BOISE POLICE DEPARTMENT

CRIME LABORATORY

Evidence Processing and Latent Print Technical Manual Version 5.0

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1. Introduction

1.1. Background

1.1.1. Physical evidence is any object with size, shape, and dimension that can establish that a crime has been committed or can link a crime and its victim or its perpetrator. The examination of physical evidence by an analyst is usually undertaken for identification or comparison. When examining evidence, it is important to note all characteristics and identifying information, as these are what differentiate one piece of evidence from another. The Crime Laboratory uses various techniques to process, screen, collect and evaluate physical evidence. Some examples of physical evidence are:

- Blood, semen, saliva
- Fibers
- Glass
- Paint
- Soil and minerals
- Documents
- Fingerprints
- Hair
- Powder residues
- Tool marks
- Drugs
- Firearms and ammunition
- Vehicle lights
- Serial numbers
- Impressions (tire, shoe prints, glove, etc.)

1.1.2. A comparison analysis subjects a suspect specimen and a standard/reference specimen to the same tests and examination for the ultimate purpose of determining whether they have a common origin. The object of identification is to determine the physical or chemical identity with as near absolute certainty as existing analytical techniques will permit.

1.1.2.1. Evidence that can be associated with a common source with an extremely high degree of probability is said to possess individual characteristics. Examples of this are:

- Ridge characteristics of fingerprints, palm prints and the soles of the feet
- Random striation marking on bullets or tool marks
- Irregular and random wear patterns in tire or footwear impressions
- Irregular edges of broken objects that can be fitted together like a jigsaw puzzle.

The conclusion of common origin must be substantiated by the practical experience of the examiner.

1.1.2.2. Evidence is said to possess class characteristics when it can be associated only with a group and never with a single source. Probability is a determining factor. Examples of this are:

- Type of firearm used in a shooting
- Width of the tip of a screwdriver
- Bloodstain pattern
- Fibers

- Paint

1.1.3. The chemical composition of latent print residue is such that chemical techniques can be used effectively to develop impressions on many types of surfaces, such as porous, semi-porous, and non-porous surfaces.

1.1.3.1. The eccrine, or sweat, glands on the human body are most concentrated on the palmar surfaces of the hands and the plantar surfaces of the feet. Secretions from the eccrine glands consist of approximately 20-70% water content with the remainder as solids (about one-half organic substances and one-half inorganic salts). Sodium chloride is the most prevalent salt present and of the organic substances present, alpha-amino acids are important for latent print chemical processing purposes.

1.1.3.2. The oils and fats that may be present in latent print residue are primarily the result of sebum secreted by the sebaceous glands. Sebaceous glands are most concentrated on the face and other areas but are not present on the palmar surfaces of the hands or the plantar surfaces of the feet. The oily and fatty deposits present in latent print residue are generally the result of contaminants present on the hands from contact with other areas of the body

1.1.4. Friction ridge impressions can be divided into three categories:

1.1.4.1. Latent prints
Those made by perspiration and other substances on the skin surface, and which require development by physical or chemical methods in order to be visualized

1.1.4.2. Visible prints (Plastic)
Those made in soft pliable substances such as putty, modeling clay, etc. and which do not require development by physical or chemical methods in order to be visualized

1.1.4.3. Visible prints (Patent)
Those made by contamination of the skin with such substances as blood, paint, ink, etc. and which do not require development by physical or chemical methods in order to be visualized

1.1.5. The objective of latent print examination is to determine whether a particular area of friction ridge skin produced a particular latent print. The process involves the development and recovery of latent prints, which are subsequently analyzed for multiple levels of detail such as pattern type, ridge characteristics (also known as minutiae), ridge shapes, etc. Once analyzed, latent prints are compared and evaluated against known impressions. When there is agreement between the details in a latent or questioned print and those in the known print, without any unexplainable dissimilarities, an identification can be declared.

1.1.6. The fundamental principles that underpin friction ridge examinations are documented in the literature and summarized below.

- The morphology of friction ridge skin varies among individuals and is unique.

- The arrangement of friction ridges persists for the individual's lifetime, barring trauma to the basal layer of the epidermis.
- An impression of the unique details of friction ridge skin can be transferred during contact with a surface.
- An impression that contains sufficient quality and quantity of friction ridge detail can be identified to, or excluded as having arisen from, a particular source.
- "Sufficiency" means the analyst has determined that adequate unique details of the friction skin are present in the impression.

1.2. Scope

1.2.1. This manual shall serve as a guide to preforming scientific examinations and evaluations of physical evidence in order to provide information relevant to criminal investigations. The primary purpose of these procedures is to ensure quality and efficiency by establishing documentation and collection procedures that are utilized by the Lab.

1.2.2. The analyst is responsible for the preservation and possible collection of evidentiary materials that may be on the item being requested to be processed. The analyst must remain cognizant of other probative evidence which may be on each item in addition to what is being requested.

1.2.3. This manual will describe the methods, procedures and techniques that are routinely used in the examination of evidence. The procedures cannot be expected to address each and every situation or type of evidence encountered. The analyst will be given flexibility to determine an appropriate course of action in regard to the processes employed; therefore, the procedures will be designed to accommodate the majority of evidence encountered.

1.2.4. The procedures presented are to be used in conjunction with all applicable laboratory policies, good laboratory practice, and proper scientific methodology.

1.2.5. Only the procedures, formulas and/or processes that are found in this manual are approved for use. All other procedures, formulas and/or processes not outlined here must be validated as per the Quality Assurance Manual.

1.2.6. This manual defines the administrative and technical procedures for evidence control and handling, the processing evidence, the examination of friction ridge impressions, conducting MBIS searches, documentation of casework, and the reporting of results. This is a living document that can be reviewed and updated at any time as deemed necessary by the Crime Lab Manager and/or Technical Leader. Any update to this manual must then be approved by the Chief Administrative Officer or Crime Lab Manager.

1.2.7. This manual is not designed to be an all-inclusive collection of procedures but should serve as a guide to situations most often encountered and as a sound framework upon which to build. It is expected that deviations in the methodology will occur, and it is at the discretion of the individual analyst to exercise sound judgement in working a case. Analysts should seek guidance and/or approval from the Technical Leader and/or Quality Assurance/Lab Manager

should they encounter a situation outside their experience or requirements set forth in this manual.

1.2.8. Latent print processing is a qualitative method and Uncertainty of Measurement does not apply.

2. References

- BPD Policy and Procedures Manual
- BPD Crime Lab Health and Safety Procedures Technical Manual
- BPD Crime Lab Quality Assurance Manual
- BPD Crime Lab Biological Screening Technical Manual
- BPD Crime Lab Crime Scene Investigation Technical Manual
- SWGFAST Guidelines, Scientific Working Group on Friction Ridge Analysis, Study, & Technology (*It is important to note that these are for historical reference only and can be found on the OSAC website. They may provide information to bridge the gap between standards being published and the disciplines previous scientific workgroup.)
- OSAC (Organization of Scientific Area Committees for Forensic Science) Friction Ridge Subcomittee
- SWGIT Sections 6, 8, and 11
- Chemical Formulas & Processing Guide for Developing Latent Prints, U.S. Department of Justice, FBI, 2000
- Ada County Sheriff's Office Property and Evidence Unit Evidence Packaging Guide
- Forensic Science International Vol. 294, 2019. "Measuring the water content in freshly-deposited fingermarks," Pages 204-210. Or Keisar, Yair Cohen, Yacov Finkelstein, Natalie Kostirya, Roey Ben-David, Albert Danon, Ze'ev Porat, Joseph Almog
- The Fingerprint Sourcebook, U.S. Department of Justice, NIJ, 2011
- QueTel LIMS Manual
- uQA-2 Verbiage Guidance Document
- US Department of Justice Uniform Language for Testimony and Reports for the Forensic Latent Print Discipline (Effective: 8.15.20)

3. Responsibilities

3.1. Quality Assurance/Lab Manager

3.1.1. Overall responsibility for ensuring that personnel adhere to established methods, safety practices, and laboratory policies and procedures

3.1.2. May assign casework based on priority, crime type, crime date, court date, or other factors at their discretion or the discretion of the Chief Administrative Officer.

3.1.3. Shall act as or designate the Multi-Modal Biometric Identification System (MBIS) Administrator

3.2. Analyst

3.2.1. Responsible for adherence to established methods, safety practices, and laboratory policies and procedures

3.2.2. Duties may include but are not limited to (as appropriately authorized):

- Development of friction ridge impressions
- Documentation of visible or developed friction ridge impressions
- Digitally preserving and processing friction ridge impressions
- Analysis, comparison, evaluation, and verification of friction ridge impressions
- Issuing reports of processing and examination activities
- Searching latent prints using the Multi-Modal Biometric Identification System

3.3. MBIS Administrator

3.3.1. Shall communicate system status to the manager and other system users

3.3.2. Shall ensure access is limited to authorized users

3.3.3. Shall act as a liaison with Idaho State Police and MBIS vendor on system maintenance, upgrades, and when technical difficulties arise

4. General Safety

4.1. Personnel Safety

Personnel shall comply with all departmental and laboratory occupational safety requirements, as delineated in the Safety and Security Section A, 6.00 of the City of Boise's Employee Policy Handbook, the Boise Police Department's Policy & Procedures Manual, the Boise Crime Laboratory's Health and Safety Procedures Manual, and the BPD Crime Laboratory's online MSDS library. This includes, but is not limited to:

- Personal protective equipment
- Chemical handling and storage
- Contamination prevention
- Emergency procedures

4.1.1. Analysts shall wear gloves while handling evidence to preserve the integrity of the evidence and for personal protection. A face mask shall be worn upon opening items that could pose an airborne hazard. Extreme caution shall be used in suspected Fentanyl cases.

4.2. Equipment and Supplies

Personnel shall conform to the manufacturer's requirements and/or training.

5. Request for Analysis

5.1. Related Documents

- QueTel TraQ (LIMS) Manuals
- Case Submission Guidelines (QA-10)

- WIN-OPS Manual (MBIS)
- Ada County Sheriff's Office Property and Evidence Unit Records Management User Guide
- BPD Crime Lab LIMS "How To" Guide (QA-19)
- Evidence Tracking in New World LERMS Guide (QA-18)
- BPD Crime Lab Crime Scene Investigation Technical Manual

5.2. Request for Evidence and Latent Processing

See BPD Crime Lab Quality Assurance Manual.

5.3. Request for Comparison

5.3.1. Processing requests listing a suspect or subject are considered requests for comparison.

5.3.2. All latents of value shall be compared to the provided exemplars, as well as to listed suspects, subjects and/or victims, unless otherwise agreed upon with the customer

5.3.2.1. It is not the policy of the Crime Lab to routinely compare victim exemplars to latent impressions in cases with no suspects.

5.3.3. Listed suspects, subjects and/or victim exemplars may be retrieved from state archives, WIN, LVMPD, and/or FBI.

5.3.4. Latents of MBIS value not identified via manual comparison, shall be entered into MBIS (refer to section regarding the Multi-Modal Biometric Identification System).

5.4. Request for MBIS

5.4.1. Requests that do not list suspects or subjects are considered requests for MBIS.

5.4.2. Latents meeting MBIS submission criteria shall be entered into MBIS (NEC MBIS 3.0) (refer to the section regarding the Multi Modal Biometric Identification System (MBIS)).

6. Case Management

6.1. Case Assignments

Cases are assigned at the discretion of the Chief Administrative Officer, Manager, or Technical Leader, and may be based on a specific case number, an offense type, crime date, court date or other such metric. Analysts may also self-assign cases as needed. Analysts should consult with their supervisor if they are unclear about a case assignment.

6.2. Evidence Control and Disposition

6.2.1. Starting the case

6.2.1.1. The analyst or authorized personnel shall intake the evidence into the lab using the evidence tracking system (New World/LERMS) ensuring the location is updated.

6.2.1.2. Evidence packaging shall be reviewed by the analyst to confirm that the case number matches the request, and all other information is complete and correct.

6.2.1.3. Confirm that the evidence seal is intact, initialed (ADA # is recommended), and dated, and the chain of custody is complete.

6.2.1.4. Disposable bench paper will be placed on top of decontaminated lab work surfaces prior to analysis. The packaging shall be opened, and contents inventoried upon starting the examination.

6.2.1.5. Evidence items shall be handled in a manner to prevent loss, alteration, contamination, or mixing. Examination of the evidence is conducted. Procedures are detailed in this manual under their appropriate examination type.

6.2.2. Latent Impression Evidence

6.2.2.1. Latent lift cards/Digital Images/Photographs are considered both evidence and examination records, thus, shall be handled under the rules of evidence. Physical latent evidence shall be stored in sealed evidence envelopes identified by a case number.

6.2.2.1.1. In the event that the latent lift evidence is opened at a personal workspace and is subsequently found to contain a potential biohazard, the evidence shall be removed immediately to an area in which laboratory coats are required. A biohazard sticker shall be affixed to the packaging. The area where the evidence was manipulated shall be cleaned with a 10% bleach spray or appropriate decontamination wipes as soon as possible.

6.2.2.2. In the event that lift cards/photos are to be relinquished by the Crime Lab, for any reason, the primary analyst will ensure legible copies (front and back, including all annotations) are made for placement in a latent lift card/photo envelope, then sealed and securely stored in long-term storage.

6.2.2.3. If the primary analyst is not available, the verifier, or Technical Leader, will handle the transfer.

6.2.3. Upon Case Completion

6.2.3.1. Evidence packaging shall be reviewed to confirm that the case number matches the completed case and that all evidence previously inventoried are present.

6.2.3.2. Seal the evidence packaging with evidence tape, and initial and date the seal(s). The original packaging shall have a notation if items inside may be hazardous due to chemical processing (can be done by placing a chemical hazard sticker on exterior packaging).

6.2.3.3. Ensure the location is updated in the Property & Evidence module of New World LERMS.

6.2.3.4. The chain of custody shall be completed.

6.2.3.5. Evidence shall be returned to the Ada County Property Room or returned to the submitting agency, unless otherwise noted in the LIM system.

7. Physical Evidence Examination

There are several techniques at an analyst's disposal that can be used to thoroughly examine physical evidence for latent impressions, trace evidence, and biological fluids. An appropriately thorough examination may require inspecting the front, back, outside, and inside of the item, using a multitude of techniques. The method(s) chosen shall be based upon the training and experience of the analyst and will depend on the evidence substrate, the condition of the evidence, the targeted specimen, request for analysis, and case-specific considerations as to what is probative. The analyst's decisions must pass the scrutiny of the peer review process.

Unless circumstances dictate otherwise, examinations for biological stains should be done prior to the processing and/or preservation of latent prints and/or other discipline examinations and after collection and/or preservation of trace evidence. Refer to the Biology Screening Technical Manual for specifics.

If the submitting agency did not request the collection and/or analysis of trace evidence, biological, and/or latent print evidence, but such evidence is incidentally observed during the requested examination, the evidence may be collected for preservation purposes (see techniques for each evidence type in the following subsections). Consideration of preservation is case dependent. The analyst should consult the submitting agency or requester to discuss specific analyses needed, or what may be possible, on evidence from violent crimes cases. Documentation of such conversations shall be in the case record.

7.1. Documentation

Documentation is extremely important to provide a detailed record of events, aid in report writing, assist with testimony, and allow for independent review by other experts. Documentation may include a combination of notetaking, photography, and diagramming. Documentation shall take place as the analysis is occurring. All original documentation shall be retained.

7.1.1. Evidence description in the examination record shall include the following:

- Type of item and quantity (e.g., clear plastic recloseable bag, two clear glass pipes)
- A general description of the item (e.g., color, size, brand, and designs on clothing, bedding, towels, etc.)
- Condition of the item (e.g., cleanliness, damage, holes, buttons missing, hooks bent, etc.)
- The approximate location of any physical evidence observed and their visual appearance, as applicable (e.g., stains, trace)

7.1.2. Document the following information:

- Examination start and end date
- Date evidence received
- Evidence packaging, seal, and whether seal is initialed
- Other agency case numbers, if any are associated

- Whether photographs are in BPD's digital evidence storage
- Methods and examination conclusions
- Quality Control and/or performance check results
- Lot and/or equipment
- Evidence collected/preserved during processing
- Evidence disposition
- Communication record
- Additional analyst(s)

7.1.3. Any consultation with an analyst regarding evidence examination on a specific case shall be described in the examination record. Include the name and date of consultation.

7.2. Latent Impressions

See Section 8

7.3. Drug Evidence

See "Evidence Handling" in the Quality Assurance Technical & Procedural Manual

7.4. Alternate Light Source (ALS)

An ALS is a specialized light that combines powerful illumination with the ability to select discrete wavelengths of light that are used to enhance or visualize potential evidence. The ALS can be used to identify and visualize a variety of physical evidence (e.g., latent impressions, blood, semen, saliva, hairs, fibers, and gunshot residue (GSR)). Latent impressions may be composed of various substances that react differently to different wavelengths of light.

The ALS creates contrast between a targeted substance (latent impressions, blood, etc.) and the substrate it is on. When a reagent-treated latent impression is excited with a particular wavelength of light, the deposit absorbs the light and re-emits it at a different wavelength. The short-lived light being re-emitted is termed fluorescence. Fluorescence may be chemically induced in latent print residue with certain dyes and powders known to exhibit fluorescent properties, or may occur due to a naturally occurring substance within the latent print residue itself (inherent luminescence), or due to contamination transferred to the friction ridge skin and re-deposited. Fluorescence of the substrate may also occur.

There are several alternate light sources available to analysts that adequately meet the needs described in this manual. Authorized alternate light sources are listed in QA-25 Lab Equipment Inventory Log. Refer to the user manuals.

Refer to the BPD Crime Lab's Biology Screening Technical Manual for ALS use for biology screening.

7.5. Crime-lite AUTO

The Crime-lite AUTO is an all-in-one portable forensic imaging system that allows the analyst to search surfaces using UV, visible, and IR wavelengths and capture photographs with the built-in

camera. The Crime-lite AUTO combines ALS, IR, photography and video capabilities into a single unit. It can be used to identify and visualize a variety of physical evidence (e.g., latent impressions, blood, semen, saliva, hairs, fibers, and gunshot residue (GSR)). The same ALS and IR principles apply. The unit creates contrast between a targeted physical evidence (latent impressions, blood, etc.) and the substrate it is on.

7.5.1. Method

1. An examination using this unit may be conducted under any lighting condition
2. Follow the manufacturer's recommendations for proper operation of the unit.
3. Examine the evidence/surface. Use the wavelength or combination of wavelengths most appropriate for the surface type and targeted evidence. The unit can automatically select the corresponding filter to optimize visualization. Manual control of filter selection is also available.
4. Systematically scan for targeted evidence.
5. Document, preserve and/or collect targeted evidence.
6. Observations shall be documented via photographs, videos, and/or in examination records. Photography is recommended.

7.5.2. Digital Imaging

The unit has the ability to enhance/process images within the software. All requirements set forth in the Digital Imaging section of this manual shall be considered.

Refer to the BPD Crime Lab's Biology Screening Technical Manual for Crime-lite AUTO use for biology screening.

7.6. Infrared (IR)

Infrared lighting (700-900nm) causes some dark fabric/surfaces to reflect visible and infrared wavelengths of light and appear white when viewed with an IR-sensitive device. Different substrates reflect and absorb IR illumination in different quantities. Differences in light reflectance and absorption can create contrast between substrates. For example, bloodstains absorb IR and can appear as dark patches on dark fabrics that appear white when viewed with an IR-sensitive device.

Additionally, IR illumination can improve the visibility of tattoos, which is particularly effective when using these distinctive markings to identify charred remains. IR illumination is also applicable in analyzing questioned documents (forgery, etc.); detecting gunshot residue (GSR); detecting impressions (such as tire, tooth, etc.) invisible to the naked eye; enhancing the visibility of blunt force injuries in living victims of crimes such as domestic violence, rape/sexual assaults, and motor vehicle accidents; fingerprint detection; and more. Several other materials may also absorb light, such as inks, oils, charred material, paint, and/or the substrate material itself.

An infrared camera is a DSLR camera that has been converted to detect and measure infrared light. Alternatively, a video camera with nighttime viewing capabilities may also be used to view infrared.

Either may be used in conjunction with an IR light emitter, such as an alternate light source. Images and/or videos recorded by an IR camera/video camera are black and white because infrared light is longer in wavelength than the colors of the visible spectrum. This also means IR light cannot be seen by the naked eye and can only be observed using an IR-sensitive camera/video camera.

Refer to the BPD Crime Lab's Biology Screening Technical Manual for IR use during biology screening.

7.7. DNA and/or Biological Evidence Collection

On occasion, the Crime Lab is requested to collect DNA samples subsequent to processing evidence items for latent prints or when areas of ridge detail are developed that are insufficient for analysis. Processing of such cases shall be considered on a case-by-case basis, as the surfaces may be contaminated due to latent print processing procedures.

In general, the item may be visually examined and subsequently fumed with Lumicyano, provided that the fuming chamber is cleaned and no contaminating evidence is fumed with the item(s). Alternatively, it may be fumed with cyanoacrylate and dusted with clean powder and a sterile brush prior to forwarding the evidence for DNA. Developed impressions should be imaged and not lifted if an item is pending DNA analysis. Chemical reagents or techniques that require a wash may be performed after the biological evidence has been collected. If needed, consult with the appropriate DNA laboratory to determine processing sequence for any item possibly contaminated with blood or other biological contaminants.

Refer to the BPD Crime Lab's Biology Screening Technical Manual for procedures.

7.8. Trace Evidence

Trace evidence analysis is, in part, based on Locard's Principle of Exchange where an individual or object leaves behind and/or picks up traces of materials from another person or an environment, however brief or slight the contact. Types of trace evidence can include, but are not limited to, soil, building materials, glass, fracture matches, hairs, fibers (including fabric and cordage), paint, and gunshot residue (GSR).

Trace evidence may be either visible or not visible to the naked eye. There are a wide variety of methods available for screening and collecting trace evidence. Screening methods include general visual searches, searches enhanced by different types of illumination, such as ALS, IR, and/or oblique lighting, and visual searches enhanced by magnification. The choice of collection method will depend upon the evidence type, the substrate, and the need to determine exact location of the evidence, among other variables.

7.8.1. When requested, or at analyst discretion, trace examinations should be performed prior to processing evidence items for latent impressions. Document the evidence in the examination record(s) to include (if possible): type of evidence (e.g., possible hair), amount of trace

evidence, approximate length of trace evidence, where it was collected from, and whether there is substance on the trace evidence (e.g. long dark hair with red substance).

7.8.2. Prior to collection, trace evidence should be photographically documented, unless trace collection was not requested and the trace is being preserved per analyst discretion.

7.8.3. In the case of preservation, per analyst discretion, any trace observed may be placed back into the original packaging or preserved in a sealed container and placed with the original item. They will not be assigned an item number.

7.8.4. If trace examination was requested, package the trace in vellum or sealed container in an evidence envelope. They will be assigned an item number (e.g., Item #ML1).

7.8.5. If placing multiple collection sheet(s)/vellum(s) inside one exterior packaging, label each sheet/vellum envelope with the case number, item number (if applicable), date and initials/Ada# of analyst. If multiple lifts are collected from the same piece of evidence, the total number used shall be documented in the examination records.

7.8.6. Trace paper shall be collected when trace examination has been requested, if trace evidence is observed on the paper.

7.8.7. Collection techniques include, but are not limited to:

7.8.7.1. Tape/Adhesive Lifting:

- Scotch tape, fingerprint lifting tape, mailing tape, sticky notes, lint rollers, or commercially purchased adhesive lifters are all acceptable materials to be used. Choice of lifting method is dependent on the fragility of the substrate.
- Is not recommended for substrates that will strongly adhere to the tape lift adhesive (e.g., paper products, cardboard). *Using sticky notes as the lifting method may alleviate this problem.
- Is useful when collecting trace evidence that is not visible or apparent to the unaided eye.
- Collects trace evidence from an area, so it is impossible to determine the exact location of a specific piece of trace evidence.
- Perform after samples have been collected for DNA analysis, since adhesive lifting techniques have the potential for removing DNA material.
- Peel away the protective layer to expose the adhesive layer of the tape lift. Do this just prior to use to avoid contamination. Successively apply the sticky surface to overlapping areas in an area defined by the analyst until the adhesive loses its tackiness. The size of the area is dependent upon how much the evidence itself sheds fiber/particles, how much dirt/debris/trace evidence is present, and the overall size of the tape lift used. Doing this causes loosely adhering trace evidence to stick to the tape.
- After collection, affix tape lifts to a clear, colorless plastic sheet (e.g. transparency film, sheet protectors). The plastic sheet must allow for the tape lift to be removed or peeled away from it and may be pre-printed with a

grid. Do not separate the tape lift from the plastic sheet unless unavoidable. Each time it is separated, the possibility of contamination and/or loss is introduced.

- If using a sticky note, fold the note over on itself and place inside a vellum envelope. Seal the vellum to prevent contamination, damage, or loss.

7.8.7.2. Picking:

- Trace evidence is separated from an item using clean gloved fingers, clean forceps, or other hand implements. Avoid using implements with serrated edges.
- Recommended when visible hair evidence is to be collected.
- Dependent upon the trace evidence, you may place trace evidence on the adhesive of a sticky note, then fold the note over on itself, or place the evidence in an appropriate container.
  - If using a sticky note, place inside a vellum envelope and seal to prevent contamination, damage, or loss.

7.8.7.3. Cutting:

Stains and materials firmly adhering to a substrate (such as fabric) can be removed by cutting using clean scissors or any clean sharp bladed tool. Place cutting inside a vellum envelope and seal to prevent contamination, damage, or loss.

7.8.7.4. Scraping:

A clean spatula or similar tool is used to dislodge trace evidence from an item onto a collection surface, such as trace evidence paper. The trace paper should be folded using a paper evidence fold technique and placed inside vellum envelope. Seal the vellum to prevent contamination, damage, or loss.

8. Latent Processing Sequences

Plan an approach to process the evidence for friction ridge impressions. The examiner may, at any time, decide that an item has been tested to its full potential. Many items of evidence consist of more than one physical property (e.g., a porous envelope with a glassine window). In those situations, the analyst shall apply the processing techniques using sequences appropriate for the relevant areas in a manner that does not negatively impact other areas of the evidence.

8.1. Processing Considerations

The analyst shall apply processing techniques in the sequences (i.e., sequential processing) prescribed in this manual, from least destructive to most destructive, for the detection of friction ridge impressions.

8.1.1. The analyst may supplement and/or deviate from the sequences for the detection of friction ridge impressions in certain situations. Some examples of when the analyst may supplement and/or deviate from the sequences are:

- The item does not react to a processing technique as expected (i.e. dry plastic vs soft plastic, thermal paper).
- The item of evidence has an obvious known contaminant such as blood or grease.
- The processing technique has not been validated to perform sufficiently in certain environmental conditions.
- The size of the item does not allow for a specific processing technique that aligns to the required sequence.
- The analyst has evaluated the efficacy and limitations of the processing technique, availability of resources, the circumstances of the case, and the type and condition of the evidence.

8.1.1.1. The analyst shall document deviations from the sequences in the case record.

8.1.2. Prior to applying specific processing techniques to evidence, the analyst shall assess the potential for negative implication to other types of examinations. Some potential negative implications to consider are:

- Forensic Light Source(s), such as short-wave ultraviolet (UV) light source, and the potential negative impact on DNA examinations.
- Cyanoacrylate Dye Stains and the potential negative impact on adhesive side processing, Questioned Documents, Drug Chemistry, and Trace Evidence examinations.
- Porous Chemical Processing and the potential negative impact on thermal paper and Questioned Documents examinations.
- Powder and the potential negative impact on electronic evidence examinations.

8.1.3. Additionally, the analyst should make the following considerations in determining the processing sequence for each item:

- The surface of the item (porous, semi-porous, or non-porous) to establish suitable processing techniques.
- The color of the surface to determine which technique will provide suitable contrast for the detection of impressions.
- The texture of the surface to determine whether developed impressions will require imaging for preservation. In such a case, use a technique that will provide the best contrast.
- Which matrix (sweat, blood, dirt, oil, amino acids, lipids, etc.) may have been deposited or will best be developed on the surface of the item.

8.1.4. Water Spot Test

To assist with determining substrate type, the substrate may be tested by placing a small drop of water on the item. If the water is immediately absorbed into the surface, then the surface is porous. If the water sits on top and then is slowly absorbed, the surface is considered semi-porous. If the water sits on top of the surface, then the surface is non-porous. Include documentation of this test in examination record, when performed.

8.1.5. The aforementioned considerations will work in conjunction with the following general processing sequence guidelines to allow the analyst the flexibility to determine the best course of action.

8.2. Visual Examination

During latent print processing, visual examination is a non-destructive process for observing latent print impressions that may be visible prior to physical/chemical processing, as well as for biological and trace evidence, on items of evidence. Each item of evidence shall be visually examined prior to any testing. Friction ridge residue and contaminants may be inherently visible and can be observed using a variety of lighting methods (white light, ALS) and/or angles of view. As part of visual examination, items may be examined with an ALS for trace evidence or for other potential evidence that may fluoresce. During visual examination, take precautions to prevent the loss of biological and trace evidence and minimize the impact to other forms of potential evidence, including latent print evidence. Prior to starting, be conscious of all requests involved with each item of evidence.

All relevant observations, such as conditions that may affect friction ridge impression recovery, shall be recorded in the examination records. If other types of evidence are observed, a notation regarding what was observed and how it was preserved for further analysis should be made. See Section 7 “Physical Evidence Examination.”

A visual examination with the appropriate lighting method shall follow each technique employed. Impressions that are suitable for further analysis shall be preserved once detected. If the impression is enhanced by subsequent techniques, preserve the impression following each technique.

8.2.1. Porous Surfaces

Defined as substrates that absorb the constituents of the latent print. Examples include paper, untreated wood, and cardboard.

Chemicals used in porous processing may destroy writing/markings. Prior to the application of a chemical, writing or markings on porous substrates shall be recorded, unless an agreement is made with the submitting agency or requestor. Methods for recording writing/markings include: photocopying, digitally scanning, and/or photographing.

This information shall be included in the examination records.

1. Visual examination

2. Alternate light source (minimum of two wavelengths must be used)
3. Magnetic powder/regular powder (consider or move on to #4)
4. DFO, 1,2-indanedione, or 1,2-indanedione+zinc chloride (consider or move on to #5)
5. Ninhydrin
6. Oil Red O
7. Physical Developer, Silver Nitrate

8.2.2. Semi-Porous Surfaces

A semiporous surface is characterized by its nature to both resist and absorb fingerprint residue. The residue may not be absorbed due to properties of the substrate and the variable viscous properties of the fingerprint residue. These surfaces should be treated with processes intended for both nonporous and porous surfaces. Examples include some treated wood, some cellophane, glossy magazines, and some cardboard.

1. Visual examination
2. Alternate light source (minimum of two wavelengths must be used)
3. Cyanoacrylate and/or Lumicyano
4. Powder processing
5. DFO, 1,2-indanedione, 1,2-indanedione+zinc chloride, and/or Ninhydrin

8.2.3. Non-Porous Surfaces

Defined as substrates that do not absorb the constituents of the latent print. Examples include glass, metal, and plastic.

1. Visual examination
2. Alternate light source (minimum of two wavelengths must be used)
3. Cyanoacrylate and/or Lumicyano
4. Powder processing and/or dye stain (not necessarily in that order)

8.2.4. Biologically Contaminated

Surfaces possibly contaminated with blood, may be processed with Amido Black, Acid Yellow 7, Hungarian Red, and/or Leucocrystal Violet. Non-contaminated surface areas should be processed independently. Prior to processing the surrounding surfaces, ensure that the processing technique (e.g., Cyanoacrylate/Lumicyano) will not affect the recovery of impressions with the blood development/enhancement chemical.

8.2.5. Adhesive Surfaces

Examples include tape and stamps. Process the non-adhesive side of an item independently.

1. Visual examination
2. Alternate light source (minimum of two wavelengths must be used)
3. In situations where the adhesive may need to be unstuck from itself or from another surface, Un-Do may be used. Alternatively, the item may be placed in the

freezer for a short period of time. Considerations of the substrate must be made as well as future processing methods. Additionally, the non-adhesive side may need to be processed first to attempt to manipulate the adhesive.

4. Powder suspension, Gentian violet, Lumicyano, and/or dye stain (TapeGlo™)

8.3. Quality Controls

Processing chemicals are quality control checked. A positive control must be obtained, either prior to use, or concurrent to evidence processing for all reagents. Commercial fingerprint reference pads or one's own sweat/sebum will suffice for the positive quality control check of latent print reagents. Use of other materials will require the documentation of the specific control. Both the positive and negative controls can be combined on one control card; the ridges, which should develop as expected, serve as the positive control, and the untouched negative space serve as the negative control.

If a control test fails, re-test the reagent a second time. If the test fails again, the reagent shall be removed from service, QA-22 Chemical Log updated, and the Quality Assurance Manager or Technical Leader notified. If a control test fails while it was concurrently run with evidence, but additional observations indicate that the processing reagent functioned properly, there is no need to reprocess the affected evidence. This can occur when the control print does not react to the reagent (due to the variability of latent print residue), but the evidence reacts normally (latent print development occurs). The analyst will document in the examination records that the negative control occurred, but that the evidence reacted properly.

See subsections for specific positive/negative control results for each chemical.

8.4. Processing Documentation

8.4.1. Document the following information:

- Examination start and end date
- Date evidence received
- Evidence packaging, seal, and whether seal is initialed
- Other agency case numbers, if any are associated
- Substrate
- Whether photographs are in BPD's digital evidence storage
- Methods and examination conclusions
- Quality Control and/or performance check results
- Lot and/or equipment/serial numbers
- Evidence collected/preserved during processing
- Evidence disposition
- Communication record
- Additional analyst(s)

8.4.2. Examination records shall include observations, if applicable, and each examination activity and the results of those activities.

8.4.3. Any consultation with an analyst regarding evidence examination on an item shall be detailed in the examination records. Include the name and date of consultation. The consultation may be recorded in the Internal Analyst Notes field. If the latent print processer is consulting about a specific area of ridge detail, document the specifics, such as location of the ridge detail. Ex. On 8/18/22, consulted Boise Police Criminalist C. Sanchez #7067 regarding an area of ridge detail to the right of the manufacturer label. The ridge detail was not preserved.

8.4.4. Latent impressions designated for preservation shall be labeled and documented in the examination records. The development technique used prior to the lift or image shall be clear in the examination records. Developed impressions may be preserved either by imaging or lifting. The location and orientation of each lift and/or image shall be documented and may be done through any combination of written notes, sketches, and/or photographs. Within each case, images and lifts shall be uniquely identified. The LIMS automatically assigns unique numbers to each image. The contents of each image shall be clearly indicated, either in the notes or on a label included within the image. Examination records shall indicate which impression number (e.g., L1 on Item #JD1) are represented in each image and/or lift. This is done through the digital area within LIMS and on EP-1 Latent Location Documentation, which shall be attached to the case in LIMS.

8.4.5. All digital images, photographs, and latent lifts, whether submitted or lab-generated, must be assigned a unique identifier that is documented in LIMS. Digital file names or lift numbers previously assigned by an outside submitting agency shall be used as identifiers when provided. Every lift must be annotated with the unique lift identifier, case number, date, the analyst's initials, and Ada number.

8.4.6. Mark the evidence with the item number and analyst's initials upon completion of processing in lab so that it can be identified in court. Impression numbers should also be marked on the evidence where obtained. All markings or identifiers shall be made in such a manner that the evidentiary value of the item is not compromised.

8.4.6.1. Marking the proximal container or exterior packaging would be appropriate in the below circumstances. If the analyst marks something other than the item of evidence, document in the examination records for clarification.

- Evidence item does not lend itself to marking. Examples: challenging substrate, size of item, swab samples.
- Analyst recommends that the entire item be submitted to another laboratory for analysis and marking the item would compromise further testing.
- Non-destructive methods are requested by the customer. Example: evidence is to be returned to victim in the case.

- In cases where multiple items are packaged together, the item processed may be placed in a package with the item number and the analyst's initials before being returned to the original package.

8.4.6.2. It is not necessary to mark items of evidence which are received but not examined.

9. Latent Impression Processing Techniques

It should be noted that the following do not intend to cover all scenarios an analyst may encounter. The following sections offer general procedures. For chemicals purchased, follow the procedures outlined below and/or in the instructions/technical notes/technical information sheet that accompany the reagent. Technical information sheets can be found in the Accreditation folder or in the Technical Notes for Chemicals binder located in the Chemical Processing Area. Procedures may also be located on the bottle itself. For reagents that are made in-lab, follow the procedures below. Analysts should refer to the chemicals' MSDS for safety considerations prior to using the chemical.

9.1. Acid Yellow 7 (AY7)

Acid Yellow 7 is a fluorescent dye that stains proteins present in blood to give a yellow-colored product. It is used to develop or enhance impressions that have been left in blood on non-porous surfaces. Do not use AY7 on porous or waxed items.

Quality Control Test

Deposit animal or synthetic blood onto a dark non-porous substrate, make an impression, allow to dry, and process with Acid Yellow 7. A positive test will result in the development of a yellow impression and will fluoresce when viewed with the ALS. The negative space around the impression serves as the negative control.

Procedure

1. The impression must be fixed prior to staining by using a 2% solution of sulfosalicylic acid in water. Hold a dry piece of absorbent paper over the impression area and drop one edge to the surface of the solution. Working from the wet edge, progressively wet the paper while smoothing onto the impression area. When completely covered, leave the wet paper on for at least three minutes and then remove it.
2. Apply the staining solution using a pipette or immersion. Leave the stain in contact with the impression area for one to three minutes, then wash with the wash solution.
3. Examine the evidence using an ALS. Refer to the manual associated with the ALS being used.
4. Developed impressions shall be imaged for preservation within a couple of hours after processing, as they will become blurry over time.
5. The impression may then also be preserved by lifting with a rubber/gelatin lifter. Leave the lifter on the item for approximately 1 minute. Lifted impressions shall be imaged for preservation within several hours utilizing the ALS.

6. Re-lifting can be done without re-staining between lifts.

9.2. Amido Black

Amido Black, also known as naphthol blue-black, is a dye that stains proteins present in blood to give a blue-black product. It is used to develop or enhance impressions that have been left in blood on both porous and non-porous surfaces. Cyanoacrylate fuming should not be done on evidence that will be processed with Amido Black. Amido Black may have a detrimental effect on the recovery of DNA. Porous evidence may be processed with Physical Developer after Amido Black to try and improve developed latent prints.

Quality Control Test

Deposit animal or synthetic blood onto a light-colored medium of choice (e.g. white lift card), make an impression, allow to dry, and process with Amido Black. A positive test will result in the development of a blue/black impression. The negative space around the impression serves as the negative control.

Procedure

There are several different recipes for Amido Black. The following are two procedures used.

Methanol Based – can be used on both porous and non-porous surfaces and is preferred for painted surfaces.

1. All blood must be dried prior to application.
2. Apply the developer solution by immersion or spraying via a squirt bottle.
3. After 30-90 seconds, rinse with the de-staining solution.
4. Apply a final rinse of distilled water (or tap water if necessary) as needed.
5. Allow the item to air dry.
6. Developed impressions shall be imaged for preservation.
7. Repeat staining and rinsing may improve contrast.

Water Based – can be used on both porous and non-porous surfaces, but is not preferred for painted surfaces.

1. All blood must be dried prior to application.
2. Apply blood fixative solution and allow it to remain on the surface for 5 minutes.
3. Apply the developer solution by immersion, spraying, or a squirt bottle.
4. After 3 minutes, rinse with the de-staining solution.
5. Additionally rinse with distilled water (or tap water if necessary) as needed.
6. Allow the item to air dry.
7. Developed impressions shall be imaged for preservation.
8. Repeat staining and rinsing may improve contrast.

Porous evidence may be processed with Physical Developer after Amido Black to try and improve developed latent prints.

9.3. Basic Yellow 40 (BY)

Basic Yellow 40 is a fluorescent dye stain used for latent print luminescence in conjunction with ALS and cyanoacrylate fuming on non-porous surfaces. The dye stain does not develop friction ridge skin detail; it merely improves the contrast of cyanoacrylate enhanced prints.

Quality Control Test

Utilize a positive test from Cyanoacrylate/Lumicyano processing or use a fumed sebaceous control print on a medium of choice and process with Basic Yellow. A positive test will result in a developed print fluorescent yellow in color, when viewed with the ALS. The negative space around the ridges serves as the negative control.

Procedure

1. It is recommended that the evidence be under-fumed rather than over-fumed with Cyanoacrylate/Lumicyano prior to the application of Basic Yellow.
2. Test a small section of the surface with Basic Yellow before applying to the entire surface. If the section completely fluoresces after rinsing and drying, do not use Basic Yellow to process that surface.
3. Apply the Basic Yellow 40 solution by submerging the evidence in a tray or container. Washing the solution over the surface using a wash bottle may also be done; however, do not spray the solution. Leave the Basic Yellow on the surface for approximately one minute.
4. Rinse with running tap water. Allow the evidence to air dry.
5. Examine the evidence using an ALS. Refer to the manual associated with the ALS being used.
6. Developed impressions shall be imaged for preservation.

9.4. Cyanoacrylate Ester (Superglue) Fuming

Cyanoacrylate (CA, i.e., superglue) fuming on non-porous and some semi-porous surfaces (e.g., plastic, carbon paper, metals, glass, tapes, wood, rubber and rock) will turn latent print residue white in color. Cyanoacrylate ester fumes are monomers that polymerize on latent print residue and create a more stable impression. Latent prints developed this way are not easily damaged.

Sometimes over-development will occur, usually in the form of a heavy white deposit obscuring most of a latent print. Use of an adhesive lifting technique (e.g., tape, lifter, etc.) is effective in lifting away the heavy upper deposits, revealing underlying ridge detail.

Select the Fuming Chamber

Evidence shall be loaded into a fuming chamber that is an appropriate size to the evidence item(s) being processed.

Air Science Safe Fume Cyanoacrylate Fuming Chamber

Procedures for operation are detailed in the AIR SCIENCE SAFEFUME CYANOACRYLATE FUMING CHAMBERS USER OPERATION MANUAL, which will be retained electronically.

Small Fuming Chamber

The addition of humidity to the fuming chamber prior to fuming plays a major role in successful development of white ridge detail. Place two cups of hot steaming water on the outer hot plates and "turn on" the switches to all hotplates. Seal the chamber. After the humidity has been raised, the appropriate amount of superglue, typically dime-sized but may vary according to the size of the items to be fumed, should be added to the chamber (in a disposable container) and the chamber shall be sealed. Alternatively, a number of CA packets relative to the size of the chamber can be opened and taped to the side of the chamber to emit cyanoacrylate fumes. Viewing from outside the chamber, check the test print ten to twenty minutes after fuming begins. Once the test print begins to be visible, turn off the hot plates, remove the superglue from the chamber, and leave the door open to exhaust the fumes from the chamber thoroughly (for approximately fifteen minutes) before examining the item(s). Since this chamber exhausts via propping the door open, some form of indication to alert personnel that the chamber is exhausting may be used.

Large and Temporary Fuming Chambers

The addition of humidity to the fuming chamber plays a major role in successful development of white ridge detail. Multiple buckets of hot steaming water shall be placed throughout, and then superglue should be placed near the buckets. Alternatively, a humidifier may be used, if applicable. Seal the door. Close the inlet and purge valves (if applicable). After the development time has elapsed, remove the superglue from the chamber, close the door (if applicable), open both vent holes (if applicable), turn on the fan switch (if applicable), and exhaust the fumes from the chamber thoroughly (for approximately ten minutes) before examining the item(s).

Quality Control Test

Deposit a sebaceous-rich print onto a non-porous substrate of choice and place it with the fuming chamber concurrent with the items(s) being tested. A positive test will result in a cyanoacrylate-developed control print. The negative space around the ridges serves as the negative control.

Selecting the Superglue Method

Liquid CA with Heat Source

1. Allow the glue to come to room temperature before use.
2. The liquid glue is placed in a disposable container and placed on the heating source at the bottom of the chamber. It is typically dime-sized, but the number of drops may vary and is dependent on the size of the chamber and the surface area(s) of the evidence to be fumed.

3. Developed impressions shall be imaged for preservation.

Commercial CA Packets

Commercially available cyanoacrylate packets (e.g., Sirchie's The FINDER™, Lightning Powder's Hard Evidence® Cyanoacrylate Pouches) is a good choice when the area to be fumed is exceptionally large and time is not a factor. The foil packets contain a gel-like cyanoacrylate substance. The number of packets to use varies according to the size of the chamber and the surface area(s) of the evidence to be fumed. If there is superglue remaining in the packet after fuming, it can be saved and reused.

1. Place the opened cyanoacrylate packet(s) in the enclosed area. Best results are achieved when the packet is suspended above the items fumed. Since the fuming compound is a paste, it will not drip on the items below. If the pack is dried out, it should not be used and should be thrown away.
2. Monitor the test print at 5 to 10-minute intervals and stop when the test print becomes visible.
3. Developed impressions shall be imaged for preservation.

Commercial CA Canisters

Commercially available cyanoacrylate canisters (e.g., Lynn Peavey's HotShot™ or Sirchie's CYANO-SHOT™ / ULTRA CYANO-SHOT™) work rapidly and produce copious amounts of cyanoacrylate fumes. These kits are meant for applications where a heating plate is not available. It is easy to use in the lab or field and can be utilized for large objects including bodies and vehicles. Each kit typically comes with a plastic development container, activator solution, activator crystals, and the cyanoacrylate compound.

1. Place canister into container with hole side down. Do not touch the drum and plastic container, as they will become very hot. Caution should be used when placing on a heat sensitive surface, such as plastic.
2. After fuming is complete, allow the container to cool down and dispose of contents in an appropriate manner. Re-establish air flow and evacuate fumes prior to entering an area that has been processed with cyanoacrylate.
3. Developed impressions shall be imaged for preservation.

9.5. DFO (1,8-Diazafluoren-9-one)

DFO is a fluorescent reagent used to develop latent prints on paper, other porous surfaces, and semi-porous surfaces. It excels in the development of latent prints on white and most pastel-colored papers and glassine envelopes and packets. DFO reacts to the amino acids present in perspiration and should be used prior to Ninhydrin. Prior to applying DFO on paper with writing/ink or on thermal paper, check that the recipe will not cause the ink to run or the thermal paper to darken.

Quality Control Test

Deposit an amino acid-rich print onto a porous surface, process with DFO, and place into a heat chamber or apply dry heat. A positive test will result in a developed print pale purple/red in color, observable with the unaided eye, and will fluoresce when viewed with the ALS. The negative space around the ridges serves as the negative control.

Procedure

1. Apply DFO through pipetting, brushing, or dipping (although it is possible to spray DFO, it is not the preferred method due to its carcinogenic properties and is not as thorough at covering the surface you are processing).
2. Allow it to dry at room temperature.
3. Place the item in a chemical processing oven between ~80-100°C for twenty minutes. Alternatively, a hair dryer or dry iron will work. If using one of these alternative heat sources, place a thick towel or other protective material on the counter first. Then, place a few paper towels on the towel. Place the paper evidence next. Cover the evidence with layers of paper towels. Apply dry heat to the surface for several minutes. A dry iron can be placed directly on top of the paper towels and used the same as when ironing clothes. It is possible to stop ironing to check progress with the alternate light source and, if the latent prints are not very bright, continue to iron for a few minutes longer.
4. The DFO-developed prints may be visible to the naked eye with white light but should be viewed under an ALS. Refer to the manual associated with the ALS being used.
5. Developed impressions shall be imaged for preservation.

9.6. Gentian Violet (Crystal Violet)

Gentian Violet (GV) is a dye stain for developing latent prints on non-porous surfaces, especially the adhesive side of tapes. It works well on almost all kinds of adhesive tapes that have a viscid, rubber-like adhesive: surgical tape, strip bandages, cellophane tape, electrical tape, packing tape, duct tape, etc. It is not suggested for tapes that have a water-soluble adhesive, such as paper packing tape. This reagent is a fat-soluble dye stain. It may be applied to surfaces that are contaminated with oils and grease. This dye stain may also be used for post-cyanoacrylate enhancement. If considering wetwop or sticky-side powder, GV must be used first.

Quality Control Test

Deposit a sebaceous-rich print onto the adhesive side of tape or substrate similar to the evidence being processed. A positive test will result in the development of a purple print. The negative space around the ridges serves as the negative control.

Procedure

1. Application of the reagent may be applied by gently agitating the item in a tray containing the solution for ~1 to 2 minutes. The solution can also be applied by brushing.
2. Running cold tap water rinse – ~30 seconds.

3. Development is complete when a purple color is noted and when repeated applications no longer produce enhancement of ridge detail. GV may be applied more than once, to darken ridge detail, while watching how the chemical is reacting with the background. Photographing between multiple applications may be warranted.
4. View visually, with white light and/or with an Alternate Light Source. Refer to the manual associated with the ALS being used.
5. Clearing solution (100 ml Hydrochloric acid in 90 mL of tap water (10% solution)) may be utilized as the final rinse to remove background staining.
6. Developed impressions shall be imaged for preservation.

9.7. Gun Bluing Solution

Gun bluing is a process that is used to develop latent prints on brass cartridges and cartridge cases. The reaction occurs on areas of metal unprotected by sebaceous latent print residue, creating a dark-colored coating on these areas.

Quality Control Test

Deposit a sebaceous rich print onto a clean brass item and process with Gun Bluing solution. A positive test will result in a dark-colored product. The negative space around the ridges serves as the negative control.

Procedure

There are several different recipes for Gun Blue. The following are two recipes used.

Formula 44/40 (instant Gun Blue)

Mix the following:

1 part reagent (Birchwood Casey Super Blue was used)
80 parts distilled water

Outer's Gun Blue

Mix the following:

1 part Outer's Gun Blue
40 parts distilled water

Gun blue reagent can be store in clear or dark bottles for up to 12 months.

1. Light cyanoacrylate fuming has been shown to be beneficial prior to testing with gun bluing solution. Ideally, no other processing prior to using this solution should be conducted.
2. Immerse the evidence for several seconds and closely monitor for the development of latent prints.
3. Halt the development by rinsing with tap water and air dry.
4. Developed impressions shall be imaged for preservation.

9.8. Hungarian Red (Acid Fuchsin)

Hungarian Red, also known as Acid Fuchsin, is a dye that stains proteins present in blood to give a purple/red color. It is used to develop or enhance impressions that have been left it blood on most semi-porous and non-porous surfaces (e.g. linoleum, glass, tiles, painted surfaces, or PVC floor covering). It is not for use on absorbent surfaces such as paper, bed sheets, fabric, etc.

Quality Control Test

Deposit animal or synthetic blood onto a non-porous or semi-porous substrate of choice, make an impression, allow to dry, and process with Hungarian Red. A positive test will result in the development of a purple/red impression. The impression will also fluoresce when viewed with an ALS. The negative space around the impression serves as the negative control.

Procedure

Prior to use, the impression must be set/fixed to prevent loss of detail. A fixative solution of 2% sulfosalicylic acid in water (20g in 1 liter of water) should be used or the fixative agent may be included in the purchased Hungarian Red solution.

1. Submerge the item into an appropriate container of the solution. Alternately, the solution could be placed into a bottle and sprayed onto the item. Allow the solution to set (approximately 1 minute).
2. Rinse the item with water or Rinse/Destain solution.
3. The water or Rinse/Destain solution should be removed immediately from the processed area after rinsing with compressed air, a powerful blower, or paper towels.
4. Examine the evidence using an ALS. Refer to the manual associated with the ALS being used.
5. Once the impression is dry, it shall be preserved via imaging.
6. The impression may then also be preserved by lifting with a rubber/gelatin lifter. Leave the lifter on the item for 15-30 minutes. Lifted impressions shall be imaged for preservation within several hours utilizing the ALS.
7. Re-lifting can be done without re-staining between lifts.

9.9. 1,2-Indanedione (IND) and 1,2-Indanedione with Zinc Chloride (IND-Zn)

1,2-indanedione is used to develop latent prints on paper, other porous surfaces, and semi-porous surfaces that have not been previously wet. IND should not be used on cardboard, recycled paper products, or newspaper. IND reacts to amino acid residues in latent prints to produce a pink-red color that fluoresces.

IND or IND-Zn may be used after superglue fuming of semi-porous items. When IND or IND-Zn is used, it is typically not necessary for the analyst to also use DFO and Ninhydrin further in the sequence. For dry porous items, IND or IND-Zn may be followed by ORO. Prior to applying IND or IND-Zn on paper with writing/ink or on thermal paper, check that the recipe will not cause the ink to run or the thermal paper to darken.

Quality Control Test

Deposit an amino acid-rich print onto a porous surface, treat with IND or IND-Zn, and place into a heat chamber or expose to heat with a steam or dry iron, dependent on recipe. A positive test will result in a developed print fluorescent pink-red in color, not observable with the unaided eye and only observable under the ALS. The negative space around the ridges serves as the negative control.

Procedure

1. Whether using 1,2-indanedione or 1,2-indanedione+zinc chloride, dip the evidence item in the reagent, air dry in the fume hood, and repeat both steps. Place the item in the oven at ~100°C for ten to twenty minutes, dry iron for twenty minutes, or steam iron (depending on recipe). If using the dry iron, place sheets of thick paper between the evidence and the iron; don't directly iron the prints.
2. Examine the evidence using an ALS. Refer to the manual associated with the ALS being used.
3. Developed impressions shall be imaged for preservation.

9.10. Leucocrystal Violet

Aqueous Leucocrystal Violet (LCV) is a dye that stains proteins present in blood to give a dark blue to purple/violet product. It is used to develop or enhance blood, and impressions that have been left in blood on both porous or non-porous surfaces. As LCV does not require a rinsing step, it is recommended for surfaces that do not lend themselves to rinsing such as carpet. Amido Black or Acid Violet may be done after LCV to improve contrast of the impression.

Quality Control Test

Deposit animal or synthetic blood onto a substrate similar to that being processed (non-porous or porous), make an impression, allow to dry, and process with Leucocrystal Violet. A positive test will result in the development of a dark blue to purple/violet impression. The negative space around the impression serves as the negative control.

Procedure

Prior to use, the impression must be set/fixed to prevent loss of detail. A fixative solution of 5-sulfosalicylic acid, hydrogen peroxide, and water should be used. Of note, the fixative agent may be included in the purchased Leucocrystal Violet solution.

1. Apply the solution by either submersion or by washing the solution over the surface. It is not recommended to spray the reagent, except in the case of carpeting (or other large surfaces such as walls). The development will begin to occur within 30 seconds.
2. Lightly blot with paper towels to remove the excess reagent. After blotting, and the surface is dry, additional solution may be applied if impressions are very weak.
3. Developed impression may be visible to the naked eye, but an ALS and/or IR may be utilized to enhance contrast between the surface and the developed impression.

4. Developed impressions shall be imaged for preservation. It is recommended that the impression be photographed immediately as background staining may occur.

9.11. Lumicyano

Lumicyano is a fluorescent cyanoacrylate. Lumicyano will cause latent print residue on non-porous and some semi-porous surfaces to appear white in color under white light and to fluoresce when viewed with an ALS. Latent prints developed this way are not easily damaged but are more fragile than traditionally cyanoacrylate-developed prints. Lumicyano has no detrimental effect on the recovery of DNA or on subsequent DNA profiles. Unlike traditional cyanoacrylate, there is no risk of overdevelopment.

Quality Control Test

Deposit a sebaceous-rich print onto a non-porous substrate of choice and place it within the fuming chamber concurrent with the items being tested. A positive test will result in a cyanoacrylate-developed control print and will fluoresce when viewed with the ALS. The negative space around the ridges serves as the negative control.

Procedure

1. Although variables (determined by tank size and number of evidence items) may need to be changed in some circumstances, the optimized settings for the fuming cycle under testing were as follows: Glue Time – 25 Min; Glue Temperature – 120°C; Relative Humidity – 80%; .08g of Lumicyano Powder and bring it up to 1.68g with Lumicyano Solution.
2. Examine the evidence within 24 hours, if possible, both with and without an ALS. Refer to the manual associated with the ALS being used.
3. The evidence items may be re-fumed without risk of overdevelopment, or subsequently processed with powders and/or chemicals (dependent on surface type).
4. Developed impressions shall be imaged for preservation.

9.12. Ninhydrin (NIN)

Ninhydrin is a chemical method for developing latent prints on porous surfaces, absorbent materials such as paper, cardboard, and smooth raw wood, and semi-porous surfaces. This method is based on the reaction of the Ninhydrin and the amino acids, proteins, and peptides that are present in the latent print residue. Prior to applying Ninhydrin on paper with writing/ink or on thermal paper, check that the recipe will not cause the ink to run or the thermal paper to darken. Standard formulations for ninhydrin can cause the active chemicals on thermal papers to turn dark, obscuring fingerprints. Treatment with a ninhydrin clearing reagent can, in many cases, remove the darkened layer uncovering any developed latent fingerprints. Ninhydrin can target amino acids that did not undergo a complete reaction with indanedione, indanedione-ZnCl, or DFO and thus may be applied subsequent to the aforementioned chemicals.

Quality Control Test

Deposit an amino acid-rich print onto a porous surface and process with Ninhydrin. Results may be accelerated by using an iron to apply heat and humidity. A positive test will result in a purple-colored print, observable with the unaided eye. The negative space around the ridges serves as the negative control.

Procedure

1. Application of the Ninhydrin solution may be accomplished through spraying, brushing, or dipping (although it is possible to spray Ninhydrin, it is not recommended).
2. Allow to dry at room temperature. A 24-hour development period is recommended. Acceleration methods, such as subjecting the item to a combination of heat and humidity, can be applied during the development period. *Note, prints may continue to develop over time. It is recommended to preserve impressions as they continue to develop.
3. Developed prints may be visible to the naked eye. An ALS can be used to enhance contrast between the surface and the developed print.
4. Developed impressions shall be imaged for preservation. A green colored filter may assist with contrast.
5. If the background darkens, apply a ninhydrin clearing agent.
    a. Pour the solution into a shallow tray, enough to cover the document or paper evidence item.
    b. Place document or paper evidence item in the tray.
    c. Monitor the staining. Soak for ~1-3 minutes, or until the staining is visibly lighter.
    d. Remove from solution, and blot and dry immediately. An oven or blow dryer can be utilized to quicken the drying process.

9.13. Oil Red O (ORO)

Oil Red O develops latent prints on porous surfaces that are wet or have been wet. ORO is a lipid protein stain / hydrophobic dye which targets lipids in fingerprint deposits. It does not depend on the presence of amino acids or salts. ORO may be used on dry or wet porous surfaces. Consideration should be taken if subjecting the item to ORO may cause the item to disintegrate.

For dry porous surfaces, Oil Red O should be integrated into the sequence after DFO/ninhydrin/indanedione and before physical developer. Recommended dry porous surface sequence: DFO -> NIN -> ORO -> PD or IND -> ORO -> PD. *For dry porous surfaces, ORO can be done after NIN/DFO/IND.

For wet porous surfaces, Oil Red O should be integrated into the sequence before physical developer. Recommended wet porous surface sequence: ORO -> PD. If only a small part of the item was previously wet (e.g. corner of paper), then process with DFO and/or NIN prior to ORO and/or PD.

Quality Control Test

Place a sebaceous-rich print on a porous surface. Process with Oil Red O. A positive test will result in a red-colored print, observable with the unaided eye. The negative space around the ridges serves as the negative control.

Procedure

1. Immerse the evidence item in the stain solution and shake gently for ~60 to 90 minutes, or for the duration indicated on the technical information sheet. Usually, strong fingerprints will give good results after only 5-10 minutes.
2. Remove the item from the stain solution and drain.
3. If applicable, immerse the item in the buffer solution to adjust the pH. Let the item air dry.
4. Developed impressions shall be imaged for preservation.

9.14. Physical Developer (PD)

Physical developer is a silver-based aqueous reagent that reacts with sebaceous compounds in latent prints to give a silver/gray product. It is effective on porous items such as paper, cardboard, raw wood, paper based adhesive tapes, paper currency, and items that have been subjected to moisture. It should not be used as the primary method of latent print development, but rather a follow up to processing with DFO, IND, IND+ZN, NIN and/or ORO. PD cannot be used in conjunction with Silver Nitrate application.

Quality Control Test

Deposit a sebaceous rich latent print onto a porous surface and process with physical developer. A positive test will result in a gray/black print. The negative space around the ridges serves as the negative control.

Procedure

Multiple items can be processed simultaneously as long as they do not overlap or become folded in the processing trays.

1. If the item was previously processed with DFO, IND, IND+ZN, NIN, ORO, or the item is dirty, immerse the evidence in distilled water. Gently rock for 5-10 minutes. This step may be omitted for items not previously processed, and not contaminated.
2. Immerse the evidence in the Maleic Acid pre-wash solution for 10 minutes or until no bubbles are coming from the paper. This step may be omitted for wood and fragile papers (e.g. tissue or charred paper).
3. Immerse the evidence in the working solution. Gently rock the dish until dark gray ridge detail develops (5-15 minutes, time decreases as the number of items processed together is increased). Remove the evidence when the background appears significantly darker or after twenty minutes.

4. Immerse the item in distilled water and rinse until there is no yellow stain and the water runs clear. Item can be washed in cold tap water for an additional five to ten minutes. Thoroughly dry the evidence.
5. Developed impressions shall be imaged for preservation.

9.15. Powder Processing

Powder development techniques are used to develop friction ridge skin impressions on non-porous and semi-porous items. Powder development makes surface ridge detail visible or may improve the contrast of already visible detail. Impressions can be preserved via imaging and lifting. Many commercially produced latent print "dusting" powders are available. No powder is universally applicable to all types of non-porous and semi-porous surfaces.

Selecting the Powder

The type of powder selected for processing will depend upon:

- The contrast with the surface on which impressions are to be developed;
- The nature of the surfaces to be processed;
- Any special application attributes of the powders available;
- The anticipated means of preservation (imaging or lifting).

When there is any doubt as to the suitability of a powder for processing a surface, a test print can be made. A similar surface to the suspected surface should be used. If there is none available, then a small area of the suspected surface may be dusted with the most suitable powder, wiped clean, and used for testing. The test will be documented in the analyst's notes and the test impression will be destroyed immediately after it has served its purpose.

Selecting the Applicator

A wide variety of types, shapes, and sizes of brushes are available for processing evidence with powders. The total supply of different kinds of brushes required in a Latent Print discipline depends on the types of brushes and colors of powders used. An adequate number of appropriate brushes will help to preclude cross-contamination of powders and brushes.

Brushes may be cleaned with mild detergent and water. Blow drying will help (especially with camel hairbrushes) to prevent matting after washing with the soapy solution. Dirty or contaminated brushes cannot always be cleaned to alleviate stiff bristles. Brushes that have been cleaned and still have stiff bristles should not be used for dusting latent prints.

Disposable brushes may be used for DNA probative cases to prevent contamination. Selecting the proper applicator is dependent upon:

- The type of powder used (magnetic wand with magnetic powder, etc.);
- The size of the area to be dusted (cotton ball, brush, etc.);

- The type of surface to be dusted (metal, plastic, etc.).

Types of Applicators Available

- Feather Brush: Generally used for fluorescent powder applications and delicate processing purposes involving the removal of excess powder or soot
- Fiberglass Brush: Consists of fine fiberglass bristles and is used by many examiners as an all-purpose brush in lieu of several other sizes and types. The primary advantage is the ability to process a large area with considerably less "re-powdering" of the brush than other types. These brushes are more expensive than hair or feather brushes but often last longer than either type.
- Hairbrush: Soft and pliable and are appropriate for all powders, except magnetic. Stiff bristles can damage latent impressions, usually by causing light or dark streaks in the latent print. Commercially produced latent print hairbrushes are most often made from camel hair. Soft fine brushes are appropriate for applying TapeGlo™, Wetwop™ and sticky side powder.
- Magnetic Wands: These wands are used only for the application of magnetic type powders (or mixtures of magnetic/conventional powders). The "bristles" consist of the magnetic powder itself; therefore, the applicator head of the wand will not wear out. One magnetic wand will suffice for many colors of powder. Some examiners also use 5 cm and 10 cm wide magnetic brushes for processing large areas. "Self-contained magnetic brushes" include a built-in powder reservoir.

Quality Control Test

Deposit a sebaceous print on a test medium of similar type and color as the evidence and process with the appropriate powder technique. A positive test will result in a developed print. The negative space around the ridges serves as the negative control. This applies to both conventional and magnetic powders listed below. Lot numbers do not need to be recorded in the examination records, unless the powder is used to make a powder suspension / sticky-side powder.

Dusting Procedure: Conventional Powder

1. The key to successful "conventional" powder application (dusting) is the use of a small amount of powder with a delicate touch. Touch only the ends of the brush bristles to the powder. The excess powder should be shaken or tapped off.
2. Use a smooth motion to guide the brush over the suspected area or over the barely discernible print while very lightly brushing the bristles across the surface. When sufficient ridge detail has been developed so that the direction of flow of the ridges can be observed, continued brushing should follow the ridge flow. Occasionally, in spite of all precautions, the powder will adhere so tenaciously to the object on which the latent is

found that brushing will not remove the excess powder. If so, a lifting technique may be used to remove the excess powder (this process is discussed under Lifting Techniques).

3. Sometimes a latent print may be enhanced after the initial lifting by additional processing with brush and powder or the use of fluorescent dye stains post-superglue fuming.
4. The adherence of powder to a latent print can be enhanced by using the "breath technique". Exhaling warm breath on a surface while dusting for latent prints sometimes adds moisture to the latent print residue, thereby enabling the powder to adhere to the ridge structure of the latent. All moisture, however, should be visibly evaporated from the surface prior to applying powder. This technique should only be utilized if DNA testing will not be pursued.
5. An ALS will be required to examine areas that have been processed with fluorescent powders.
6. Impressions developed shall be preserved via imaging prior to lifting.

Dusting Procedure: Magnetic Powder

1. Proper use of the magnetic brush (wand) and magnetic powders is similar to the "dusting" procedure described for conventional powders. When the "closed" magnetic wand is inserted into the magnetic powder container the powders will be picked-up with the tip of the wand. The powders actually form a bristle-less brush. Only the powder "bristles" should touch the surface being processed, and not the wand itself. A light, smooth stroking motion is used in guiding the magnetic wand over the suspected area.
2. When the rod is pulled to a fully extended position the powder will be released from the tip. Excess powder should be removed from the processed area by passing the wand over the area without it actually making contact with the surface.
3. An ALS will be required to examine areas that have been processed with fluorescent powders.
4. Impressions developed shall be preserved via imaging prior to lifting.

Selecting the Preservation Method

Lifting materials for latent fingerprints consist primarily of transparent, opaque, adhesive-coated materials, and electrostatic dust lifts. The background color of the opaque lifting medium is dependent upon the color of the impression to be lifted. Caution must be exercised in utilizing general-purpose tapes (book-binding, etc.) in place of specialized latent print lifting tape or lifts, the reason being that a thick adhesive emulsion base can cause the migration and disappearance of some latent print ridge detail (especially with some light-colored powders) either immediately or over a period of days or weeks. Following is a list of recommended tapes and lifts for latent print preservation.

- Tape: Special latent print lifting tape, both transparent and frosted, is available from several commercial sources. They can be used with a wide variety of black or white

backing materials, including pre-printed backing cards, index cards, photographic papers and vinyl backing tabs. Flexible lifting tape may be used in place of rubber lifters for curved surfaces.

- Hinge Lifts: These consist of a transparent lifting medium (tab) attached to a clear, black or white plastic backing tab. The lifting tab is usually of a less flexible nature than most lifting tapes that sometimes results in white circles surrounding powder particles (especially with magnetic powders). This can be mostly alleviated using a more pliable medium. Lifts of materials similar to hinge lifts are available in sizes suitable for lifting palm prints and footprints.
- Rubber/Gelatin Lifts: These are available commercially with black, white, or transparent backgrounds and come in various sizes. These are soft pliable lifts with a moist gelatin like base and can be used for dried mud, dried blood, or dust impressions. They may be useful on rough, grained or irregular surfaces. The primary advantage is the ability to lift latent impressions from curved surfaces without the creases inherent to tape and hinge lifts. They may stand alone or can be used as an adjunct to the electrostatic lift for dust impressions. The ridge detail must be photographically (or optically as with a prism/mirror viewer) reversed to enable comparison with inked impressions.
- Electrostatic Lifting Material: Electrostatic lifting film for use with the electrostatic lifting kit is available commercially and should be used whenever possible. After photographs have been taken of the current dust impression, the film can be wiped clean and used again. Lay the film flat or roll it -never fold as it will permanently crease.
- Casting Material: Commercially available silicone rubber or dental/die stone powder may be used for lifting difficult latent impressions from uneven surfaces. Mix according to manufacturer's directions and apply to the intended casting area. Should a light-colored casting need to be darkened, the user may cautiously add black fingerprint powder to the mixture until the desired shade is achieved. Dark-colored silicone rubber is an alternative.
- Glue: Transparent Elmer’s Glue, or similar, is used in conjunction with a can of compressed air. The premise is to spread a thin layer of glue over the latent impression to be preserved. Dispense a thin line of glue adjacent to the impression; the amount of glue depends on the size of the area to be preserved. Using the can of compressed air, direct the nozzle at the line of glue, spreading the glue over the impression. Allow the glue to dry. Preserve the glue containing the impression using latent print lifting tape and the appropriate backing material.

Lifting Procedure

1. When using lifting tape to remove a developed impression, care should be taken in unrolling the tape from a roll so that hesitation creases do not occur. The unrolling should be performed in one smooth, continuous action.

2. The application of the lifting tape (or other lifting medium) to the surface should also be in one smooth motion. The bulb of your finger or a rounded object may be pressed to the tape during application to preclude air bubbles and to ensure good contact with the lifting surface. Some bubbles can be eliminated effectively (without damaging the impression) by applying pressure with your finger (or other smooth, rounded object) to force the air pocket out at the edge of the tape.
3. The lifting of the impression away from the surface should be in a smooth continuous motion.
    a. It is possible to take more than one tape lift of the same targeted area. This is useful when the surface may have been contaminated and the powder used, adhered to the surface, in addition to the ridge detail. Under theses or similar circumstances, the second or third lift may provide better representation of the ridge detail developed.
4. If using lifting tape, the lift should be placed on a latent lift card(s) (LLC).
5. The lift shall be marked with the following:
    - Date of lift
    - DR# or internal case number if DR# is not applicable (e.g. internal investigations)
    - Location of lift (to include Item # from where the lift was obtained)
    - Name or initials of person making the lift and Ada#
    - Latent number (e.g. L1, L2, etc.)
6. A diagram and/or imaging of the lift location on the object is required. An arrow indicating the direction of the lift is also valuable for determining the orientation of the impression(s) and how an object was touched or handled.
7. If a latent print processer preserves latents via LLC, then the processor is responsible for scanning the LLC and uploading them to LIMS, before packaging them as an item number (ex. #ML1) and generating a Property Invoice.

9.16. Powder Suspension (Sticky-Side Powder, WETWOP™)

Powder suspension is used to process the adhesive side of tapes, labels, and other adhesive items for latent prints. Wetwop™ is a commercially available powder suspension that can be used on various types of the adhesive side of tapes, labels, Post-It® notes, stamps, bandages, and rubber gloves (i.e., latex and nitrile), as well as on the non-adhesive side of tapes and items with an adhesive backing (ex. plastic label from a water bottle, with tacky area). Wetwop™ is available in both black and white colors. Black can be used to process most colored adhesive and non-adhesive surfaces. White can be used to process dark-colored and/or clear adhesive and non-adhesive surfaces. In some instances, both black and white solutions can be used in sequence to present contrast for better visualization of prints. May also be used after GV, but not prior to.

Quality Control Test

Deposit a print on a test medium of similar type and color as the evidence and process with the appropriate powder suspension technique. A positive test will result in a developed print in contrast to the background color, observable with the unaided eye. The negative space around the ridges serves as the negative control.

Procedure: Sticky-Side Powder (SSP)

1. Remove /or and collect/preserve any foreign material from the item.
2. If the adhesive substrate is wadded or stuck on another surface, attempt to remove and expose the adhesive surface. Placement in a freezer may help in the adhesive lose its tackiness. See 8.2.5. Depending on the case, separating the pieces may be subsequent to application of the powder suspension.
3. "Sticky-Side" powder comes as a pre-packaged kit. Alternatively, conventional fingerprint powder can be used. Place approximately 1 teaspoon of powder into a shallow container.
4. Mix a 1:1 solution of water and Photo-Flo 200 and shake well. Alternatively, Ivory dishwashing liquid can be used instead of Photo-Flo 200. Slowly add this solution to the powder in a shallow jar until you have a paste with the consistency of thin paint.
5. Use a camelhair brush to "paint" the liquid mixture onto the adhesive surface.
6. Leave the liquid on the tape for no more than 10 seconds, and then gently rinse it off with water. The tape can be rinsed under running water, but the preferred method is to gently agitate it in a bowl of water. Sticky-Side powder may be applied more than once while watching how the chemical is reacting with the background.
7. Allow the evidence to dry at room temperature.
8. Developed impressions shall be imaged for preservation.

Procedure: Wetwop™ (WW)

1. Shake the bottle thoroughly and pour a small amount into a clean beaker or dish.
2. Apply Wetwop™ with an appropriately sized camelhair brush, using a painting motion to completely cover the surface. Allow the Wetwop™ solution to stand on the adhesive or non-adhesive surface for 15-30 seconds.
3. Rinse the solution off with a gentle stream of tap water. For glove processing, rinse the Wetwop™ solution quickly to avoid background staining. Wetwop™ may be applied more than once while watching how the chemical is reacting with the background.
4. Allow the evidence to dry.
5. Developed impressions shall be imaged for preservation.

9.17. Rhodamine 6G (R6G)

Rhodamine 6G is a fluorescent dye stain used for latent print luminescence in conjunction with ALS and cyanoacrylate fuming on non-porous surfaces. The dye stain does not develop friction ridge skin detail; it merely improves the contrast of cyanoacrylate enhanced prints

Quality Control Test

Utilize a positive test from Cyanoacrylate/Lumicyano processing or use a fumed sebaceous control print on a medium of choice and process with Rhodamine 6G. A positive test will result in a developed control print in contrast to the background color when viewed with the ALS. The negative space around the ridges serves as the negative control.

Procedure

1. It is recommended that the evidence be under-fumed rather than over-fumed with Cyanoacrylate/Lumicyano prior to the application of R6G.
2. Test a small section of the surface with R6G before applying to the entire surface. If the section completely fluoresces after rinsing and drying, do not use Rhodamine 6G to process that surface.
3. Apply the Rhodamine 6G solution by submerging the evidence in a tray or container, or by brushing the solution on the item. Washing the solution over the surface using a wash bottle may also be done; however, do not spray the solution. Leave the R6G on the surface for approximately one minute.
4. Rinse with running tap water.
5. Allow the evidence to air dry.
6. Examine the evidence using an ALS. Refer to the manual associated with the ALS being used.
7. Developed impressions shall be imaged for preservation.

9.18. Silver Nitrate

Silver Nitrate reacts with chlorides in latent prints to give a dark brown or gray/black product when exposed to light. It is effective on porous surfaces (i.e. untreated wood, cardboard) that have not been wet or exposed to high humidity. Silver Nitrate can be used after DFO, IND, IND+ZN, NIN and/or ORO but cannot be used in sequence with PD.

Quality Control Test

Deposit a sweat or saline covered finger onto a porous surface and process with Silver Nitrate. A positive test will result in a dark brown or gray/black print when exposed to light. The negative space around the ridges serves as the negative control.

Procedure

Application should occur in subdued lighting.

1. Immerse the evidence in the solution for a maximum of five seconds. Alternatively, the solution can be brushed on the evidence and allowed to evaporate. Do not spray the solution.
2. Allow the evidence to dry completely in the dark.

3. Exposed the evidence to sunlight or a UV light source at 366nm and observed until the best contrast is observed. Development may occur in seconds or take several hours.
4. Developed impressions shall be imaged for preservation. Store the evidence in the dark until imaged.

9.19. Small Particle Reagent (SPR)

Small Particle Reagent is a suspension of fine particles in a detergent solution. SPR adheres to fatty constituents of latent prints to form a dark gray, white, or fluorescent product, depending on the SPR solution used (dark, white, or fluorescent). It can be used on wet, non-porous surfaces, sticky side of tape, and is especially useful on wet automobile bodies and glass surfaces. It can also be used on oxidized and galvanized metals. When SPR is used as a secondary technique after cyanoacrylate fuming, the results are sometimes superior to powders in both adhesion and clarity of detail.

Quality Control Test

Deposit a sebaceous rich print onto a white or black lift card, or substrate similar to the evidence being processed, and process with SPR. A positive test will result in a dark gray, white, or fluorescent print depending on the SPR solution used. The negative space around the ridges serves as the negative control.

Procedure: Bath Method

1. Shake the container of SPR working solution and pour enough of the solution into a tray cover the evidence to be processed.
2. Stir the solution thoroughly to ensure that all powder is suspended in the liquid and immerse the evidence immediately. Keep the evidence stationary at the bottom of the dish for approximately 30 seconds and then remove it carefully.
3. A thick film will be seen coating the evidence item's surface. Invert the evidence and gently draw it across the surface of tap water in a second tray or tank of similar size. Agitate the evidence gently. The film should wash off, revealing developed latent print detail.
4. Allow the evidence to dry at room temperature.
5. If using fluorescent SPR, utilize the ALS. Refer to the manual associated with the ALS being used.
6. Developed impressions shall be imaged for preservation. The impression may also be preserved via lifting using any suitable lifting medium.

Procedure: Spray Method

1. If being used outside during rain, shelter the area to be treated from direct rainfall.
2. Shake the container of working solution and fill the spray bottle. Shake well and adjust the nozzle to give a cone-shaped jet.

3. Spray the area to be examined starting at the top and working downwards. If signs of latent print development appear, continue spraying just above the relevant area until there is no further buildup of reagent deposit.
4. If it is necessary to remove excess powder from developed prints, spray water gently above developed prints with a second spray bottle.
5. Allow the surface to dry. If the prints appear weak, the process may be repeated.
6. If using fluorescent SPR, utilize the ALS. Refer to the manual associated with the ALS being used.
7. Developed impressions shall be imaged for preservation. The impression may also be preserved via lifting using any suitable lifting medium.

9.20. Sudan Black

Sudan black is a dye stain that reacts with the fatty components of sebaceous secretions in latent prints to give a blue-black product. It can be used on non-porous surfaces contaminated with grease, foodstuffs, or dried deposits of soft drinks and will also enhance cyanoacrylate developed latent prints. Sudan Black is ineffective on dark or printed plastic surfaces.

Quality Control Test

Utilize a positive test from Cyanoacrylate/Lumicyano processing or deposit a sebaceous rich print onto a white lift card or medium of choice, and process with Sudan black. A positive test will result in a developed blue-black print. The negative space around the ridges serves as the negative control.

Procedure

1. Immerse the evidence in the working solution or float on the surface for two minutes. For large items, the solution can be sprayed or poured over the surface.
2. Rinse the evidence under cool, gently running tap water until excess dye has been removed from the background.
3. Allow to dry at room temperature.
4. Developed impressions shall be imaged for preservation.

9.21. TapeGlo™

TapeGlo™ is a commercially available solution used to process the adhesive side of tape (i.e., plastic--, cloth-, or paper-backed adhesive tape) for latent prints. It is a reusable fluorescent dye stain used for latent print luminescence in conjunction with ALS.

Quality Control Test

Deposit a print on a test medium of similar type and color as the evidence and process with TapeGlo™. A positive test will result in a developed print in contrast to the background color when viewed with ALS. The negative space around the ridges serves as the negative control.

Procedure

1. Place the tape adhesive-side up in a tray or dish.
2. Application of TapeGlo™ may be accomplished through spraying, brushing, or dipping. After completely covering the adhesive side, allow the solution to remain on the surface for ten to fifteen seconds.
3. Gently rinse the surface with water.
4. Examine the evidence using an ALS. Refer to the chemical manufacturer's technical sheet for peak wavelengths.
5. Developed impressions shall be imaged for preservation.

9.22. Developing Latent Prints on Human Skin

Consider collection of touch DNA from areas of interest prior to processing the skin for prints.

Amido Black

For deceased bodies only. Amido black can be used to enhance latent prints contaminated with blood on a cadaver. The standard technique for amido black should be used. Confirm via approved laboratory presumptive tests, as specified in the Biology Screening and/or Crime Scene Investigation Technical Manuals, that the print seen is in blood prior to applying the amido black reagent to the print area. See the Boise Crime Laboratory's Biology Screening Technical Manual.

Glossy Photo Printer Paper Transfer Method

For live or deceased bodies. The glossy side of the paper is placed against an area of interest, removed, and processed with cyanoacrylate followed by powders.

Adding Machine Paper Technique

For live or deceased bodies. Roll the paper with gentle pressure over the body area in question. Mark the paper accordingly so that relative orientation of the paper on the body area is maintained and location of any prints recovered is not lost. Tape the paper contact side up inside a box or container and lightly powder the contact side of the paper using magnetic powder with very light strokes.

Cyanoacrylate Fuming

For deceased bodies only. Ideally, the body should not be refrigerated prior to fuming because moisture can destroy impressions that might otherwise be developed. If already refrigerated, permit all condensation moisture to evaporate upon removing the body from the cold locker/drawer. An airtight plastic tent can be assembled over the body and fumed with cyanoacrylate. A small, battery powered fan may be used to help with fume distribution. After fuming, process the body using a contrasting color magnetic powder. Developed impressions shall be photographed. Lifts can be attempted after photography.

10. Digital Imaging

Digital imaging technology is used to preserve, document, and analyze impressions which have the potential to be of evidentiary value. Images generated for the purpose of examination will be captured, stored, and documented in the history/chain of custody within LIMS. Images generated for the purposes of orientation and documentation will also be retained in the case record.

10.1. Image Capture

Examination-quality images are to be captured in uncompressed formats at a calibrated resolution exceeding 1000ppi unless circumstances prevent capturing the image at that resolution. Anything not meeting this standard must be documented. Examination quality images of impressions should include a metric scale on the same plane as the impression. Orientation images utilized to document the location of latent impressions on a surface, may be captured in a compressed format.

10.2. Digital Image Storage

Original digital image files will be retained in the LIMS, which is a secure database. Examination-quality images shall be saved in the same format in which they were captured. The unaltered saved images will be considered the original images.

10.3. Image Enhancement/Processing

10.3.1. Enhancement work shall be done on a copy of an original image and not to the original image itself. Image enhancement techniques employed by an analyst must be explainable and within the scope of their training.

10.3.2. The processing steps for enhancements of examination quality images shall be documented in the case record (which is captured electronically via Photoshop and stored with the image in LIMS). The resultant enhanced image(s) will also be retained in LIMS (see Sect. 13.2 Digital Image Enhancement/Processing for ACE-V).

10.3.3. Disposition of Digital Evidence

- Copies of photographs and/or videos may be made as necessary to unalterable permanent storage media, such as an archive-quality CD-R or DVD-R, per Criminalist discretion or request from authorized personnel (e.g., Criminal Investigation Division personnel, detectives, coroners, attorneys).
- Label the CD-R or DVD-R with the following information:
    - DR number (case number)
    - General description of what is on the media
    - Date on which the disc was made and by whom
    - An indication that the media is a “copy”
- The media disc shall be treated as an evidence item for tracking and security purposes: barcoded, proper packaging, a Property Invoice, and chain of custody.

11. Recording Friction Ridge Exemplars

When called upon to record finger and palm print exemplars, the analyst shall record all friction ridge skin detail which may be required for comparison. Major case prints consist of recordings of all the friction ridge detail present on the palmar surfaces of the hands. This includes the extreme sides and bottom of the palms and the extreme tips, side, and lower joints of the fingers. If necessary, friction ridge detail on the bottom of the feet and toes may also be recorded. Include the extreme sides of the bottom of the feet and the extreme tips, sides, and joint of the toes.

Various methods and techniques may be used to facilitate the successful recording and preservation of suspect, victim, elimination, or postmortem exemplars. The condition of the friction ride skin will dictate the various methods and techniques that should be used to successfully record the friction ridge detail. The following methods should be considered, noting it may be necessary to use more than one method.

Decedent prints and biologically contaminated exemplars will be packaged in a separate evidence envelope and booked into ACSO Property Room. If needed for in-house comparisons, a scan, copy, or photograph of the exemplar(s) may be placed in LIMS prior to booking.

Materials

Exemplars should be recorded with black ink on a white background card whenever possible. An 8”x 8” template card is preferred, but not required. Black magnetic powder may also be used and resulting impression captured on an adhesive backing with a clear sheet placed on top. When completed, each page of the exemplars must be signed and dated by the person recording the exemplar(s), and DR added to all associated cards. When known, the source of the exemplars must be noted on each card and, if possible, signed by the donor. Indicate on the exemplar if subject is unknown or the circumstances preventing a signature.

11.1. Suspect, Victim, and Elimination Print Exemplars

11.1.1. The area of the friction ridge skin being recorded should be thoroughly washed. Firmly roll a thin, even film of ink over the entire surface being recorded.

11.1.2. Fingers shall be recorded by rolling from each edge of the fingernail to the other and should include the entire joint from the palm to the fingernail. The tips of the fingers may also be recorded by placing the inked tip along the fingernail on the card at a 45° angle and shifting from one side of the tip to the other.

11.1.3. Record friction ridge skin from the fingers in order, beginning with the right thumb and proceeding through the fingers of the right hand and then continuing with the left thumb and proceeding through the fingers of the left hand.

11.1.4. The exemplars must be labeled immediately to clearly indicate which finger is which.

11.1.5. Palms are best recorded using a cylindrical object 3 inches or more in diameter. The card shall be positioned around the cylinder and held in place with a rubber band around each

end, or another method to secure the card may be used. The inked heel of the palm is placed on the edge with fingers together and pointed straight ahead. Roll the cylinder backwards with the palm of the subject's hand until the tip areas of the fingers are recorded.

11.1.6. If a cylindrical object is not available, the inked hand may be recorded with a stamping action onto the center of the card (be sure to place adequate pressure in the raised/cupped center of the hand).

11.1.7. Record the edges of the hypothenar and thenar areas with a stamping action on the white card just outside those respective areas on the previously recorded palm print.

11.1.8. Footprints may be recorded in a manner similar to the palms, either by rolling the foot from the heel to the toes or by stamping straight down onto a white card. Ensure that the card is large enough to record the entire surface of the friction ridge skin.

11.2. Deceased Person Exemplars

If possible, the procedures for recording suspect, victim, and elimination print exemplars should be followed. In most cases, however, unique measures will be required to adequately record friction ridge detail of deceased persons. Examine human remains visually to determine the appropriate methods of obtaining prints. If the described methods are unsuccessful in obtaining the necessary exemplars, digital imaging may be employed to record the friction ridge skin detail. The following methods would typically be done at the Coroner's Office and therefore, should be coordinated with them.

11.2.1. Rehydrating Skin

The area of the friction ridge skin being recorded should be thoroughly washed. In cases where rigor and decomposition have affected the pliability of the skin, the area being recorded may be hydrated by injecting water or tissue builder under the surface. In some cases, the outer layer of the skin may be removed and similarly cleaned and hydrated in preparation for recording the friction ridge skin detail. The analyst shall determine the best means for preparing the skin.

11.2.2. Human Remains in Good Condition

11.2.2.1. If fingers are received detached, place each finger in an appropriately labeled container (one through ten to correspond with the finger number, Item number, case number and analyst's initials/Ada#).

11.2.2.2. 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, case number and analyst's initials/Ada#.

11.2.2.3. Gently clean the remains using a brush and warm water.

11.2.2.4. Air dry the friction ridges or blot with paper towels before attempting to print.

11.2.2.5. Use the appropriate printing method. Powder the finger and roll the powdered finger on the appropriate lifting medium with a clear sheet placed on top (the print

must be examined with the adhesive side of the tape facing the examiner), or apply ink to the finger and roll the inked finger on a fingerprint card. A fingerprint spoon may be used to facilitate recording.

11.2.2.6. Rolled palm method- apply ink to palm, roll palm onto paper and check results.

11.2.2.7. Preservation of both the powder and ink methods may be done via photography in addition to or in place of the adhesive method. This is circumstance dependent.

11.2.3. Desiccated Human Remains

11.2.3.1. 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.

11.2.3.2. 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.

11.2.3.3. Air dry the friction ridges or blot with paper towels before attempting to print.

11.2.3.4. 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.

11.2.3.5. Alternatively, use a casting material (Mikrosil or equivalent) to record the friction ridge skin, following manufacturer's recommendations for application of casting material.

11.2.3.6. Alternatively, photograph the friction ridge skin detail.

11.2.4. 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.

11.2.4.1. Gently clean the remains using a soft brush and warm water.

11.2.4.2. Dry the friction ridges before attempting to print. Air dry or blot the friction ridges with paper towels or dry with alcohol or acetone.

11.2.4.3. Use the appropriate printing method. Powder the finger and roll the powdered finger on a Handiprint 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.

11.2.5. Alternative Printing Methods for Gloved Skin

11.2.5.1. Slip the skin over the examiner's gloved finger and roll the finger in ink or powder the finger, then roll onto the appropriate card or acetate.

11.2.5.2. Use a casting material (Mikrosil or equivalent) to record friction ridge skin detail.

11.2.5.3. Photograph the friction skin ridge detail.

11.2.5.4. If printing the underneath side of the epidermis, the print will be in the reverse position.

11.2.6. 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.

11.2.6.1. Remove hardened or partially loose skin by gently twisting.

11.2.6.2. Examine underside of the skin for ridge detail.

11.2.6.3. Gently clean the remains using a brush and warm water.

11.2.6.4. Photograph the friction skin ridge detail.

11.2.6.5. Dry the friction ridges before attempting to print.

11.2.6.6. Air dry or blot the friction ridges with paper towels or dry with alcohol or acetone.

11.2.6.7. 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.

11.2.6.8. If the friction ridge skin has been destroyed by burning, note on the fingerprint card.

11.2.7. Human Remains in a State of Rigor

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

11.2.7.2. Photograph the friction skin ridge detail.

11.2.7.3. Use the appropriate printing method. Powder the finger and roll the powdered finger on a Handprint 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.

11.2.8. Absent Epidermal Layer and Depressed Dermal Layer Ridges

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. 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.

11.2.9. Limitations

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

12. Latent Impression Examinations Using the ACE-V Methodology

Friction ridge impression examinations are conducted by examiners using the Analysis, Comparison, Evaluation, and Verification (ACE-V) methodology in consideration of both qualitative and quantitative aspects. ACE is not generally applied as a strictly linear process; it may include a return to any previous phase. Applications of ACE-V include observations, measurements, assessments, decision-making, and documentation supported by the education, training, skill, and experience of the examiner.

The examination of friction ridge impressions and the resulting conclusions are based on ridge flow and ridge paths, the location, direction, and spatial relationships of minutiae, and ridge structure. The analysis phase leads to the determination of suitability for comparison, leading to an evaluation which may conclude in identification, exclusion, or inconclusive. These conclusions are based on the following premises:

- Friction ridge skin bears an extremely complex, unique, and persistent morphological structure.
- Notwithstanding the pliability of friction ridge skin, the contingencies of touching a surface and the nature of the matrix, an impression of friction ridge skin structure may be left following contact with a surface.
- This impression may display features of varying quality (clarity of ridge features) and specificity (weighted values and rarity).
- Notwithstanding variations in clarity and specificity, the unique aspects of friction ridge skin contain highly discriminative features.
- An impression that contains sufficient quality and quantity of friction ridge features can be identified to, or excluded from, a source.
- The use of a fixed number of friction ridge features as a threshold for the establishment of an identification is not scientifically supported (see OSAC – Standard for Examining Friction Ridge Impressions).

12.1. Scope

The ACE-V methodology is applied to examinations and comparisons of friction ridge impressions. This section applies not only to the more common comparisons of unknown to known impressions but is also applicable to known to known and unknown to unknown comparisons. The application of the ACE-V methodology to casework requires examiner competency as established through the Evidence Processing and Latent Print Training Manual and Crime Laboratory Quality Assurance Manual.

12.2. Factors Affecting Examinations

The following factors affect the qualitative and quantitative aspects of friction ridge impressions. A competent examiner will understand these factors, recognize that they occur in friction ridge impressions, and understand how they influence friction ridge impression reproducibility. Failure to properly assess the occurrence and influence of these factors could result in

misinterpretation. When applicable, the following factors must be considered in all steps of the ACE-V methodology:

- Anatomical aspects, including the condition of the skin (e.g., scars and warts) and the morphology of the hand and foot relative to the shape and contour of the substrate
- Transfer conditions, including pressure applied during transfer, slippage/lateral movement or twisting, sequence of deposition (i.e., double taps and overlays), and an understanding of the limitations of friction ridge pliability
- Matrix, including bodily secretions and contaminants (e.g., sweat, blood, paint, dirt, oil, grease)
- Detection techniques that can be one or more of the following: optical (i.e., light sources and illumination techniques), physical, or chemical processing techniques
- Recording or preservation techniques, such as photography, lifting, live-scan, and ink
- Substrate (e.g., porous, non-porous, semi-porous, smooth, rough, corrugated, pliable, or textured surfaces)
- Environmental conditions (e.g., protected, unprotected, wet, dry, cold, or hot) (see SWGFAST Document #10, pg. 2)

12.3. Levels of Friction Ridge Impression Detail for Examinations

The ACE-V methodology of friction ridge impression examination utilizes a qualitative and quantitative assessment of Level 1, Level 2, and Level 3 details. The features and related observable data that should be considered during the analysis includes the classification pattern, ridge flow, minutiae, creases or wrinkles, and scars, as well as the individual attributes of the features, such as type, location, orientation, shape, texture, and morphology.

12.4. Analysis, Comparison, Evaluation, and Verification (ACE-V)

12.4.1. Analysis

The assessment of a friction ridge impression to determine if the impression is of value for search in the Multi-Modal Biometric Identification System (MBIS) or for manual comparison. Factors considered include the following:

- The quality and quantity of Level 1, 2, and 3 detail
- The anatomical source of the impression
- Condition of the friction skin
- Deposition pressure
- Surface/substrate
- Environment
- Development medium
- Method of preservation

The analysis may also provide anatomical information to prioritize the potential corresponding areas and limit unnecessary comparisons. Certain orientation indicators such

as recurves, deltas, creases, and scars may provide specific guidance as to where to begin the comparison.

12.4.1.1. Level 1 Detail

Refers to overall ridge flow and general morphology (e.g., presence of incipient ridges, overall size). Level 1 detail can be used for:

- Pattern interpretation
- Determine anatomical source (e.g., finger, palm, foot, toe)
- Orientation

It is not used alone for identification, but it can be used for exclusion purposes under certain circumstances. Not all three must be present for sufficiency consideration.

12.4.1.2. Level 2 Detail

Refers to features associated with individual ridge paths to include the absence or presence of ridge endings, bifurcations, or dots as well as the path morphology (i.e., size and flow of a ridge). Level 2 can be used in conjunction with Level 1 for identification or exclusion.

12.4.1.3. Level 3 Detail

Refers to the structure of individual ridges, such as shape of the ridge and relative pore position and location, and specific friction skin morphology such as secondary crease, ridge breaks, among others. These details are used in conjunction with Level 1 and Level 2 detail to identify or exclude. Other features associated with friction ridge skin, such as crease and scars, may be useful in conjunction with Level 2 friction ridge detail to identify or exclude.

12.4.1.4. Determination of Suitability

The determination of whether a friction ridge impression is of value for search in MBIS/NGI or of value for comparison is based on the assessment of the discriminating strength of the features and their arrangements. MBIS/NGI and comparison value is the determination, by an analyst trained to competency, that there is adequate quality and quantity of friction ridge features in an impression for an MBIS/NGI search and/or comparison. The assessment is made based on the observed features' quality (clarity of the observed features), quantity (amount of features and area), specificity (weighted values and rarity), and their relationship (see SWGFAST Document #10, pg. 3).

12.4.1.4.1. Quality

Quality is the assessment of the clarity of ridge features. Generally, as quality increases so does the discernibility and reliability of the ridge features. It is recognized that quality is not necessarily

constant throughout an impression. The assessment of quality may represent just the areas of highest quality, a range of qualities, or a map or rating system of quality of various regions in a single impression.

Table 1 shall be used for categorizing the levels of quality of the features in an impression (unknown or known). The level of quality determines the degree of tolerances that will be used during the comparison process. High quality will lead to low tolerances and conversely low quality will require high tolerances. The utility of these categories is to assist in the analysis of suitability and subsequent evaluation and verification. The quality assessment should not be considered as the sole criteria for a decision threshold.

Tolerance is the allowance of variation in appearance of friction ridge features (due to the factors listed in section 12.2) that will be accepted during comparison, should the corresponding print be available (see SWGFAST Document #19) (see SWGFAST Document #10, pg. 5).

There are subjective as well as objective elements to this categorization, but the descriptions provided in the table should allow a meaningful quality description to be made.

Table 1 Categories of Quality Defined as a Function of Levels of Details (see SWGFAST Document #10, pg.5)

Quality	
High	Level 1 is distinct; Level 2 details are distinct; There are abundant distinct Level 3 details.
Medium High	Level 1 is distinct; Most of the Level 2 details are distinct; There are minimal distinct Level 3 details.
Medium Low	Level 1 is distinct; Few of the Level 2 details are distinct; There are minimal distinct Level 3 details.

Low	Level 1 may not be distinct; Most of the Level 2 details are indistinct; There are no distinct Level 3 details.

12.4.1.4.2. A quality assessment (using Table 1) will be noted. The complexity of the impression as described below will dictate the extent of the documentation:

Non-complex

High or Medium High quality with a plainly sufficient quantity of features. Only the minimum documentation of the relevant features that may be used as a basis for a conclusion is required.

Complex

Low or Medium Low quality with uncertain sufficiency of the quantity of features. Extensive documentation of the relevant features used as a basis for a conclusion is required. (see SWGFAST Document #10, p.8)

12.4.1.4.3. An impression categorized initially as non-complex may be re-classified as complex if the following modifying factors are present: low specificity of features, significant distortion (e.g., multiple taps, superimposed impression, extreme pressure leading to tonal reversal, and slippage/movement), high tolerances, or the original conclusion is contested during verification.

12.4.1.4.4. An impression categorized initially as complex may be re-classified as non-complex if modifying factors are present such as high specificity of features, presence of creases, scars, and open fields.

12.4.1.4.5. Justification for reassignment of complexity shall be documented (see SWGFAST Document #10, pg. 8).

12.4.1.4.6. Quantity

Quantity, as applied in this section, is the number of ridge endings, bifurcations, and dots (minutiae) in contiguous ridges and other unique features, if present, such as scars, creases, and incipient ridges. All features are considered, including indistinct features for which type, or exact location cannot be established. The utility of the quantity of features is to assist in the analysis of suitability and the recognition of alternative levels of case complexity as they relate to sufficiency with subsequent evaluation and verification. The quantity of features should not be

considered as the sole criteria for a decision threshold. The utility of the number of features as applied in this section is to assist in the analysis of suitability and the recognition of alternative levels of case complexity as they relate to sufficiency, evaluation, and verification. This use of the number of minutiae should not be considered as suggesting or endorsing the use of minutiae counts as the sole criteria for a decision threshold (see SWGFAST Document #10, pg. 6).

12.4.1.5.1. Designating Impressions for Comparison

12.4.1.5.1. Any impression that is potentially suitable for identification will be designated for comparison.

12.4.1.5.2. Impressions suitable for exclusion only will be marked as such and only be compared at the examiner's discretion or upon a specific request by the customer.

12.4.1.5.3. No additional analysis will be required for any impressions that are not designated for comparison. If an impression is designated for comparison, more comprehensive analysis determines the features and their tolerances to be used in the comparison.

12.4.1.5.4. An impression must go through a documented analysis and be given a unique identifier prior to being compared.

12.4.1.5.5. The unique identifier for impressions designated for comparison should be distinct from the unique image and lift card identifiers (see Section 13.1.1). The identifier will be marked near the impression within the image or on the lift card. Copies of annotated lifts or images will be retained in the case record.

12.4.1.6. Analysis Documentation of Impressions Designated for Comparison

12.4.1.6.1. Analysis documentation of a latent print of value shall be completed prior to comparison. Initial analysis (mark-up) of latent print shall be uploaded to LIMS. Annotations in LIMS shall include enhancement software system used (such as Photoshop), initials, Ada number and date (e.g., PS analysis TE #7172, 9/26/22) Minimum documentation of analysis includes the following, if known:

- Anatomical source (e.g., fingerprint, palm print)
- Anatomical orientation (e.g., distal direction)
- Presence of level 1 detail
- Presence of level 2 detail

When known, the following shall be documents within the case record:

- Substrate
- Development medium
- Preservation method (e.g., lift, photograph, legible copy)

12.4.1.6.2. Extensive documentation of analysis includes the following, either through narrative or image mark-up:

- Minimum documentation requirements
- Additional factors, if known, such as matrix, deposition pressure, lateral movement, rotational movement, level 3 detail, or other friction ridge skin detail (e.g., creases, scars)
- The location of sufficient level 2 features to establish at least one target group for comparison and/or reach a conclusion of identification or exclusion

12.4.1.6.3. Image mark-ups shall be clear in their intent or color-coded. When a color-coded image mark-up is utilized, the following key should be used:

Color Coded Mark-Up	
	Unclear areas of ridge flow
	Debatable minutiae
	Definitive minutiae
	Definitive ridge edges and pores
	Scars and creases

Table 2 Color Key for Documenting Impressions Designated for Comparison (see SWGFAST Document #8, pg. 13)

If a different color scheme is used, it shall be documented in the examination records. A legible copy of the unmarked latent print shall be retained in the case record. Analysis documentation of a latent print designated for comparison shall be completed prior to comparison.

12.4.1.6.4. Ridges and ridge features may be traced, shaded, or highlighted using any semi-transparent color. Dots may also be used to indicate location of minutiae, as described in Table 2 (see OSAC – Standard for Examining Friction Ridge Impressions and SWGFAST Document #8, pgs. 10, 13).

Note: All images uploaded to LIMS shall have annotations to include relevant information describing the image/process used. When using enhancement tools (e.g., Photoshop), examiner shall ensure the history of the enhanced image is being saved along with the image (see Sect. 13.2).

12.4.1.7. Outcomes for Impressions Designated for Comparison

All impressions given a unique identifier shall be given a sufficiency value as defined below (comparison value, exclusion only value, no value, no ridge detail). Value determinations shall be documented in the annotations section of the LIMS system (e.g., 1KB1.L1A – CV, TE #7172, 8/2/22). Any ridge detail not assigned a unique identifier is considered to be no value.

12.4.1.7.1. Comparison Value

A friction ridge impression contains sufficient quality and quantity to identify or exclude. The examination may continue to the comparison phase.

12.4.1.7.2. Exclusion Only Value

Latent impressions of value for exclusion are routinely marked as such and described on the ACE-V worksheet and in the report.

12.4.1.7.3. MBIS/NGI Value

A friction ridge impression contains sufficient quality and quantity to identify or exclude. In addition, it contains enough quality and quantity of detail to conduct a search in the MBIS/NGI. The examination may continue to an MBIS/NGI search and comparison phase. The purpose of these criteria (see below) is not to restrict an analyst from searching latent prints that do not meet the criteria but is intended to maintain efficiency in computer searches of latent prints. Factors such as training and experience, type of case, number or location of latents, direction from investigators, etc. can all impact on whether a latent is searched in MBIS/NGI.

Fingerprint Criteria

The latent print contains sufficient quality, reliable and encodable Level 2 details. Eight or more Level 2 details provide a good base with which to start.

Palm Print Criteria

The orientation and region of the latent palm print can be reliably determined. The latent print contains sufficient reliable and encodable Level 2 details. Eight or more Level 2 details provide a good base with which to start.

Latents not meeting the above criteria may be entered on a case-by-case basis, determined at the analyst's discretion.

12.4.1.8. Outcomes for Impressions Not Designated for Comparison

The presence of impressions designated for analysis but not designated for comparison shall be documented in the examination records. Documentation may be accomplished by making a "no value" notation (e.g., "NV" or a circled negative sign) on the legible copy retained as part of the case record or by indicating in the examination records that "no value" impressions are present on a lift or photograph. No further documentation of the analysis is required.

12.4.1.8.1. No Value

The friction ridge impression lacks sufficient quality and quantity to identify or exclude. The examination will stop at the analysis phase.

12.4.1.8.2. No Ridge Detail (NRD)

Indicates no ridge detail was observed on the latent lift card, digital image or other medium used to preserve impressions submitted to the laboratory.

12.4.2. Comparison

The direct side-by-side observation of the friction ridge detail in two impressions to determine whether the detail is in agreement based upon similarity, sequence, and spatial relationship within the tolerances of clarity and distortion.

Comparison of impressions known to be from different anatomical sources is unnecessary. If a comparison cannot be completed because the exemplars required for a conclusive comparison are not available, the necessary exemplars should be requested to either complete the current request or for a possible subsequent request. If the anatomical source of one or more of the impressions being considered is unknown, all possible areas shall be compared.

12.4.2.1. Documentation of Comparisons

12.4.2.1.1. Regarding known impressions: documentation that records the information relied upon during comparison shall be made for each comparison. The quality and quantity of the information present will dictate the extent of the documentation. The analyzed latent print (included with mark-ups) should be used for the side-by-side comparison.

12.4.2.1.2. These factors include:

- Incomplete recording of the friction ridge skin
- Missing anatomical sources (e.g., palms, areas of fingers)
- Unclear recording of the friction ridge skin

12.4.2.1.3. If re-analysis of the latent print during comparison results in new information, supplemental notes shall be added and dated.

12.4.2.1.4. If an impression is re-analyzed in the comparison process and determined to be unsuitable for comparison, the notes must reflect that the comparison was attempted and the reason for vacating the comparison.

12.4.2.1.5. A legible copy of known prints used for comparison will be retained in the case record. The origin of the exemplars will also be documented in the examination records if they were obtained from any source other than being printed/downloaded on site from the WIN archives.

12.4.2.1.6. Known prints that are deemed insufficient for comparison, or that contain any factors that adversely affect the comparison, shall be documented.

Simultaneous Impression

When determining if friction ridge impressions are part of a simultaneous impression, the following factors must be considered and documented:

- Substrate
  If the aggregate of the friction ridge impressions is consistent with the surface(s) on which it appears
- Orientation
  If the orientation is consistent between:
  - Friction ridge impressions within the aggregate
  - Each friction ridge impression and the hand or foot
  - morphology
  - The hand or foot morphology and the source object
- Spatial relationship
  If each friction ridge impression within the aggregate is within anatomical spatial tolerances of the hand or foot and the substrate
- Friction ridge skin features and anatomical features
- If the friction ridge skin features (ridge width, ridge flow, creases) and anatomical features (finger height, toe span, and impression size) are consistent with simultaneity
- Processing technique and matrix
  If each friction ridge impression within the aggregate has similar and consistent appearance for the matrix or processing technique(s) used to visualize it
- Distortion
  If the friction ridge impressions have consistent appearance with regards to deposition pressure, lateral pressure, and rotational distortion

The analysis of the above factors will support or refute simultaneity.

Any impressions meeting the criteria described may be considered simultaneous. If they do not meet the criteria, then each impression that is sufficient to stand alone shall be considered independently (see SWGFAST Document #20).

12.4.2.2. Comparison to Victim or Elimination Prints

Victim or Elimination prints are exemplar prints of individuals known to have legitimate access to an item or location. It is not the policy of the Crime Laboratory to routinely compare Victim/Elimination prints to latent prints unless requested by the customer. If no subjects are provided to compare in the case, the analyst may proceed directly to MBIS/NGI searching. If victim prints are generated through an MBIS "hit," they shall be compared, and results shall be forwarded to the requestor.

12.4.2.3. Comparison to a MBIS/NGI Generated Candidate

A candidate generated from a MBIS/NGI search shall have their known impressions compared to the latent they "hit" to (Refer Section 13.7.1. MBIS "Hit" Outcomes).

12.4.3. Evaluation

Evaluation is the formulation of a conclusion based upon the analysis and comparison of friction ridge impressions. An examiner considers, based upon knowledge and experience, the probability of encountering the observed corresponding features in two impressions made by the same source against the probability of observing the same correspondence between the unknown impression and an impression from a different source. The probability is considered by the examiner factoring in the strength of the evidence and the degree to which support for one proposition outweighs support for the conflicting proposition.

A quantifiable probability cannot be assigned to the likelihood of these events without the use of a statistical model (no statistical model is validated for use by the lab at this time).

Conclusions which may be reached as a result of an evaluation are Source Identification, Source Exclusion, Inconclusive/Lacking Support, and Incomplete.

12.4.3.1. Source Identification

Source identification is the conclusion that the observed data provides substantially stronger support that the two impressions originated from the same source rather than different sources. There is strong correspondence present

such that the examiner would not expect to see the same arrangement of details repeated in an impression from another source (United States Department of Justice Uniform Language for Testimony and Reports for the Forensic Latent Print Discipline).

In order to support the proposition that the two impressions were made by the same source, an examiner must find discriminability in the corresponding features to outweigh any support for the proposition that the two impressions were made by different sources.

When evaluating a simultaneous impression, and subsequently determining identification, the details contained within all the friction ridge impressions must be in agreement across all corresponding impressions.

12.4.3.2. Source Exclusion

Source exclusion is the conclusion that the observed data provides substantially stronger support that the two impressions originated from different sources rather than the same source. There is a strong disagreement present such that the examiner would not expect to see that level of disagreement in an impression from the same source.

Source exclusion of a subject can only be concluded if all relevant anatomical areas are represented and legible in the known exemplars. In addition, an anchor point must be present and used in conjunction with the observed features for a source exclusion to be concluded. An anchor point may be one of the following: innermost recurve, delta, or a characteristic ridge flow/pattern (i.e., arches). A portion of a palm with enough ridge detail to reliably determine the source location may also be used in lieu of an anchor point.

Ridge morphology, incipient ridges, and occasional features cannot be the sole factors for source exclusion (United States Department of Justice Uniform Language for Testimony and Reports for the Forensic Latent Print Discipline).

12.4.3.3. Inconclusive/Lacking Support

Inconclusive/lacking support is the conclusion that the observations do not provide a sufficient degree of support for one proposition over the other.

Inconclusive determinations may be the result of uncertainty in the distal orientation or anatomical source of an unknown impression or upon determination in comparison that the detail in an unknown impression is insufficient to either identify or exclude a subject.

To reach an inconclusive decision, the analyst has determined that additional exemplars will not permit a definitive conclusion. (United States Department of Justice Uniform Language for Testimony and Reports for the Forensic Latent Print Discipline)

12.4.3.4. Incomplete

An incomplete comparison will occur when the exemplars are inadequate (quantity or quality). The latent impression may or may not have limited detail in agreement with the exemplars. Additional exemplars of the friction ridge skin will be required and may permit the analyst to reach a source conclusion.

12.4.3.5. Documentation of Evaluation Conclusions

All conclusions shall be documented on the ACE-V worksheet and annotated in LIMS, and shall include the unique impression identifier, unique identifier of the exemplars (as appropriate, see below), anatomical source(s) identified or excluded, initials of the examiner reaching the conclusion, and the date the conclusion was reached.

12.4.3.5.1. *For Known Exemplars Obtained by Analyst*

Documentation shall include state identification number (or other identification number such as the FBI identification number) and should also include the subject name if available; additional information such as date of birth or date of arrest should also be documented. If numerous exemplars are submitted or obtained for the same individual a brief descriptor (e.g., last four digits of the TCN) or sequential indicator (e.g., K1, K2, K3…) shall be used to differentiate the exemplars.

12.4.3.5.2. *ForSubmitted Known Exemplars*

Documentation shall include the item number (contributing agency or as assigned by the laboratory) and should include additional information such as name and state identification number (SID) or date of birth.

12.4.3.5.3. *For Comparisons of Two Unknown Impressions*

The unique identifier of each impression, initials of the examiner reaching the conclusion, and the date the conclusion was reached shall be documented on the ACE-V worksheet.

12.4.3.5.4. Documentation to support the conclusion shall be such that another competent examiner could evaluate what was done and interpret the conclusion. The documentation must be sufficient to demonstrate the basis upon which the conclusion was based. This may include a combination of written notes and printed images (Freehand markings

on printed images are acceptable, provided they are clear and unambiguous. Image mark-ups shall be clear in their intent or color-coded).

12.4.4. Verification

Verification is the independent confirmation by another qualified examiner, that a conclusion or opinion conforms to specified requirements and is reproducible.

All conclusions shall be verified (source identification, inconclusive/lacking support, source exclusion, no value, and no ridge detail). If an impression is identified, any exclusions to the impression do not need to be verified unless requested by the case analyst, so it can be specified in the report.

If the verifier believes that another conclusion would be more appropriate, he or she will discuss the conclusion with the examiner and follow the process outlined in the Conflict Section (12.4.5.1.) of this manual. All conclusion changes will be reported to the examiner's Technical Leader when verification is complete. All erroneous source identifications or source exclusions will first be reported to the examiner's supervisor, prior to a discussion with the original examiner.

12.4.5. Consultation and Conflict Resolution

Consultation

A consultation can occur after the examiner has recorded their preliminary observations in the case record. To avoid any potential bias from the examiner, these observations shall not be provided to the consultant until they have completed their observations.

- The following consultation interactions shall be documented:
- Assessment of the utility of the friction ridge impression for comparison value.
- Presence or absence of specific friction ridge features during the analysis or comparison phases.
- Assessment of a friction ridge impression for database searching.
- Simultaneity of impressions.

A consultant who has viewed both known and unknown friction ridge samples shall not be used as the verifier or technical reviewer for that examination.

If there is doubt whether a discussion has risen to the level of a consultation, it should be treated as a consultation.

12.4.5.1. Documenting Consultations

A consultation must be documented with the specific impression(s) discussed, the nature and result of the consultation, date(s) of the consultation, and the

consultant (see OSAC – Standard for Consultation During Friction Ridge Examination).

12.4.5.2. Conflict

- Conflict may be resolved through a consultation among the conflicting examiners. They should attempt to resolve the conflicting suitability decisions or source conclusions via consultation with an attempt to arrive at a mutually agreed upon decision or conclusion that is best supported by the observed data. In such instances, the original analyst and the verifier should attempt to resolve their difference of view through discussion, enlargements, or other means of communication available to convey their opinion.
- If agreement is achieved, then the conflict resolution process concludes.
- If agreement is not achieved, the disagreements shall be noted in the case file. The case file, including documentation from each examiner supporting their opinion, will be brought to the attention of the Technical Leader for mediation.
- If agreement cannot be reached during mediation with the Technical Leaders(s) (unless the Technical Leader is involved in the conflict, in which case it would be referred to designee who will select an analyst to act in the Technical Lead position for this conflict resolution procedure).
- When a conflict is referred to the Technical Leader, they will gather additional data. If blind verification is used, the analyst(s) selected should be, to the extent possible, unaware of the people involved and the questioned result. This may have to be done by qualified examiners external to the Laboratory, based on available resources.
- All documentation generated during the conflict process will be retained in the case file.
- The Technical Lead or Manager will review the issue and propose a recommendation in accordance with the QAM, taking into account data provided by all parties involved.
- The Technical Leader or Manager will be guided by the following considerations.
- If the difference in opinion is one of degree, such as when the analyst concludes an identification or exclusion and the verifier makes an “inconclusive” call, the Manager, may refer the case to a qualified independent internal or external analyst. If referral is made, all analysts must ultimately agree, or the examination will be reported as “inconclusive”.

- If the difference in opinion is profound, for example as when the analyst's conclusion is an identification and the verifier's conclusions is an exclusion, the Manager shall seek the assistance of a qualified independent internal or external analyst. The review will be blind.
- If the independent analyst returns an inconclusive result, the case will be reported as "inconclusive". The case may also be re-assigned. In the event the independent analyst returns a definitive conclusion, the Manager will convene a round table discussion wherein the case analyst, the verifier, and the independent analyst will attempt to resolve their differences of view through discussion, use of enlargements, or other means of communication available to convey their opinion. If unanimous agreement is reached, a report conveying the agreed results will be issued. If a unanimous agreement is not reached, an inconclusive result will be reported.
- The conflict resolution process may reveal a need for corrective action. The process of corrective action due to errors in casework or proficiency tests is described in the Quality Assurance Manual. The Manager will evaluate the need for corrective action with the Chief Administrative Officer (see OSAC - BPR for the Resolution of Conflicts in FRE).

13. Documentation and Report Writing

13.1. Latent Impressions

See Digital Imaging (Section 10)

13.1.1. Latent Lift Cards and other Permanent Medium

13.1.1.1. All latent lift cards shall be initialed with Ada and dated by the primary analyst on the front (tape side) of the lift card. If working with other medium, such as a pawn slip, the same shall apply.

13.1.1.2. The lift card unique identifier shall be written in the top left of both the front and back of the card. The unique identifier shall begin with the Item number (or a capital letter if an Item number wasn't assigned) followed by a letter. All subsequent latent lift cards shall follow the Item number/alphanumeric identifier sequence (e.g., two latent lift cards booked in as JD1 = JD1A, JD1B). Once marked, the analyst or any authorized personnel shall scan all lift cards/other permanent medium and upload the images into LIMS.

13.1.1.3. Ensure that the front (tape side) and back (case information) of each lift card/other permanent medium are scanned as .TIFF images. The front shall include a metric scale and be scanned at a minimum of 1200dpi. *Note: scale should not obstruct or cover any writing on LLC, and/or*

ridge detail. Analyst shall attempt to place scale in an area near latent(s), but to not placed directly on top of lift tape.

The back shall be scanned at a minimum 300dpi. The images shall be uploaded into LIMS and annotated verbatim and in quotes, as described by the submitter on the back of each card. For pawn slips or other permanent medium, the item description as listed on a Property Invoice may be used. Refer to BPD Crime Lab LIMS "How To" Guide regarding latent lift card scanning procedures. The lift cards/other permanent medium should remain in the primary analyst's possession.

13.1.1.4. The analyst shall evaluate all latent print impressions on the latent lift cards/other applicable medium (Refer to Section 12.4.1. Analysis). Latent prints of value shall be marked digitally on the lift cards/other medium using a unique alphanumeric identifier that consists of the Item number for the lift number, followed by an alpha character and number (e.g., a latent on the lift card JD1A will be JD1A.L1). Subsequent latents should be denoted using the next alpha character and number (e.g., a second latent on lift card JD1A will be JD1A.L2). Latent prints that are MBIS quality are marked with an uppercase "A" adjacent to the alphanumeric latent designation (e.g., JD1A.L1A).

13.1.2. Refer to Section 12.4.2.1. ACE-V for latent lift card documentation that involves Identifications, Exclusions, and/or Inconclusive results.

13.1.3. Images in LIMS (scanned and/or saved as child images) shall include annotation describing the image.

13.1.3.1. Initial scan of latent lift card or digital images of latent print(s) to LIMS shall include annotation with information about the latent lift. This information may be found on the back of the LLC and shall be recorded verbatim (e.g., LLC developed by CSS Boynton #7828, on 1/16/21, said to be lifted from "Driver's door"). Analyst shall annotate all digital images of latent prints in this manner.

13.1.3.2. Child images shall include annotation describing analysis of latent print(s) such as sufficiency/suitability conclusion (e.g., "1KB.L1A - CV), information describing image processing/enhancements (e.g., "PS Analysis"), information observed within the latent print (e.g., "Simultaneous impression"). All annotations should include examiner's initials (Ada # is optional), and date child image was created.

13.2. Digital Image Processing/Enhancement for ACE-V

13.2.1. Image processing shall only be conducted on working copies of the original image. Working copies used in forensic case examination shall be saved as a "child image" into LIMS and shall not replace the original image.

13.2.2. Evidentiary images requiring processing shall be processed using Adobe Photoshop or proprietary digital imaging system software using a copy of the original image.

13.2.3. Processed images will be designated using a file name structure generated by the digital imaging system software or Photoshop software.

13.2.4. Image processing/enhancement shall be initiated through LIMS. Analyst shall follow these steps:

- Select scanned image in LIMS to be processed/enhanced
- Select the "PS" icon (Photoshop) on the top ribbon
- Once image has loaded in Photoshop, begin processing/enhancements
- Once image processing/enhancements have been completed, click the "x" next to the image file name tab as if to close the image. The image will then return and save within LIMS.

Note: Do not pre-save image onto desktop or folder. Doing this will change the file name and hinder the file from returning and saving to LIMS. If this is done inadvertently, history of image shall be saved to a Word document and uploaded as a child image (see Sect. 13.2.8).

13.2.5. Once image has returned to LIMS and saved as a child image, the analyst shall add an annotation describing processing phase, followed by initials, Ada #, and date (e.g., "PS Analysis JD, 9/28/22" or "1KB.L1A – CV JD, 9/28/22")

13.2.6. Processing history is recorded via the digital imaging system software. Analyst shall ensure the image history has transferred with the image into LIMS.

13.2.7. To verify that image history has transferred, follow these steps:

- Select image
- Select "History" tab
- History should be recorded under "Old Value," "New Value," and/or "Comments" column(s).

13.2.8. In the event image history did not transfer with the image to LIMS, analyst shall re-open processed/enhanced image in Photoshop (either through LIMS or in PS, recent files), copy history onto a Word document, and upload the document as a child image.

13.2.8.1. The following is a step-by-step guide on how to save image history as child image and upload to LIMS:

- Select image
- Open image in Photoshop within LIMS

- File –> Image Info
- Choose Photoshop (on lefthand side)
- Select All (ctrl + A) -> Copy (ctrl + C)
- Open new Word Document
- Paste (ctrl + V)
- Save doc to desktop as Latent # and "History" (e.g., "L1 History" or "TE1.L1A History"). Ensure document has saved as .doc
- Return to LIMS and click "Upload"
- Select File and upload
- Add annotation: (this is an example, variations of this statement are acceptable) "History did not return with image, therefore, saved as a Word document and attached to this case as notes." Initials, Ada #, date.
- Save

13.2.9. Images stored in a digital imaging system maintained by BPD Crime Lab shall be referenced in the Latent Impression Analysis Report under "Evidence Disposition" (see Verbiage doc uQA-2).

13.3. Responsibility of the Analyst

13.3.1. Analysts shall only use processing techniques that are supported by their training and/or experience.

13.3.2. Analysts shall maintain system security. Network and/or program passwords are not to be distributed to unauthorized users. Operators may change their passwords as needed.

13.4. Analysis Worksheet

The analyst shall complete the Latent Impression Analysis Notes, indicating suitability determinations, the number and designation of any latents, comparison results, whether they are for MBIS entry, and any other relevant information. For any identifications, the anatomical source shall be documented along with the subject's name. For any comparisons the Known Exemplar section of the Latent Impression Analysis Notes shall be filled out, indicating SID/TCN/FBI number and other relevant information listed in that section. Additional results and comments should also be entered in the *NOTES* section.

13.5. Evaluations

13.5.1. Source Identification

13.5.1.1. Identification decisions shall be documented on the ACE-V worksheet.

13.5.1.2. The impression used to render a source ID conclusion shall be clear. Information shall contain (in the image or in the case file), at a minimum (either within the image or on the physical item), the unique identifier, the individual's name identified to/DOB (if present), SID number (if present), and/or (FBI or TCN if SID

not present), anatomical source identified (e.g., #2 RI), initials/Ada number of the analyst, and date.

13.5.1.3. The known exemplar used in the identification shall be initialed to include Ada number, dated, and marked with DR#, manually or electronically, and retained in LIMS.

13.5.2. Source Exclusion

Exclusion decisions shall be documented on the comparison/evaluation portion of the ACE-V worksheet.

13.5.3. Inconclusive/Lacking Support

Inconclusive decisions shall be documented on the comparison/evaluation portion of the ACE-V worksheet. Include the reasoning behind the inconclusive result (refer to Section 12.4.3.3 Inconclusive).

13.6. Verifications

13.6.1. Value Determination of Friction Ridge Impressions

13.6.1.1. Suitability shall be verified by another analyst.

13.6.1.2. If the verifier uses different exemplars than the analyst, those exemplars must be retained as part of the case record and documented in the annotation section corresponding to the exemplar used.

13.6.1.3. If the verifier comes to a different conclusion than the primary analyst, documentation supporting the verifier's conclusion will be retained in the case record.

13.6.1.4. All conclusions shall be verified (refer to Section 12.4.4).

13.6.1.5. The verifying analyst or analysts shall indicate their agreement with the primary analyst's decisions by initialing and dating the latent lift card or making a notation in the annotation section within LIMS on the image used to conduct verification. If digital image only, the verifier shall indicate in the annotation area within LIMS as follows: "V. initials/Ada number and date" (example: V. JD#7935 4/6/23). The verifier(s) shall also add the following notation to the bottom of the side-by-side chart attached to the Latent Impression Analysis Report, indicating agreement and proof of verification for a source identification: "V. initials/Ada number and date."

13.6.1.6. The verifying analyst shall add initials (may be done electronically) and date to ACE-V worksheet in the "Verified" field. This shall be done for all conclusions being verified.

13.7. Known Exemplars

13.7.1. Known impressions submitted to the lab or located and used during analysis by analysts, to include elimination prints and MBIS exemplar printouts, will be scanned/uploaded and entered in LIMS.

13.7.2. If an analyst is collecting an original set of exemplars (e.g. during a search warrant/detention order), evidence envelopes containing the exemplars shall contain the name of the individual, DOB, SID number (if present), name of individual that recorded the impressions, initials/Ada number of analyst, date, and a description of the evidence. This will then be booked into ACSO Property.

13.7.3. Evidence shall be sealed with evidence tape and initialed/Ada number and dated over the seal.

13.7.4. Notes shall indicate that additional known exemplars are present in the case and retained in LIMS.

13.7.5. Refer to Section 4.3. Contaminated Evidence for the policy regarding evidence containing a potential biohazard.

13.8. Major Case File

13.8.1. Historically, this was the collection of documents comprising information concerning a particular investigation. (This collection may be kept in case jackets, file folders, ring binders, boxes, file drawers, file cabinets, or digital files. Sub-files are often used within case files to segregate and group interviews, media coverage, laboratory requests and reports, evidence documentation, photographs, videotapes, audiotapes, and other documents.)

13.8.2. If a major case file has been established, copies of reports, notes, exemplars and other related documentation may be stored here. Beginning in 2020, this has been phased out as all latents and reports are retained in the LIMS.

14. Multi-Modal Biometric Identification System (MBIS)

14.1. Next Generation Identification (NGI) Background

The Multi-Modal Biometric Identification System (MBIS)/Next Generation identification/(NGI) are computer-aided search tools that allow analysts to search latent prints against a database of known ten-print and palm print records as well as against unknown latents in the database. The database provides a list of potential candidates for the analyst to compare against the unknown latent print. There are several different AFIS databases that can be searched, such as ones at the county, state, regional, and federal levels, but for the purpose of this document they will all be referred to as the MBIS database, since their function is the same. Currently, the Boise Police Department Crime Laboratory accesses the MBIS/NGI databases via NEC MBIS Software.

14.2. References

The current software instructions, vendor training materials, and guidelines can be consulted for system operating instruction and best practices as necessary.

The following documents are located on the Western Identification Network Training Reference Library internet page: (http://winid.org)

- ABIS 3.0 IBW AMF QR
- ABIS 3.0 IBW MMF QR
- ABIS 3.0 IBW Latent QR
  - Latent Best Practices Guide
- ABIS 3.0 Archive QR
  - ABIS 3.0 Training Curriculum
  - ABIS 3.0 Tenprint Training Checklist
  - ABIS 3.0 Latent Training Checklist
  - ABIS 3.0 Archive Training Checklist
- IBW Keyboard Shortcuts
- Connecting encrypted USB drive to VDI desktop

The following applicable documents are located on the MBIS terminal:

- IBW Latent User Guide
- IBW Latent Quick Reference
- Archive User Guide
- Archive Quick Reference
- ULW Guide

14.3. MBIS Entry

MBIS suitability is determined during the Analysis phase. The general criteria for MBIS suitability are outlined in Section 12.4.1. Analysis and Section 0. Value Determination of Friction Ridge Impressions.

An analyst uses their discretion evaluating case circumstances to determine the extent to search WIN and other external databases. However, in addition to the WIN database, impressions from cases of crimes against persons will also be searched in the Las Vegas Metropolitan Police Department and the Federal Bureau of Investigation's NGI databases.

Analysts should use their knowledge of friction ridge skin and the MBIS databases to maximize the likelihood of a potential match. Permutations of searches may be needed due to the attributes of a latent print or to ensure database penetration.

A negative result means that no matching print was located in the searched database; it does not mean that no matching print exists in the database. A MBIS search with negative results will not be verified. Impressions searched with negative results will be registered (unless later identified).

14.3.1. The analyst will add the relevant case information, which should at a minimum contain the case number, Item or Lift card number, Latent number, analyst conducting the search, crime type/code, and crime date.

14.3.2. Refer to the vendor's User Manual for the proper procedure for acquiring, plotting, searching, and registering a latent print.

14.4. Screening MBIS Search Results

For routine casework, the Limitation of Candidates (LOC)/Number of Candididate Images (NOCI) is set to 15 for both Idaho and WIN searches. The number of candidate images returned for NGI is 10 for fingers and 20 for palms (10 from upper palms and 10 from lower palms). Depending on the circumstances of the case, an analyst may opt to higher LOC/NOCI from ID, WIN, or NGI. No fewer than the top 15 candidates shall be searched for Idaho and WIN, unless one of the candidates is identified as the source of the impression. NGI searches may remain at 10, though an analyst may opt to higher LOC/NOCI at their discretion. The appropriate exemplars for any candidate which cannot be excluded on screen shall be obtained for comparison, if available.

14.4.1. Auto LI or Auto LIP (Lights Out Latent Inquiry) is designated to be used with a ROI (Region of Interest). Pattern selection is not utilized for finger searches. For palms, database penetration can be adjusted by specifying right or left and palm area. Analysts have the option to specify search rotation for auto LI/LIP searches.

14.4.2. LI (Latent Inquiry) or LIP (Latent Inquiry Palm) search regions set to "Include Idaho." LI/LIP searches may utilize manual processing, editing, and/or user rotation/penetration parameters if applicable.

14.4.3. LATENT_COMBO or LATENT_PALM_COMBO search regions set to "Exclude Idaho" to search the remaining WIN database and register the print should no HIT be obtained. Combo searches may utilize manual processing, editing, and/or user specific rotation/penetration parameters.

14.4.4. LR (Latent Registration) is routinely performed after a print is searched through ID and WIN as a LI/LIP when no HIT is obtained.

14.4.5. REMOTE_LI for NGI search is an exclusive search through the FBI's database and may be done at the analyst's discretion. Searches may utilize manual processing, editing, and/or user specific rotation/penetration parameters.

14.4.6. At times it may be beneficial to conduct additional database searches using modified search parameters (e.g. include incipient ridges, large ridges, wide ridges, search multiple cores, and/or orientations).

14.5. Documenting MBIS Searches and Registration

For each impression searched, the following shall be documented and/or retained in the examination records to include LIMS:

- Candidate List - Each search will generate a "Latent Verification Report" containing a list of candidates ranked on matching score. System generated Latent Verification Reports generally show the Minutiae, Zoning, and Core placement (if applicable) on the left side of the image.
- In the event of a MBIS HIT, the HIT chart or split screen image of the search print and candidate print should be preserved as administrative documentation.
- Analysts may, at their discretion, include other case documentation such as screenshots of the edited latent or demographic information pertaining to a HIT.

The comparison and exclusion of exemplars of MBIS candidates are part of the MBIS search results and do not need to be specifically reported. However, exemplars of "hit" MBIS candidates will be annotated as such and retained in the case record.

Latent prints searched in the database are compared against the generated candidate list and will result in one of the two following outcomes.

14.5.1. MBIS "Hit"

14.5.1.1. A "hit" in MBIS is not considered to be identified until it has been compared and evaluated to an exemplar from the candidate.

14.5.1.2. A single "hit" to a candidate shall proceed to a comparison and evaluation (refer to Section12.4.2. Comparison and Section 12.4.3. Evaluation) of the known exemplars.

14.5.1.3. If there are multiple "hits" to the same individual, the analyst shall select the most probative latent lift (e.g., inside of a vehicle instead of outside of a vehicle) for comparison and evaluation (refer to Section 12.4.2. Comparison and Section 12.4.3. Evaluation) to the known exemplar. Further comparisons to the remaining latent print(s) that "hit" to the individual are not required and will not be conducted at analyst discretion (MBIS documentation is still required). Deviations to this policy require a written request and approval from the Quality Assurance/Lab Manager or higher ranked member of the Laboratory. This is an administrative decision. If it is unclear to the analyst which latent is most probative, they may use his or her discretion in the selection process (see OSAC – BPR for Limited Friction Ridge Examinations).

14.5.1.4. Once a latent "hits" to a candidate, remaining candidates need not be compared.

14.5.1.5. Refer to Section 14.5. MBIS Searches and Registration for the required printouts and case documentation for a MBIS "hit".

14.5.2. MBIS "No Hit"

14.5.2.1. If the latent does not "hit" to the generated candidates, follow the MBIS software's guidelines for registering the latent to the unsolved latent database, if applicable.

14.5.2.2. Latents may or may not be registered depending on the case specifics such as crime type, latent quality, etc. A reason will be documented in the examination records for an impression searched but not registered (unless identified).

14.5.2.3. Refer to Section 14.5. MBIS Searches and Registration for the required printouts and case documentation for a MBIS "no hit".

14.6. Unsolved Latent Inquiries (ULI)

Registered latent print impressions are automatically searched against newly submitted known exemplar records as they are added to the MBIS database. These responses are sent to the TLI (ten print to latent inquiry) queue. Analysts are responsible for periodically reviewing (at least monthly) the electronic TLI notices. Registered impressions may be deleted from the system manually due to the impression being identified, by agency request, or automatically if the case exceeds the statute of limitations.

14.6.1. Unsolved Latent Inquiry "Hit"/Report

If an unsolved latent inquiry hits, the analyst should generate a Latent Impression Analysis Report regarding the TLI. The report should contain the following statement:

Additional comparisons of previously unidentified latents may be conducted upon written request.

The original analyst who registered the latent should be assigned the request, if available. Otherwise, the request will be assigned to the analyst who issued the ULI Notification, unless otherwise directed by the Manager.

14.7. MBIS Performance Check

A WIN/NEC developed performance check will be performed quarterly by the LP Technical Leader, MBIS Administrator, or a designated and authorized individual. This test verifies that all components of the system, including matching algorithms, are operating within WIN standards. The Quality Assurance Manager and Technical Leader will be notified if a performance check does not return the expected result.

Procedure

The following procedure will be used for performing the performance check (at least one QA print will be searched from each terminal):

1. Import the WIN QA print

a. Open Latent Case Management.
b. Case Information tab-Enter a MBIS case number that incorporates the two digit year following the state, originating agency code, and the two letters PC (for performance check) (e.g. ID03PC21CS01).
c. Evidence tab-Import WIN QA print. Enter an evidence number, WIN designator (e.g. QAP, QAR or QAS).
d. Click "New Latent". Enter the latent number as a date. Month and two-digit year (e.g. 0721).
e. Click search to enter the case. Submit the search without changing any of the search parameters.
f. Check that the results are consistent with the expected results listed on the Control Key provided by WIN.

2. Document the results of the Performance Check on the MBIS Quality Control Log.
3. The job will then be killed and purged from the Job Queue.

15. Quality Assurance

15.1. Technical Review

15.1.1. Technical reviews will be conducted on all evidence processing cases. When possible, reviews should be conducted by another authorized analyst not otherwise involved in the case. On Latent Evaluation and Comparison Cases, reviews may be conducted concurrently with verification, if applicable.

15.1.2. Technical Reviews shall check the following.

- Appropriate tests and/or examinations have been performed
- Grammar/spelling in the case documentation and report is correct and verbiage consistent
- Evidence processing techniques have been conducted in the proper sequence
- Sufficient supporting documentation (notes, images, worksheets, sketches, charts, annotated images, electronic records, etc.) is present and accurate
- Verifications (comparison work) have been completed and properly documented
- Results are clear, concise, accurate, and complete
- Conclusions are consistent with the documented data and within acceptable practice
- Requested examinations have been addressed
- Review of lift cards and associated annotations
- Review of annotations on digital images within LIMS.
- Verification of observations and conclusions
- Worksheets consistent with examinations performed

- Report consistent with worksheets
- Report is signed and dated

15.1.3. Technical reviews will be documented on the Tech and Admin Review Worksheet (QA-4) (see SWGFAST Document #16 - Standard for the Tech Review of FRE)

15.2. Administrative Review

15.2.1. All cases, to include notes and reports, will be administratively reviewed. When possible, reviews should be conducted by another analyst not otherwise involved in the case.

15.2.2. Administrative reviews shall check the following.

- Clerical accuracy
- All examinations reported on
- Report is signed and dated
- Results transcribed properly and clearly communicated
- Appropriate additional samples/standards/exemplars are requested if needed
- Evidence disposition included
- Agency Policy & Procedures followed
- Complete number of all pages
- Worksheet completed
- Necessary documentation present

15.2.3. Administrative reviews will be documented on Tech and Admin Review Worksheet (QA-4).

16. Reporting

See BPD Crime Lab's Quality Assurance Manual (Section 7.8) for detailed information.

16.1. Reports should follow the Verbiage Document (uQA-2), which includes terminology and phrasing. It is recognized that many unique or complex situations may justify variations for the sake of clarity.

16.2. The report may be written in LIMS using the analytical module or another word processing program. The report header must contain the relevant information from the Laboratory in a format similar to the LIMS module-created report.

16.3. Results and/or conclusions for each item of evidence analyzed must be addressed in the report. In addition to the Quality Assurance Manual, the report and associated worksheets must address the following main categories, if applicable:

16.3.1. The techniques used in latent print development, photography, biological screening, trace examination, etc. on each item of evidence and the overall processing results (i.e. images and/or lifts, if any)

16.3.2. Additional evidence collected and/or preserved

16.3.3. Statement that submitted items were not examined

16.3.4. Latent Evaluation and/or Comparison

16.3.4.1. Statement that latent impressions were analyzed.

- Terminology accepted by OSAC (Organization of Scientific Area Committees for Forensic Science) are generally encouraged for usage in reports at the analyst's discretion (refer to OSAC FRS CONCLUSIONS Documents and Document #19 Standard Terminology of Friction Ridge Examination)
- Statement that comparisons were done and the resultant conclusions. The name of all subjects compared must be cited, and the source of the exemplars must be clear. If any subject is identified as the source of any impressions, the state identification number (SID) or other identification number such as the FBI or TCN number must also be cited, if known.
- When reporting identifications, associate the impression identifier and its source item with the name of the exemplar(s) and the correct anatomical source (See Verbiage Document uQA-2). If the source of an impression is identified, all other subjects are assumed to be excluded.

16.3.4.2. Inconclusive Comparisons, stating the reason:

- Impressions assigned a unique identifier which were not designated for comparison (i.e., subsequently determined unsuitable for comparison).

16.3.4.3. Incomplete Comparisons, stating the reason:

- Exemplars for the correct anatomical source of the impression have not been provided or located in the search files.
- MBIS – No additional comparison after 1st confirmed/verified hit ID, to remaining prints that hit in MBIS. Documentation still required to be attached to examination records.
- Exemplars are inadequate (quantity or quality)

16.3.5. Final disposition of evidence following completion of case (e.g. Returned to Property, released to detective, submitted to another agency for further analysis).

16.3.6. Laboratory-generated digital media with images, latent lift cards, or other evidence shall be assigned an Item #, and documented on a Property Invoice. Laboratory-generated evidence may be booked into the Ada County Property Room or released to appropriate personnel (e.g., officer/detective, external laboratory or agency).

17. Equipment

A list of authorized equipment is maintained in QA-25 Lab Equipment Inventory Log, QA-21 Preventative Maintenance Log, and QA-24 Personnel Equipment Inventory Log. User manuals detailing operation and/or maintenance are retained.

17.1. Alternate Light Source

17.1.1. Operation

Refer to the user manual(s) for operation.

17.1.2. Calibration/Performance Check

Prior to use, screen a swatch of fabric stained with the biological fluid of interest. For general visual examination or trace examination, screen a swatch of fabric containing trace. Pre-made swatches are available for use.

17.1.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning.

17.2. Crime-lite Auto

17.2.1. Operation

Refer to the user manual(s) for operation.

17.2.2. Calibration/Performance Check

Prior to use, screen a swatch of fabric stained with the biological fluid of interest. For general visual examination or trace examination, screen a swatch of fabric containing trace. Pre-made swatches are available for use.

17.2.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning.

17.3. Cyanoacrylate Fuming Chambers

17.3.1. Operation

Refer to the user manual(s) and/or this manual for operation.

17.3.2. Calibration/Performance Check

Quality control checks required with each use suffice as regular performance checks of the chambers.

17.3.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) and/or this manual for preventative maintenance and routine cleaning.

17.3.4. Other Situations

Temporary chambers may be utilized on case-by-case basis with Quality Assurance/Lab Manager and/or Technical Leader approval.

17.4. Balances

17.4.1. Operation

Refer to the user manual(s) for operation.

17.4.2. Calibration/Performance Check

Balances should be calibrated at the start of the day, prior to use. Refer to the user manual(s) for calibration. Performance checks include placing the weights back on the scale to confirm accuracy.

17.4.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning. If the user manual(s) does not specify, then use a dusting brush to remove debris from the weighing plate and clean the balance with lint-free cloths slightly dampened with water or a mild cleaning agent. Glass surfaces may be cleaned with a commercial glass cleaner. Do not use solvents, harsh chemicals, ammonia, or abrasive cleaning agents.

17.5. Digital Image Calibration Tool Check

Incorporated into the digital module of LIMS is a utility called "Calibrate". This utility resizes the captured image to bring it to an original 1:1 size.

17.5.1. Operation

Refer to the LIMS user manual for operation.

17.5.2. Calibration/Performance Check

The resizing is not a critical measurement for Latent Print analysis, and discrepancies of 5% (1mm per 2 cm) are within tolerance. The Calibration utility will be checked following installation, significant upgrades, repair, and/or replacement.

17.5.3. Performance Verification

- Photograph a scale into the system
- Calibrate the image using the Image Calibration Tool
- Print the calibrated image at actual size (1:1).
- Compare the scale with the imaged/printed scale. If it appears the same, the check is complete. If the imaged scale is out of tolerance with the original scale, place the scale calibration utility out of service
- When the check is completed, initial and date the print-out and retain with the Equipment Log QA-25.

17.5.4. Maintenance

The Image Calibration Tool is embedded in the LIMS software and requires no maintenance.

17.6. DSLR and IR Cameras

A digital single-lens reflex camera (DSLR) is a camera with interchangeable lenses and a mirror that directs light from the lens to the viewfinder, which enables the user to see exactly what the lens sees. DSLR cameras have applications on a crime scene and in the laboratory. An infrared camera (IR) is a DSLR camera that has been converted to detect and measure infrared light. Alternatively, a video camera with nighttime viewing capabilities may also be used to view infrared. Images and/or videos recorded by an IR camera/video camera are black and white because infrared light is longer in wavelength than the colors of the visible spectrum. See the Biology Screening Technical Manual for theory and method.

17.6.1. Operation

Due to the conversion process of the DSLR camera, the IR camera must be used in the live view mode, in conjunction with an IR light emitter. When using the IR DSLR camera, the white balance should remain on PRE when in the manual mode. When not set to PRE, the resulting photographs will have a pink/purple hue.

The video camera with nighttime viewing capabilities does not require use with an IR light emitter. NightShot Plus (switch on the camera's body) must be "on" to enable its IR detection capabilities.

Refer to the user manual(s) for operation.

17.6.2. Calibration/Performance Check

Performance checks are not required, with the exception of IR cameras. For IR cameras, screen a swatch of IR-reflecting black fabric stained with blood. Pre-made swatches are available for use. For all other camera's, scanners and accessories, the images that are created indicate whether the equipment is working properly.

17.6.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning.

17.7. Scanners

17.7.1. Operation

Examination-quality scans shall be scanned with a metric scale in 1200dpi unless circumstances prevent from doing so. Non-examination-quality scans, such as the opposite side of the latent on a latent lift card, should be scanned in 300dpi. Refer to QA-19 LIMS "How-to" Guide and user manual(s) for operation of scanner.

17.7.2. Calibration/Performance Check

Performance checks are not required.

17.7.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning.

17.8. Vent/Fume Hoods

17.8.1. There are stand alone vent/fume hoods and vent/fume hoods attached to fuming chambers. Operation

Refer to the user manual(s) for operation.

17.8.2. Calibration/Performance Check

External calibration will be conducted annually by an approved external vendor. The results of the calibration shall be documented on each vent/fume hood. Performance checks are not required. An audible hum should indicate that the vent/fume hoods are operating.

17.8.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning.

17.9. Microscopes

17.9.1. Operation

Refer to the user manual(s) for operation.

17.9.2. Calibration/Performance Check

Performance checks are not required.

17.9.3. Maintenance

Maintenance should be in accordance with the manufacturer's recommendations. Refer to the user manual(s) for preventative maintenance and routine cleaning.

18. Terms and Definitions

ACE-V

It is an acronym for the scientific method of hypothesis testing used in latent print comparisons. The acronym stands for: Analysis, Comparison, Evaluation and Verification. See individual terms for further.

ADMINISTRATIVE REVIEW

The review conducted in order to determine the clerical accuracy of reports and case documentation and to ensure the examiner/analyst has followed agency policy and procedure. Administrative reviewers do not have to be trained to competency.

ALTERNATE LIGHT SOURCE (ALS)

An instrument which delivers a high intensity light of specific wavelengths. It may be used with appropriate filters to visualize different types of evidence, such as fibers or chemically treated fingerprints, as they may fluoresce during exposure to this light. Other types of evidence, such as bloodstains, may absorb light.

ANALYSIS

The methodical examination of friction ridge impressions, and first step in the ACE-V methodology. It is at this step a latent print is determined to be suitable or unsuitable for comparison.

ANATOMICAL SOURCE

An area of friction ridge skin from an individual from which an impression originated (finger, joint, palm, toe, or sole).

ARCH (PLAIN)

A type of fingerprint pattern in which the ridges enter on one side of the impression, and flow, or tend to flow, out the other with a rise or wave in the center.

ARCH (TENTED)

A type of fingerprint pattern that possesses an angle, an up-thrust, or two of the three basic characteristics of the loop.

ARTIFACT

- Any distortion or alteration not in the original friction ridge impression, produced by an external agent or action.
- Any information not present in the original object/image, inadvertently introduced by image capture, processing, compressions, transmission, display or printing.

AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM (AFIS)

An automated system used to search both unknown and/or questioned latent or inked/LiveScan fingerprints and palm prints against a database of known prints and return a list of potential candidates to the analyst. It is used in the latent print discipline primarily to search latent fingerprints and palm prints against on-file records in an attempt to identify the source of the latent print (also known as MBIS and IAFIS).

Axon Evidence

(Evidence.com) Boise Police Department's digital evidence storage.

BIAS

See cognitive bias, confirmation bias, and contextual bias.

BIFURCATION

The point at which one friction ridge divides into two friction ridges.

BLIND VERIFICATION

The independent examination of one or more friction ridge impressions at any stage of the ACE process by another competent analyst who is provided with no, or limited, contextual information, and has no expectation or knowledge of the determinations or conclusions of the original analyst/examiner.

BRIDGE

A connecting friction ridge between, and generally at right angles to, parallel running friction ridges.

CANDIDATE

An individual's finger/palm print record, generated after a search through AFIS, which is under consideration for comparison to the latent finger/palm print searched.

CHARACTERISTIC/MINUTIA

Distinctive detail of friction ridges; commonly referred to as minutiae, Galton detail, point, feature, ridge formation, or ridge morphology (dot, bifurcation, and ending ridge). This includes Level 1, 2, and 3 details.

COGNITIVE BIAS

The effect of perceptual or mental processes on the reliability and validity of one's observations and conclusions.

CLARITY

Visual quality of a friction ridge impression. The quality of the visible distinguishable features or the level of detail of a print.

CLASS CHARACTERISTICS

Characteristics used to put things into groups or classes (e.g., arches, loops, and whorls).

CLASSIFICATION

Alpha/numeric formula of fingerprint patterns used as a guide for filing and searching.

COMPARISON

The side-by-side observation of two areas of friction ridge impressions to determine the existence of similarities and/or differences. It is the second step in the ACE-V methodology.

COMPETENCY

Possessing and demonstrating the requisite knowledge, skills, and abilities to successfully perform a specific task.

COMPLETE FRICTION RIDGE EXEMPLAR

A systematic recording of all friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, joints, tips, and sides of the fingers (also known as major case prints).

COMPLEX EXAMINATIONS

The encountering of uncommon circumstances during an examination (e.g. the existence of high distortion, low quality or quantity, the possibility of simultaneity, or conflicts among analysts).

COMPRESSION

The process of shrinking or condensing data to reduce the file size. Generally, there are two types of compression: lossless and "lossy". The lossless method shrinks a file in such a way that when the file is decompressed, the image will appear exactly as it did before it was compressed. The lossy method will discard some of the data during the compression process, so that when the image is decompressed, it will

not have the same values as the original image. The image quality loss may or may not be significant, depending upon its intended use.

CONSENSUS DETERMINATION OR CONCLUSION

Agreement reflecting the collective judgment of a group of examiners trained to competency when making determinations or conclusions with respect to one or more impressions.

CONCLUSION

Determination made during the evaluation stage of ACE-V, including source identification, inconclusive/lacking support, source exclusion.

CONFIRMATION BIAS

A tendency to search for data or interpret information that confirms preconceived expectations while ignoring data that does not confirm one's beliefs.

CONFLICT

A difference of conclusions that becomes apparent during, or at the end of an examination.

CONSULTATION

A significant interaction (i.e. guidance or exchange of information) between analysts regarding one or more impressions in question.

CONTEXTUAL BIAS

The effect of information or outside influences on the evaluation and interpretation of data.

CONTROL

A known standard or preparation for checking or verifying a test reagent.

CORE

It is the approximate center of a pattern.

CREASE

A line or linear depression; grooves at the joints of the phalanges, at the junction of the digits and across the palmar and plantar surfaces that accommodate flexion.

DELTA

The point on a friction ridge at or nearest to the point of divergence of two type lines and located at or directly in front of the point of divergence. Also known as a tri-radius.

DERMIS

The layer of skin beneath the epidermis.

DEVIATION

- A change in ridge path.
- An alteration or departure from a documented policy or standard procedure.

DIGITAL IMAGE

An image that is dependent upon a computer to be displayed, edited, saved and output in some other form, such as a hardcopy print.

DIGITAL IMAGE PROCESSING

Computer dependent techniques used to clarify details within an image in order to facilitate the analysis and/or comparison of the image content. Examples include brightness and contrast adjustment, color correction, and image reversal.

DISCREPANCY

The presence of friction ridge detail in one impression that does not exist in the corresponding area of another impression (compare with dissimilarity).

DISSIMILAR

The appearance of inconsistency between two friction ridge impressions that, based upon further analysis, could be attributed either to distortion or difference.

DISSIMILARITY

A difference in appearance between two friction ridge impressions (compare with discrepancy).

DISSOCIATED RIDGES

Disrupted rather than continuous, friction ridges. An area of friction ridge units that did not form into friction ridges, which is generally due to a genetic abnormality.

DISTORTION

Variances in the reproduction of friction skin caused by pressure, movement, force, contact surface, substrate, matrix etc. Distortion is not a discrepancy and is not a basis for exclusion.

DOT

An isolated ridge unit whose length approximates its width in size.

DNA

Deoxyribonucleic acid is a molecule composed of two polynucleotide chains that coil around each other to form a double helix carrying genetic instructions for the development, functioning, growth and reproduction of all known organisms and many viruses.

EDGEOSCOPY
Study of the morphological characteristics of friction ridges; contour or shape of the edges of friction ridges.

ELASTICITY
The ability of skin to recover from stretching, compression, or distortion.

ELIMINATION PRINTS
Exemplars of friction ridge skin detail of persons known to have had access to the item examined for latent prints.

ENCLOSURE
A single friction ridge that bifurcates and rejoins after a short course and continues as a single friction ridge.

ENDING RIDGE
The point at which a single friction ridge terminates within the friction ridge structure.

EPIDERMIS
The outer layer of the skin.

ERRONEOUS EXCLUSION
The incorrect determination that two areas of friction ridge impressions did not originate from the same source (false negative).

ERRONEOUS IDENTIFICATION
The incorrect determination that two areas of friction ridge impressions originated from the same source (false positive). Clerical errors where the analyst correctly associates the latent print to the correct standard, but writes identifying information incorrectly (e.g., finger number, subject name, etc.) do not fall into this category.

EVALUATION
Where an examiner assesses the significance, including the quality and quantity, of information in a friction ridge impression through observation; the result of the comparison is the evaluation process or coming to a conclusion (identification, exclusion or inconclusive). It is the third step in the ACE-V methodology.

EXAMINATION QUALITY PHOTOGRAPHS

Close-up photographs taken at 90 degrees (when possible) in a non-compressed format (e.g. RAW) containing a scale, taken of specific items in a manner to capture maximum detail, so they can be used later in a scientific comparison.

EXEMPLARS

The prints of an individual, associated with a known or claimed identity, and deliberately recorded electronically, by ink, or by another medium (also known as known prints).

EXCLUSION

Source exclusion is the conclusion that the observed data provides substantially stronger support that the two impressions originated from different sources rather than the same source. There is a strong disagreement present such that the examiner would expect to see that level of disagreement in an impression from the same source.

FEATURES

Distinctive details of the friction ridges, including Level 1, 2, and 3 details (also known as characteristics).

FINGERPRINT

An impression of the friction ridges on the first (distal) joint of a finger.

FINGER JOINT

An impression of the friction ridges from any part of the finger proximal to the first joint.

FOCAL POINTS

- In classification, the core(s) and the delta(s) of a fingerprint.
- Another term for target group.

FRICTION RIDGE

The raised portion of the epidermis on the palmar or plantar skin, consisting of one or more connected ridge units of friction ridge skin and assists with grip.

FRICTION RIDGE DETAIL (MORPHOLOGY)

An area comprised of the combination of ridge flow, ridge characteristics, and ridge structure.

FRICTION RIDGE UNIT

A single section of a friction ridge containing one pore.

FURROWS

Valleys or depressions between the friction ridges.

GALTON DETAILS
Refers to friction ridge characteristics (also known as minutiae) attributed to the research of English fingerprint pioneer, Sir Francis Galton.

GROUND TRUTH
Definitive knowledge of the actual source of an impression.

HENRY CLASSIFICATION
An alpha-numeric system of fingerprint classification named after Sir Edward Richard Henry. Used for filing, searching and retrieving tenprint records.

IAFIS
Acronym for Integrated Automated Fingerprint Identification System, the FBI's national AFIS (see AFIS).

IDENTIFICATION
Source identification is the conclusion that the observed data provides substantially stronger support that the two impressions originated from the same source rather than different sources. There is strong correspondence present such that the examiner would not expect to see the same arrangement of details repeated in an impressions from another source.

INCIPIENT RIDGE
A friction ridge not fully developed which may appear shorter and thinner in appearance than fully developed friction ridges (interstitial, nascent).

INCOMPLETE
The determination during comparison that the exemplars are inadequate in either quantity or quality.

INCONCLUSIVE/LACKING SUPPORT
The determination during comparison that the observations do not provide a sufficient degree of support for one proposition over the other.

INTEGRA ID
The NEC ABIS software.

INTERVENING RIDGES
The number of friction ridges between two characteristics (features).

JOINT (OF THE FINGER)

The hinged area that separates segments of the finger.

KNOWN PRINT (FINGER, PALM, FOOT)/EXEMPLAR

The prints of an individual, associated with a known or claimed identity, and deliberately recorded electronically, by ink, or by another medium (also known as exemplars).

LATENT PRINT

Although this refers specifically to an impression that is not readily visible or needs to be developed by physical or chemical processes, it can generically refer to any unintentional deposit of friction ridge detail. For the purposes of this manual, the term "latent print" is used as a generic term for a friction ridge impression that is unknown.

LEVEL 1 DETAIL

Friction ridge flow, pattern type, and general morphological information.

LEVEL 2 DETAIL

Individual friction ridge paths and friction ridge events, including minutiae (e.g., bifurcations, ending ridges, and dots).

LEVEL 3 DETAIL

Friction ridge dimensional attributes (e.g., width, edge shapes, pores, etc.).

LIFT TAPE

An adhesive or other medium used to transfer a friction ridge impression from a substrate.

LIFT CARD

A card on which recovered friction ridge detail is preserved.

LIVE-SCAN

Electronic recording of friction ridges (fingers and/or palms).

LOOP

A type of pattern in which one or more friction ridges enters an area, recurves, and flows out the same side the friction ridges entered. Loops can be slanted to the right or left and be designated as either radial or ulnar loops.

LOOP – ULNAR

A type of pattern in which one or more ridges enter upon either side, re-curve, touch or pass an imaginary line between delta and core and flow out, or tend to flow out, on the same side the ridges entered. The flow of the pattern runs in the direction of the ulna bone of the forearm (toward the little finger).

LOOP – RADIAL
A type of pattern in which one or more ridges enter upon either side, re-curve, touch or pass an imaginary line between delta and core and flow out, or tend to flow out, on the same side the ridges entered. The flow of the pattern runs in the direction of the radius bone of the forearm (toward the thumb).

LATENT REGISTRATION (LR)
Latent registration in the Unsolved Latent Database (ULD) single search - a Latent Inquiry (L/I) and a Latent Re-Inquiry (L/RI) of a single latent constitute a single search.

LVMPD
The acronym for Las Vegas Metropolitan Police Department

MAJOR CASE PRINTS/COMPLETE FRICTION RIDGE EXEMPLARS
A systematic recording of all of the friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, joints, tips, and sides of the fingers. Under special circumstances complete friction ridge exemplars may also need to be taken from the plantar portion of the feet.

MATERIAL SAFETY DATA SHEETS (MSDS)
See Safety Data Sheet.

MATRIX
The substance that is deposited or removed by the friction ridge skin when making an impression (e.g., blood, sweat, sebaceous material, etc.).

MBIS
The acronym for Multi-Modal Biometric Identification System (See AFIS)

MINUTIAE
Events along a ridge path, including bifurcations, ending ridges, and dots (also known as Galton details).

MISSED EXCLUSION
The failure to make an exclusion when in fact the friction ridge impressions are non-mated (includes false positive, non-consensus inconclusive and non-consensus no value).

MISSED IDENTIFICATION
The failure to make an identification when, in fact, both friction ridge impressions are from the same source (includes false negative, non-consensus inconclusive and non-consensus no value).

NATIONAL CRIME INFORMATION CENTER (NCIC) CLASSIFICATION
An alpha/numeric system of fingerprint classification.

NEC
The acronym for Nippon Electric Company

NGI
The acronym for Next Generation Identification, the updated version of IAFIS.

NON-COMPLEX
The encountering of common circumstances during an examination (e.g., low distortion, high quality or quantity, or no conflicts among analysts).

NON-CONSENSUS DETERMINATION OF NO VALUE
A decision of no value that conflicts with the consensus.

NON-CONSENSUS DETERMINATION OF SUITABILITY
Determination of suitability does not concur with consensus. Suitability determinations include non-consensus no value, and non-consensus value decisions.

NON-CONSENSUS DETERMINATION OF VALUE
A decision of value that conflicts with the consensus.

NON-CONSENSUS EXCLUSION CONCLUSION
A decision of exclusion that conflicts with the consensus, exclusive of false negative errors.

NON-CONSENSUS INCONCLUSIVE
A decision of inconclusive that conflicts with the consensus, exclusive of false positive and negative errors.

NON-CONSENSUS IDENTIFICATION CONCLUSION
A decision of identification that conflicts with the consensus, exclusive of false positive errors.

NON-POROUS
Non-absorbent.

NORMAL PRACTICE
As it relates to digital enhancement/processing within the Boise Police Department's Crime Laboratory, is any procedure defined as a basic technique, as defined by SWGIT (Scientific Working Group on Imaging Technology).

ORIGINAL DIGITAL IMAGE
An accurate and complete replica (pixel for pixel) of the primary image, irrespective of media.

PALM PRINT
An impression of the friction ridges from the palmer surface of the hand.

PATENT PRINT
Friction ridge impression of unknown origin that is visible without development.

PATTERN TYPE
Fundamental pattern of the ridge flow: arch, loop, whorl. Arches are subdivided into plain and tented arches; loops are subdivided into left and right loops (or radial and ulnar); whorls are subdivided into plain whorls, double loops, central pocket loops, and accidental whorls.

PERSONAL PROTECTIVE EQUIPMENT (PPE)
Specialized clothing or equipment (such as disposable gloves, masks, and eye protection) worn by an employee that are utilized to provide a barrier to keep biological or chemical hazards from contacting the skin, eyes, and mucous membranes and to avoid contamination of the items. General work clothes (e.g., uniforms, pants, shirts, etc.) that are not intended to function as protection against a hazard are not considered to be personal protective equipment.

PHALANX/PHALANGE
A bone of the finger or toe sometimes used to refer to a segment of a finger.

PLASTIC PRINT
Friction ridge impression of unknown origin that is impressed in a soft substrate to create a three-dimensional impression.

PORES
Small openings in the skin through which perspiration is released.

POROSCOPY
A study of the size, shape, and arrangement of pores.

POROUS
Absorbent.

PRESERVED IMPRESSION

Casting, photography, lifting, or other method used to capture a latent impression for further examination.

PROFICIENCY
The ongoing demonstration of competency.

QUALIFIED ANALYST
An individual who has completed the internal training program, passed competency testing, and been approved to perform case work.

QUALITATIVE/QUALITY
The clarity of information contained within a friction ridge impression.

QUANTITATIVE/QUANTITY
The amount of information contained within a friction ridge impression.

REAGENT
A substance that is used to test for the presence of another substance by causing a chemical reaction with it.

RELATIVE POSITION
Proximity of characteristics to each other.

RIDGE FLOW
The direction of one or more friction ridges. A component of Level 1 detail.

RIDGE PATH
The directional flow of a single friction ridge. A component of Level 2 detail.

RIDGE UNIT
The basic building blocks of ridges. Each unit corresponds on the epidermis with one pore associated on the dermal layer with a sweat gland.

RIDGEOLOGY
The study of the uniqueness of friction ridge skin and its use for personal identification (individualization). This term was developed in 1982 by Sergeant David Ashbaugh (Royal Canadian Mounted Police) to describe the scientific evaluation process used for friction ridge identifications.

SAFETY DATA SHEETS (SDS)

Summary sheets developed by the product's manufacturer or distributor to provide fundamental information about the identity of the product's constituents. Provides employees with procedures for handling or working with chemicals in a safe manner, and includes information such as physical data, toxicity, health effects, first aid, reactivity, storage, proper disposal, protective equipment, and spill-handling procedures. See also Material Safety Data Sheets (MSDS).

SEGMENT (OF THE FINGER)
The proximal, medial, or distal section of the finger.

SEQUENTIAL PROCESSING
Use of a series of development methods in a specific order to maximize development of friction ridge detail.

SHORT RIDGE
A single friction ridge beginning, traveling a short distance, and then ending.

SIMULTANEOUS IMPRESSION
Two or more friction ridge impressions from the same hand or foot deposited concurrently.

SOURCE
An area of friction ridge skin from an individual from which an impression originated.

SOURCE CONCLUSIONS:
Findings or statements expressed as opinion and made by an examiner after interpretation of observed data. They may offer support for one proposition over another. The following source conclusions are used by the Laboratory: source exclusion, inconclusive/lacking support, or source identification.

SOURCE EXCLUSION
The conclusion that the observed data provide substantially stronger support that the two impressions originated from different sources rather than from the same source. There is a strong disagreement present such that the examiner would not expect to see that level of disagreement in an impression from the same source.

This may also be referred to as exclusion.

SOURCE IDENTIFICATION
The conclusion that the observed data provides substantially stronger support that the two impressions originated from the same source rather than different sources. There is strong correspondence present such that the examiner would not expect to see the same arrangement of details repeated in an impression from another source.

This may also be referred to as identification.

SPUR
A bifurcation with one short friction ridge branching off a longer friction ridge.

STANDARDS
An intentional recording of the friction ridge skin impressions on a person's hands or feet; from a known source.

STAND-ALONE
A segment of a simultaneous impression that has sufficient information to arrive at a conclusion of identification independent of other impressions within the aggregate.

STOCK SOLUTION
Concentrated solution diluted to prepare a working solution.

STRENGTH OF THE EVIDENCE
A means of describing the weight of support the evidence lends to one source proposition over the other.

SUBSTRATE
Surface upon which a friction ridge impression is deposited.

SUFFICIENCY
The product of the quality and quantity of the objective data under observation (e.g., friction ridge, crease, and scar features).

SUITABLE FOR COMPARISON
A decision is made by an examiner that a friction ridge impression contains sufficient observed data to be utilized for comparison and a Source Conclusion can potentially be reached. This designation may also be referred to as "of value for comparison".

SUFFICIENT FOR LIMITED COMPARISON/SUFFICIENT FOR EXCLUSION ONLY
A latent print containing a limited quantity and quality of information; a conclusion of exclusion (other acceptable conclusion is "cannot be excluded") may be reached if the standards contain sufficient quantity and quality of information in the corresponding area, but the latent print does not contain enough information to reach a conclusion of identification.

SUITABLE

The determination made by the examiner as to whether or not an impression will proceed to the next step in the examination process.

TARGET GROUP

A set of friction ridge features selected as a starting point during comparison.

TECHNICAL REVIEW

Review of notes, documents, and other data that forms the basis for a scientific conclusion to ensure proper technical procedures were used and documented.

TEN PRINT

- A generic reference to examinations performed on intentionally recorded friction ridge impressions.
- A controlled recording of an individual's available fingers using ink, electronic imaging, or other medium.

TOLERANCE

The amount of variation in appearance of friction ridge features to be allowed during a comparison, should a corresponding print be made available.

TRACE EVIDENCE

Physical evidence that results from the transfer of small quantities of materials (e.g., hair, textile fibers, paint chips, glass fragments, gunshot residue particles).

TRIFURCATION

The point at which one friction ridge divides into three friction ridges.

TYPE LINES

The two innermost friction ridges associated with a delta that parallel, diverge, and surround or tend to surround the pattern area.

UNIVERSAL PRECAUTIONS

An approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other blood borne pathogens.

VERIFICATION

The confirmation by another examiner, during an independent ACE application, that a conclusion or opinion conforms to specified requirements and is reproducible. This may be conducted as a blind verification.

WHORL – ACCIDENTAL

- A fingerprint pattern consisting of two different types of patterns (excluding the plain arch) with two or more deltas.
- A pattern which possesses some of the requirements for two or more different types.
- A pattern which conforms to none of the definitions.

WHORL – CENTRAL POCKET LOOP

A type of fingerprint pattern which has two deltas and at least one ridge which makes, or tends to make, one complete circuit, which may be spiral, oval, circular, or any variant of a circle. An imaginary line drawn between the two deltas must not touch or cross any recurving ridges within the inner pattern area.

WHORL – DOUBLE LOOP

A type of fingerprint pattern that consists of two separate loop formations with two separate and distinct sets of shoulders and two deltas.

WHORL – PLAIN

A type of fingerprint pattern which consists of one or more ridges which make, or tend to make, a complete circuit, with two deltas, between which, when an imaginary line is drawn, at least one recurving ridge within the inner pattern area is cut or touched.

WIN

Acronym for Western Identification Network

WORKING COPY

Any image that is subjected to processing, or a compressed copy of an original image, used for distribution and display purposes.

WORKING SOLUTION

Chemical solution at the proper dilution for processing.

19. Appendix A: Reagent Specifications

19.1. Consumables and Chemicals

19.1.1. Latent reagents have no established purity or impurity threshold; therefore, reagents will be laboratory reagent grade (sufficient for the technical analysis) or greater. Since most reagents purchased from specialty latent print supply vendors generally do not have a specified grade, reagents will be functionally tested. The positive functioning of a reagent when tested at its creation (if made on site) and again during a daily (or more frequent) evidence processing session, in conjunction with appropriate documentation, shall suffice for establishing that a reagent is of an appropriate grade.

19.1.2. See Health and Safety Procedures Manual for the handling and storage of chemicals and reagents.

20. Appendix B: Reference Information

20.1. SI to U.S. Customary Units Conversion Table

DRY		
1 pound (lb) 1 ounce (oz) 1 g 1 milligram (mg)	= = = =	453.6 grams (g) 28.35 g 0.035 oz 0.001 g
LIQUID		
1 milliliter (mL) (cc) 1 liter (L) 29.573 mL 500 mL 3.79 (L) 18.95 L 0.946 L	= = = = = = =	0.034 fluid oz 1000 mL 1 fluid oz 0.5 (1/2) L 1 gallon (gal) 5 gal 1 quart (qt)

Figure 1 SI Units to U.S. Customary Units

21. Appendix C: Evidence Processing and Latent Print Technical Manual History

ISSUING AUTHORITY: Chief Administrative Officer / Quality Assurance/Lab Manager / Technical Leader		
DATE	SECTION AND COMMENTS	AUTHOR/REVIEWER
11/03/2020	Current Manual 2020	Delaney, Voorhees, Sanchez/ Leung, Anderson
4/8/2021 – July/13/2021	Revision 1: Formatting throughout, added several reference documents, pulled BIO related info out and added to see BIO Screening technical manual, 4.3.2. updated booking protocol, 5.2 submission/entry moved to QAM 7.1.1., 5.4 LIMS entry moved to 7.1.2. of QAM, 5.5 moved to QAM, Added a new 5.2 Request for Evidence and latent processing, Section 6 title changed to Case Management, many sections in 6 were moved to QAM section 7.4, 6.2.3.2. Chemical hazard verbiage updated, Section 7 added trace considerations, 7.3.4. reworded, 7.6 trace requirements updated, Added Methanol & water-based application to 9.2 Amido Blk, removed 9.3 (Ardrox P-133D), 9.5 updated DFO application, 9.11 Nin – added clearning agent comment. 9.12.2.3. Removed failed control statement, 9.13 Removed MBD, 9.18 Removed Polycyano UV, 9.18.4.6. & 9.18.5.4 (as part of powder)-reworded to include imaging prior to lifting no matter surface type, 9.29 Removed RAM since Ardrox & MBD were removed, 11.3.2.7. Latex glove method removed, 12.3 removed description of LV1,2, &3 detail since its broken down later. Added additional verbiage, 12.4.3.1. completely reworded, added source ID, source EX, inconclusive/lacking support, 12.4.3.3.1 removed due to LP, 14.4.3.3.2. removed inc due to knowns, 12.4.3.1.1.-12.4.3.1.3 removed, deleted 15.3 & 15.4 (contained in QAM), deleted 17 (Security) which is contained in QAM., removed the following chemicals: *This remained, Fluorescein, NIN HT, PDMAC, Coomassie Brilliant Blue, Section 14: ABIS info updated to include MBIS definitions and upgrade info; Added new ABIS upgrade terms to Section 18: Terms/Definitions (MBIS, NEC); added DNA to terms and definitions.	Delaney, Voorhees, Sanchez, Leung/ Delaney

9/9/2021	Revision 2: See EP-6 LP Technical Manual Changes to V2 and suggested changes document for all changes.	Delaney / Delaney
11/29/2022	Revision 3: See EP-6 Technical Manual Changes for V4 for all changes.	Leung, Sanchez, Wenetzky, Eccles/ Delaney
10/27/2023	Revision 4: See EP-6 Technical Manual Changes for V5 (x2) for all changes.	Eccles, Oldemeyer, Leung, Wenetzky, Sanchez / Delaney