LPU – 7

Processing Techniques

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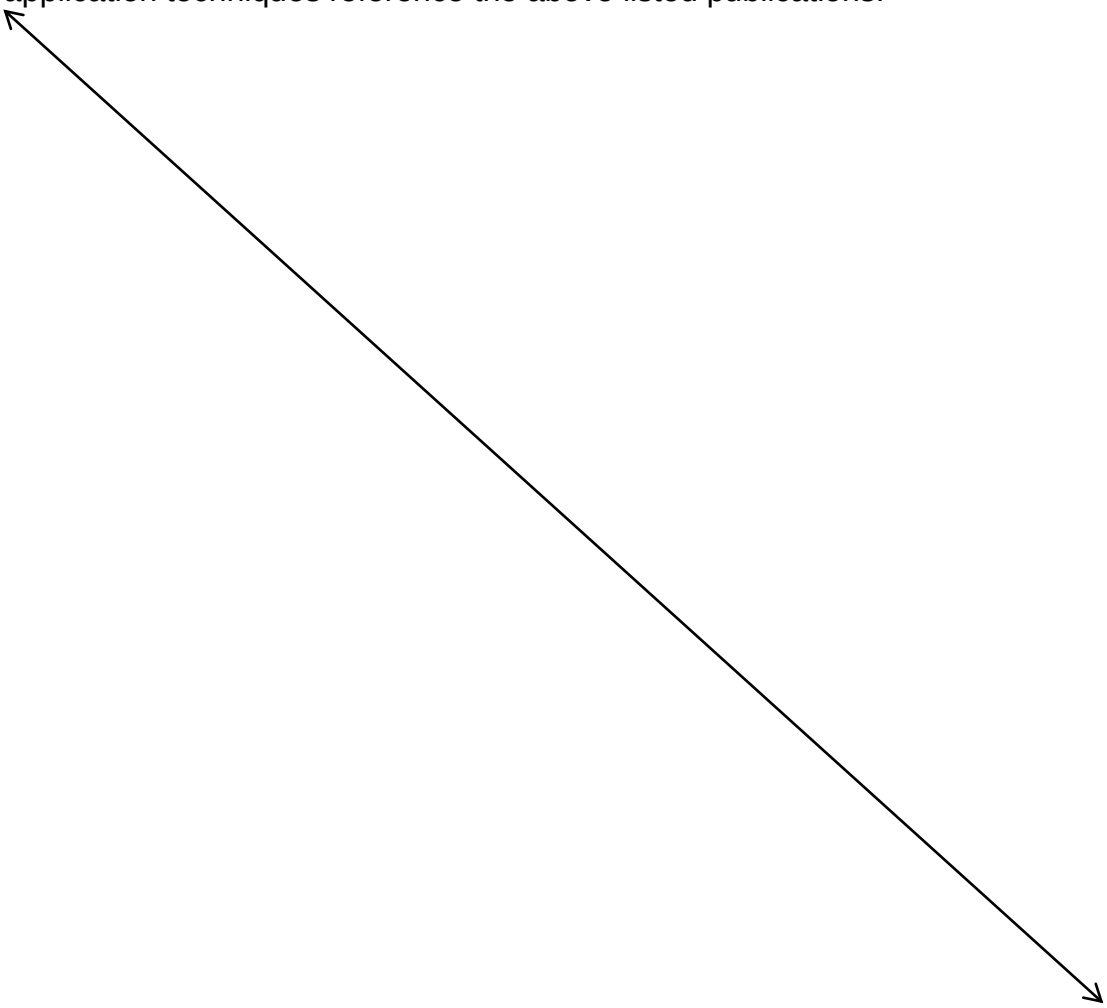
Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # LPU-7	Subject: Processing Techniques
Approved: David C. Schultz	Matthew C. Mathis

Purpose:

This policy section shall contain recommended techniques that are preferred to be used by the CMPD latent Print unit; these techniques are preferred due to their ease of use, low cost, high reliability and compatibility with a high volume laboratory. The recommendations of these techniques in no way restricts the analyst from selecting any technique that is approved under this SOP and described in either the current FBI Processing Guide for the Development of Latent Prints or the PSDB Manual of Fingerprint Development Techniques as described in 6-2 of this policy. For working, stock and chemical variations of all application techniques reference the above listed publications.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-1	Subject: Visual Examination
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To examine items of evidence for the presence of friction ridge impressions.

Advantages

1. Proper visual examination of evidence will reveal any latent friction ridge impressions without chemical or physical processing or destructive techniques.
2. Some constituents of sweat and foreign contaminants have the ability to luminance or fluoresce without any treatment when exposed to filtered light.
3. Non Destructive.

Disadvantage

1. Time consuming.
2. Low success rate with latent deposits.

Process sequence

This is the first process that all evidence under examination is exposed to prior to applying any physical or chemical processes. This process is also applied to items in between other destructive processes to ascertain the presence of latent impressions.

Materials:
Butcher paper

Equipment:
Protective clothing: lab coat, porous/non porous gloves, and protective eyewear
Fume hood
Evidence trays
Bright Ambient light
High intensity forensic light source with various viewing filters
Professional fingerprint magnifiers
Imaging system

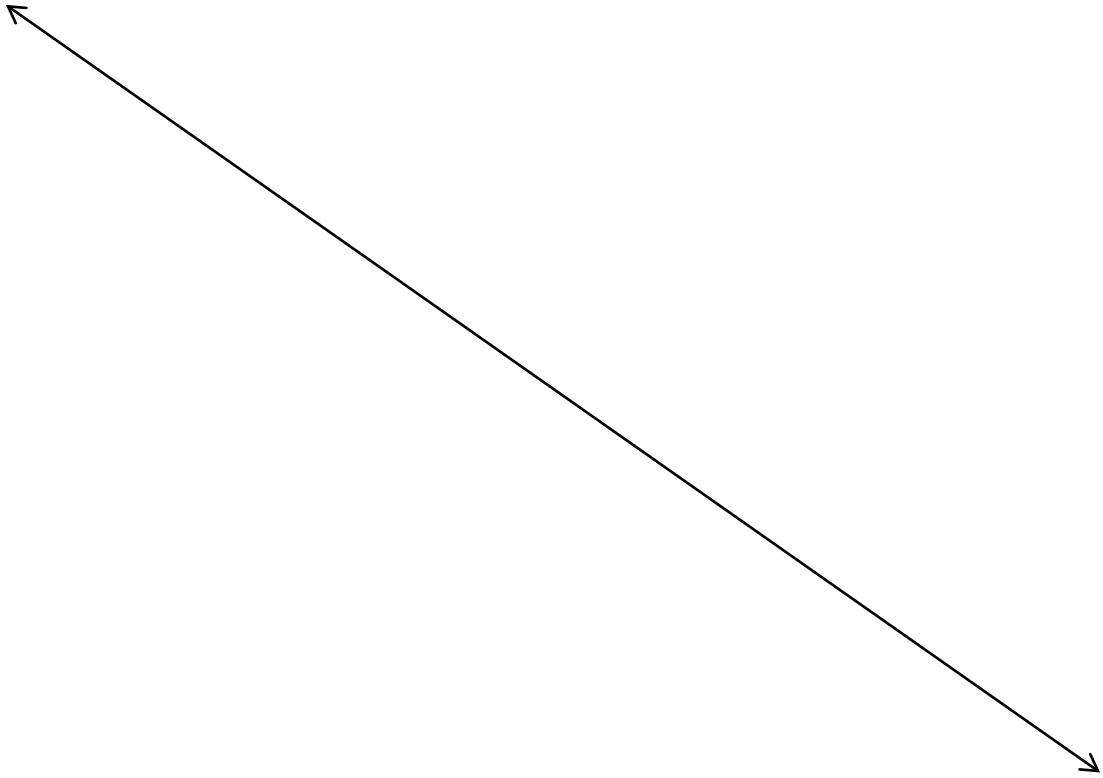
Procedures:

1. Place the evidence items on clean butcher paper in evidence trays, on the dedicated work bench, or in the fume hood, depending on the evidence type.
2. Analyze the evidence to determine what specific lighting technique to apply. Based on experience and training, the examiner selects the appropriate technique and light source based on the reflective nature of the substrate, type of development medium used and color of substrate and matrix.
3. Examine the item for any indication of visible friction ridge impressions.
4. Use magnification during the examination in order to ensure an effective result.
5. Mark latents as per current policy.
6. Photograph and/or Document Latent Impressions of value.
7. Visual examination must be performed after further processing and again after each sequential process applied to the item.

Results:

Results of the examination are recorded as positive if any friction ridge impressions of value are visible on the item of evidence.

Results of the examination are recorded as negative if no friction ridge impression of value are visible on the item of evidence.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-2	Subject: Conventional Powder
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To visualize and enhance latent fingerprint deposits on non-porous items of evidence. The Latent Print Unit of the CMPD Crime Laboratory shall use only black powder regardless of the items surface and background color on surfaces where powder is applicable with the exception of fluorescing powders.

Advantages

1. Proper application of conventional powder to the proper surface will adhere to remaining trace amounts of moisture allowing for the visualization of fingerprints.
2. Fast, cost effective and productive technique for processing immovable objects or large areas such as homes and vehicles.

Disadvantage

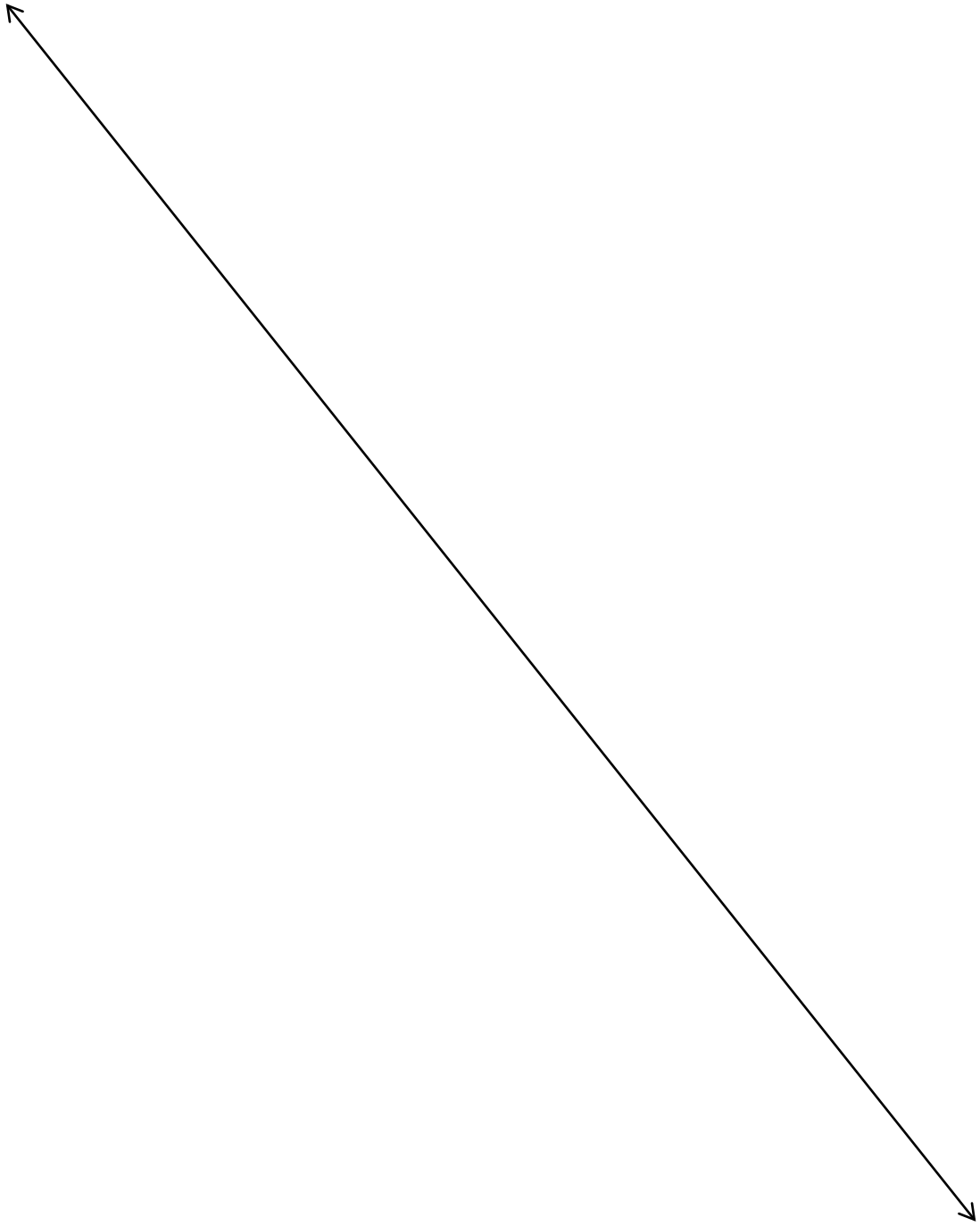
1. Can be messy.
2. Destructive technique.
3. Biological cross contamination likely if new unopened brush and powder are not used for each item processed.

Materials:
Conventional black powder.
Camel hair or fiber fingerprint brush.
Bright white oblique light source.

Equipment:
Misonix WS6 Down Flow Workstation.
Laboratory vent hood system.

Procedures:
1. Charge the fingerprint brush with powder.
2. Apply the powder to the item with a light circular spinning motion in the direction of the fingerprint ridges (if visible).
3. Use an oblique light source to visually search for any developed latent fingerprints.
4. Photograph, document or preserve latent impressions.

Results:
Results are recorded as positive if conventional powder adheres to any developed latent fingerprints allowing visualization; negative if powder does not adhere to the item of evidence and no latent prints of value are developed and visualized.



.Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-3	Subject: Magnetic powder
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To enhance latent fingerprints on glossy, waxed or sealed non-porous items of evidence.

Advantages

1 Proper application of magnetic powder to the proper surface will adhere to remaining trace amounts of moisture allowing for the visualization of fingerprints.
2 Fast, cost effective and productive technique for processing sealed porous surfaces.

Disadvantage

1. Can be messy.
2. Destructive technique.
3. Difficult to use on metal surface
4. If not properly applied can destroy ridge detail.
5. Biological cross contamination likely if new unopened wand and powder are not used for each item processed

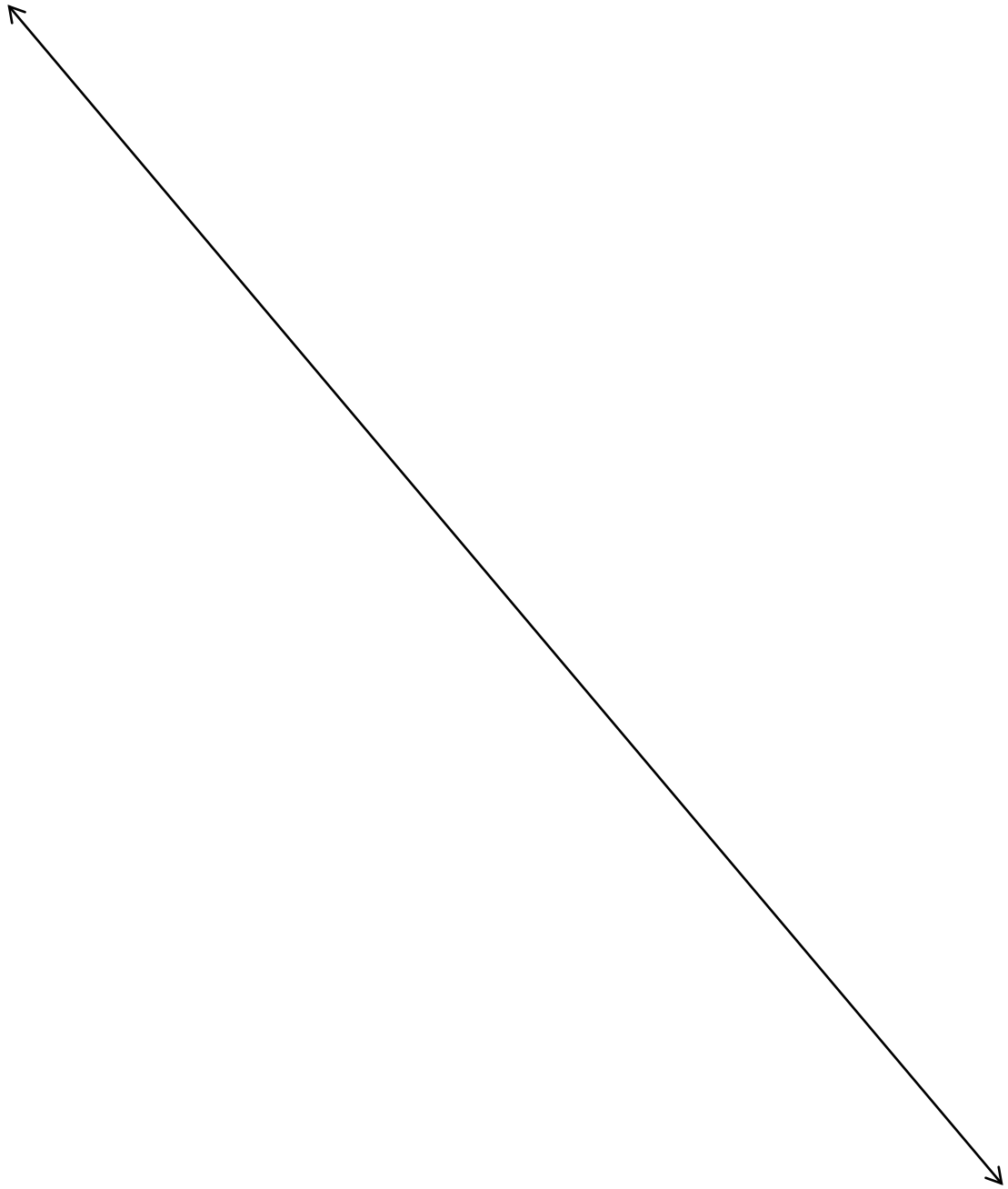
Materials:
Magnetic powder
Magnetic application Wand
Oblique light source

Equipment:
Misonix WS6 Down Flow Workstation.
Laboratory vent hood system.

Procedures:
1. Charge magnetic wand with magnetic powder.
2. Apply powder to the surface with a light brushing action in the direction of the fingerprint ridges (if visible).
3. Hold the magnetic wand over the powder container and deactivate the brush by withdrawing the magnet.
4. Pass the clean magnetic wand over the surface as closely as possible without touching the surface. Repeat this step again if an excess of powder remains on the surface.

5. Use an oblique light source to visually search for any developed latent fingerprints.
6. Photograph, document or preserve latent impressions.

Results:
Results are recorded as positive if magnetic powder adheres to any developed latent fingerprints allowing visualization; negative if powder does not adhere to the item of evidence and no latent prints of value are developed and visualized



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-4	Subject: DFO (1,8-DIAZAFLUREN-9-ONE)
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To develop latent fingerprints on paper and other various porous surfaces. This process is used prior to any Ninhydrin processing.

Advantages

1 Proper application of DFO to the proper surface will react to any trace amounts of amino acids allowing for the visualization of fingerprints once exposed to filtered light.
2 Fast, cost effective and productive technique for processing porous paper surfaces that may have been wetted.

Disadvantage

1. Can be messy.
2. Destructive technique.
3. If not properly applied can destroy evidence.

Materials:
DFO working solution
Forceps
Shallow glass pan
Plastic wash bottle

Equipment:
DFO Development Control Chamber (oven) and ALS

Procedures:
1. Charge wash bottle with DFO working solution
2. Saturate porous evidence with DFO working solution.
3. Hang item and allow item to dry at room temperature.
4. Heat the item for 20 minutes at 100 °C in the DFO Development Control chamber. Do not humidify.
5. Carry out a fluorescence examination with mini crime scope visualizing any developed latent fingerprints.
6. Photograph, document and preserve latent impressions.

Results:
Results are based on if a reaction occurs between the DFO and any latent Fingerprint deposits. Results are recorded as positive if latent fingerprints of value are observed; and negative if no latent fingerprints of value are observed.

Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-5	Subject: Ninhydrin
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
Ninhydrin is used to develop latent prints on porous surfaces. Ninhydrin reacts with the amino acids present in perspiration and is used after DFO. Ninhydrin is available commercially in spray cans, in a thermal paper formula and in an acetone or petroleum either carrier formula.

Advantages
1. Simple to use and very effective
2. Possible to detect very old prints
3. Will react with blood

Disadvantages
1. Weak or no development on items that have been wetted
2. Detrimental to inks and writings.
3. If contacts human skin will color purple for extended period of time.

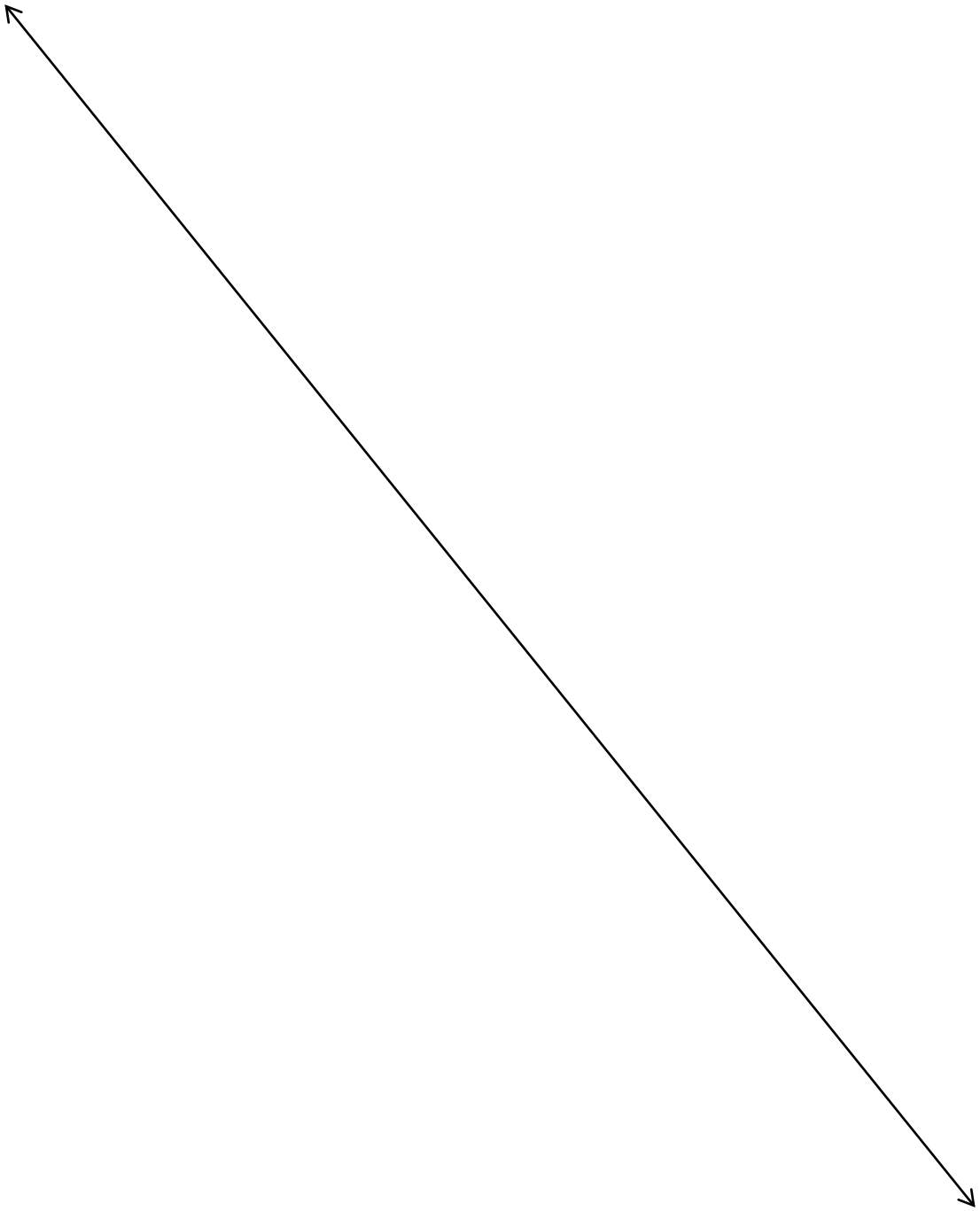
Materials:
Ninhydrin working solution or commercially available preparation.
Absorbent paper
Blotting or tissue paper

Equipment:
Protective clothing: lab coat, nonporous gloves and safety glasses
Fume hood
Shallow pan
Forceps
Soft brush
Wash Bottle
Ventilated area for evidence drying
Ambient light

Procedures:
1. Charge wash bottle with ninhydrin working solution
2. Saturate porous evidence with Ninhydrin working solution.
3. Hang item and allow item to dry at room temperature.
4. Heating the item at 85 Deg F. and 80% relative humidity can accelerate the development time.

5. Carry out a visual and fluorescence examination.
6. Photograph, document and preserve latent impressions.

Results:
Results are based on if a reaction occurs between the Ninhydrin and any latent Fingerprint deposits. Results are recorded as positive if latent fingerprints of value are observed; and negative if no latent fingerprints of value are observed.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-6	Subject: Cyanoacrylate Fuming
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
This procedure is used to develop latent friction ridge impressions on non-porous and some porous substrates. Cyanoacrylate (Superglue) fumes react (polymerize) with friction ridge constituents to form a hard, whitish to clear deposit throughout the latent impressions. Processing is referred to as CA fuming. The processing is performed in a high humidity chamber (up to 80% relative humidity). Cyanoacrylate is heated to about 120ºC to vaporize the glue. The procedure results in the growth of a microscopically fibrous matted deposit on the friction ridge impression and polymerizing the latent print deposit.

Advantages
1. The polymerization of the latent impression preserves the latent print by forming it into a hard polymerized deposit.
2. Cyanoacrylate fuming may help to visualize latent impressions.
3. Cyanoacrylate treated latent impressions can be enhanced further by dye staining with fluorescent chemicals and powders or traditionally powdered and tape lifted.

Disadvantages
1. Improper application or over-fuming of the items of evidence can result in the latent impressions being over-developed, damaged or obliterated.
2. Not suitable on most porous surfaces or older latent friction ridge impressions.
3. Less effective on items that have been wetted.
4. Destructive technique, process is irreversible.

Process Sequence
On non-porous and some porous substrates, this process is preceded by visual examination after cyanoacrylate fuming, items are visually examined and positive results are captured. Cyanoacrylate fuming is usually followed by applying chemical dye stain or latent print powders.

Materials:
Cyanoacrylate (Superglue)
Control standards
Aluminum fuming dishes

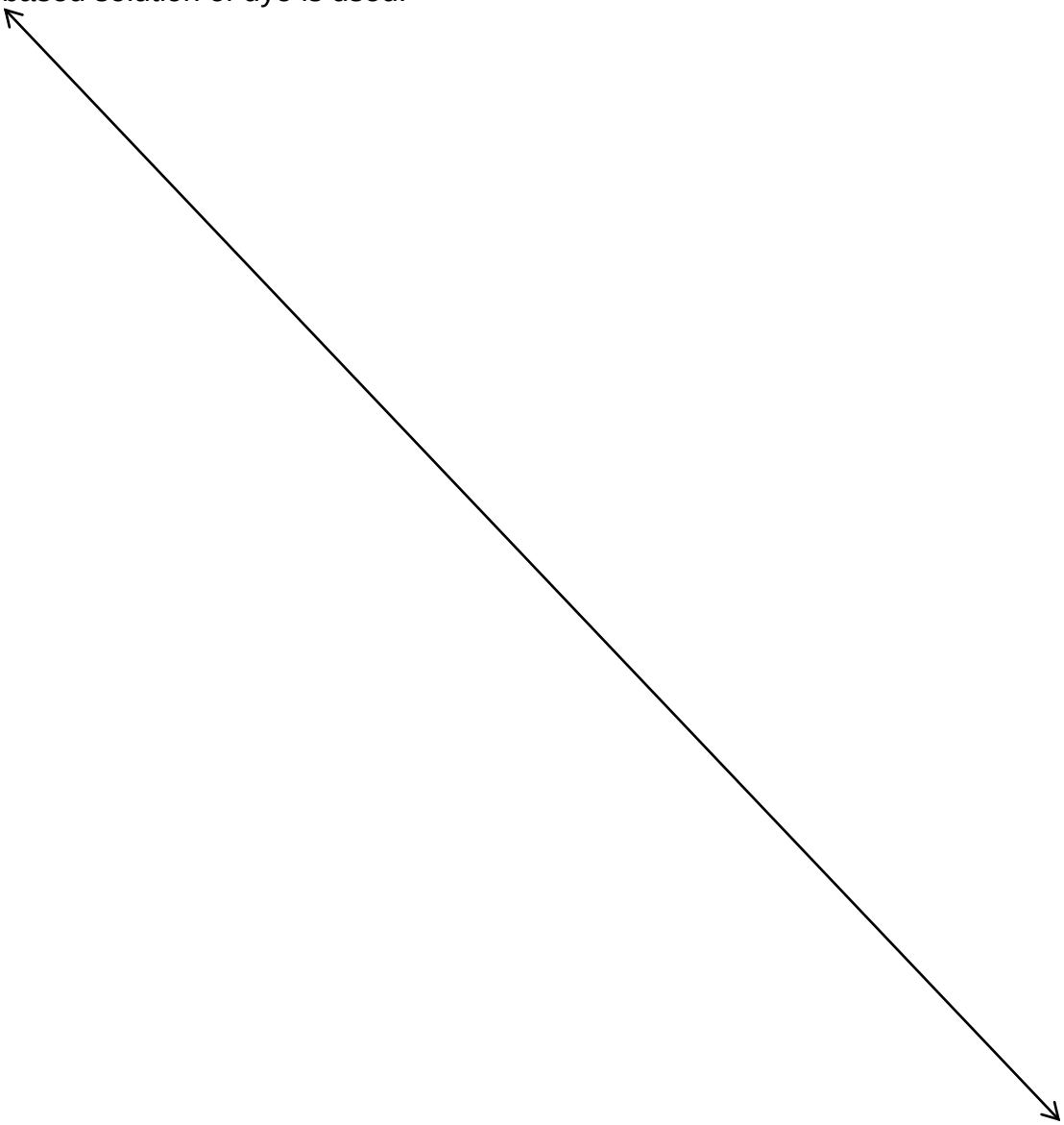
Equipment:
Protective clothing: lab coat, non-porous gloves, safety glasses.
Misonix CA-6000
Payton WS-1800-40-A CY-AT Vac
Payton CYVAC-M
Sirchie VAC 200
Sirchie VAC 100
Sirchie FR200 AT VAC Chamber
High Intensity Forensic Light source

Procedures:
1. Select the appropriate fuming chamber based on the evidence to be processed.
2. Prepare the chamber for use according to the procedures in the vendors supplied operations manuals
3. Place the item(s) to be processed in the fuming chamber by clipping lightweight or flimsy item(s) to the hanging rails and placing larger item(s) on the base of the chamber or on shelving, if available. Evidence should be evenly distributed throughout the chamber and should not be in contact with the walls or other items of evidence.
4. Place a control sample where it can be observed during the fuming cycle if possible.
5. Distribute the appropriate amount of cyanoacrylate and place in position based on the relevant instrument instructions.
6. Begin the fuming process.
7. The fuming process should start producing results within 5 minutes of fuming. The time is dependent on the type of substrate, chamber used as well as the matrix, which is usually an unknown factor. For this reason both the control sample and the evidence should be closely monitored.
8. If no friction ridge impressions develop on the control sample and no accumulation of glue is visible, all processing of evidence in the chamber should be stopped after 20 minutes. The process should be repeated with a different control sample on its own to establish the cause of the unsuccessful result.
9. Once the friction ridge impressions on the control sample have developed visually, the process must be stopped. In order to stop the fuming process, follow the appropriate steps as outlined in vendor operations manuals.
10. Follow the relevant instrument requirements for purging to remove hazardous fumes before opening the chamber.
11. Remove the processed items and visually examine the evidence using a forensic light source at different wavelengths and angles with subsequent application of the appropriate dye stain.
12. Photograph, document and preserve latent impressions.

Note: The decision to re-fume will be at the discretion of the examiner.

Results:
Results are based on whether the cyanoacrylate fuming process developed any friction ridge impressions of value on the evidence. Results of the process are recorded as *positive* if friction ridge impressions developed on the evidence. Results of the process are recorded as *negative* if no friction ridge impressions of value developed on the evidence.

Note: It is recommended that the cyanoacrylate developed impressions be allowed to cure for 20 minutes before the dye stain is applied, unless a water based solution of dye is used.



Crime Laboratory – Latent Fingerprint Unit		
Standard Operating Procedure Manual		
SOP# 7-7	Subject:	Amido Black
Approved: David C. Schultz	Matthew C. Mathis	

Purpose:
Amido black is a protein stain that is used to develop latent prints and enhance faint visible prints that have been deposited in blood. It can be water or methanol based depending on the application and surfaces that it is intended for.

Advantages

1. Very sensitive to bloody latent print impressions.

Disadvantage

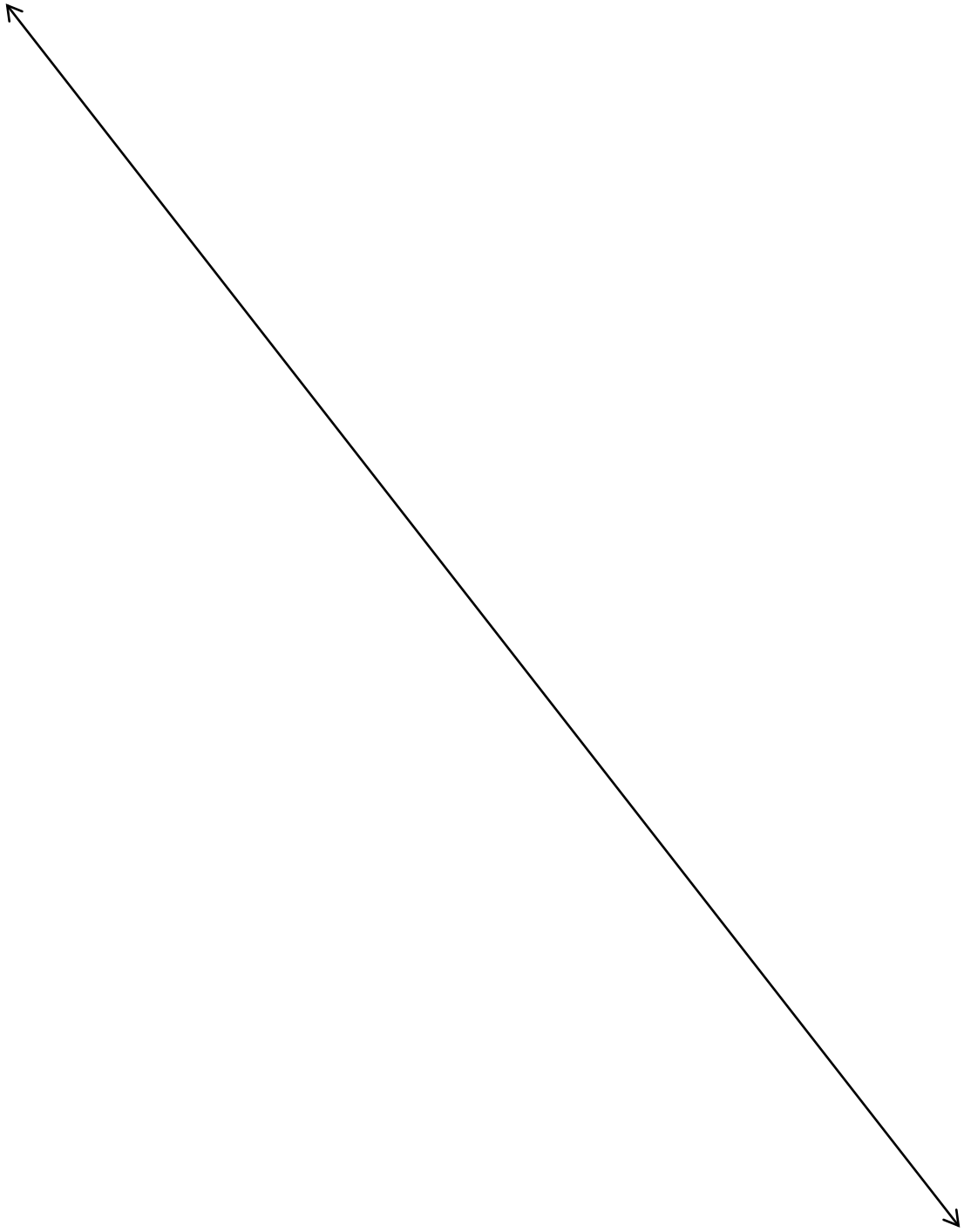
1. Methanol based formula can be detrimental to painted surfaces. May destroy latents as well as the underlying surface.
2. Cyanoacrylate fuming is detrimental to this process.

Materials:
Naphthol blue black
Glacial acetic acid
Methanol
Distilled water
Citric Acid

Equipment:
Scales, beakers, graduated cylinder, magnetic stirrer and stirring bar, squirt bottles or sprayer, clear or dark storage bottles

Procedures:
The process is different for each base carrier; refer to the FBI processing manual for specific chemical recipe. Application is a three stage process, developer solution, rinse solution and final rinse solution. Apply the developer to the specimen(s) by dipping, spraying, or using a squirt bottle. Leave the developer on the specimen for approximately 30 seconds to 1 minute, and then apply the rinse. These steps can be repeated to improve contrast. Apply the final rinse of distilled or tap water, then dry the specimen(s).
Photograph, document and preserve latent impressions.

Results:
Results of the examination are recorded as positive if any friction ridge impressions of value are visible on the item of evidence.
Results of the examination are recorded as negative if no friction ridge impressions of value are visible on the item of evidence



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-8	Subject: Gentian Violet
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To develop latent fingerprints on the adhesive side of tape products.

Advantages

1. Highly sensitive dye that stains skin cells imbedded into the sticky side of tape glue.

Disadvantage

1. Water soluble, adhesive tapes should not be processed with this method..
2. Can destroy tape and underlying surface.

Materials:
Gentian Violet working solution
Tap water
Shallow pan
Forceps

Equipment:
None

Procedures:
1. Fill a shallow glass pan with one inch of gentian violet working solution.
2. Gentian violet is applied by dipping. When processing, place the specimen(s) in the gentian violet solution for approximately 1 to 2 minutes, then rinse with cold tap water. The gentian violet solution can be reused.
3. Rinse the item under slowly running, cold tap water until excess dye has been removed. Any latent fingerprints that react with the dye will be purple.
4. If developed latent fingerprints appear faint, repeat steps 2 and 3 one time.
5. Photograph, document and preserve latent impressions.

Results:
Results are based on the visualization of a staining reaction between the gentian violet and any latent fingerprints. Results are recorded as positive if purple-colored latent fingerprints of value are observed; negative if no latent fingerprints of value are observed.

Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-9	Subject: Sticky Side Powder
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To process latent fingerprints on the adhesive side of tape and labels.

Advantages

Excellent results
Duct tape masking tape packing labels
Adhesive bandages plastic surgical tape double-sided foam tape
Paper-backed label clear plastic tape reinforced packing tape

Good / fair results
Cloth surgical tape frosted plastic tape
Adhesive edge of 3M™ Post-it® notes

Disadvantage

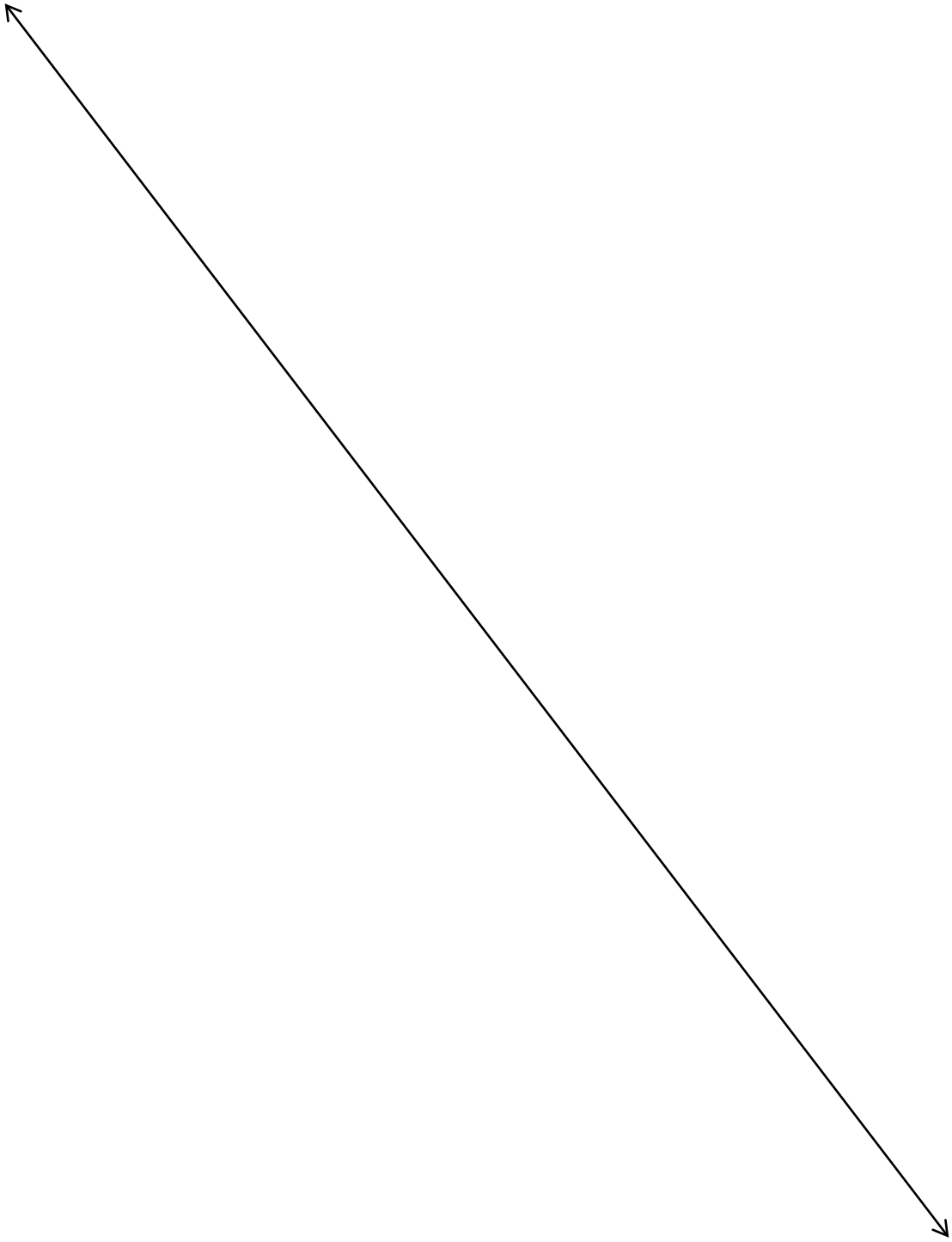
Poor results
Black electrical tape (due to poor contrast)
Some paper labels and tapes and labels with dried-out adhesives
Some contact papers or shelf papers

Materials:
Sticky-Side working solution
Application brush

Equipment:
None

Procedures:
1. Apply the sticky-side working solution to the adhesive side of the item(s) with an application brush.
2. Leave the solution on the item for 10 to 15 seconds and then rinse with tap water to remove excess solution.
3. Visually examine the item for any developed latent fingerprints.
4. If developed latent fingerprints appear faint, repeat steps 1-3 one time.
5. Photograph, document and preserve latent impressions.

Results:
Results are recorded as positive if the sticky-side powder enhances any developed latent fingerprints of value; negative if the powder does not enhance any latent fingerprints of value.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-10	Subject: Alternate Black Powder
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To process latent fingerprints on the adhesive side of tape and labels.

Advantages

Inexpensive and highly effective technique for developing friction ridge detail from the adhesive side of tape.
Displays very good contrast

Disadvantage

Not suitable for dark or black electrical tape.
Must be mixed properly or will not work.

Materials:
Lightning® black powder
Liqui-Nox— concentrated liquid detergent or liquid Dawn
Photo Flo solution

Equipment:
Application brush
Petri dish

Procedures:
1. Apply the Alternate Black Powder working solution to the adhesive side of the item(s) with an application brush.
2. Leave the solution on the item for 10 to 15 seconds and then rinse with tap water to remove excess solution.
3. Visually examine the item for any developed latent fingerprints.
4. If developed latent fingerprints appear faint, repeat steps 1-3 one time.
5. Photograph, document and preserve latent impressions.

Results:
Results are recorded as positive if the sticky-side powder enhances any developed latent fingerprints of value; negative if the powder does not enhance any latent fingerprints of value.

Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-11	Subject: Liqui-Drox
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
Liqui-Drox is a fluorescent dye used to develop latent prints on the adhesive and non adhesive sides of dark-colored tape.
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Advantages

Inexpensive and highly effective technique for developing friction ridge detail from the adhesive side of dark colored tapes and labels.

Disadvantage

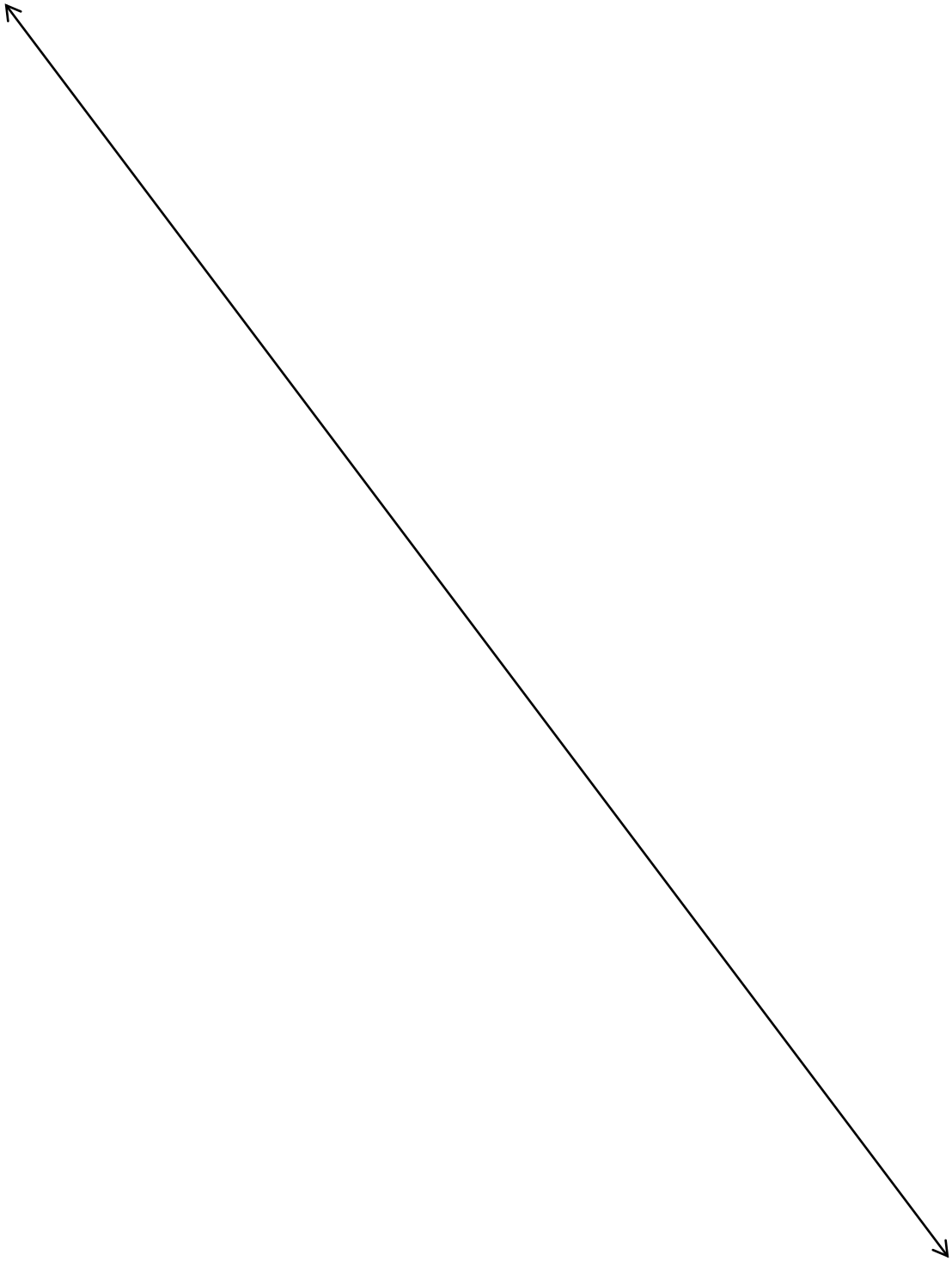
Not permanent
Limited working time after development

Materials:
Ardrox P133D
Liqui-Nox — concentrated liquid detergent or liquid Dawn

Equipment:
Application brush
Petri dish
ALS

Procedures:
1. The Liqui-Drox solution is applied with a small brush to both sides of the tape, provided the non adhesive side of the tape has been cyanoacrylate fumed.
2. Brush until a lather is produced. Allow the solution to sit on the tape for about 10 seconds.
3. Rinse the tape under a stream of water until Liqui-Drox is no longer visible.
4. Allow the tape to dry.
5. The tape is then viewed under a long-wave ultraviolet light.
6. Photograph, document and preserve latent impressions. Photograph promptly, because the ridge detail begins to fade within 12 hours. Do not leave the specimen under the ultraviolet light for extended periods of time because this will cause the latent print to fade.

Results:
Results are recorded as positive if the Liqui-Drox enhances any developed latent fingerprints of value; negative if the powder does not enhance any latent fingerprints of value.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-12	Subject: Gun Blue
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
To develop latent fingerprints on brass cartridge casings.

Advantages

Effective technique for developing friction ridge detail from fired and unfired brass shell casings.
Used after CA Fuming.

Disadvantage

Destructive technique

Materials:
Liquid Gun Blue working solution
Distilled water
Shallow mixing bowl
Forceps

Working Solution:
1. Measure 50ml of distilled water and place in a clean, dry, glass beaker.
2. Using a dropper, add 50 drops of liquid gun blue solution to the distilled water.
3. Shake well.
4. Transfer the solution into a glass container. Label the container with the date that the solution is prepared.

Equipment:
None

Procedures:
1. Dip the item(s) into the liquid gun blue working solution for 15 to 20 seconds.
2. Rinse the item(s) with distilled water.
3. The prints will appear lighter on the dark background of the brass.
4. Photograph any developed latent fingerprints of value.

Results:
Results are based on whether there is a reaction between the liquid gun blue and any latent fingerprints of value. Results are recorded as positive if a light film is deposited on the latent fingerprints against the dark background of the brass; negative if no film is observed.

Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 7-13	Subject: MBD
Approved: David C. Schultz	Matthew C. Mathis

Purpose:
MBD is a fluorescent dye used to make cyanoacrylate developed latent prints more visible on various colored surfaces. An ALS is used in conjunction with this process.

Advantages

Effective technique for visualizing friction ridge detail on items of evidence processed with cyanoacrylate fuming.
Adheres to very miniscule deposits of cyanoacrylate

Disadvantage

Destructive technique, permanently alters the matrix of the latent fingerprint

Materials:
MBD
Acetone
Isopropanol
Petroleum ether
Methanol

Working Solution:
Stock Solution
MBD ..... 1 g
Acetone ..... 1000 ml
Combine the ingredients and stir on a stirring device until all the MBD is dissolved.

Working Solution
MBD stock solution ..... 10 ml
Methanol ..... 30 ml
Isopropanol ..... 10 ml
Petroleum ether ..... 950 ml
Combine the ingredients in the order listed. Do not place on a magnetic stirrer.

Equipment:
Scales, beakers, graduated cylinder, magnetic stirrer and stirring bar, ALS, squirt bottle, laser or alternate light source, dark storage bottles.

Procedures:

1. The MBD working solution can be applied by dipping or using a squirt bottle. This solution is applied to the specimen(s) after the cyanoacrylate fuming process
2. Examined under a ALS
3. Photograph any developed latent fingerprints of value.

Results:

Results are based on whether there is visualization any latent fingerprints of value when examined under the ALS. Results are recorded as positive if latents of value are visualized, negative if no latents of value are observed.