Training for Friction Ridge Chemical and Physical Processing

1.0 Purpose - This document provides an outline for training in physical and chemical processing of evidence 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 procedures for the **Training for Friction Ridge Examination and Comparison** and the **Training for CODIS Verifications** for the specifics of those segments. This procedure applies to friction ridge chemical and physical processing 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 practical exercises and written exercises. Written examinations shall be completed with a minimum score of 85%.

4.0 Module I – Evidence Handling and Processing Overview

4.1 Objectives: Through the completion of this module, the trainee shall develop an understanding of evidence handling and the different categories and sequence of physical and chemical processing and the associated chemicals.

4.2 Required Reading: The following items are located in the Lab-Wide Official Policy and Procedure and Latent Technical Procedures.

Lab-Wide Official Policy and Procedure:

- Procedure for Evidence Management
- Policy and Procedure for Evidence Submissions (1.0, 2.0, 3.0-3.8, 3.11, 5.3.2, and 6.0-9.0)

Latent Technical Procedures:

- Friction Ridge Analysis and Comparison (4.0, 5.0, 6.0)

4.3 Practical Exercises: During the course of this module, the trainee shall work with the assigned latent print examiner and demonstrate the proper procedure for evidence handling and the proper sequence of evidence processing for porous and non-porous evidence. The trainee shall document any notes and/or observations in his/her Observation Journal.

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4.4 Evaluation:

4.4.1 Latent Print Training Coordinator will sign off on the module to indicate its completeness.

4.4.2 Assigned latent print examiner conducting the training shall complete the training checklist after ensuring that the trainee understands the methods and has mastered the necessary skills from the module.

4.4.3 All materials created during this training module (photographs, practice lifts, etc.) shall be retained for the trainee training file.

4.4.4 An examination shall be given at the conclusion of each section in this module to ensure an understanding of each topic.

5.0 Module II – Non-Porous Chemical Applications

5.1 Objectives: Through the completion of this module, the trainee shall develop knowledge and demonstrate practical skills in the correct application for processing of non-porous evidence. The topics to be covered are:

- Alternate Light Sources
- Cyanoacrylate Ester (superglue) Techniques
- Fingerprint Powder Techniques
- Non-Porous Fluorescent Dye Stain Techniques

5.2 Required Reading: The following items are located in the Latent Technical Procedures.

- Crimescope
- Cyanoacrylate Ester Kits
- Gelatin Lifters
- Inherent Luminescence
- TracER Laser
- SafeFume Cyanoacrylate Chamber
- Cyanoacrylate Ester (superglue) Fuming Wand
- Cyanovac
- Cyvac M
- Liquid Adhesive Print Lifter
- Powder Processing
- R6G (Rhodamine 6G)

5.2.1 Additional reading materials may be provided by the Latent Evidence Processing Training Coordinator.

5.3 Practical Exercises: During the course of this module, the trainee shall work with the assigned latent print examiner and demonstrate the proper use/application and proper sequencing of the non-porous techniques. The trainee shall document any notes and/or observations in his/her Observation Journal.

5.3.1 Alternate Light Sources (ALS)

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5.3.1.1. The trainee shall operate the following ALSs and explain the different wavelengths available for each:

- Mini-CrimeScope
- CrimeScope
- TracER Laser

5.3.1.2. The trainee shall use the listed ALSs on the following types of evidence:

- Non-porous (glass, plastic, metal, etc.)
- Porous (paper, cardboard, etc.)
- Semi-porous (glossy photo paper, glossy cardboard, etc.)

5.3.2 Cyanoacrylate Ester Techniques

5.3.2.1. The trainee shall learn and explain how to use the listed approved equipment for developing latent impressions on non-porous surfaces. The trainee shall demonstrate the processing of non-porous items with each piece of equipment.

- Cyvac
- Cyanovac
- Hot Shots
- Cyanoacrylate Ester (superglue) Fuming Wand
- SafeFume Chamber

5.3.2.2. The trainee shall learn and explain the following for each cyanoacrylate ester procedure:

- Suggested uses
- Required equipment
- Required chemicals
- Application procedures
- Steps to preserve prints
- Safety
- Storage
- Shelf life

5.3.3 Fingerprint Powdering, Lifting and Labeling Latent Lifts - The trainee shall learn the proper techniques for powdering items of evidence, lifting developed impressions with lifting tape, and labeling a latent lift backing card. The trainee shall:

5.3.3.1. Demonstrate powdering proficiency with the various available powders.

5.3.3.2. Explain how and when to use the different types of fingerprint brushes available.

5.3.3.3. Explain how and when to use the different types of fingerprint lifting tapes available.

5.3.3.4. Properly lift a latent print.

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5.3.3.5. Correctly label a latent lift.

5.3.4 Non-porous Fluorescent Dye Stain Techniques - The trainee shall learn the proper techniques for processing non-porous items of evidence with the appropriate chemicals available in the Latent Evidence section. The trainee shall:

5.3.4.1. Explain how and when to use the various non-porous fluorescent dyes.

5.3.4.2. Explain how and when to use the various Alternate Light Sources in conjunction with the non-porous fluorescent dyes.

5.4 Evaluation:

5.4.1 Assigned latent print examiner conducting the training shall complete the non-porous checklist after ensuring that the trainee understands the methods and has mastered the necessary skills from the module.

5.4.2 All materials created during this training module (photographs, practice lifts, etc.) shall be retained for the trainee training file.

5.4.3 An examination shall be issued at the conclusion of each section in this module to ensure an understanding of each technique.

6.0 Module III – Porous/Semi-porous Chemical Applications

6.1 Objectives: Through the completion of this module, the trainee shall develop knowledge and demonstrate practical skills in the correct application for processing of porous and semi-porous evidence. The topics to be covered are:

- Porous/Semi-porous Fluorescent Dye Stain Techniques
- Porous/Semi-porous Dye Stains (non-fluorescent)
- Physical Developer

6.2 Required Reading: The following items are located in the Latent Technical Procedures.

Technical Procedures:

- 1,2-Indanedione-Zinc
- 1,8-Diazafluoren-9-one (DFO)
- Ninhydrin HFE-7100
- Zinc-Chloride HFE-7100
- Physical Developer

6.2.1 Additional reading materials may be provided by the Latent Evidence Processing Training Coordinator.

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6.3 Practical Exercises: During the course of this module, the trainee shall work with the assigned latent print examiner and demonstrate the proper use/application and proper sequencing of the following porous and semi-porous techniques:

- 1,8-Diazafluoren-9-one (DFO)
- 1,2-Indanedione-Zinc
- Ninhydrin/NinhydrinHFE-7100
- Zinc Chloride/Zinc ChlorideHFE-7100
- Physical Developer/Modified Physical Developer

The trainee shall document any notes and/or observations in his/her Observation Journal.

6.3.1 The trainee shall learn and explain the following for each chemical procedure:

- Suggested uses
- Required equipment
- Required chemicals
- Application procedures
- Steps to preserve prints
- Safety
- Storage
- Shelf life

6.4 Evaluation:

6.4.1 Assigned latent print examiner conducting the training shall complete the porous/semi-porous checklist after ensuring that the trainee understands the methods and has mastered the necessary skills from the module.

6.4.2 All materials created during this training module (photographs, practice lifts, etc.) shall be retained for the trainee's training file.

6.4.3 An examination shall be given at the conclusion of each section in this module to ensure an understanding of each technique.

7.0 Module IV – Other Processing Applications

7.1 Objectives: Through the completion of this module, the trainee shall develop knowledge and demonstrate practical skills in the correct application for processing of specialized evidence. The topics to be covered are:

- Adhesive Processing
- Blood Print Processing
- Fluorescent Dye Stains
- Wet/Grease Print Processing

7.2 Required Reading: The following items are located in the Latent Technical Procedures.

Technical Procedures:

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- Amido Black
- Coomassie Blue
- Crystal Violet
- Leuco Crystal Violet (LCV)
- Merbromin
- TapeGlo
- Sticky-Side Powder
- Sudan Black
- Small Particle Reagent (SPR)

7.2.1 Additional reading materials may be provided by the Latent Evidence Processing Training Coordinator.

7.3 Practical Exercises: During the course of this module, the trainee shall work with the assigned latent print examiner and demonstrate the proper use/application and proper sequencing of the chemical techniques. The trainee shall document any notes and/or observations in his/her Observation Journal.

7.3.1 Adhesive Surfaces

7.3.1.1. The trainee shall learn and explain how to process various types of adhesive surfaces with the following chemicals:

- Crystal Violet
- Sticky-Side Powder
- TapeGlo

7.3.1.2. The trainee shall learn and explain the following for each chemical listed above.

- Suggested uses
- Required equipment
- Required chemicals
- Application procedures
- Steps to preserve prints
- Safety
- Storage
- Shelf life

7.3.2 Blood Print Processing

7.3.2.1. The trainee shall learn and explain how to process various types of bloody evidence with the following chemicals:

- Amido Black
- Coomassie Blue
- LCV (Leuco Crystal Violet)
- Merbromin

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7.3.2.2. The trainee shall learn and expalin the following for each blood print processing chemical listed above.

- Suggested uses
- Required equipment
- Required chemicals
- Application procedures
- Steps to preserve prints
- Safety
- Storage
- Shelf life

7.3.3 Wet/Grease Print Processing

7.3.3.1. The trainee shall learn and explain how to process various types of evidence with the following chemicals:

- Sudan Black
- Small Particle Reagent (SPR)

7.3.3.2. The trainee shall learn and explain the following for each chemical listed above.

- Suggested uses
- Required equipment
- Required chemicals
- Formulas
- Application procedures
- Steps to preserve prints
- Safety
- Storage
- Shelf life

7.4 Evaluation:

7.4.1 Assigned latent print examiner conducting the training shall complete the module checklist after ensuring that the trainee understands the methods and has mastered the necessary skills from the module.

7.4.2 All materials created during this training module (photographs, practice lifts, etc.) shall be retained for the trainee's training file.

7.4.3 An examination shall be given at the conclusion of each section in this module to ensure an understanding of each technique.

8.0 Module V – Preservation of Latent Prints and Crime Scene Training

8.1 Objectives: Through the completion of this module, the trainee shall develop knowledge and demonstrate practical skills in the proper method by which to preserve latent prints and to process and preserve latent prints from a crime scene. The topics to be covered are:

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- Photography
- Latent Evidence Image Processing System (LEIPS)/Photoshop
- Recognizing Footwear and Tire Tread Applications (Limited)
- Crime Scene/Disaster Response
- Advanced Crime Scene Training

8.2 Required Reading: The following items are located in the Latent Technical Procedures. **Technical Procedures:**

- Impression Evidence Examination
- Gelatin Lifters
- Pathfinder
- Preservation of Footwear and Tire Tread Evidence

8.3 Practical Exercises:

8.3.1 Photography of Latent Impressions

8.3.1.1. The trainee shall use and become familiar with the digital cameras used by the State Crime Laboratory.

8.3.1.2. The trainee shall photograph latent impressions with the appropriate tools (e.g., scale, tri-pod, and light source).

8.3.1.3. The trainee shall create a 1:1 photograph for comparison purposes.

8.3.2 Latent Evidence Image Processing System (LEIPS)

8.3.2.1. The trainee shall use the LEIPS to accomplish the following:

- Scan/photograph a latent print and save the image.
- Calibrate the same image 1:1.
- Enhance the image with appropriate procedures.
- Print the image.
- Scan and save a set of known inked impressions.

8.3.3 Detection, Preservation, and Collection of Footwear and Tire Tread Impressions

8.3.3.1. The trainee shall become familiar with and define the following terms::

- Two-dimensional impression
- Three-dimensional impression
- Dental stone
- Casting
- Electrostatic lifting devices
- Oblique lighting

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8.3.3.2 The trainee shall understand and list the four basic ways of collecting footwear and tire tread evidence.

8.3.3.3 The trainee shall understand and demonstrate the proper way to mix and pour a dental stone cast.

8.3.3.4 The trainee shall understand and document the proper identification that is required on dental stone casts and the proper packaging of a cast.

8.3.4 Crime Scene and Disaster Response Equipment

8.3.4.1. The trainee shall understand and describe evidence processing and collection in crime scenes.

8.3.4.2. The trainee shall review the Technical Field Assistance Form.

8.3.5 Advanced Crime Scene Training - The trainee shall be required to complete the Advanced Crime Scene training. The following topics will be covered:

- Forensic Biology
- Digital Evidence
- Firearm and Tool Mark
- Latent Evidence
- Photography
- Trace Evidence

8.4 Evaluation:

8.4.1 Assigned latent print examiner conducting the training shall complete the module checklist after ensuring that the trainee understands the methods and has mastered the necessary skills from the module.

8.4.2 All materials created during this training module (photographs, practice lifts, etc.) shall be retained for the trainee's training file.

8.4.3 An examination shall be given at the conclusion of each section in this module to ensure an understanding of each technique.

9.0 Module VI – Competency

9.1 Trainee shall complete a final written examination.

9.2 Trainee shall complete a mock case.

9.3 Trainee shall complete a round table.

10.0 Supervised Case Work

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10.1 Once the trainee has successfully completed the entirety of the Latent Evidence Processing Training Program, the trainee will be released to independently work laboratory cases that involve the processing of evidence. For a period of time, the trainee shall have all completed casework subject to a full case review as set forth in the **Procedure for Release from Supervised Casework and Reviewer Training.**

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).

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

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Revision History		
Effective Date	Version Number	Reason
03/07/2018	1	Original Document
02/01/2019	2	4.0: added "Evidence Handling" 4.1: corrected grammar; added "and sequence" 4.2: added additional reading 4.3: added practical exercises 4.4, 6.4, 7.4, 8.4: added/adjusted evaluation section to be consistent throughout modules 5.1, 5.2, 5.3.2.2: changed "superglue" to "cyanoacrylate ester" 5.2: removed Portable UV light and UltraLite ALS; added gelatin lifters 5.2.1, 6.2.1, 7.2.1: added statement about additional readings 5.3, 6.3, 7.3: added statement about documentation of observations, removed topics not related to module 5.3.1.1: removed UltraLite ALS 5.3.1.2: adjusted the types of evidence to analyze to reflect current module 5.3.2.1: changed "cyanowands" to Cyanoacrylate Ester Fuming Wand" 5.3.4, 5.3.4.1, 5.3.4.2: Adjusted section to reflect correct training module topic 5.4.1, 5.4.2, 5.4.3: adjusted phrasing to reflect what is needed for evaluation 5.4.4: removed section (duplicate) 6.0, 6.1: added "semi-porous" 6.2: corrected chemical names 6.3.1: added section 7.1: added "wet/grease print processing" 7.2: added "crystal violet" and "merbromin"; removed "and Latent Friction Ridge Training" from required reading 7.3.3: changed to "wet/grease print processing" 7.3.3.1: removed chemicals not related to module 8.2: removed "and Latent Friction Ridge Training" from required reading 8.3.3.1-8.3.3.4: adjusted phrasing Removed 8.3.4.1 10.1: changed "Examination and Comparison" to "Latent Evidence Processing"

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