INTRODUCTION

The Latent Print Section will follow the guidelines set forth in the Forensic Science Division SOP. Supplemental requirements specific to the LP Section are contained within the LP Standard Operating Procedures Manual (SOP), the LP Technical Manual, and the LP Training Manual. These manuals combined represent guidelines for the Quality System within the LP Section.

This document specifies procedures for routine examination and analysis of latent print evidence for human identification. Within the scope of that purpose, it is intended to ensure effective and efficient use of the laboratory facilities for the benefit of all user agencies and with the ultimate goal of detection, solution, and prevention of crime. In addition, it incorporates the quality assurance elements necessary to ensure the reliability and uniformity of analyses and reported conclusions.

It is not possible to anticipate every situation that arises or to prescribe a specific course of action for every case; therefore, the Examiner must exercise good judgment based on experience and common sense. In some cases, the manual offers guidelines for analysis that must be tempered with the experience of the Examiner. However, any portion of a procedure not explicitly qualified as a guideline, e.g., by use of the word “should,” may not be modified for use in casework without prior approval by the Technical Leader.

CHAPTER 1: SCIENCE OF FINGERPRINTS

1.1 BIOLOGY

1.1.1 Papillary ridges are anatomical areas of skin that include the dermal and epidermal layers of skin that cover the areas of the fingers, palms, and the soles of the feet. They are formed during fetal development and remain persistent throughout the life of the individual except through damage by scarring or disease. Friction skin ridges (papillary ridges) are not continuous formations; rather they are made up of biologically unique components, ridge units that form the appearance of linear formations.

1.1.2 No two areas of friction skin on the hands or feet of any person, or persons, have been found to be duplicated in their minute detail.

1.2 SCIENTIFIC BASIS

There are two basic principles for the basis for identification:

1.2.1.1 Permanence (persistence) - Friction skin permanence is based on Embryological studies that show the friction ridge skin begins forming in the 6th week of estimated gestational age and are fully developed at approximately the 23rd week. These biological developments include the basal layer of skin which is considered the template and generating layer for all friction ridge skin growth. This layer remains unchanged throughout one’s lifetime with the exception of natural expansive growth and/or damage to the basal layer that permanently alters that area of friction skin.

1.2.1.2 Uniqueness - Friction skin is biologically diverse in that there is a genetic influence up until cellular differentiation. Friction ridge growth and placement takes place due to physical influences and volar pad development (epigenetic). The timing of development of the ridges

with respect to volar pad regression, in combination with the forces on the skin, ensures that the minute details of the friction ridge skin cannot be duplicated. It is this basic principle, referred to as differential growth, which assures that the formations on the friction skin are biologically random and cannot be replicated.

CHAPTER 2: LATENT PRINT COMPARISON

2.1 THE EXAMINATION PROCESS

2.1.1 The purpose of an examination is to determine or exclude the source of a friction ridge print.

2.1.2 The clarity of the friction ridge detail is an important part of the examination process and dictates the quality and quantity of the detail that may be present and used in determining the source of latent images.

2.1.3 The degree of clarity of a latent print influences the level of tolerance that will be acceptable to the latent print examiner.

2.2 METHODOLOGY

2.2.1 Friction ridge print examinations are conducted by following the methodology of analysis, comparison, and evaluation (ACE); qualitative and quantitative factors determine suitability for comparison.

2.2.1.1 Analysis – The first step of the ACE method is the assessment of an impression to determine suitability for comparison. Areas of consideration include:

a) Substrate
b) Matrix
c) Development medium
d) Deposition pressure
e) Anatomical source
f) Distortion

2.2.1.2 Comparison – The step following analysis is the observation of two or more impressions to determine the existence of discrepancies, dissimilarities, or similarities. This phase progresses systematically and sequentially until all available ridge detail has been compared and events shared by both impressions are accounted for, and any differences are noted.

2.2.1.3 Evaluation – In the third step of the ACE method, an examiner assesses the value of the corresponding ridge features in the two prints and reaches a conclusion. The clarity and uniqueness of the ridge features determines the weight to be given them in determining identity or non-identity.

2.2.1.4 Although the verification process is sometimes said to be the fourth part of the ACE methodology, it is actually the application of the ACE method by a second examiner during an independent examination of the two prints under consideration.

2.3 FINGERPRINTS DEFINED

2.3.1 Latent print is a general term to define accidental or unintentional impressions, visible or invisible, which have evidentiary value. When the friction skin area of the palmar or plantar regions of the body are touched to a receiving surface, a reproduction of the ridge detail from that friction skin area may be left behind on that surface.

2.3.2 Known prints are exemplars of friction skin from a known source that are recorded electronically, photographically, by ink, or by any another medium. Examples of known prints:

2.3.2.1 Ten print / palm print cards recorded by a law enforcement agency

2.3.2.2 Elimination print submissions

2.3.2.3 Prints obtained from the Medical Examiner's Office (serve as both known and unknown)

2.4 FRICTION RIDGE FEATURES

2.4.1 The friction skin ridges on the hands and feet exhibit distinctive features which can be grouped into three levels:

2.4.1.1 Level 1 - Identification cannot be made; however exclusion may be possible.

a) Anatomical source
   1. Finger
   2. Palm
   3. Foot
   4. Toe

b) Orientation

c) Pattern Interpretation
   1. Arch
   2. Loop
   3. Whorl
   4. Overall ridge flow

d) General morphology

2.4.1.2 Level 2 - Identification or exclusion may be made; however, any level 1 or 3 detail present must also be examined.

a) Individual ridge paths, their type and relative position

1. Ending ridge - an abrupt ending of the friction ridge
2. Bifurcation - the friction ridge splits into 2 or more ridges
3. Dot - a single ridge unit that is no longer than its width

2.4.1.3 Level 3 - Identification may be made; however any level 1 or 2 detail present must also be examined.

a) Ridge structure and their relative arrangement

1. Size and shape of the ridge edges
2. Relative pore position

2.4.2 Creases, scars, warts, incipient ridges, and other features may be reflected in all three levels of detail.

2.5 CONCLUSIONS

2.5.1 There is no current scientific basis for a minimum characteristic requirement (or point threshold) for friction ridge identification. This is based on the IAI Resolution in1973, which stated that "no valid basis exists at this time for requiring that a pre-determined minimum number of friction ridge characteristics must be present in two impressions in order to establish positive identification." IAI Resolution 2009-18 is an amendment to the 1973 IAI and states "the official position of the I.A.I., effective August 21, 2009, is as follows: there currently exists no scientific basis for requiring a minimum amount of corresponding friction ridge detail information between two impressions to arrive at an opinion of single source attribution."

2.5.2 **Identification** is the result of the comparison of two friction ridge impressions containing sufficient quality (clarity) and quantity of friction ridge detail in agreement. Identification occurs when a latent print analyst, trained to competency, determines that two friction ridge impressions originated from the same source. (ASCLD/LAB 5.10.3.5)

2.5.3 Generally the unknown or questioned impression will be analyzed prior to comparing to a known exemplar, unless the quality of the known is less than the unknown.

2.5.4 If an impression possesses sufficient clarity and quantity of friction ridge detail the print is determined to be **Suitable for Comparison.**

2.5.5 If an impression lacks sufficient clarity and quantity of friction ridge detail the print is determined **Non Suitable for Comparison. Non Suitable** is not a comparison conclusion but is the result of an analysis of a single latent print. It is used when the examiner has determined that any future comparison of this print will never result in a conclusion of identification or exclusion.

2.5.6 If the friction ridge detail present in the known print and latent print is in agreement, the resulting conclusion will be reported as **Identification.**

2.5.7 If the friction ridge detail present in the known print and latent print is not in agreement, the resulting conclusion will be reported as **Exclusion.** This conclusion can only be reached if all relevant exemplars are available.

2.5.8 When an impression is divided into two or more parts, the latent print examiner will use their discretion to determine if each part can be examined separately or considered as a whole. All information present will be taken into account to support the decision.

2.5.9 If the known exemplars used for comparison purposes are not adequately recorded so that there is insufficient detail to form a conclusion of either **Identification** or **Exclusion**, the resulting conclusion will be reported as **Incomplete**.

2.5.10 If all relevant exemplars are available and corresponding features are observed between the latent print and the known print but are not sufficient to reach a definitive conclusion of **Identification** or **Exclusion**, the resulting conclusion will be reported as **Inconclusive**.

2.5.11 Composites or enlargements with annotation documentation will be retained in LIMS.

2.6 CONSULTATION, CONLICT AND CONSENSUS

2.6.1 Occasionally, a latent print is such poor quality that the examiner should seek the advice of other examiners. This is encouraged to foster a culture of openness and discussion.

2.6.2 A **CONSULTATION** takes place between two examiners to resolve questions about an analysis or comparison, and requires no additional documentation. Discussions concerning the anatomical source, pattern type, orientation, etc. are examples of a consultation.

2.6.3 A **CONSENSUS** is a request to all available latent print examiners for help with an examination or to resolve a conflict.

2.6.3.1 Unmarked copies will be sent to all available latent print examiners.

2.6.3.2 Responses to a consensus will be returned within 2 business days.

2.6.3.3 The final decision will be based on a consensus from all returned responses. Except for an unverified identification, the original conclusion will stand if no consensus can be reached..

2.6.3.4 All returned documentation will have the unique case number assigned by the requesting examiner before attachment to the case file in LIMS.

2.6.4 When there is a disagreement between two latent print examiners, the two will work together to resolve it by viewing the images on a computer screen and discussing each other's observations. If an agreement cannot be reached, a **CONFLICT** exists, which must be settled by seeking a consensus with other examiners. The consensus will be handled and documented as outlined in 2.6.3 above.

2.6.5 When a latent print has been marked for identification and the designated verifier will not verify it, it will be handled as outlined in 2.6 4 above. If there is no consensus, the examiner will change the conclusion to 'inconclusive' or 'not suitable', and line through the ID information on the lift card or photo and initial it. The markings will not be erased.

2.6.6 The Technical Leader and Supervisor will be notified when there has been an erroneous identification, erroneous exclusion, or a suitability determination that resulted in a missed identification.

2.7 LATENT PRINT SUITABILITY

The suitability of a latent print should be determined following a complete analysis of all visible features within the print, prior to the comparison phase. A latent print will be considered suitable for comparison when there are a minimum of six discernible minutiae **AND** one or more of the following are present:

a) Discernible distal orientation

b) At least one focal point (e.g. core, delta, crease, scar)

c) At least one region of considerable size

Other significant detail, such as clear incipient detail, scar detail, or small groupings of minutia with high clarity contribute to the determination of suitability for comparison; therefore, latent prints that do not meet the above-listed criteria may be marked as suitable for comparison at the discretion of the case examiner.

2.8 MARKING LATENT PRINTS

2.8.1 The examiner conducting a latent comparison will write an item number on each photograph on the front and back of each lift card, and initial each item examined. In addition, all suitable latent prints on each latent-bearing item (lift card or photograph) will be marked with a capital letter designation marked in blue.

2.8.2 The item number will correspond with the LIMS item number and a sequential number i.e. 14.1, 14.2, etc. and marked in blue (ISO 5.8.2).

2.8.3 The examiner will, in the event of identification, write the name and unique identifying number of the person identified on the lift card, photograph, copy or other latent-bearing item. This will be marked in blue.

2.8.4 The initials and employee's number making the identification will be marked in red.

2.8.5 The following symbols will be added near the identified latent and will be marked in red:

- A half circle over the top of the latent in the event of a finger latent identification.
- Lines drawn parallel on both sides of the latent in the event of a phalange (joint) identification.
- A vertical line drawn along the hypothenar area and a connecting line drawn along the base in the event of a palm latent identification.
- If the location of the identified latent print on the card / image is such that drawing the required symbol would mean marking over another suitable latent print, then a small arrow can be used in lieu of the usual symbol.
- The Latent Print Examiner verifying identifications will place their initials along with "**√ID**" and will be marked in green.

2.8.6 Once analytical markings are made on a latent lift card or photo by an analyst, it becomes examination documentation and must have the lab number and the analyst's handwritten initials written on the side containing the markings.

2.8.7 Documenting Duplicates:

2.8.7.1 'Duplicate' refers to a latent print created by a single touch of a surface, but lifted or photographed more than once.

2.8.7.2 Each latent print deemed suitable for comparison, whether duplicate or not, must be given a letter designation; however, the latent print examiner will document the results of their comparison of only one instance of each particular latent print. Duplicate latent prints will be documented as a duplicate with references in the results block of the worksheet and in the report.

2.8.7.3 Duplicates will not be subject to verification.

2.8.7.4 Examiners will determine, based on clarity and completeness, which latent print will be compared, and which ones will be documented as duplicates.

2.8.7.5 Duplicate latent prints will not count toward the final tally of identified latent prints, but will be counted as an examination in LIMS.

2.9 ERRORS IN EXAMINATION

2.9.1 Erroneous Identifications (Type I Error):

2.9.1.1 An erroneous identification is the marking of a latent print as having originated from a particular known source when, in fact, the print did not come from that source.

2.9.1.2 When another examiner, usually the verifying examiner, discovers what is believed to be a true erroneous identification and an administrative error has been ruled out, the Technical Leader and the Section Supervisor will be notified immediately.

2.9.1.3 The technical leader will examine the latent and exemplar and verify that the identification is erroneous.

2.9.1.4 An examiner who verifies an erroneous identification will have also committed a type I error.

2.9.2 Erroneous Exclusions (Type II Error):

2.9.2.1 An erroneous exclusion is the incorrect conclusion that two friction ridge impressions did not originate from the same source.

2.9.2.2 Inconclusive is not considered a missed identification.

2.9.3 Administrative Error (Type III Error)

2.9.3.1 In situations where only the position or finger number of the print is incorrect and not the individual identification, it is not an erroneous identification. The verifying examiner will communicate with the original examiner to ascertain if this is the case.

CHAPTER 3: LATENT EVIDENCE RECEIVING

3.1 Latent and CD packets received by the LP Section are entered into the LIMS via the Web Prelog as an ADM submission assignment.

3.2 Latent envelopes will be initialed by the receiver, verifying the number of lifts or photos match the number appearing on the front of the envelope.

3.3 Latent prints will be examined to determine AFIS suitability, placing an "A" in the upper right of the latent envelope. If suitable, it will then be filed in the AFIS drawer awaiting AFIS entry. The packets can remain there in an open and unsealed condition until AFIS inquiries are conducted, not to exceed a period of 24 months from receipt.

3.4 Latent packets that do not contain AFIS suitable prints will have the "ADM" assignment administratively closed in LIMS and then filed as per section guidelines.

3.5 All latent and CD packets received will have a proper seal over the envelope flap along with the date and initials of the impounder. If a packet is received without an initial seal the receiving person will seal the envelope with evidence tape, initial, and date it. The original seal will not be broken or disturbed by LPS personnel.

CHAPTER 4: DIGITAL IMAGING

4.1 Latent print examiners can utilize scanning equipment and imaging software in order to capture, enhance, and preserve images of friction ridge prints for analytical purposes.

4.2 Whenever a latent print is captured digitally for the purpose of suitability analysis or for preparing a chart, the image will be preserved and placed in the LIMS case file. (ASCLD/LAB 4.13.2.5.2).

4.3 Images saved in LIMS will have at the minimum, the unique identifying case number, the examiners initials, the date the image was prepared, and the number of the latent print items.

4.4 Current versions of Photoshop are approved for use in capturing and enhancing digital images of latent prints. Analysts can use tools that affect the tonal value of an image, such as **Brightness and Contrast**, **Levels**, **Dodging and Burning**, or **Curves** tools. Examiners can also use software tools within Photoshop that effectively improve contrast for visualization of a latent print, such as **Channel Mixer**, **Black and White**, **Invert**, etc.

4.5 Additional tools and actions can be used in the digital processing and enhancement of the latent print, such as:

- **4.5.1** Rotating the image
- **4.5.2** Changing the color mode i.e. RGB to Grayscale
- **4.5.3** Enlarging or reducing the size of the image
- **4.5.4** Cropping an area of the original image
- **4.5.5** Selecting and enhancing a portion of the image

4.6 Examiners will not use, or overuse, any process in a way that will cause any loss of relevant detail.

4.7 Examiners will not use Artistic or Stylistic filters or processes on a latent print image (Emboss, Smudge stick, etc.).

4.7.1 Examiners will not utilize a filter or process they are not familiar with, the effect of which they cannot explain, or one in which they have not received training.

4.7.2 It is recommended to capture latent prints for analysis/examination at a minimum of 1000 ppi, and use native resolutions of their scanners (1200) whenever possible.

4.7.3 Examiners can document or be ready to explain the processes they use in capturing and enhancing a latent print image, and be able to duplicate what they have done to a reasonable degree.

CHAPTER 5: COURT TESTIMONY

5.1 In legal proceedings the duties of a latent print examiner will include:

5.1.1 Pre-Trial Conference with prosecutor (s) when requested

5.1.2 Provide examination documentation to prosecutors when requested

5.1.3 Meet with defense counsel when Forensic Division criteria have been met

5.1.4 Notifying the court liaison of any expected time off

5.2 The court appearance, pre-trial conference, etc. will be documented in the Activity Log of LIMS

5.3 In-court examinations of new latent prints are not permitted.

5.4 If mandated by a judge, latent to latent or latent to inked examinations documentation must be added to the case file.

5.5 Comparisons of inked prints to inked prints are permitted in order to verify identity (confirmation examinations).

CHAPTER 6: AFIS PROCEDURES

6.1 Latent prints not identified during the initial search, which meet the criteria, will be entered into the Unsolved Latent Database (ULDB).

6.2 Latent prints from crimes against person's cases will be given priority for AFIS entry.

6.3 Each latent print to be searched as an AFIS inquiry will be logged into the stats portion of LIMS.

6.4 Finger or palm print records entered into the system solely for training purposes will be clearly marked as TEST material.

6.5 Latent print inquiries are purged from any AFIS system when the statutes of limitations have expired.

6.6 Viable Candidate results made from an AFIS inquiry will be documented by printing the image and information screen displays.

6.7 Suitable for search is determined by several factors which can include clarity and quality of the impression; the surface the impression was developed on or lifted from and the amount of minutiae present.

6.8 Latent prints that are not suitable for AFIS entry can be suitable for identification purposes.

6.9 CAFIS (Local):

6.9.1 The Assistant Forensic Division Manager is the designated CAFIS operations manager.

6.9.2 AFIS suitable latent prints will first be entered into CAFIS unless otherwise directed.

6.9.3 When a viable candidate is indicated from a TLI (Ten-Print to Latent Inquiry) return, the latent print examiner is responsible for deleting the transaction.

6.9.4 All LP Section employees are responsible for checking the TLI ten-print and palm print queues when assigned.

6.9.5 TLI's from other agencies submissions will be printed out and placed in a binder. The submitting agency will be notified of the viable candidate and that the latent transaction in AFIS was deleted.

6.9.6 All CAFIS direct entries and associations will be entered in the LIMS AFIS stats panel.

6.9.7 All TLI associations will be updated in the LIMS AFIS stats panel.

6.9.8 Whenever the AFIS technician cannot determine whether the image on the screen is a viable candidate, they can consult with a latent print examiner, making a note in the case record.

6.9.9 The operator will specify one of the following crime types. The standardized listing will be in capital letters and periods will not be used.

6.12.9.1 **BOV** is the abbreviation that will be used for burglary of vehicle offenses.
6.12.9.2 **BOR** is the abbreviation that will be used burglary of residence offenses.
6.12.9.3 **BNR** is the abbreviation that will be used for burglary of non-residence offenses.
6.12.9.4 **AUTO THEFT** will be used for any auto theft.
6.12.9.5 **DRUG OFFENSE** will be used for any drug related offenses.
6.12.9.6 **WEAPONS** will be used for any weapons related offenses.
6.12.9.7 **ROBBERY** will be used for any robbery related offenses.
6.12.9.8 **DEATH INV** will be used for any death related offense except **murder**.
6.12.9.9 **FORGERY** will be used for any forgery or falsified information offenses.
6.12.9.10 **SEXUAL ASSAULT** will be used for any sexual assault offense not involving a child.
6.12.9.11 **S ASSAULT CHILD** will be used for any sexual assault offense involving a child.
6.12.9.12 **CRIM MIS** will be used for any criminal mischief or vandalism offenses.

6.12.9.13 **THEFT** will be used for any theft offense other than auto theft.
6.12.9.14 **UC PROP** will be used for any property crime that doesn't fit any one of the other categories – add details in comments.
6.12.9.15 **UC PER** will be used for any person crime that doesn't fit any of the other categories – add details in the comments.
6.12.9.16 **ARSON** will be used for any arson offense.
6.12.9.17 **ASSAULT** will be used for any assault offenses.
6.12.9.18 **MURDER** will be used for any murder.

6.13 AFIS (State)

6.13.1 The State AFIS system will be used to search latent prints from persons crimes, at the discretion of the examiner assigned. All State AFIS inquiries, whether direct entry or TLI, will be recorded in the State AFIS Logbook. The State AFIS system will be searched only after the local AFIS system has been searched.

6.13.2 Each examiner is responsible for checking their own TLI's in the State AFIS.

6.13.3 If an examiner, upon receiving a Latent Packet designated for a State AFIS Inquiry, determines that the latent prints are not suitable for such an inquiry, he or she will document that decision in LIMS.

6.14 IAFIS (Federal)

6.14.1 The Federal IAFIS system will be used to search latent prints in violent persons crimes where the perpetrator(s) are unknown, at the discretion of the examiner or as directed by the supervisor. The IAFIS system will be searched only after local and State AFIS systems have been searched.

6.14.2 Each examiner will manage their own IAFIS inquiries.

6.14.3 IAFIS inquiries and TLI viable candidates will be entered into the LIMS AFIS Stats.

6.15 Latent Print Suitability for AFIS Entry

6.15.1 Images lacking clarity and quantity of friction ridge detail would not make a good candidate for an AFIS inquiry.

6.15.2 All latent prints received by the LP Section will be evaluated for AFIS suitability when first received.

6.15.3 Latent images from the tip or extreme edge of a finger would not make a good candidate for a State AFIS inquiry.

6.15.4 Interpretation of what is suitable for AFIS inquiry is based on the experience and judgment of the LPS employee conducting the inquiry.