

## Training for CODIS Verifications

**1.0 Purpose** - This document provides an outline for training in the examination and comparison of known thumb prints, CODIS verifications, and the requisite competency testing. Most of the information contained herein is based on the International Association for Identification's (IAI) Friction Ridge Skin Identification Training Manual and the Organization of Scientific Area Committees (OSAC)/Scientific Working Group for Friction Ridge Analysis, Study, and Technology's (SWGFAST) recommended guidelines for the training of Latent Print Examiners. Additional information, assignments, and evaluations have been added to specifically address topics of interest to latent print examiners in Latent Evidence at the North Carolina State Crime Laboratory.

**2.0 Scope** – The full Latent Evidence Training Program consists of three tracks of instruction: (1) Examination and Comparison of latent prints, (2) Latent Evidence Chemical and Physical Processing, and (3) CODIS Verifications. See the Outline of the **Training for Friction Ridge Chemical and Physical Processing** and the **Training for Friction Ridge Examination and Comparison** for the specifics of those segments. This procedure applies to CODIS verifications only.

**Note:** Individuals entering the Latent Evidence Section that have prior experience or that have completed individual parts of the training programs may not be required to complete the repeating parts. In such cases a review of prior training by the Latent Evidence Forensic Science Manager and Latent Print Technical Leader shall be conducted and a memorandum generated that specifically designates which segments shall be completed and provide documentation in regards to the segments that have been previously completed to competency. Additionally, they shall be assessed by a written examination, competency test, and moot court prior to conducting unsupervised casework.

**3.0 Trainee Instructions** - The trainee shall successfully complete each module of training and complete all comparison practical exercises written examinations with a minimum score of 85%. Practical comparison exercises will not be considered complete until the trainee has reached a score of 100%. Trainees shall be required to score 100% on the final comparison competency test in order to be released to conduct comparison casework.

### 4.0 Module I – Introduction to Fingerprints

**4.1 Objectives:** Through the completion of this module the trainee shall have developed and demonstrated theoretical and/or practical knowledge of:

- The History of Fingerprints and Fingerprinting Science
- The Biology and Physiology of Fingerprints
- Latent Print Terminology
- ACE-V Methodology
- The State Automated Fingerprint Identification System (SAFIS)
- Advanced Fingerprint Identification Technology (AFIT)
- Latent Evidence Image Processing System (LEIPS) and PhotoShop

**4.2 Required Reading:** The following items are located in the Latent Official Policy and Procedure.

- Image Processing
- SAFIS AFIT
- Friction Ridge Analysis and Comparison (9.0)

### **4.3 Practical and Written Exercises:**

#### **4.3.1 History of Fingerprints - The trainee shall attain:**

- 4.3.1.1.** An understanding of the earliest recorded awareness of fingerprints.
  - 4.3.1.1.1.** The trainee shall complete a research paper based on the “History of Personal Identification and Friction Ridge Skin Identification” and explain this science as it has evolved over centuries. The trainee must cite all related topics including, but not limited to, the below listed references.
- 4.3.1.2.** An understanding of early anatomical observations of friction skin.
  - 4.3.1.2.1.** List the observations from early researchers Grew, Malpighi, Purkinje, and Mayer.
- 4.3.1.3.** An understanding of the scientific methodology leading to modern fingerprint identification.
  - 4.3.1.3.1.** List and give a description of the research of the following scientists and how the research relates to friction ridge skin: Herschel, Faulds, Galton, Vucetich, Henry.
- 4.3.1.4.** An understanding of scientific methods of identification (other than fingerprints).
  - 4.3.1.4.1.** Describe in writing the Bertillon System.
- 4.3.1.5.** An introduction to the basic foundations of the science of fingerprints identification: permanence and individuality.
  - 4.3.1.5.1.** Explain in writing the terms permanence and individuality and how they relate to friction ridge analysis.

#### **4.3.2 Biology and Physiology of Fingerprints - The trainee shall:**

- 4.3.2.1.** Study and understand the anatomy of friction ridge skin.
- 4.3.2.2.** Research the growth and properties of friction ridge skin and its relation to the fundamental principle of uniqueness and write a brief essay on the findings.
- 4.3.2.3.** Understand the principle function of eccrine, apocrine, and sebaceous glands and explain the functions to the instructor.
- 4.3.2.4.** Understand and list the chemical composition of human sweat as a means of understanding the composition of latent print residue.
- 4.3.2.5.** Read and prepare a short essay on three articles.

- 4.3.2.6.** Complete the illustration depicting the friction ridge skin surfaces of the fingers, palms and feet by labeling the respective anatomical regions/areas. Complete the cut-out (dissected) view illustration of friction ridge skin by labeling the layers of skin, papillae, sweat glands and pores.

**4.3.3 Latent Print Terms and Definitions** - The trainee shall learn and understand the following terms:

- **ACE-V** - The acronym for a scientific method: Analysis, Comparison, Evaluation, and Verification.
- **AFIT** - The acronym for Advanced Fingerprint Identification Technology.
- **Analysis** - The first step of the ACE-V method. The assessment of an impression to determine suitability for comparison.
- **Appendage** - An attachment or connection within friction ridges.
- **Arch (Plain)** - A fingerprint pattern in which the friction ridges enter on one side of the impression and flow, or tend to flow, out the other side with a rise or wave in the center.
- **Arch (Tented)** - A type of fingerprint pattern that possess an angle, an up-thrust, or two of the three basic characteristics of the loop.
- **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 by a second qualified examiner who has no expectation or knowledge of the conclusion of the original examiner.
- **Bridge** - A connecting friction ridge between, and generally at the right angles to, parallel running friction ridges.
- **Characteristics (Minutiae)** - Features of the friction ridges. Commonly referred to as minutiae, points, or ridge formation morphologies.
- **Classification** - Alpha numeric formula of finger and palmprint patterns used as a guide for filing and searching.
- **Cognitive Bias** - Influences that may affect the reliability and validity of one's observations and conclusions.
- **Comparison** - The second step of the ACE-V method. The observation of two or more impressions to determine the existence of discrepancies, dissimilarities, or similarities.
- **Competency** - Possessing and demonstrating the requisite knowledge, skills, and abilities to successfully perform a specific task.
- **Confirmation Bias** - The tendency to search for data or interpret information in a manner that supports one's preconceptions.
- **Conflict** - A difference of conclusions that becomes apparent during the application of an examination methodology.
- **Consultation** - A significant interaction between examiners regarding one or more impressions in question.
- **Contextual Bias** - The tendency to allow information or outside influences to interfere with the evaluation and interpretation of data.
- **Core** - the approximate center of a pattern.
- **Delta** - The point on a friction ridge at or nearest to the point of divergence of two type lines and located or directly in front of the point of divergence.
- **Deviation** - A change in friction ridge path. An alteration or departure from a documented policy or standard procedure.

- **Discrepancy** - The presence of friction ridge detail in one impression that does not exist in the corresponding area of another impression.
- **Distal** - The farthest away from the center or point of attachment.
- **Distortion** - Variances in the reproduction of friction skin caused by pressure, movement, force, contact surface, etc.
- **Dot** - An isolated friction ridge unit whose length approximates its width in size.
- **Elimination prints** - Known inked impressions of friction ridge detail of persons known to have had legitimate access to an item.
- **Enclosure** - A single friction ridge that bifurcates and rejoins after a short course and continues as a single friction ridge.
- **Ending Ridge** - A single friction ridge that terminates within the friction ridge structure.
- **Erroneous Exclusion (Elimination/miss)** - The incorrect determination that two areas of friction ridge impressions did not originate from the same source.
- **Erroneous Individualization (Identification/bum)** - The incorrect determination that two areas of friction ridge impressions originated from the same source.
- **Evaluation** - The third step of the ACE-V method in which an examiner assesses the value of the details observed during the analysis and the comparison steps and reaches a conclusion.
- **Exclusion (Elimination)** - The determination by an examiner that there is sufficient quality and quantity of detail in disagreement to conclude that the two areas of friction ridge impressions did not originate from the same source.
- **Exemplar (Known inked impressions)** - The known prints of an individual recorded electronically, photographically, by ink, or by another medium. [Known Inked Impressions (KII) and Known Inked Fingerprint Impressions (KIFI).]
- **Fingerprint** - An impression of the friction ridges of all or any part of the finger.
- **Focal Points** - In classification, those areas that are enclosed within the pattern of loops and whorls. They are also known as the core and delta. In ACE-V, the areas selected for comparison purposes.
- **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 ridge containing one pore.
- **Furrows** - Valleys or depressions between friction ridges.
- **Galton Details** - A term referring to friction ridge characteristics attributed to the research of English fingerprint pioneer, Sir Frances Galton.
- **Henry Classification System** - a system of fingerprint classification developed by Sir Edward Richard Henry (1850-1931).
- **IAFIS** - The acronym for Integrated Automated Fingerprint Identification System (the FBI's national AFIS).
- **Incipient Ridge** - A friction ridge not fully developed; it may appear short and thinner than fully developed friction ridges.
- **Inconclusive** - During the evaluation step, the conclusion reached that neither sufficient agreement exists to individualize nor sufficient disagreement exists to exclude.
- **Individualization (Identification)** - The determination of an examiner that there is sufficient quality and quantity of detail in agreement to conclude that two friction ridge impressions originated from the same source.
- **Known Prints (Finger, Palm, Foot)** - A recording of an individual's friction ridges with black ink, electronic imaging, photography, or other medium on a contrasting background.

- **Latent Print** - Transferred impression of friction ridge detail not readily visible to the naked eye. Generic term used for questioned friction ridge detail.
- **Level 1 Detail** - Friction ridge flow and general morphological information (pattern types).
- **Level 2 Detail** - Individual friction ridge paths and friction ridge events (i.e. bifurcations, ending ridges, dots, enclosures).
- **Level 3 Detail** - Friction ridge dimensional attributes (i.e. width, edge shape, and pores).
- **Lift** - An adhesive or other medium on which recovered friction ridge detail is preserved.
- **Loop (Ulnar)** – A type of pattern in which one or more friction ridges enter upon either side, recurve, touch or pass an imaginary line between delta and core and flow out, or tend to flow out, on the same side the friction 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 friction ridges enter upon either side, recurve, touch or pass on imaginary line between delta and core and flow out, or tend to flow out, on the same side the friction ridges entered. The flow of the pattern runs in the direction of the radius bone of the forearm (toward the thumb).
- **Major Case Prints (Major Case Inked Impressions)** – A systematic recording of the friction ridge detail appearing on the palmar sides of the hands which includes the extreme sides of the palms, joints, tips and sides of each finger.
- **Medial** - At or near the center.
- **Matrix (Medium)** – The substance that is deposited or removed by the friction ridge skin when making an impression.
- **Missed Identification** - The failure to make identification (individualization) when, in fact, both friction ridge impressions are from the same source.
- **NGI** - Next Generation Identification, the updated version of IAFIS.
- **Original Image** - An accurate replica (bit-for-bit value) of the primary image.
- **Poroscopy** - The study of the size, shape, and arrangement of pores.
- **Primary Image** - The first recording of an image onto media.
- **Proficiency** - The ongoing demonstration of competency.
- **Qualitative** - The clarity of information contained within a friction ridge impression.
- **Quantitative** - The amount of information contained within a friction ridge impression.
- **Ridge Flow** - The direction of one or more friction ridges (Level 1 detail).
- **Ridge Path** - The course of a single friction ridge (Level 2 detail).
- **Ridge Unit** - See Friction Ridge Unit.
- **SAFIS** - State Automated Fingerprint Identification System.
- **Short Ridge** - A single 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** - Specific area of friction ridge skin.
- **Spur** - A bifurcation with one short friction ridge branching off a longer friction ridge.
- **Substrate** - Surface upon which a friction ridge impression is deposited.
- **Suitable (Sufficient)** - The determination that there is adequate quality and quantity of detail in an impression for further analysis, comparison, or conclusion.
- **Technical Review** - Review of notes, documents, and other data that forms the basis for a scientific conclusion (see ASCLD/LAB 2008 Manual).
- **Tenprint** - A generic reference to examination performed on intentionally recorded friction ridge impressions (usually ten fingers). A controlled recording of available fingers of an individual using black ink, electronic imaging, photography, or other medium on a contrasting background.

- **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.
- **Verification** - The final step of the ACE-V method. A review and independent analysis of the conclusions of another examiner.
- **Whorl (Accidental)** - With the exception of the plain arch, a fingerprint pattern consisting of two different types of patterns with two or more deltas. A pattern that possesses some of the requirements for two or more different types. A pattern that conforms to none of the definitions.
- **Whorl (Central Pocket Loop)** - A type of fingerprint pattern that has two deltas and at least one friction 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 friction 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 that consists of one or more friction ridges which make, or tends to make, a complete circuit, with two deltas, between which, when an imaginary line is drawn, at least one recurving friction ridge within the inner pattern area is cut or touched.

#### 4.3.4 Analysis, Comparison, Evaluation and Verification Methodology (ACE-V)

- 4.3.4.1. Analysis, comparison, evaluation and the ability to individualize or exclude latent prints brings together the various segments of the training program.
- 4.3.4.2. Explain the fundamental principles for friction ridge examinations by a latent print examiner.
- 4.3.4.3. List the three levels and uses of friction ridge skin detail for examinations.
- 4.3.4.4. Demonstrate and explain the methodology of friction ridge examinations (ACE-V Methodology).
  - 4.3.4.4.1. Analysis - Analysis is the methodological examination of friction ridge skin impressions. This involves separation into parts to determine the nature of the whole. Analysis is gathering information.
  - 4.3.4.4.2. Comparison - The examination and observation of two areas of friction ridge impressions to find similarities and/or differences. The print in question is compared to determine if it matches a known standard.
  - 4.3.4.4.3. Evaluation - The summation of all information from both analysis and comparison to arrive at one of three possible conclusions: identification, elimination, or inconclusive.
  - 4.3.4.4.4. Verification - "The independent examination of a friction ridge impression by another qualified latent print examiner resulting in the same conclusion. It is an objective process free from outside pressure

**4.3.4.5.** Explain in writing the difference between “quantitative and qualitative” analysis of latent prints.

**4.3.5.1.** The training officer or designee shall demonstrate how to log into the SAFIS/AFIT system, how to search using the SID #, and how to print the fingerprint card.

**4.3.5.2.** The trainee shall log into the system, search the database, and print one fingerprint card.

**4.3.5.3.** The trainee shall understand the functions and capabilities of the SBI Criminal Information and Identification Section (CIIS) including the individuals who may be present in the SAFIS Fingerprint Database.

**4.3.6 Latent Evidence Image Processing System (LEIPS)** - The trainee shall learn and understand how to operate the LEIPS and when it is appropriate to utilize the LEIPS.

**4.3.6.1.** The trainee shall use the LEIPS to accomplish the following:

#### 4.3.6.1.1. Scan/photograph a latent print and save the image.

#### 4.3.6.1.2. Calibrate the same image 1:1.

#### 4.3.6.1.3. Enhance the image with appropriate procedures.

#### 4.3.6.1.4. Print the image.

#### 4.3.6.1.5. Scan and save a set of known inked impressions.

#### 4.4.1 Review of practical/written exercises by the Impression Evidence Technical Leader.

#### 4.4.2 Successfully complete written examinations to evaluate proficiency with Module I.

**5.1 Objectives:** Through the completion of this module the trainee shall have developed and demonstrated theoretical and practical knowledge of the comparison of friction ridge skin (fingerprints).

**5.2 Required Reading:** The following items are located in the Latent Official Policy and Procedure.

- Friction Ridge Analysis and Comparison (7.0, 8.0)

### 5.3 Practical Exercises:

**5.3.1** The trainee shall be given photographs and lifts of latent prints to analyze. The trainee will also be provided with known inked impressions for comparison to the latent prints. The latent prints and known prints will be administered in predetermined numbered sets. The trainee shall use the ACE-V methodology to compare an undetermined quantity of latent prints during the training program. The trainee shall demonstrate the following:

**5.3.1.1.** An understanding of the analysis criteria for evaluation of fragmentary latent prints for identification purposes.

**5.3.1.2.** An understanding of the value of incipient (nascent) ridge characteristics and other level two and level three detail for use in ACE-V.

**5.3.1.3.** A working knowledge of the effects of pressure distortion, slippage, overlays, pre- and post-deposit artifacts (surface scratches, soil, brush strokes, etc.), and the ability to recognize and compensate for such disturbances/distortions.

**5.3.1.4.** A working knowledge of IAI directive regarding minimum corresponding number of ridge characteristics.

**5.3.1.4.1.** 1973 International Association for Identification, 58th Annual Educational Conference: *“No valid basis exists at this time for requiring that a predetermined minimum for friction ridge characteristics must be present in two impressions in order to establish positive identification. The foregoing reference to friction ridge characteristics applies equally to fingerprints, palm prints, toe prints, and soleprints of the human body.”*

**5.3.1.4.2.** 1995 Ne’urim Israel Declaration International Symposium on Fingerprint Detection and Identification: *“No scientific basis exists for requiring that a pre-determined minimum number of friction ridge features must be present in two impressions in order to establish a positive identification.”*

**5.3.1.4.3.** Personal empirical experience/skills in analyzing and comparing latent prints.

**5.3.1.5.** A complete working knowledge of ACE-V and successful application of the ACE-V methodology to the Comparison and Evaluation Module.

**5.4 Evaluation:** Latent Print Training Coordinator will monitor the trainee’s completion of the individual comparison sets and determine when the trainee has reached a point of comparison competence. The results of all training sets, including the trainee’s comparison log, shall be maintained in the training file.

### 6.0 Module III – Forensic Advantage



**6.1 Objectives:** Through the completion of this module the trainee shall have developed and demonstrated the skills to navigate Forensic Advantage (FA).

**6.2 Required Reading:** The following items are located in the Latent Official Policy and Lab-Wide Official Policy and Procedure.

**Lab-Wide Official Policy and Procedure:**

**6.2.1** Use of Forensic Advantage

**Latent Official Policy and Procedure**

**6.2.2** Friction Ridge Analysis and Comparison (10.0, 11.0)

**6.3 Practical Exercises:**

**6.3.1** The trainee shall work with a scientist who is authorized to perform CODIS/Latent verifications. This scientist is responsible for ensuring that the trainee understands and can successfully navigate the following topics:

- Latent Print CODIS Worksheets
- Latent Print CODIS Reports/Memos
- Forensic Advantage Object Repositories

**6.4 Evaluation:** The authorized scientist will observe the trainee navigating through FA to ensure adherence to Latent Evidence and Lab-Wide policy and procedure.

**7.0 Module IV – Courtroom Testimony**

**7.1 Objectives:** Through the completion of this module the trainee shall demonstrate the knowledge, skills, and abilities to successfully complete a mock comparison case and then successfully complete an oral round table.

**7.2 Practical Exercises:**

**7.2.1** The trainee shall prepare answers to qualifying questions and review with the Training Coordinator (TC).

**7.2.2** Sample qualifying questions:

- What is your name?
- How and by whom are you employed?
- How long have you been employed with the State Crime Laboratory?
- What is your educational background and what training have you received in the field of latent print examination and identification?
- What are your official duties?
- What is a latent print?
- What is an inked impression?
- How are fingerprints compared and identifications made?

- What factors make it possible for an individual to be identified by fingerprints?
- How many times have you testified as an expert in the field of Latent Print Analysis?

### **7.3 Evaluation:**

**7.3.1** Trainee shall successfully complete a round table discussion that covers all topics covered in the 10 print/CODIS verification training process to include, but not limited to history or fingerprints, biology and physiology, latent print terminology, ACE-V, and latent print results statements.

## **8.0 Module V – Final Exam**

**8.1 Objective:** Through this module the trainee shall demonstrate the knowledge, skills, and abilities obtained throughout the comparison training modules.

**8.2 Evaluation:** The trainee shall successfully complete a written and practical final exam/competency test.

**8.2.1** Successful completion of the written exam is a score of 85% or higher covering the following topics.

- History of the Science of Fingerprints
- Biology and physiology of friction ridge skin
- Pattern interpretation
- Known inked impressions
- Expert witness testimony
- Administrative forms and documents

**8.2.2** Successful completion of the latent print comparison competency test is 100%.

## **9.0 Required External Training**

**9.1** Prior to being released for independent casework the trainee shall complete the following external training classes:

- The Science of Fingerprints
- Basic Latent Print Comparison

Successful completion of the external training classes shall be documented in the training file. This documentation shall include any certificates issued.

## **10.0 Supervised Case Work**

**10.1** Once the trainee has successfully completed the entirety of the CODIS Verification training program the trainee will be released to independently work CODIS Verification cases in accordance with the **CODIS Fingerprint Verification** technical procedure.

## **11.0 References**

International Association for Identification Friction Ridge Analysis Training Manual (IAI).

Scientific Working Group on Friction Ridge Analysis, Study, and Technology's (SWGFAST) Recommended Guidelines (Training to Competency for Latent Print Examiners; Glossary; Standards for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V); Standards for Minimum Qualifications and Training to Competency for Friction Ridge Examiner Trainees; Friction Ridge Examination Methodology for Latent Print Examiners).

Digital/Latent Evidence Section Technical Procedures.

## 12.0 Records

- Analyst's training file
- Module tests
- Training checklist
- Final written exam
- Competency test

## 13.0 Attachments – N/A

Revision History		
Effective Date	Version Number	Reason
03/07/2018	1	Original Document