Purpose:

To outline the methods utilized by the latent print examiner for the comparison of friction ridge skin impressions.

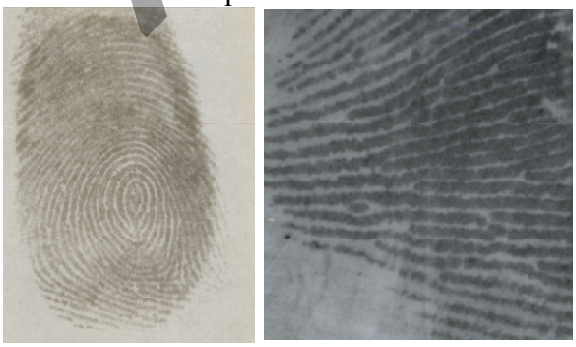
Responsibility:

Latent Print Examiners

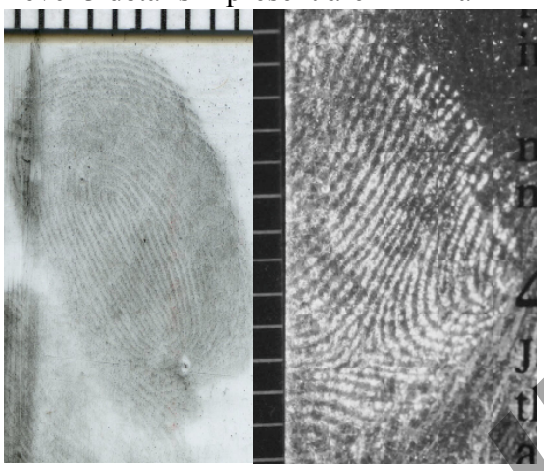
Definitions:

High Quality Friction Ridge Impression:
Level 1 detail is distinct
Level 2 details are distinct
Level 3 details are abundant and distinct

Medium-High Quality Friction Ridge Impression:
Level 1 detail is distinct
Level 2 details most are distinct
Level 3 details if present are minimal but distinct



Medium-Low Quality Friction Ridge Impression:
Level 1 detail is distinct
Level 2 details few are distinct
Level 3 details if present are minimal



Low Quality Friction Ridge Impression:
Level 1 detail may not be distinct
Level 2 details most are indistinct
Level 3 details are not distinct

Verifier: A competently trained analyst that will conduct an independent verification when requested by the primary examiner.

Procedure:

Indexing Friction Ridge Impressions of Value

1.1.
Friction ridge impressions selected for their potential to effect an identification will be documented and indexed on an appropriate worksheet (e.g. QR-LP1b, QR-LP1d, QR-LP-14 or other). These impressions will be clearly marked by the examiner. There should be no confusion as to the selected friction ridge impression and its associated index number, letter, or number letter combination. Examiners are not required to document or make comparisons to friction ridge impressions that are assessed as IQQ.

2.
ACE-V Methodology Overview

2.1.
The comparison of friction ridge skin impressions are conducted utilizing the Analysis, Comparison, Evaluation, and Verification (ACE-V) methodology. This includes both qualitative and quantitative analysis of the following three levels of friction ridge detail:

Level 1 Detail
Overall ridge flow / pattern shape
Cannot be used alone to individualize.

Level 2 Detail
Individual ridge path and events (bifurcations, ending ridges, and dots) used in conjunction with level one detail to individualize as well as to exclude.

Level 3 Detail
Ridge dimensional attributes (width, edge shape, pores) used in conjunction with level one and level two detail to form a conclusion.

2.1.1
Other Features Associated with Friction Ridge Impressions

a. Creases
b. Injury related features both temporary and permanent (scars/cuts/blisters)
c. Skin ailments such as warts

Note: Other features may be used in conjunction with friction ridge detail to individualize or exclude.

3.
EXECUTING ACE-V

3.1.
Analysis

3.1.1.
Friction ridge impressions selected as being of value will be indexed. Ridge events will include ridge endings, bifurcations, dots and other articulable ridge attributes that can be used to support a conclusion. Generated sufficiency worksheets (QR-LP-14) which were annotated as part of determining ridge event sufficiency for further review and comparison potential will be made part of the examiner's case file. The annotations shall be clearly discernable so there is no question as to the marked details (see 3.1.3). Open fields may also be given weight and noted as a characteristic to document and illustrate areas lacking minutiae. The outside edges of the area of analysis shall be traced in green using the freehand tool in CSIpix or similar tool in other graphics software or in green marker on a printed image. The following classifications will be used to demonstrate the quality assessment of a latent impression of value.

a. **Identification Value (IV):** When an impression is assessed by the primary examiner to be Identification Value it shall:

   1. Have a quality rating of High or Medium-high and;
   2. Contain a minimum of (8) clear and distinct (green) minutiae/ridge events for finger impressions or a minimum of (10) clear and distinct (green) minutiae/ridge events for palm impressions and;
   3. Contain a known anchor point such as a core, delta, or other distinct ridge formation or ridge flow which can be associated to its anatomical region by the primary examiner. For palm impressions this shall include areas indicative of the Interdigital, Thenar, Hypothenar, Central Area, Carpal Delta or outer edge areas of the palm such as the writer's palm.
   4. With the above criteria in mind, the analyst has the discretion to classify an impression as CV if in their opinion documented distortion, interference or other issues in the reviewed impression makes a comparison more complex (i.e. substrate interference).

b. **Comparison Value (CV):** When an impression is assessed by the primary examiner to be Comparison Value it shall:

   1. Have a quality rating of Medium Low or Low or;
   2. The impression contains less than eight (8) clear and distinct (green) minutiae/ridge events for finger impressions or less than ten (10) clear and distinct (green) minutiae/ridge events for palm impressions or;

3. The impression lacks a known anchor point or other distinct ridge formation or ridge flow which can be associated to its anatomical region by the primary examiner or;
4. The impression contains distortion, interference or other issues in which the primary examiner determines a CV rating is more appropriate.

3.1.2.
When the primary analyst wishes to move forward for comparison an impression that has less than (8) eight level two detail in total for finger impressions and less than ten (10) level two detail in total for palm impressions, this impression shall be reviewed by a second analyst for sufficiency using QR-LP-14 (Sufficiency Worksheet). In reviewing the friction ridge impression for sufficiency, the second analyst will document all viable ridge events on the impression being reviewed and whether the impression is sufficient or insufficient to move forward to the comparison phase. The annotated analysis including the sufficiency decision will be printed out and provided to the primary examiner for the case file.

3.1.3.
Ridge events marked for sufficiency (including delta and core locations) will be traced or plotted and color coded based on the examiner's confidence level of the feature being marked using laboratory software. Images should be calibrated to 1000ppi prior to analysis. Tools similar to the FreeHand or Dot tool will be the primary tools used to annotate the impression. In general the marking tool opacity should be set to an acceptable contrast level of 80% or higher and at a diameter sufficient to cover a ridge width. The following color codes will be used:

- Green: High Confidence Level
  - The examiner is certain that the type of event and its specific location as marked in the latent will be of a tight tolerance when compared to the source exemplar.

- Yellow: Medium Confidence Level
  - The examiner is certain that a ridge event is occurring but cannot be certain as to the specific type of event or that the event's location tolerance will be tight when compared to the source exemplar.

- Red: Low Confidence Level (areas circled in red will indicate unsuitable for analysis)
  - The examiner is noting an observation of what may possibly be a ridge event when compared to the source exemplar.

Note: If another color code other than the above is used, the examiner will indicate the designations with a color code key on the printed copy in the case file.

3.1.4
The following symbol will be used to mark core locations:

3.1.5
The following symbol will be used to mark delta locations:

3.2.
Comparison

3.2.1.
After a thorough analysis has been made of the unknown or questioned friction ridge impression(s) of value, it may be compared to the known impression(s) or exemplars following the workflow described in LP-SOP-07. Exemplars that have not been opened, examined or compared will be reported as not examined in the report.
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3.2.2.
The comparison will be accomplished by comparing the friction ridge features documented during the analysis phase of the first friction ridge impression to the features of the 2nd friction ridge impression (which under most conditions will be obtained under controlled circumstances i.e. major case prints).

3.2.3.
Documented ridge events in the final comparison chart for identification should be marked in red, however the examiner may use additional colors to mark a place holder or to illustrate ridge counts or ridge flow. If marking over a sufficiency GYR chart for comparison, the color orange should be used to plot over pre-marked ridge events.

3.2.4.
Types of Comparison

3.2.4.1.
The following types of comparison may be conducted:

a. Unknown vs Known

b. Known vs Known

c. Unknown vs Unknown

3.2.4.2.
Known Prints / Exemplar Impressions

3.2.4.2.1.
Known prints or exemplar impressions are those from a known source generally recorded under a controlled environment. Examples of known prints are:

a. Ten Print, Palm Print and Major Case Print Cards recorded by a law enforcement agency.

b. Elimination Print Submissions

c. John/Jane Doe Prints (serve as both known and unknown)

3.2.4.3.
Unknown Prints

3.2.4.3.1.
Unknown prints or impressions are of unknown or questionable origin. Examples of unknown prints are:

Prints obtained from crime scenes (unknown)

John/Jane Doe Prints (serve as both known and unknown)

3.2.4.4
Known Prints / Exemplar Impressions Used for Case Work

3.2.4.4.1
Known prints or exemplar impressions that were reviewed or compared by the latent print examiner will be printed out and included in the latent print case jacket or electronic files released for use by SPBI on QR-LP-21 will be initialed and dated by the latent print examiner for any listed file that was used for case work.

3.3
Evaluation

3.3.1.
The primary focus is to first determine if an identification can be effected. If an identification cannot be effected, or a situation as listed in 3.3.4 below has not become apparent, then the next phase of the evaluation is to determine if any of the exemplars can be excluded as containing the source impression. If an exclusion is not possible, then the reason for an inconclusive result will be reported.

3.3.2
When conducting AFIS database searches only candidate identifications will be reported out; except in the event that there is an inconclusive candidate in which it is highly probable that better exemplars could effect an identification. In this instance, the result to that candidate may be reported out as inconclusive with a request for better exemplars to be provided.

3.3.3.
When a cursory review of multiple exemplars to a specific friction ridge impression results in an identification to a specific source, it is acceptable for the examiner to terminate any pending comparisons and evaluations. In this instance, in addition to reporting the identification, it shall also be reported which other exemplars were compared and the status of those comparisons. It shall also be reported as to which exemplars were not compared.

3.3.4.
During a full comparison or cursory review of multiple exemplars that results in the focus of a particular region of friction ridge detail to a specific exemplar with a high level of agreement, but falls short of an identification (inconclusive finding) due to a lack of sufficient comparable areas in either the latent or exemplar; the examiner may terminate the comparison and evaluation of all other exemplars submitted for review. In this instance, in addition to reporting the inconclusive region of friction ridge detail, the results of all other comparisons shall be reported including the disclosure of exemplars not compared.

3.3.5
The following conclusions can be reported out as a result.

a. **That an identification was made**. When an identification is made to a friction ridge impression, the impression index number and source candidate are reported. If no identification is made, then the submitting agency's requested candidate exemplars which were examined will be reported out as excluded or inconclusive.

b. **That the questioned source was excluded.** An exclusion will only be reported when one of the following conditions have been met and sufficient exemplars have been provided and a closed search has been conducted.

    1. A clear and distinct anchor point such as a loop, whorl or delta is available in both impressions which encompasses sufficient ridge events for a conclusion to be made. If a clear and distinct anchor point cannot be documented then the result will be reported as inconclusive. Sufficient Ridge Events shall be defined as a minimum of 2 target groups with each target group separated by an average of at least 3 ridge widths in length. Each target group shall contain at least 2 clear and distinct ridge events.

2. A clear and distinct ridge flow or formation (e.g. pattern vestigia) which because of the characteristic and size of the impression can be conclusively associated to its specific anatomical region (e.g. finger, palm, thenar) and sufficient ridge events for a conclusion to be made are present. Sufficient Ridge Events shall be defined as a minimum of 2 target groups with each target group separated by an average of at least 3 ridge widths in length. Each target group shall contain at least 2 clear and distinct ridge events. If the specific anatomical region of the latent impression cannot be determined then the result will be reported as inconclusive.

c. **That the results of the examination were inconclusive.** The reason(s) for an inconclusive result will be documented and reported. Reasons for inconclusive results are as follows:

1. Inconclusive due to a lack of sufficient detail and or clarity in the latent impression.

2. Inconclusive due to the incomplete exemplars of an individual. Examples of incomplete would encompass needing better quality or fully captured exemplars [i.e. palm prints, writer's palm (blade) impressions, fully rolled finger impressions and tips of the fingers] for full comparison to be conducted. This inconclusive shall be reported as "Inconclusive due to the incomplete exemplars of 'John Doe', submitting clear and completely recorded major case prints *(to include specific region if needed)* may result in a more definitive conclusion."

3.3.6.
Documentation of an identification, inconclusive result to specific anatomical region or latent to latent comparisons shall be available in the case file on quality record QR-LP-11.

3.3.7.
Documentation of an exclusion or inconclusive result other than an inconclusive result to a specific anatomical region shall be available in the case file on quality record QR-LP-14 or QR-LP-18.

3.4.
Verification

3.4.1
All identifications, inconclusive results to a specific anatomical region or latent to latent comparisons shall be verified; the primary examiner will create a digital case folder titled "VR" for the verification review of all identifications made by the primary examiner. Digital images of the friction ridge impressions which were identified and the accompanying known impressions will be placed in this digital folder.

3.4.2

The primary analyst's assessed impression value rating will determine the minimum number of verifiers needed to release an identification, inconclusive result to a specific anatomical region or latent to latent comparisons.. Exclusions will only require the verification of the technical reviewer.

a. When the primary analyst has moved forward and made an identification on an impression that has less than (8) eight level two detail in total for finger impressions and less than ten (10) level two detail in total for palm impressions and has been previously reviewed for sufficiency by a second analyst, this identification will be verified by a second verifier.

b. All other conclusions shall be verified by the assigned technical reviewer, unless the primary examiner requests additional verifications.

3.4.3
Examiners verifying identifications, inconclusive results to specific anatomical regions or latent to latent comparisons will independently visually review the indexed friction ridge impression in question as to its quality and observed ridge events prior to the comparison phase. The verifier may produce a sufficiency chart if necessary. The verifier will generate their own independent annotated comparison chart(s). The annotated comparison chart(s) will be placed in the case file and will be initialed and dated by the verifying examiner.

3.4.4
The results of all evaluations, verifications and conclusions made by the primary examiner and the verifier shall be reviewed by the technical reviewer. If the technical reviewer agrees with the primary examiner, he/she shall sign (by hand or electronically) the report prepared by the primary examiner. The technical review is the last step after the verification process.

4.
SIMULTANEOUS IMPRESSIONS

4.1
Friction ridge impressions are simultaneous if they are deposited with one touch to an item or surface. The most obvious example of this would be impressions from adjoining fingers from one touch of the hand.

4.2
Individual segments of simultaneously placed impressions may or may not have sufficient value to arrive at a conclusion of identity.

4.3

It shall be the policy of the latent print unit, that at least one segment or area of detail, of what may appear to be simultaneously placed impressions, be able to stand alone in arriving at a conclusion of identity. An aggregate of detail from multiple impressions will not be used in concert to effect an identification.

4.4
Absent some unusual circumstance from which no other conclusion can be drawn, the latent print unit will not report a conclusion of multiple friction ridge impressions being deposited on an object simultaneously in one touch. In the rare instance such a conclusion is reported, proper documentation supporting the conclusion shall be made part of the case file.

5.
DIFFERENCE OF TECHICAL CONCLUSION

5.1
GL 18 will outline the technical and administrative review process.

5.2
When conducting a technical review, deference should always be given to the primary analyst's decision making discretion. It should be kept in mind that no two analysts will always technically approach the same problem in exactly the same manner.

If during the technical review, there appears to be deviation from standard operating procedures or substandard work, the Unit Lead/Supervisor shall be consulted.

5.3
Findings in which the analyst and the reviewer(s) are in agreement will be reported out as an identification, an exclusion or inconclusive due to the quality of the known exemplar or the impression.

5.4
If any reviewer(s) has a difference of conclusion with a case that they are reviewing, the primary analyst will first be consulted on the matter. Additional work on evidence will not be performed without the approval of the primary analyst. If additional work is performed, the appropriate documentation will be placed in the case file. The reviewer(s) and analyst will make every effort to consult and resolve the difference in conclusion.

The Unit Supervisor and Deputy Director will be notified when the consultation does not resolve the matter. The case file will be reviewed by the Unit Supervisor and Deputy Director for appropriateness of the difference of conclusions. Once this review is completed, the case jacket is returned to the analyst to complete the report.

When the difference of conclusions cannot be resolved, the result will be inconclusive for not meeting the laboratory's analysis threshold. The laboratory's threshold is an undifferentiated result after independent analysis. All worksheets pertaining to the differing conclusions will be maintained in the case jacket. If the cause of the issue is the quality of the known exemplar; then new exemplars will be requested.

The report wording may be reported as follows depending on the situation:

1. Inconclusive to the known exemplars (or impressions) of (insert name). The analysis did not meet the laboratory's threshold for reporting a definitive conclusion due to the latent quality.

2. Inconclusive to the known exemplars (or impressions) of (insert name). The analysis did not meet the laboratory's threshold for reporting a definitive conclusion. Submitting (insert what is needed i.e. Major Case Prints) may provide a more definitive conclusion.

3. Inconclusive to the (insert anatomical location i.e. right index finger) of (insert name). The analysis did not meet the laboratory's threshold for reporting a definitive conclusion. Submitting (insert what is needed i.e. right index finger tip impressions) may provide a more definitive conclusion.

5.5
If after independent analysis and consultation a difference of conclusion still exists, the analyst will report the findings out as indicated above in section 5.4 and will indicate that this case involves a difference in technical conclusion on QR-LP-4 Case Review.

5.6
Erroneous Identifications and Exclusions

5.6.1
An erroneous identification or exclusion shall be defined as an incorrect conclusion of identity or exclusion which escapes the technical review process and is released in an official report. The laboratory has set strict standards for its examiners to follow in an effort to minimize erroneous findings. All examiners are expected to follow these standards. If it is found that an erroneous identification or exclusion has occurred, then this is a serious matter which will be referred to the Deputy Director of Identification Services and the Quality Section of the laboratory. A Quality Action Record will be opened and the following may be a remediation:

a. Retraining
b. Re-evaluation of prior casework.
c. Retraining and re-evaluation of prior case work
d. Retraining and removal from case work for a predetermined amount of time.

e. Self-initiated medical vision examination.
f. Any other appropriate action based on the results of a root cause analysis conducted Quality Section in conjunction with the Latent Print Unit Supervisor and the Deputy Director.

The customer will be notified by the release of an amended report and depending on the root cause, further communication may be needed.