balance Log 241-F104.
 - 13.5.1.4 If the accuracy of a weight is outside the acceptable range, listed in the below table; ensure the balance is level and clean prior to rechecking. If, after these actions the weight check is still outside the acceptable range it shall be taken out of service and labeled as such until maintenance and/or calibration is performed by a qualified vendor.

BALANCE TYPE	BALANCE EXAMPLES	CHECK WEIGHTS
Toploading (± 0.01) gram	Mettler PE 1600 Mettler PB302	1.00 (± 0.02) gram, 10.00 (± 0.05) grams
	Ohaus Scout Pro SP202 Sartorius BP21005	100.00 (± 0.05) grams
Toploading (± 0.001) gram	Ohaus Explorer Mettler PB303	0.100 (± 0.002) gram 1.000 (± 0.002) gram 100.000 (± 0.005) grams

13.5.1.5 Records of calibration and performance check shall be maintained in the equipment maintenance log.

13.5.2 Cyanoacrylate fuming chambers

13.5.2.1 Several brands of fuming cabinets are commercially available for latent print applications in the laboratory. Follow the manufacturers' instructions and user manuals to obtain optimum results.

13.5.3 Humidity Chambers

13.5.3.1 A controlled combination of temperature and humidity enables rapid development of ninhydrin processed surfaces. Normal operating conditions include 80°F at 80% relative humidity.

13.5.3.2 Maintenance of the humidity chamber should be in conjunction with the manufacturer's specifications.

13.5.4 Alternate Light Source (ALS)

Maintenance of the light source should be in conjunction with the manufacturer's specifications.

14 MIDEO LATENTWORKS SOFTWARE

14.1 INTRODUCTION

The Mideo LATENTWORKS software is designed to capture all necessary examination documentation associated with latent print casework electronically. Each examiner is assigned two accounts to access the system. One for general casework and the second is to perform blind verifications. Both accounts are password protected. Every examiner has the capability to access every active case and all associated images and notes. The history log file documents actions taken on each file/image.

Information is recorded in the Mideo system via fieldsets which are accessed through the Edit Data function associated with each file or folder. The first information field located in the Basic Information screen is the file name. Each file name must be unique to allow it to be saved. There cannot be two case folders with the same FS Lab #. There cannot be two files contained in folder with the same file name.

The FS Lab # shall be included in the file name for all files which contain an image (i.e., latent prints, lift cards, exemplars).

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14.2 FOLDER STRUCTURE

The two main components of the Mideo system are the Workspace and the Visual Directory. Working with images is done in the Workspace. The Visual Directory displays the folder and file information. Each of the folders listed below contain specific files and information based upon the fieldsets associated.

14.2.1 Case Number

This folder is referred to as the Case Folder and is created when a case is created and contains all the other folders. Specifics related to the fieldset associated with this folder are outlined below.

14.2.2 Latents Group

No information is associated with this folder. It is designed to allow other sections to document evidence under the same case number.

14.2.3 BV Notes

The comparison workspaces created by the blind verifier are saved in this folder.

14.2.4 Common

The comparison workspaces created by the case work examiner and the verifier are saved in this folder. Overall photos of evidence or lift cards and additional case documentation is saved in this folder.

14.2.5 Evidence

This folder contains the notes associated with items processed, lift cards examined, exemplars, items received but not processed and digital media.

The only image files in this folder are of exemplars. No latent print images are saved in this folder.

14.2.6 Latents

All latent print images are saved in this folder. The unique identifier (file name) for each latent in this folder is the FS Lab# - P#. The P# is the combination of the Item number and the latent number.

14.2.7 Verification

The original latent print images analyzed are copied from the Latents Folder into this folder for examination by the verifying examiner.

14.3 CASE DOCUMENTATION

The information entered into the fieldset linked to the Case Folder (i.e., C13-XXXX) is related to container packaging and inventory of items received. Upon creating a new case in the system this is the first data set filled out.

14.3.1 Basic Information

The FS Lab # is entered in the appropriate field. The “Title” field can be utilized to document the agency and agency case number. The “Notes” field can be utilized to document any information regarding the case.

14.3.2 Custom Information

The information entered under “Custom Information” relates to the containers and items received. Each container is entered and described separately.

14.3.2.1 Container Inventory

Each container received is entered separately to allow for a description of the container.

Document “No Container” in this field if no container is received due to the item being transferred from another section.

14.3.2.2 Case Status

This field is completed when the examiner has completed his/her tasks related to the case (i.e., processing, analysis, comparisons, etc.) prior to review of no value for comparison images and comparison verifications. This field is configured to randomly select cases for blind verification.

It is acceptable to make changes to the examination documentation after the Case Status field is completed as it will be tracked in the history file.

14.4 EVIDENCE DOCUMENTATION

The workflow in Mideo is set up to start with documenting items received in the “Evidence” folder. The first step is to create the note page for the item of evidence. This is accomplished by clicking on the Evidence folder and then right clicking in open space under Files. After selecting New and then Evidence the fieldset will open allowing for the following information to be entered.

14.4.1 Basic Information

The Item or Sub-Item # is entered in the appropriate field, which is the file name. The next field is reserved for the Item Description, and should be entered as described on the RFLE. “Item Notes” are reserved to further describe or document the condition of the evidence.

14.4.1.1 Each lift card submitted or created shall have a unique Item or Sub-Item #.

14.4.1.2 It is acceptable to group multiple “no value” lifts into one Item or Sub-Item #.

14.4.2 Custom Information

The Custom Information area is separated into three tabs for additional documentation regarding the item.

14.4.2.1 Basic Information

- 14.4.2.1.1 If the item was not submitted (i.e., exemplar obtained from AFIS), the box should be un-checked to avoid the mandatory fields regarding the container.
- 14.4.2.1.2 If the item was received or created in the lab, the box is checked to allow for the container and Item # information to be completed. It is necessary to enter the Item # in this field as well as the one at the beginning of the data set for proper note page generation.
- 14.4.2.1.3 The "P#" field will be completed at the conclusion of the evidence processing. This field is necessary for correct note page generation.

14.4.2.2 Container Contents

The information in this tab is associated with the interior packaging of items in a container. If no interior packaging is present, it is not necessary to complete this field.

14.4.2.3 Item Details

This tab begins with selecting the type of item to be further documented. Different information will be entered depending on the type selected.

14.4.2.3.1 Lift Card

- 14.4.2.3.1.1 Each area of interest captured shall contain only one latent print (P#). Document the P#(s) captured for analysis in the appropriate field.
- 14.4.2.3.1.2 Scan or photograph the selected area of interest at 24-bit color or 8-bit grayscale at minimum of 1000 ppi.

14.4.2.3.2 Exemplar

- 14.4.2.3.2.1 The name listed on the exemplar will be used as the Item # in the Basic Information section of the data set if it is not a submitted item/sub-item. The FS Lab # shall be listed prior to the name.
- 14.4.2.3.2.2 For submitted major case exemplars which encompass numerous cards, the Item # field should include a brief descriptor. For example: C14-XXXX Item 1 John Doe, right hand ; Item 1 John Doe, left hand ; Item 1 John Doe, 10-print card
- 14.4.2.3.2.3 The name should be listed in the Item # field for obtained exemplars. If numerous cards are obtained for the same individual a brief descriptor used to differentiate the cards should follow the name. For example: C14-XXXX Jane Doe offense date 1/1/1990; C14-XXXX Jane Doe offense date 5/2/1991.
- 14.4.2.3.2.4 It is not necessary to import exemplar card images into the Mideo database if no comparisons are to be conducted.

- If the exemplar is not suitable for comparison due to limited area of skin, heavy distortion, incomplete recording or inappropriate recording surface, then it is recommended to import the exemplar into Mideo to allow for technical review.

14.4.2.3.2.5 Exemplars scanned and imported into the Mideo database should be at 500ppi. It is not necessary to scan at a higher resolution.

- Individual fingers may be scanned at 1000ppi if necessary.

14.4.2.3.2.6 Prints obtained from deceased individuals should be imported into the Evidence Folder and described using the fieldsets associated with Deceased Exemplar under the Item Type. The FS Lab # shall be listed in the Item # field prior to the name or Item #.

- Use the Item Description and Item Notes to describe if it was a ten print card, two morgue strips, lift cards, image of finger, etc.

Name = deceased or name provided by submitting agency

- The examiner should select the finger of the deceased to be compared to the exemplars and save it as a new file in the Latents Folder.
- Using the selection tool in the workspace, draw a box around the finger to be compared. Right click within the box and select copy region to new tab. Using the Save As function, save the file in the Latents Folder.
- Name the file for the selected finger with the FS Lab #, Item # followed by the finger alpha designator. For example: 1RI indicates the right index finger from Item 1. It is necessary to add this file name to the P# field on the Basic Information tab for proper generation of the note pages.

14.4.2.3.2.7 To generate a printed copy of the exemplar utilize the Exemplar report in the Latent Images folder.

14.4.2.3.3 Items To Be Processed

The information for this selection documents the processing techniques applied to the item and the result of each process.

14.4.2.3.4 Received - not analyzed

This selection is used to document evidence that was received by an examiner but not analyzed. The reason for no analysis should be documented in the Item Notes field.

14.4.2.3.5 Digital Media

This selection is used to document the creation as well as the resubmission of the Digital Media (DM) containing evidentiary latent print images.

- 14.4.2.3.5.1 The DM being returned to the submitting agency shall contain original images of latent prints only, not clarified images, annotated images or exemplars.
- 14.4.2.3.5.2 The P#(s) and/or the Item#(s) from which the latents were captured shall be documented in the Item Description field for the DM being returned.
- 14.4.2.3.5.3 To create the DM or evidence CD/DVD follow the below:
- Open the Latents folder
 - Click File, select New then Burn Disc
 - Click Edit then Select All
 - Drag all images into the Mideo Disc Burner window
 - Click Change Disc Settings
 - Change the disc name to the FS Lab # and DM#
 - Verify the below settings
 - Disc Options
 - Close CD after burning and Verify CD after burning completes are checked
 - Advanced Options
 - Output Type: Use Original Type
 - File Type: Original Images Only
 - Click Accept
 - Click Burn Disc
- 14.4.2.3.5.4 For DM resubmitted the Item Description field should be used to document the P#(s) contained on the disc. The Item Notes field can be used to document any other pertinent information regarding the media.
- For resubmitted media, the fields in the “Basic Information” tab should be used to document the container and Item #.
 - The images on the resubmitted media should be imported into the Latents folder using the original P#.

14.5 LATENT DOCUMENTATION

Files containing images of latent prints will be imported and saved in the Latents Folder. The file name is the FS Lab #- P#. In the instances when multiple images are captured of a single latent print (i.e., bracketing shots), the file names should be the FS Lab#-P# followed by a letter designator. For example C13-XXXX-1P1-A, C13-XXXX-1P1-B, C13-XXXX-1P1-C would be indicative of three images captured of latent print 1 on Item 1.

A file extension designating the examination or development technique should be used when images are captured as a result of sequential processing. If a latent is captured after a visual examination the file name should contain “VIS” after the P#. If the same latent is captured after super glue then the file extension should be “CA” or “SG” after the P#.

The Item Description field should be used to document the location of the latent on the item, if necessary. The Item Notes field may be used to document any pertinent information regarding the latent print image.

The fieldset associated with files in the Latents Folder is divided into the following tabs: Basic Information, Analysis Information, AFIS and Comparison Information.

The notes shall document the existence of all captured latent prints which were not analyzed, compared or evaluated.

14.5.1 Basic Information

- 14.5.1.1 The Item # and P # are entered in the Basic Information tab to ensure complete examination documentation is generated from the fieldset.
- 14.5.1.2 The optional Examination field is completed when all analysis, AFIS searches and comparisons are completed for the latent print image. This field is not printed on any note page, its' purpose is to provide a visible indication in the visual directory if the examiner has completed all that needs to be done with the image or if more information needs to be added to a fieldset.

14.5.2 Analysis Information

- 14.5.2.1 It is acceptable to not analyze every latent captured or imported into the Latents Folder.
- 14.5.2.2 The analysis shall be performed in a workspace with all appropriate fields documented and the file saved prior to starting a comparison.
- 14.5.2.3 The image should be oriented in the workspace if possible. If the image is oriented visually in the workspace, select "Image Oriented". If the image is not visually oriented, but marked indicating the correct orientation, then "Annotated" should be selected.
- 14.5.2.4 The consult / review check box field is intended to document consultations and the review of no value latent images.
- 14.5.2.5 If a consultation is necessary to assist in determining value, the examiner should provide the case number and P# to the consulting examiner. The consulting examiner will access Mideo using their general logon to view the image. Once the consult is complete, the consulting examiner will check the consult/review box and fill in the appropriate information.
- 14.5.2.6 For the review of no value images, the reviewing examiner will access Mideo using their general logon to view the image. The reviewing examiner will check the consult/review box and enter "concur with no value" into the Nature of Consult / Review field.
- 14.5.2.7 If a latent image requires a consult and the result is no value then, the review shall be documented in the Item Notes field and the consult will be documented using the appropriate fields under the check box.
- 14.5.2.8 Level Two detail shall be annotated on the image using the color scheme outlined in the Friction Ridge Print Examination section of this manual.

14.5.3 AFIS

Images exported for AFIS search may contain clarification techniques (brightness, contrast, filter application, etc.) used, but not annotations marking second level characteristics. The below describes two ways to accomplish this task.

14.5.3.1 Option A

- Open the image in the workspace and perform clarification steps.
- Calibrate the image.
- Click the disc icon on the tool bar to save the changes, leaving the image open in the workspace to continue the analysis.
- Open the visual directory and select the image for export. Right click on the file and select "Export to AFIS".
- Select the USB device, from the directory, that will be used to transport the file for AFIS entry.

- Select “One Inch at Selected Resolution” for the Crop Style.
- Place selection box around latent to be exported and click export.
- Return to the workspace and complete the analysis of the latent print.

14.5.3.2 Option B

- Open the image in the workspace and perform clarification steps.
- Calibrate the image.
- Create a Group labeled “Analysis” and annotate the image
- Lock the group and hide it prior to saving.
- Open the visual directory and select the image for export. Right click on the file and select “Export to AFIS”.
- Select the USB device, from the directory, that will be used to transport the file for AFIS entry.
- Select “One Inch at Selected Resolution” for the Crop Style.
- Place selection box around latent to be exported and click export.

14.5.3.3 The information in the AFIS tab documents which databases were searched and the result of the searches.

14.5.3.3.1 A result of “Hit” will be entered after a comparison is completed in Mideo to the exemplar listed on the candidate list.

14.5.3.3.2 The exemplar obtained should be imported into the Evidence folder.

14.5.4 Comparison Information

14.5.4.1 The Exemplar information on this tab is linked to the Exemplar information documented in the Evidence folder.

14.5.4.2 If a consultation is necessary to assist in determining a conclusion, the examiner should provide the necessary file information to the consulting examiner. The consulting examiner will login to Mideo using their general user name to view the image. Once the consult is complete the consulting examiner will check the consult box and fill in the appropriate information.

14.6 ON-SCREEN COMPARISONS

The Comparison Workspace is designed to allow a side by side comparison of the latent image and an exemplar card with the capability to document the comparison by accessing the fieldset associated with the latent image.

14.6.1 A new comparison workspace is opened by clicking on File and selecting New and then New Comparison Workspace. Opening a comparison workspace in the visual directory will allow for the visual directory to be visible in the film strip allowing for navigation to the correct folders.

14.6.2 The latent image is selected from the Latents Folder and dragged into the box on the left side of the workspace. The space is designed to bring in the clarified annotated image.

14.6.3 The exemplar is selected from the Evidence Folder and dragged into the box on the right side of the workspace. This box is configured for an exemplar scanned in at 500ppi and will zoom in to show one finger in the box at a time. The zoom panel in the tool box is available to move through the different fingers and compare the latent print image to one finger at a time.

14.6.4 The annotation markings of level two detail placed during the analysis phase can be grouped together and hidden during the comparison phase. Once the comparison conclusion is rendered, the layer may be made visible to evaluate the placement of the ridge characteristic markers.

- 14.6.5 The comparison conclusions are documented utilizing the fieldset associated with the latent print image.
- 14.6.6 If a conclusion of identification is rendered, the comparison workspace shall be saved in the Common Folder. The file name should be the FS Lab # P# ID the name on the exemplar and the finger designation.

For example: "C16-XXXX 1P1 ID John Doe RI"

- 14.6.7 If the conclusion is Exclusion or Inconclusive, it is not necessary to save a comparison workspace.

14.7 VERIFICATION

All verifications are to be done in Mideo. All latent prints analyzed and compared shall have the original image copied from the Latents Folder and placed into the Verification Folder. It is not necessary to place images of latent prints that were not analyzed into the Verification Folder. For example, if multiple images of the same latent are captured but the examiner only analyzed or analyzed and compared one image, then it is acceptable to place only the one in the Verification Folder. It is not necessary to place images of latent prints that are not compared into the Verification Folder. For example, if the print is determined to be a palm print and no palm prints are available for comparison, it is not necessary to copy the image into the Verification folder.

Prior to requesting an examiner to verify the conclusions, the original examiner will complete the Case Status field on the fieldset associated with the Case Folder.

The software is designed to randomly select cases for blind verification. If after completing the Case Status field the response is "Proceed with verification / review as necessary" the examiner should select an examiner to verify the analysis and/or comparison conclusions. If the response is "Selected for Blind Verification – Contact Supervisor" the examiner shall provide the case number to the supervisor or designee for assignment.

Types of cases not requiring blind verification:

- Latent lifts – no areas of interest
- Latent lifts – entire lift area captured for no value review
- Processed evidence – no areas of interest developed
- Captured "of value" prints, but no exemplars for comparison.
- AFIS or NGI search with no Hit shall be documented in the Notes field "AFIS / No Hit"
- Captured latent prints that were determined to be of no value for comparison. Shall have "No value review" added to the Notes field.
 - It is acceptable for an examiner or supervisor to have no value for comparison prints subjected to blind verification.
- Identification of deceased shall be documented in the Notes field "OCME case"

The verifying examiner shall complete the information in the Analysis Information and Comparison Information tabs associated with files contained in the Verification Folder. The Basic Information should already be populated with information entered by the original examiner.

It is acceptable for the verifier to consult with another examiner regarding the analysis or analysis and comparison. The assigning supervisor or designee shall be contacted to coordinate consultation for blind verification cases. The appropriate fields shall be completed when consultations occur.

14.7.1 Analysis Information

- 14.7.1.1 The verifying examiner, blind or open, shall complete the fields in the Analysis Information tab.

14.7.2 Comparison Information

- 14.7.2.1 The verifying examiner, blind or open, shall complete the fields in the Comparison Information tab.

14.7.3 Verification

- 14.7.3.1 The examiner shall log into Mideo using their general account when performing open verifications.
- 14.7.3.2 It is acceptable to check the conclusions of the original examiner by viewing the conclusion in the Object Information window.
- 14.7.3.3 When an identification conclusion is rendered, the verifying examiner shall save a workspace containing the latent image and the known prints with level two detail annotated on both images documenting the information used to render the conclusion. The file should be saved in the Common Folder with the file name containing the FS Lab # P#, ID, the name on the exemplar, finger designation and underscore (_) and the letter "V".

For example: "C16-XXXX 1P1 ID John Doe RI_V" indicates latent 1 from Item 1 was identified to the right index of John Doe and verified.

- 14.7.3.4 When an exclusion conclusion is rendered, the verifying examiner shall save a workspace containing the latent image with two target groups and anchor point annotated documenting the information used to render the conclusion. The file should be saved in the Common Folder with the file name containing the FS Lab # P#, "EXC", underscore (_) and the letter "V".

For example: "C16-XXXX 1P1 EXC_V" indicates latent 1 from Item 1 was excluded and verified.

- 14.7.3.5 The following shall be initialed by the verifying and original examiner and included in the case file; Verifying Examiner Analysis Notes, Clarified Images, Verification Notes and comparison workspaces in the event of an identification.

14.7.4 Blind Verification

- 14.7.4.1 The examiner shall log into Mideo using their BV account when performing blind verification.
- 14.7.4.2 The BV account limits access to the Verification Folder, which contains the latent print images for analysis and or comparison and the Evidence Folder, which contains the exemplar images.
- 14.7.4.3 When an identification conclusion is rendered, the verifying examiner shall save a workspace containing the latent image and the known print with level two characteristics annotated on both images documenting the information used to render the conclusion. The file should be saved in the BV Notes Folder with the file name containing the FS Lab # P#, ID, the name on the exemplar, finger designation, underscore (_), and "BV".

For example: "C16-XXXX 1P1 John Doe RI_BV" indicates latent 1 from Item 1 was identified to the right index of John Doe and blind verified.

- 14.7.4.4 When an exclusion conclusion is rendered, the blind verifying examiner shall save a workspace containing the latent image with two target groups and anchor point annotated documenting the information used to render the conclusion. The file should be saved in the BV Notes Folder with the file name containing the FS Lab # P#, "EXC", underscore (_) and "BV".

For example: "C16-XXXX 1P1 EXC_BV" indicates latent 1 from Item 1 was excluded and blind verified.

- 14.7.4.5 The blind verifier will notify the supervisor or designee when the case is complete.

- 14.7.4.6 The following shall be included in the case file and contain the blind verifying examiners' and the original examiners' hand written initials; Verifying Examiner Analysis Notes, Clarified Images and comparison workspaces in the event of an identification.
- 14.7.4.7 The supervisor or designee will utilize the Verification Notes to reconcile the conclusions. The reconciler shall document "results in agreement" in the Notes section of the Case Folder.
- 14.7.4.8 The original examiner shall initial the Verification Notes and include it with the case file.

14.8 EXAMINATION DOCUMENTATION

The information entered into fieldsets is used to generate examination documentation (notes). The following is a list of note pages configured to generate documentation based upon the fieldsets associated with the different folders. It is not necessary to generate the note page if it is not relevant to the case. For example: A Processing Note page does not need to be generated if only Lift Cards were submitted for examination.

14.8.1 Inventory Notes

This note page documents the containers and packaging that the items were received in and should be generated for each case completed.

14.8.2 Processing Notes

This note page documents the item description, development techniques employed and the results of the techniques. This note page only needs to be generated if items of evidence were processed for latent prints.

14.8.3 Lift Card Notes

This note page documents the lift cards received, information listed on the lift and if any latent prints were captured for analysis.

14.8.4 Exemplar Notes

This note page documents exemplars received or obtained from various sources, their value for comparison and any notes associated.

14.8.5 Latent Notes

This note page documents the latent print numbers, analysis results, AFIS/NGI searches, comparison results and verification.

14.8.6 Analysis Notes

This note page documents the Analysis of each latent print analyzed as well as those not analyzed.

14.8.7 Comparison Workspaces

This note page is used to print the saved comparison workspaces documenting an identification.

14.8.8 History

A history log shall be generated at the conclusion of each case and included with the examination documentation. This log contains information to track changes made to data fields, clarifications to images, as well as, who accessed the files.

- 14.8.8.1 The History is printed from the case folder level by right clicking on the folder and selecting Print Contents History
- 14.8.8.2 It is acceptable to create a PDF of the history file, burn it to a CD/DVD and attach it to the case file.

14.8.9 Images /Exemplars

Copies of the original and clarified/annotated latent print images shall be retained as examination documentation. The Mideo system is configured to generate an enlargement of each image in the Latents Folder. It is not required to print images of latent prints which were not analyzed.

Copies of exemplars used for comparison shall be retained as examination documentation. It is not required to retain copies of exemplars not used for comparison.

- 14.8.9.1 Generating images is accomplished by right clicking on the Latent Folder and selecting Print Summary.
- 14.8.9.2 Select Latent Images from the first drop down menu on the Report Selection screen.
- 14.8.9.3 Select both Image Clarified and Image Original to allow the generation of the required images for inclusion with the examination documentation.
- 14.8.9.4 Images clarified/annotated by the verifying examiner shall be included with the examination documentation.
 - 14.8.9.4.1 Right click on the Verification folder and select Print Summary.
 - 14.8.9.4.2 Select the Image Clarified report from the Latent Images folder. It is not necessary to print the original images again.
- 14.8.9.5 Generating exemplars is accomplished by right clicking on the exemplar file and select Print. Select Latent Images from the first drop down menu on the Report Selection screen and then Exemplars from the list.
- 14.8.9.6 If printing hard copies, it is necessary to print the images in color to capture the colored annotation markings representing part of the analysis.
- 14.8.9.7 A case documentation CD/DVD containing all original and marked-up images in the Latents folder shall be made and attached to the case file.
 - 14.8.9.7.1 When creating the case documentation CD/DVD follow the steps described in Section 14.4 but change the selection for the Files Included field to Marked Up AND Original Images
 - 14.8.9.7.2 It is acceptable for the case documentation CD/DVD to contain the history file and the images.

14.9 GROUPING TOOL

This feature is used to turn on/off a group of points marked on an image during analysis or comparison.

- Select View then Group Manage Panel
- Click “+” in Graphic Groups Tool Box
- Click in text area to name group (i.e., Analysis, Comparison, etc.)
- Place annotations on the image

- Click on the lock icon to lock the group together
- Click on the paint bucket icon to hide the group of annotations
- Click the paint bucket icon to un-hide the group

14.10 CLEARING SIGNATURE AND DATE FIELDS

The following should be done to clear the field if an examiner inadvertently selects the Case Status as complete prior to completing all tasks or incorrectly selects the reviewer or consultant field. This action will be tracked in the History Log.

- 14.10.1 To clear the Case Status, right click on the Case Folder, select Tools then Clear Folder Data and check the Case Status box.
- 14.10.2 To clear the Consult/Reviewer field, right click on the file (image), select Tools then Clear File Data and check the Consult/Review box.

14.11 REMOVAL OF COPIES

Once all reviews of the case file are complete the copies of the images and notes in the Mideo database will be removed. If additional examinations are required of the latent print images, the submitting agency will need to resubmit the digital media which contain the evidentiary latent print images.

The original examiner will remove the copies after they confirm the case has been technically and administratively reviewed.

- 14.11.1 Each file needs to be removed from each folder prior to the Case Folder being deleted.
- 14.11.1.1 Open each folder and select all files for removal.
- 14.11.1.2 Right click, select Edit and then select Delete Selected to remove the copies from the database.
- 14.11.2 Once all files have been removed from all folders, right click on the case folder and delete it from the database.

15 COMMONLY USED ABBREVIATIONS

The following is a list of abbreviations and acronyms commonly used by examiners in the Latent Print Section. This list has been generated to assist in the interpretation of case file notes and is not a standardized list of required abbreviations. The abbreviations are appropriate written in either lower or upper case and they are appropriate with or without punctuation such as periods. Common chemical formulas, chemical, mathematical and shorthand abbreviations are equally acceptable and will not be listed here.

Definitions	Abbreviations
Also known as (Alias)	AKA
Alternate Light Source	ALS
Analysis, Comparison, Evaluation - Verification	ACE-V
Amido Black	AB
At	@
Automated Fingerprint Identification System	AFIS
Basic Yellow 40 dye stain	BY40
Bearing the Name	BTN
Believed to be	BTB
Black Powder	BP, blk. pdr.
Blind Verification	BV
Brown	Brn
Central Laboratory	C or CL
Central Record Criminal Records Exchange	CCRE
Compared	Comp.
Comparison(s)	Comp(s)
Commassie Blue	CB
Container	Cont./C
Containing	ċ
Crimescope	CS
Designated	Desig.
Developed	Dev.
1, 8-Diazafluoren-9-one	DFO
Digital	Dig.
Disposition	Dispo.
Digital Media	DM
Drugs	DX
Elimination	Elim.
Envelope	Env.
Evidence	Evid.
Evidence Bag Containing	EBC
Evidence Receiving	ER
Examination Documentation	ED
Excluded	Exc.
Facsimile	Fax
Federal Bureau of Investigation	FBI
Fingerprint(s)	Fp(s), Fgpt., Fpts

Fingerprint Card	FPC
Fingerprint Section	LX
Firearms Section	FX
Five Times Enlargement	5X
Fluorescent Powder	FLP
Forensic Advantage, Case and Evidence	FACE, FA
Gentian Violet	GV
Humidity Chamber/Cabinet	HC
Identification	Ø, ID.
Inconclusive	Inc.
Integrated Automated Fingerprint Identification System	IAFIS
1,2-indanedione	IND
Large Evidence Envelope Containing	LEEC
Latent(s)	Lat(s)
Latent Inquiry	LI
Latent Lift Card	LLC
Latent Print(s)	LP(s)
Latent Prints Section	LX
Latent Re-inquiry	LRI
Left Thumb	LT
Left Index	LI
Left Middle	LM
Left Ring	LR
Left Little	LL
Lower Joint(s)	Lj(s), Lwr. Jt(s).
Limited Ridge Detail Detected	LRDD
Luma-Lite	LL
Magnetic	Mag.
Magnetic powder	MP
Manila	Man.
Medium Evidence Envelope Containing	MEEC
7-(p-Methoxybenzylamino)-4-Nitro-2,1,3-Benzoxadiazole	MBD
Negative(s)	Neg(s)
NGI	Next Generation Identification
Ninhydrin	Nin
No Ridge Detail Detected	NRDD
No Value	NV
Northern Laboratory	NL, NOVA
Of Value	OV
One-to-One	1:1
Palm Print(s)	PP(s), Plm(s), PPC
Petroleum Ether	PE
Physical Developer	PD
Personal Pick-up	PPU

Pick-up	PU
Possible	Poss.
Present	Pres.
Previous	Prev.
Print(s)	Prt(s).
Processed	Proc.
Presumed to be	PTB
Dye stain containing - Rhodamine 6G, Ardrox and MBD 10	RAM
Rhodamine 6G dye stain	R6G
Received	Rec.
Registered	Reg.
Remaining	Rem.
Reported	Rept'd.
Retained	Retn'd.
Returned	Ret'd.
Reverse	Rev.
Reverse position	Rev. pos.
Reverse color	Rev. col.
Ridge Detail Detected	RDD
Right Thumb	RT
Right Index	RI
Right Middle	RM
Right Ring	RR
Right Little	RL
Sealed Envelope	SE
Sealed paper bag	SPB
Sealed Brown Box	SBB
Sealed brown paper bag	SBPB
Sealed Manila Envelope	SME
Sealed Plastic Bag	SPLB
Sealed White Box	SWBX
Sealed yellow envelope	SYE, SYEN
See Other Photo	SOP
Separate	Sep
Serial Number	SN
Serology/Forensic Biology Section	SX
SID Number	SID#
Signed and Sealed	S&S
Silver Nitrate	SN
Small Particle Reagent	SPR
Small Evidence Envelope Containing	SEEC
State Identification Division Number	SID
Sticky Side Powder	SSP
Submitted	Sub.

Superglue (Cyanoacrylate)	SG, Cyano, CA
Suspect	S or Susp.
Therefore	∴
Tenprint latent inquiry	TLI
Tidewater/Eastern Laboratory	TL, EL
Trace	TE
Turned-over-to	TOT
Unidentified Latent Response	ULR
Universal Latent Workstation	ULW
Victim	V or Vic.
Visible	Vis.
Visual exam	VE
Western Laboratory	WL

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