

**SANTA BARBARA COUNTY
SHERIFF'S OFFICE
FORENSICS UNIT**

LATENT PRINT DETECTION

1.0 BACKGROUND AND SCOPE

The use of fingerprints for personal identification has been in use since the beginning of the 20th Century in the United States. Friction skin, located on the surfaces of the fingers, provides the basis for the fingerprint. The ridge formations associated with the fingerprint are unchanging and permanent until decomposition at death and develop during the fourth month of gestation. Latent fingerprints, which are left when an object is handled, can be developed using a variety of methods. Each of the methods used are based on the presence of one or more of the following substances, including water, amino acids, salts, oils and fatty acids, which may be present in the fingerprint.

This SOP describes the procedures for the latent print detection at crime scenes and for evidence obtained at crime scenes.

2.0 MATERIALS AND EQUIPMENT

A. Materials

1. Fingerprinting powders -Black, bi-chromatic, or other colors.
2. Magnetic powders.
3. Fluorescent powders (Redwop™ or similar product).
4. Fluorescent dye stains, such as Rhodamine 6G.
5. Fiberglass brush.
6. Feather duster.
7. Magnetic brush.
8. Fingerprint lifters or fingerprint tape.
9. Fingerprint lift cards.
10. Cyanoacrylate ester (Superglue).
11. Tinting material or other receptacle for Superglue fuming.
12. Self-contained Superglue for fuming, such as Hotshot™, or similar product.
13. Small particle reagent (SPR).
14. Performance test print.

B. Equipment

1. Alternate Light source.
2. Superglue fuming wand, such as Search® Cyanowand™ or similar product.
3. Cyanoacrylate cartridges and butane fuel for fuming wand.

3.0 PROCEDURE

A. Visual Examination

1. Before an item is processed for fingerprint evidence, the surface should be examined for any visible prints. The RUVIS SceneScope can also be used to help visualize prints found on a surface prior to any chemical processing.
2. When appropriate, these visible fingerprints should be photographed with and without a scale prior to any further processing. Occasionally, further processing may destroy a visible fingerprint.
3. Before processing for latent prints, examine the object for trace evidence, such as hairs, fiber, glass, paint and biological evidence. In most all instances, the trace evidence should be removed prior to any fingerprint processing so that the evidence is not lost. Depending on the circumstances of the case, it may be important to collect the biological evidence prior to fingerprinting. A determination should be made as to which type of evidence is more useful to the case. Discussing this with other members of the Forensics Unit and Detectives may help make this determination. For example, if a knife was used to kill the victim and the knife handle is void of blood then processing the knife for latent fingerprints may be more important than determining whose blood is on the knife. DNA evidence will survive most fingerprint processing techniques. However, processing may reduce the amount of DNA or inhibit some biological testing techniques.

B. Methods to Use on Non-Porous Surfaces (glass, metal, plastic, finished wood)

1. Powders

- a. This is the most common technique used at the scene and it typically involves the use of bi-chromatic fingerprint powder. Other contrasting powders are also available and fluorescent powders can also be used in conjunction with the Alternate Light Source (ALS).
- b. A small amount of powder is placed on a fiberglass brush, often by dipping the brush into the container of powder. Before applying to the object, the excess powder should be removed. **NOTE:** A little fluorescent powder goes along way, therefore very little is needed on the brush.
- c. Lightly twirl the brush over the object until the fingerprint develops. More powder can be applied as needed, depending on the development of the latent print. In order to visualize the fluorescent powder, the ALS must be used when applying the powder (use appropriate goggles). Excess fluorescent powder should be removed with a feather brush prior to examination with the ALS. Photograph the print before attempting to lift.
- d. To recover the fingerprints developed with powder, place a piece of fingerprint lifting tape over the print and attempt to remove by rubbing any

- bubbles that may have occurred in the tape.
- e. Once the bubbles have been sufficiently removed, lift the tape off of the object and place it on a fingerprint lift card. The color of the card used should provide the greatest amount of contrast to the color of powder chosen (ex: black powder - white card). If a fluorescent powder is used, place the recovered print on a black card.
 - f. Make a small diagram on the back of the fingerprint card to indicate the location and direction of the fingerprint recovered. Place an arrow next to the lifter and do the same on the diagram to indicate placement of the lifter on the object. This will aid in orientation of the fingerprint for those who will be comparing the print.
 - g. Write the case number, location, date and your initials on the back of the lift card.
2. Powders (magnetic)- non-porous surfaces
- a. Magnetic powder contains iron filings mixed in with the powder. These types of powder are applied with a magnetic wand. Magnetic powder cannot be used on some metal surfaces, because they contain magnetic elements and the powder will not spread.
 - b. Apply the magnetic powder in the same way as the black powder, using the magnetic wand to lightly brush over the object until friction ridge detail has developed.
 - c. Pick-up the left over material (which incorporates the iron filings) by using the magnetic wand.
 - d. Magnetic powders are useful for items in which you want to control the amount of powder placed on the object, such as cardboard or glossy paper.
 - e. The developed print will be lifted using a fingerprint lifter or tape and placed on a contrasting card.
 - f. The card should be properly labeled and a diagram should be present depicting the location of the latent print and its orientation on the fingerprint lifter.
3. Cyanoacrylate (superglue) fuming
- a. This type of processing will not be used routinely at crime scenes for most objects. If it is determined that Superglue fuming would be appropriate, those objects should be collected and processed at the laboratory.
 - b. This technique can be used for the processing of the interior of vehicle. The best results require a humid environment.
 - + Follow the instructions on the "Hotshot™" container or similar product to determine the number of packets needed to Superglue fume the vehicle.
 - + The "Hotshot™" containers create their own humid environment. Other products may not provide a source of humidity and you will need to place a few bucket-sized containers of hot water inside the vehicle to help in the fuming process.

- + Include a performance check inside the vehicle to insure the Superglue fuming functioned properly.
 - + Make sure the windows and doors are closed in order to provide a chamber for Superglue development. A fan may be used to increase the air circulation inside the vehicle.
 - + Once the Superglue is done, open up a car door and let the fumes escape before processing the interior. Examine the interior for any fingerprints that are visible before the addition of a powder or dye stain. If appropriate, these fingerprints should be photographed prior to any additional processing. The ALS will need to be used in a darkened room in conjunction with the use of any dye stain or fluorescent powder.
 - If you choose to use a dye stain, such as Rhodamine 6G, to process the interior of the vehicle, then any fingerprints that develop will need to be photographed. These types of prints cannot be lifted. If a developed fingerprint cannot be photographed due to its location, an attempt to remove that portion of the vehicle should be made.
 - The use of any dye stain should be done in a room with adequate ventilation due to the solvents used in the dye stain mixture.
- c. This technique may also be used to process a body for fingerprints.
- + Prior to Superglue fuming a body, photograph and recover any other type of evidence, such as sexual assault evidence and trace evidence, from the body. If the victim is partially clothed, their clothing should be removed prior to fuming.
 - In order to process a body for prints, the body must be placed into a Superglue chamber or a chamber must be created around a body (tenting). The Cyanowand can also be used to fume the body.
 - In most instances a tent can be created around the body using PVC pipe and plastic sheeting. The tent should be as air tight as possible to prevent the Superglue fumes from escaping.
 - + Once erected, the "Hotshot™" or similar product can be placed under the tent with the body for fuming.
 - + When the fuming process is done, air out the tent. Look for any latent prints which were developed with the Superglue prior to using any powders on the body. Document any fingerprints found with photography.
 - + The body can be processed using magnetic powder or fluorescent powder. Depending on the condition of the body, the developed prints may or may not lift from the skin's surface. Therefore, make sure photographs are taken prior to attempting a lift.
 - + When photographing the latent prints, make sure you place a ruler, preferably an "L" shaped ruler, in the photograph so that the photograph can be made to the true size of the fingerprint.
4. Superglue fuming wand such as Cyanowand™ or similar product.

- a. A Superglue fuming wand is a non-electric, flameless, butane-heating tool that uses disposable Cyanoacrylate cartridges which, when heated, will emit Superglue vapor used for developing latent prints. In general, cyanoacrylate vapor polymerizes most latent fingerprints on nonporous surfaces causing a white deposit on the surface of the material. Prints developed using the fuming wand can be further enhanced by using dusting powders (regular, magnetic or fluorescent powders). The prints are then photographed and/or lifted. The fuming process is best used on non-porous surfaces, such as

plastic, metal, glass, enamel or varnished wood surfaces, cellophane, metal foils, and plastic coated papers.
- b. Safety concerns.
 - + DO NOT wear contact lenses when fuming with the fuming wand.
 - + Use an exhaust fan, fuming hood and/or respiratory protection when fuming indoors.
 - + Wear eye protection at all times.
 - + DO NOT refill with butane, a very flammable substance, or store the wand near open flame, furnaces, heaters, pilot lights or combustible materials or sparking devices.
 - + Do not store in direct sunlight, including dashboard or in trunk or anywhere that the temperature will exceed 120°F (50°C).
 - + Do not bring the tip into contact with flammable or combustible materials as the tip can exceed 900 degrees during this operation.
- c. Refer to the instructions provided with the superglue fuming wand on its operation and additional concerns. Each type of wand will have specific instructions covering refilling the fuel and superglue cartridges. The user shall read the instructions before using the fuming wand.

5. Other Types of Surfaces

- a. Most other types of materials encountered at a crime scene, including porous surfaces, such as papers and cardboards, and sticky surfaces (such as tape) will not be processed at the scene.
- b. These items will be collected and brought back to the laboratory for further processing.

6. Bloody Prints

- a. Fingerprints in blood may be encountered at crime scenes and can be a very crucial type of evidence.
- b. Bloody fingerprints will be photographed to show their location in the scene and the amount of detail that is present. They should be photographed with and without a ruler.
- c. The object with bloody prints will be collected, if possible. If the object cannot be collected, the Forensics Unit Supervisor the Forensics Unit member in charge of the scene should be contacted to discuss if blood enhancement techniques will be applied out the in the field.

7. Wet Surfaces

- a. Surfaces that are wet or that were wet may still have fingerprints that can be developed.
- b. Small particle Reagent (SPR) can be used on these surfaces. SPR is a liquid suspension of molybdenum disulfide particles. The particles adhere to the fatty deposits left in the fingerprint.
- c. SPR should be available for processing crime scenes. Refer to the SBSO Fingerprint Unit's procedures under FP003, Processing, for the preparation and use of SPR.

8. Packaging of Objects for Transportation

- a. Hard, non-porous items should be secured, when possible, in boxes so that the surfaces to be processed do not come in contact with anything.
- b. Items can be placed individually in paper bags and should be handled with care to minimize any movement of the object within the paper bag.
- c. Adhesive materials, such as duct tape, must be prevented from coming in contact with each other, its own sticky surface, or the paper packaging in which it is placed. If this occurs, it may be difficult to remove the tape or the surface of the tape will be contaminated. Where appropriate, the tape can be gently placed onto a clean piece of plastic or glass to facilitate transportation.
- d. Objects that contain biological evidence, such as blood, should be air-dried (using the Dry-Safe evidence drying cabinet) prior to packaging and for long term storage.

4. REFERENCES

- 1) SIRCHIE Fingerprint Laboratories, INC Technical Information on Search® Cyanowand™ TI02-66ENG-REV2.

| Revision Year | Prepared by | Approved by /date | Effective date |
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