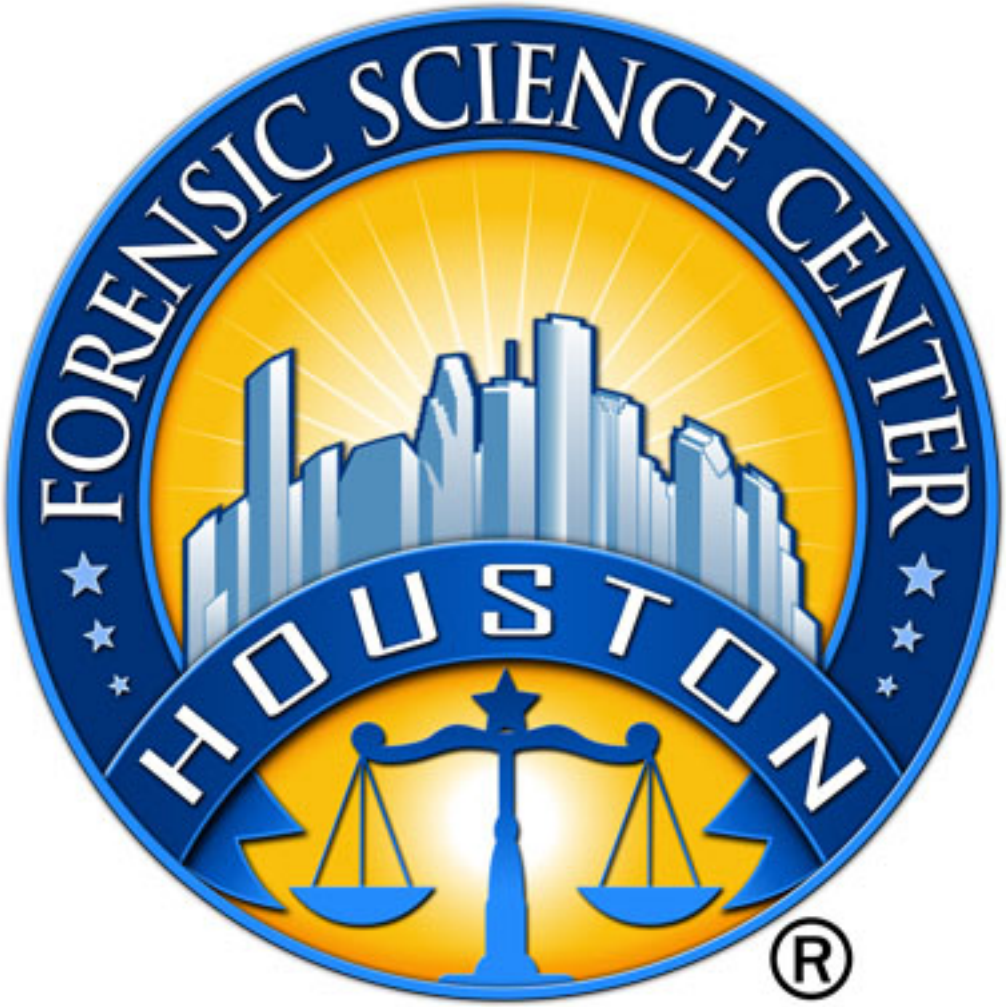

Latent Print Section

Analysis, Comparison, Evaluation and Verification Methodology

Comparative and Analytical Division

1. Analysis, Comparison, Evaluation, and Verification

1.1 Scope

1.1.1 This procedure details the examination of friction ridge skin impressions and applies to all Latent Print Examiners assigned to the Latent Print Unit of the Houston Forensic Science Center (HFSC).

1.1.2 The two basic scientific premises forming the foundation of the use of friction ridge impressions as a means of identification are persistence and uniqueness. That is, no two areas of friction ridge skin are the same and it remains unchanged, barring any damage to the dermal layer of skin, from after embryonic development until after death. The fundamental principles of persistence and uniqueness have been founded through the study of the biological sciences for over a century.

1.2 Methodology

1.2.1 Friction ridge impression examinations are conducted by examiners, trained to competency, using the Analysis, Comparison, Evaluation, and Verification (ACE-V) methodology, which includes both qualitative and quantitative aspects. Application of ACE includes observations, measurements, assessments, decision-making, and documentation, which are enabled by the training, skill, and experience of the examiner. The application of V or Verification phase requires a second examiner to apply the ACE process to support or refute the conclusion of the primary examiner.

1.2.2 There are three levels of detail that may be present within the friction ridge impressions that are used for the application of ACE-V:

1.2.2.1 Level 1 Detail:

- Overall ridge flow that includes the pattern type (loop, arch, whorl).
- Major creases
- Anatomical source such as finger, palm, foot
- Orientation
- Cannot be used alone for identification or exclusion

1.2.2.2 Level 2 Detail:

- Individual characteristics or ridge path deviations to include formations defined as ridge endings, bifurcations, dots, or combinations thereof.
- Absence of ridge path deviations (i.e. continuous ridges or open fields)
- Can be used in conjunction with Level 1 detail for identification as well as exclusion

1.2.2.3 Level 3 Detail:

- The unique shape, size, and position of pores (Poroscopy)

- Edges of the ridges (Edgeoscopy) to include dimensional attributes of a ridge, such as ridge path, deviation, width, and shape.
- Minor creases
- Incipient ridges
- Scars
- Can be used in conjunction with Level 1 and Level 2 details for identification and exclusion

1.3. Procedure

1.3.1. Analysis

1.3.1.1. During the Analysis phase, the latent print is analyzed to determine if it is suitable for comparison. The following factors are considered when performing analysis and determining suitability:

1.3.1.1.1. Analysis is conducted on all friction ridge impressions regardless of whether comparisons will be made.

1.3.1.1.2. The quantity of the latent print present is observed to determine how much of the friction ridge area is reproduced.

1.3.1.1.3. The quality of the latent print is analyzed by looking at factors such as clarity, contrast, downward pressure, lateral pressure, slippage, background noise, and focal points.

1.3.1.1.4. Orientation of the latent print is determined if possible.

1.3.1.1.5. A determination of "suitable for comparison" by an examiner indicates that there is sufficient quality and quantity of unique details present in the impression such that, when compared to another impression, a conclusion may be reached.

1.3.1.1.6. If the impression lacks sufficient detail to reach the conclusion of suitable for comparison, the print is determined to be of no value for comparison purposes.

1.3.1.2. Suitability Determinations:

1.3.1.2.1. AFIS Quality (AQ) – When a latent print is deemed suitable for comparison and entry into AFIS.

1.3.1.2.2. Not AFIS Quality (NAQ) – When a latent print is deemed suitable for comparison purposes, but not for AFIS entry. Latent prints with random ridge detail, insufficient clarity and quantity, or extreme tips/sides of the finger may be deemed NAQ.

1.3.1.2.3. Value for Exclusion Only (VEO) - When a latent print is determined to be suitable for comparison, but it is not believed that it is identifiable.

1.3.1.2.4. No Value (NV) – When friction ridge detail is visible, but it is determined to not be suitable for comparison.

1.3.1.2.5. No Ridge Detail (NRD) – When no friction ridge detail is observed.

1.3.1.2.6. Possible Suitable Latent (PSL) – When friction ridge detail is determined to have sufficient information to be further analyzed by a Latent Print Examiner (LPE).

1.3.2. Comparison

1.3.2.1. During the comparison phase, a direct side-by-side comparison is conducted of two or more impressions to determine the existence of features in agreement or disagreement until an evaluation conclusion is made.

1.3.2.2. Latent to Latent Comparisons

1.3.2.2.1. Latent to latent comparisons of friction ridge skin impressions are not conducted on a routine basis. Any request received for a latent to latent impression comparison must be approved by the Section Manager and/or designee.

1.3.2.2.2. No conclusions of exclusions to an individual(s) will be reported.

1.3.3. Evaluation

1.3.3.1 The evaluation phase is the formulation of a conclusion based on the analysis and comparison. It must be determined whether the information observed in the phases above is sufficient to form one of four conclusions or return to the analysis phase and reassess suitability. It is during the evaluation phase that the examiner assesses the value of the friction ridge detail observed during the analysis and the comparison steps and reaches a conclusion. There are four possible conclusions Latent Print Examiners of the Latent Print Section of HFSC can reach:

1.3.3.1.1 **Identification** - An identification is the conclusion by an examiner that two friction ridge impressions originated from the same source due to sufficient quality and quantity of corresponding information such that the examiner would not expect to see that same arrangement of features repeated in a print from another source.

1.3.3.1.2 **Exclusion** – An exclusion is the conclusion by an examiner that the impressions compared did not originate from the same source.

1.3.3.1.2.1 To reach the determination of exclusion the latent print must have a focal point (i.e. core, delta, major crease, etc.) and the examiner will utilize more than one target group.

1.3.3.1.2.2 Exclusions will not be based solely on level one detail.

1.3.3.1.3 **Inconclusive** - The conclusion of inconclusive can be used under two (2) circumstances based on observations from the examiner:

1.3.3.1.3.1 Inconclusive due to the incomplete or insufficient recording of the friction ridge detail (lack of area of detail needed in the record prints to compare to the latent print or record prints are of poor quality such as over inking, distortion, etc.)

1.3.3.1.3.2 Inconclusive due to the quantity and quality of information in the latent. The latent print lacks sufficiency to identify or exclude.

1.3.3.1.4 **Preliminary AFIS Association (PAA)** – This conclusion is used only as a result of a Preliminary AFIS Association and reported as an investigative lead only.

1.3.3.1.4.1 A PAA is the result of searching an image of a latent print impression in AFIS and the conclusion is reached, based upon observed corresponding characteristics between the latent and the candidate image, to conclude they **MAY** have originated from the same source.

1.3.3.1.4.2 Official identifications are **NEVER** reported from PAA results alone.

1.3.3.1.4.3 If desired, stakeholders may request a confirmatory comparison of the reported PAA. If a confirmatory comparison is requested and upon a full comparison it is determined that the friction ridge impression did not originate from the same source, this does not constitute an error. The PAA Reports are generated as investigative leads only and never indicate an official identification has been effected.

1.3.4. Verification

1.3.4.1. The independent application of the ACE process is utilized by another examiner to either support or refute the conclusion of the primary examiner.

1.3.4.2. Suitability, identifications, exclusions, and inconclusive decisions documented by the original examiner will be verified by a second examiner.

1.3.4.3. PAAs will not be verified.

1.3.4.4. The primary examiner will transfer latent comparison evidence and record prints to the second examiner through proper transfer of custody when dealing with physical evidence or through secure electronic means when verifying comparisons that are documented utilizing digital imaging.

1.3.4.5. All verifications will be conducted prior to sending the case to Technical/Administrative review. Prior to verbally releasing comparison conclusions a verification must be conducted.

1.4. Erroneous Conclusions

1.4.1. Erroneous Identification

1.4.1.1. An Erroneous Identification occurs when an identification has been declared and it is later determined that the friction ridge impression did not originate from the same source.

1.4.1.2. A verification of an Erroneous Identification is considered an Erroneous Identification.

1.4.1.3. When an Erroneous Identification occurs, the primary concern is to conduct an immediate assessment to determine the extent of the situation and impact on the stakeholder.

1.4.1.4. Immediate action must be taken to ensure corrections are made and the comparisons in question are completely re-examined. A corrected report will be issued and the stakeholder/affected parties notified of the correction if a final report has been issued.

1.4.1.5. If an Erroneous Identification occurs, the Quality Division will be notified, regardless of whether a final report has been issued.

1.4.2. Missed Identifications

1.4.2.1. A Missed Identification occurs when an examiner determines a print to be of no value for comparison and it is later determined to be an Identification.

1.4.2.2. When a Missed Identification occurs, the primary concern is to conduct an immediate assessment to determine the extent of the situation and impact on the stakeholder. Immediate action must be taken to ensure corrections are made, a corrected report is generated and the stakeholder/affected parties are notified of the correction if a final report has been issued.

1.4.2.3. If a Missed Identification occurs, the Quality Division will be notified if a final report has been issued.

1.4.3. Erroneous Exclusions

1.4.3.1. An Erroneous Exclusion occurs when an examiner incorrectly determines that a friction ridge impression did not originate from the same source and it is later determined that the impressions are from the same source.

1.4.3.2. When an Erroneous Exclusion occurs, the primary concern is to conduct an immediate assessment to determine the extent of the situation and impact on the stakeholder.

1.4.3.3. Immediate action must be taken to ensure corrections are made, a corrected report is generated and the stakeholder/affected parties are notified of the correction if a final report has been issued.

1.4.3.4. If an Erroneous Exclusion occurs, the Quality Division will be notified if a final report has been generated.

1.5. References

1.5.1. SWGFAST, *Document #8 Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V)* 9/11/12 Ver 2.0

1.5.2. SWGFAST, *Document #10 Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint)* 3/13/13 Ver. 2.0

1.5.3. Defense Forensic Science Center, *CILA LP 11.0 Analysis, Comparison, Evaluation and Verification Methodology* 11 March 2014

1.5.4. Langenburg, G., (2009) *A Performance Study of the ACE-V Process: A Pilot Study to Measure the Accuracy, Precision, Reproducibility, Repeatability, and Biasability of Conclusions Resulting from the ACE-V Process*, Journal of Forensic Identification 59(2): 219-257.

1.5.5. Ashbaugh, D.R., (1999) *Quantitative-Qualitative Friction Ridge Analysis,* CRC Press.

1.5.6. Ulery, B.T.; Hicklin, R.A., Roberts, A.R.; Buscalia, J., (2014) *Measuring What Latent Fingerprint Examiners Consider Sufficient Information for Individualization Determinations,* PLOS ONE (DOI: 10.1371/journal.pone.0110179)

1.5.7. Swofford, H.; Steffan, S.; Warner, G.; Bridge, C.; Salyards, J.; (2013) *Impact of Minutiae Quantity on the Behavior and Performance of Latent Print Examiners,* Journal of Forensic Identification 63 (5), 2013 pg. 571.

1.5.8. SWGFAST, *Document #101 Limited Examination Considerations for Latent Print Sections (Latent) Position Statement* 09/11/12 Ver 1.0

1.5.9. Ulery, B; Hicklin, R. A.; Buscaglia, J.; Roberts, M.A.; (2011) *Accuracy and Reliability of Forensic Latent Fingerprint Decisions,* PNAS May 10, 2011, Vol. 108, No. 19, 7733-7738.