

Department of Forensic Science

LATENT PRINT TRAINING MANUAL

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1 Introduction

1.1 Overview

The goal of this manual is to provide uniform coordination and quality training in all aspects of the Science of Fingerprints for forensic latent print examiners employed by the Commonwealth of Virginia. This work is intended to be used in a formal training program that will establish a certain minimum standard of professional competency throughout the Department of Forensic Science.

- 1.1.1 The training program will be coordinated by the Training Coordinator (TC). The TC is designated by the Section Supervisor in consultation with the Program Manager (PM).
- 1.1.2 The training period should be completed in approximately one year, which is to include successful completion of all components of the Competency Exam.
- 1.1.3 The TC will be responsible for the overall training, which will incorporate all of the listed topics, but may delegate certain duties and blocks of instruction to other examiners in the section. The TC is responsible for ensuring that the Latent Print Training Record is completed. The various activities for the Modules will be assessed on a Pass/Fail basis.
 - 1.1.3.1 Passing for a written exam is at least 85% correct responses. See Appendix B for presentation and written paper passing criteria.
- 1.1.4 Monthly performance evaluations, as outlined in the Quality Manual (QM), of the trainee will be prepared by the TC. The TC is required to discuss each evaluation with the trainee prior to providing it to the PM and Laboratory Director. Any relevant comments by either the trainee or coordinator are to be included with the report.
- 1.1.5 It is recommended that each new member of the section spend time in each of the laboratories observing casework, participating in question and answer sessions, attending court and performing supervised work-alongs.
- 1.1.6 Documentation shall be prepared by the staff members that spent time with the trainee summarizing the activities as well as providing the TC with observations and recommendations related to the trainee's knowledge and performance.
- 1.1.7 Should a trainee demonstrate a deficiency which may impact successful completion of the training program, the TC will notify the trainee's Supervisor, who will notify the Section Supervisor (if different from Supervisor), the PM and the Laboratory Director within five working days.
 - 1.1.7.1 A deficiency can include, but not limited to, failing to obtain an 85% on a test, not meeting expectations on a presentation, submitting assignments past a due date, not exhibiting critical thinking skills, poor decision making or unethical behavior.
- 1.1.8 Expectations of Trainee

The trainee shall maintain a notebook to document training received. This notebook should include, but is not limited to, daily training received (to include observed events), activities performed by the trainee, and all completed assignments. The Latent Print Training Record shall be dated and initialed by the trainee, and TC as the trainee completes each described objective and assignment. The trainee should provide a weekly written progress report to the TC, to include activities or goals accomplished during the week (i.e., exercises completed, cases work observed, lectures and presentations) as well as objectives for the upcoming week.
- 1.1.9 Guidelines for Competency Exam

- 1.1.9.1 Completion of the Practical Exercises listed in the following sections of the Latent Print Training Manual demonstrates competence in these processes/methods. The TC shall authorize the trainee to participate in supervised work-alongs after the review of the exercises. The TC's initials in the training record shall serve as documentation.

Section 4 Quality Assurance and Quality Control
 Section 5 Latent Print Development Techniques
 Section 10 AFIS
 Section 11 Photography
 Section 12 Digital Imaging and Mideo

- 1.1.9.2 Practical Test

The practical test is a mock case, intended to simulate an average case in difficulty and complexity. It should contain 3-5 items for processing, 2-3 lift cards and 2-3 exemplar cards for comparison to the lift cards. There should be clear expected outcomes for the processing and comparison results. Latent prints should be intentionally placed on certain items and the expected result is a latent is recovered. The lift cards should contain latent prints which the ground truth is known and has been validated through comparison and verification by qualified examiners. At least one latent print shall be searched in AFIS/NGI and the expected hit result obtained.

The test shall be approved by the PM prior to being presented to the trainee.

- 1.1.9.3 Technical Final

The technical final examination will be given by the Laboratory's Latent Print Section Supervisor and TC in the presence of the PM and other Department management (as needed) to ascertain the technical knowledge of the individual. This examination will be limited to three (3) hours. After the examination, the TC, PM and relevant management with input from other attendees, will assess the individual's performance. The performance of the individual will be determined to be either satisfactory or unsatisfactory. The trainee must clearly demonstrate sufficient technical knowledge to perform examinations unaided and to draw correct conclusions. If the performance is deemed to be unsatisfactory, the TC, Section Supervisor, PM and Laboratory Director will determine the appropriate action. After satisfactory completion of the technical oral examination, the individual will be subjected to a final mock trial.

- 1.1.9.4 Mock Trial

A mock trial will follow the successful completion of the technical oral examination. Section 19 of the QM outlines the roles and responsibilities of the participants as well as evaluation and grading guidelines.

- 1.1.10 Training Documentation

The following shall be maintained and serve as the technical training file:

- written tests
- description of practical exercises, with results as applicable
- copies of the presentations
- competency practical test
- signed and dated Latent Print Training Record
- signed and dated Department Training Documentation form
- monthly training reports

At the completion of the training the technical training file should be retained by the trainee or supervisor and be accessible for internal and external quality audits.

1.1.11 Transition from Trainee to Examiner

The employee's Supervisor or TC should monitor the new examiner's casework for a period of at least six months following certification by the Department. In addition, the Supervisor, or designee will accompany the newly qualified examiner to court for the first few court appearances. Approximately four to six months after qualification, the trainee will complete a Training Program Evaluation form in accordance with the QM.

1.2 Experienced Personnel

1.2.1 Assessment

A technical assessment interview will be conducted with the new employee, Section Supervisor, TC and PM. The interview will contain questions from each module of this training manual.

1.2.2 Individual Training Plan (ITP)

1.2.2.1 The ITP, see Appendix A for template, will address what additional training is needed for each module. The ITP is written by the TC and approved by the PM and Section Supervisor. If no additional training is required for a specific module the plan must contain documentation related to what training the new employee received in the subject matter.

1.2.2.2 At a minimum the new employee should take a written or practical test for each module, provide a presentation on how the discipline meets the prongs of Daubert and provide a presentation on the 2009 NAS report recommendations, specifically how the Department addresses them. Information on the 2016 PCAST report as it relates to latent prints should be included in one of the presentations.

1.2.2.3 Monthly performance evaluations as described in this Section and the QM shall be completed for experienced personnel.

1.2.3 Training Documentation

The following shall be maintained by the employee and serve as the technical training file:

- Individual Training Plan
- written tests
- description of practical exercises, with results as applicable
- copies of the presentations
- competency practical test
- signed and dated Latent Print Training Record
- signed and dated Department Training Documentation form monthly training reports

1.2.4 Expectations of Experienced Personnel

See Section 1.1.8 for expectations.

1.2.5 Guidelines for Competency Examination

An experienced examiner shall complete a Competency Exam as outlined in this manual for a new examiner approximately four months from their hire date.

1.3 Training of Forensic Science Laboratory Specialists (FLS)

- 1.3.1 The training program will be coordinated by the TC. The TC is designated by the Section Supervisor in consultation with the PM.
- 1.3.2 The TC will be responsible for the overall training, which will incorporate all of the listed topics, but may delegate certain duties and blocks of instruction to other examiners in the section. The TC is responsible for assuring that the Latent Print Training Record is completed. The various activities for the Modules will be assessed on a Pass/Fail basis.
- 1.3.2.1 Passing for a written exam is at least 85% correct responses. See Appendix B for presentation and written paper passing criteria.
- 1.3.3 Monthly performance evaluations, as outlined in the QM, of the trainee will be prepared by the TC and then be provided to the PM and the Laboratory Director of the laboratory in which the trainee is being trained. The TC is required to discuss each evaluation with the trainee prior to providing it to the PM and Laboratory Director. Any relevant comments by either the trainee or coordinator are to be included with the report.
- 1.3.4 Should a trainee demonstrate a deficiency which may impact successful completion of the training program, the TC will notify the trainee's Supervisor, who will notify the Section Supervisor (if different from Supervisor), the PM and the Laboratory Director within five working days.
- 1.3.4.1 A deficiency can include, but not limited to, failing to obtain an 85% on a test, not meeting expectations on a presentation, submitting assignments past a due date, not exhibiting critical thinking skills, poor decision making or unethical behavior.
- 1.3.5 Expectations of Trainee
- See Section 1.1.8 of this manual for the requirements.
- 1.3.6 Guidelines for Competency Examination
- An FLS shall complete a Competency Exam as outlined in this manual for a new examiner, for specific modules for which they were trained, approximately six months from their hire date.

2 Orientation

2.1 Facilities and Personnel

A tour of the building shall be provided as well as introductions to personnel.

2.2 Specific Topics

The trainee shall familiarize themselves with the below references and review the necessary training modules.

- Quality Manual (QM)
- Department Administrative policies
- Regional Operating Procedures (ROPs)
- Latent Print Procedures Manual
- Latent Print Training Manual
- Organization of the Department of Forensic Science (DFS)
- DFS Safety Manual
- Departmental training presentations (Quality Systems 1,2 &3, Ethics, Legal and Social Media)

2.3 Laboratory Locations and Capabilities

An introduction to the technical capabilities of all laboratories, to include the regional boundaries and areas of overlap will be discussed.

2.4 Agencies and Court Systems

An explanation of the operation of local, state and federal law enforcement agencies and court systems will be provided.

2.5 Employee Work Profile (EWP)

The duties of a forensic latent print examiner or forensic laboratory specialist, as determined by the classification of the position, will be clarified.

2.6 Software Systems

An introduction shall be provided for the following systems:

- Forensic Advantage Laboratory Information Management System (FA LIMS)
- Qualtrax
- Mideo System Inc.
- LatentSleuth

3 History

3.1 Purpose

To provide the trainee with a background in the historical foundations of the fingerprint field. Historical figures in the field as well as significant cases associated with fingerprints will be covered.

3.2 Objectives

Trainee will:

- Describe purposes for personal identification systems and early methods of personal identification (Bertillon, scars, tattoos, photos).
- Summarize the major figures and achievements in the history of fingerprints (Herschel, Henry, Faulds, Galton, Vucetich).
- Describe the chronology of the introduction and use of fingerprints in the United States.
- Explain the development of the fingerprint field during the last century. (Babler, Cummins).

3.3 Mode of Instruction

3.3.1 Lectures

- Courts Early Years
- History of Fingerprints
- Critically Thinking About Fingerprints

3.4 Assignments

Read the following:

- Gillhelm, N. (2001). *A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics*. New York, NY: Oxford University Press. pp. 231-249.
- Ashbaugh, D. (1999). *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*. Boca Raton, FL: CRC Press. pp. 11-60.
- United States Department of Justice (2011). "History". *The Fingerprint Sourcebook*. Washington, D.C.:U.S. Government Printing Office.

3.5 Mode of Evaluation

Successful completion of the History written exam.

4 Biology and Physiology

4.1 Purpose

To provide the trainee with a background in the biological nature of friction ridge skin, ridge characteristics and anomalies. The general chemical composition of sweat and latent fingerprint residue will also be covered.

4.2 Objectives

The trainee will:

- Describe the basic anatomical features of friction ridge skin.
- Explain the underlying principles and biological basis for the use of fingerprints as a means of identification.
- Knowledge of abnormalities of friction ridge skin.
- Discuss methods of alteration and mutilation of friction ridge skin.
- Describe the general chemical composition of human perspirations as a means of understanding the composition of latent print residue.
- Relate biological factors that impact the results of latent print examinations.
- Understand and explain Ridgeology.
- Define key terminology used in the science of friction ridge examination.
- Understand the purpose of the classification systems used in the US: Henry and NCIC.

4.3 Mode of Instruction

4.3.1 Lectures

- Biology and Physiology
- Pattern and Classification

4.4 Assignments

4.4.1 Read the following:

- Ashbaugh, D. (1999). *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*. Boca Raton, FL: CRC Press. pp. 61-85.
- United States Department of Justice. (2011). "Systems of Friction Ridge Classification". *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.
- United States Department of Justice. (2011). "Anatomy and Physiology of Adult Friction Ridge Skin". *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.
- United States Department of Justice. (Rev 12-84). *The Science of Fingerprints*. Washington, D.C.: U.S. Government Printing Office. pp. 5-110.
- Wertheim, K., & Maceo, A. V. (2002). The Critical Stage of Friction Ridge and Pattern Formation. *Journal of Forensic Identification*, 52 (1), 35-85.
- Maceo, A. (2003). The Biology of Skin: Book Report. *Journal of Forensic Identification*, 53 (5), 585-595.
- United States Department of Justice. (2011). "Embryology and Morphology of Friction Ridge Skin". *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.
- Kucken, M., & Newell, C. (2005). Fingerprint Formation. *Journal of Theoretical Biology*, 235, 71-83.

- Kucken, M., & Newell, C. (2004). A Model for Fingerprint Formation. *Europhysics Letter*, 68 (1), 141-146.
- Babler, W. J. (1991). Web.
https://math.la.asu.edu/~dieter/courses/Math_Modeling_2013/Babler_1991.pdf
- Maceo, A, (2005). The Basis for the Uniqueness and. Persistence of Scars in the Friction Ridge Skin. *Fingerprint Whorld*, 31 (121), 147-161.
- Gaensslen, R., & Lee, H. (2001). *Advances in Fingerprint Technology*. New York, NY: Elsevier. pp. 1-40.

4.4.2 Provide a 10-15 minute presentation focused on biology and physiology as they relate to friction ridge skin to an audience that should include the TC and the section supervisor.

4.5 Practical Exercises

4.5.1 Prepare a diagram depicting the structure of the skin.

4.5.2 Prepare a diagram describing the progression of the volar pads and how they relate to the pattern development.

4.5.3 Document the pattern type of ten fingerprint exemplars.

4.6 Mode of Evaluation

4.6.1 The presentation will be evaluated on if the trainee successfully presents the information within the allotted time to the audience with a minimal amount of visible or distracting nervousness and successfully answering questions from the audience. See Appendix B for additional criteria. The trainee will have two attempts to complete this assignment.

4.6.2 Successful completion of the Biology and Physiology written exam.

4.6.3 Successful completion of the Pattern Interpretation written exam.

5 Quality Assurance and Quality Control

5.1 Purpose

To acquaint the trainee with quality assurance policies of the Department as well as Latent Print Section specific procedures. The trainee will be acquiring knowledge about chain of custody, maintenance, and documentation. The trainee will become familiar with forms internal to the Department of Forensic Science as well as those of the various services which they will come into contact with in examining evidence at the Department of Forensic Science. The trainee will become familiar with the Laboratory Information Management System (LIMS), Certificates of Analysis and how they are distributed.

5.2 Objectives

The trainee will:

- Describe the LIMS and how to use it.
- Summarize the flow of evidence through the laboratory system and how it is documented.
- Explain the importance of the maintenance/reagent logs and how to properly complete them.
- Use the QM and the Latent Section SOPs to answer questions.
- Obtain a working knowledge of the various forms, records and reports related to daily operations in the Latent Print Section of the Department of Forensic Science.
- Possess the ability to properly complete the forms necessary to accomplish the examination of physical evidence.
- Possess the ability to properly preserve, mark and package evidence.
- Learn the proper format and content of a Certificate of Analysis (CoA).
- Perform technical and administrative reviews in accordance with policy and procedures.

5.3 Mode of Instruction

5.3.1 Lectures

- Documentation Case File
- Documentation Evidence Handling

The CoA is often the initial information available to the submitting agency and the servicing legal office upon which a determination is made as to the prosecution of the criminal case. It is therefore essential that accurate, clearly written and informative reports be returned to the submitting agency. During this segment of training, the trainee will ultimately be required to properly complete the appropriate forms, records and render written draft reports pertaining to the evidence upon which they will perform examinations. Emphasis will be on evidence accountability, contemporaneous note taking and the completed CoA.

5.3.2 Technical / Administrative Review training

The following documents shall be read and discussed with the TC:

- Quality Manual - Section 17 Monitoring Results
- Latent Print Procedures Manual - Section 1.8 Examination Documentation
- Technical Review Form
- ANAB AR 3125 ISO/IEC 17025:2017 Forensic Science Testing Laboratories Accreditation Requirements - Sections 7.5 Technical Records, 7.7 Ensuring the validity of results, 7.8 Reporting Results and 7.11 Control of data and information management

- ISO/IEC 17025:2017 – Sections 7.5 Technical Records, 7.7 Ensuring the validity of results, 7.8 Reporting of results and 7.11 Control of data and information management

5.3.3 Observation

Shadow numerous examiners as they complete all aspects of casework. The purpose of observation is for the trainee to gain understanding of documentation requirements and how the LIMS is utilized. Observation events should be recorded in the training notebook.

5.4 Assignments

5.4.1 Read and understand the evidence packaging and marking criteria listed in the QM.

5.4.2 Read and understand the examination documentation requirements in the QM and the Latent Print Procedures Manual.

5.4.3 Complete the Manuals and Policies Questions

5.4.4 Complete the Quality Manual Questions

5.5 Practical Exercises

5.5.1 The trainee should document the review of at least five case files using the appropriate Technical Review Form. Case files should be generated by multiple examiners, if possible. The potential findings of the reviews shall be discussed with the TC. Technical Review forms generated in this capacity shall be marked as Training and retained in their Training File. The case files shall be technically reviewed by an authorized examiner pursuant to QM 17 prior to release.

5.5.2 Complete a DFS Audit Trail Worksheet on at least one case.

5.6 Mode of Evaluation

5.6.1 Review of case notes to ensure completion in accordance with QM and Section Manual.

5.6.2 Review the Audit Trail Worksheet to ensure each question was addressed.

6 Latent Print Development Techniques

6.1 Purpose

To obtain comprehensive knowledge of the physical and chemical methods available for latent print development, and understanding of the various constituents of latent print residue and knowledge of the factors that can affect the recovery of latent prints. The trainee will be required to become knowledgeable in the choice and application of latent development techniques.

6.2 Objectives

The trainee will attain:

- Working knowledge of the different types of powders and their applications.
- Ability to lift and/or preserve latent prints on varying surfaces.
- Working knowledge of chemical processing techniques to include, but not limited to; ninhydrin, gentian violet, amido black, small particle reagent and physical developer.
- Knowledge and ability to prepare reagents.
- Working knowledge of cyanoacrylate ester (superglue) fuming.
- Working knowledge of dye stains to be used in conjunction with cyanoacrylate ester.
- Working knowledge of alternate light sources as related to latent fingerprint excitation (fluorescence and luminescence).
- Understanding safety concerns and best practices for dealing with biohazards (syringes), firearms, eye protection when utilizing the ALS, and safe handling of chemicals.

6.3 Mode of Instruction

6.3.1 Lecture

- Latent Print Development

6.3.2 Demonstrations

Observe examiners completing casework. The purpose of observation is for the trainee to gain understanding related to how development techniques are performed.

6.4 Assignments

6.4.1 Utilize all techniques (to include different formulas of chemical processing techniques and different powders) listed in the current manual to develop latent prints on mock evidence.

6.4.2 Read the following:

- United States Department of Justice. (2001) *Processing Guide for Developing Latent Prints*. Washington, D.C.: U.S. Government Printing Office.
- United States Department of Justice. (2011). "Latent Print Development". *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.

6.4.3 Provide a 10-15 minute presentation focused on a new development technique or a modification to a current technique that should be considered for implementation at the Department to an audience that should include the TC and the section supervisor. Examiners are encouraged to attend if available.

6.5 Practical Exercises

Process numerous items to include, but not limited to; plastic bags, aluminum foil, Styrofoam, paper, cardboard, adhesive tape surface, thermal receipts, and surfaces containing blood prints, with the appropriate techniques.

6.6 Mode of Evaluation

- 6.6.1 Review of the items processed during the practical exercises to determine if the appropriate techniques were utilized.
- 6.6.2 The presentation will be evaluated on if the trainee successfully presents the information within the allotted time to the audience with a minimal amount of visible or distracting nervousness and successfully answering questions from the audience. See Appendix C for additional criteria. The trainee will have two attempts to complete this assignment.
- 6.6.3 Successful completion of the Latent Print Development Techniques written exam.

7 Recording Friction Ridge Skin

7.1 Purpose

To familiarize the trainee with the materials, procedures, methods, and techniques of recording finger, palm and sole prints, including those for post-mortem identification. The trainee must gain sufficient practical working knowledge and skill in this subject matter to demonstrate an acceptable proficiency in recording friction ridge skin.

7.2 Objectives

The trainee will attain:

- Knowledge of fingerprint recording equipment necessary for various types of prints (major case, fingerprint only, etc.) and the methods of recording prints (ink and LiveScan).
- The ability to record all friction ridge skin detail on the hands.
- The ability to obtain complete and legible post-mortem record prints and a knowledge of various procedures involved in recovering friction skin from cadavers in differing states of decomposition (to include burn victims, drowning victims, etc.).
- The ability to follow all procedures to handle evidence potentially contaminated with bloodborne pathogens or other hazards.

7.3 Mode of Instruction

7.3.1 Lectures

- Recording Fingerprints
- Attend the Forensic Science Academy class on postmortem collection, if possible.

7.3.2 Demonstrations

Emphasis is placed on practical hands-on work in this training segment. The trainee will record major case prints (complete record finger and palm prints) of several individuals according to various prescribed methods.

7.4 Assignments

Read the following:

- United States Department of Justice. (2011). "Recording Living and Postmortem Friction Ridge Exemplars". *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.
- United States Department of Justice. (Rev 12-84). *The Science of Fingerprints*. Washington, D.C.: U.S. Government Printing Office. pp. 111-157.
- FBI requirements for legible/illegible recording of prints. (available in the Latents shared folder)

7.5 Practical Exercises

Collect exemplars (major case prints) from at least three individuals, at least one being post-mortem.

7.6 Mode of Evaluation

7.6.1 Successful completion of the written Recording Prints exam.

7.6.2 Demonstration of obtaining legible exemplars from living and deceased individuals.

8 Cognitive Factors in Comparative Analysis

8.1 Purpose

Fingerprint comparisons are conducted using comparative analysis. Comparative analysis is a cognitive process in which the primary “tool” is the examiner’s brain. It is important therefore to have an understanding of how the brain “sees” images and how one’s view can be influenced by outside factors or extraneous information. The trainee will develop an awareness of how the brain affects what is seen and the implications this can have on the decision making process when conducting fingerprint comparisons.

8.2 Objectives

The trainee will:

- Understand the role the brain plays in the comparative analysis process.
- Develop an awareness of various factors, physical and psychological, that can influence the decision making process when making comparisons.

8.3 Mode of Instruction

8.3.1 Lectures

- Cognitive Factors in Forensic Decision Making

8.4 Assignments

8.4.1 Read the following:

- Ashbaugh, D. (1999). *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*. Boca Raton, FL: CRC Press. pp. 103-108.
- Risinger, D.M., Saks, M.J., Thompson, W.C., & Rosenthal, R. (2002) The Daubert/Kuhmo Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion. *California Law Review*, 90 (1). 1-56.
- Stacey, R. (2004). A Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case. *Journal of Forensic Identification*, 54 (6), 706-718.
- Byrd, J. S. (2006). Confirmation Bias, Ethics, and Mistakes in Forensics. *Journal of Forensic Identification*. 56 (4), 511-525.
- Dror, I.E., Charlton, D., & Peron, A.E. (2006). Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications. *Forensic Science International*, 156 (1). 74-78.
- Dror, I.E., Hind, S.L., Peron, A.E., & Charlton, D. (2005). When Emotions get the Better of Us: The Effect of Contextual Top-down Processing on Matching Fingerprints. *Applied Cognitive Psychology*. 19 (6). 799-809.
- Dror, I., & Charlton, D. (2006). Why Experts Make Errors. *Journal of Forensic Identification*. 56 (4). 600-616.
- Dror, I.E. (2014). Practical Solutions to Cognitive and Human Factor Challenges in Forensic Science. *Forensic Science Policy & Management*, 4(3–4).1–9.
- United States Department of Justice. (2011). “Special Abilities and Vulnerabilities in Forensic Science”. *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.

- 8.4.2 Write a 3-4 page paper explaining how the brain “sees” things, the role of the brain in the comparative analysis process, and factors that can influence the comparison process. Address the potential ramifications of different types of errors and specific steps one can implement into daily work habits that will help prevent negative influences.

8.5 Mode of Evaluation

- 8.5.1 The paper will be evaluated on the accuracy of the explanations provided. See Appendix B for additional criteria. The trainee will have two attempts to complete this assignment.
- 8.5.2 Successful completion of the written Cognitive Factors exam.

9 ACE-V Method - Analysis

9.1 Purpose

Provide the trainee with a basis in the analysis of latent prints and the various forces that can affect a latent print. Value determinations, pattern recognition and “smart” searching skills will also be covered. The ability to properly conduct and document the Analysis of latent prints is an essential phase of training. The ability to grasp this subject matter together with early practical application is essential to the successful completion of the Latent Print Examiner Training Program.

9.2 Objectives

The trainee will be able to:

- Define common terminology associated with friction ridge pattern recognition.
- Analyze a latent print and appropriately document the features observed.
- Utilize ridge flow, scars, creases, incipient ridges and other friction ridge details to further the analysis.
- Determine the orientation of latent prints.
- Describe distortion and its effects on latent and known prints (color reversal, pressure, movement, overlays).
- Analyze friction ridge prints to determine the value of the print.
- Relate how to determine if latent prints are of value for comparison, of value for exclusion or of no value for comparison.

9.3 Mode of Instruction

9.3.1 Lectures

- Analysis Presentation
- Fingerprint Orientation and Smart Search Presentation
- Palms Orientation and Smart Search Presentation

9.3.2 Demonstrations

- 9.3.2.1 The trainee should observe experienced examiners analyzing latent prints. The purpose of this observation is for the trainee to obtain knowledge regarding an efficient workflow to accurately conduct and document latent print analysis.
- 9.3.2.2 The trainee should be observed by experienced examiners analyzing latent prints. Feedback should be given to the trainee during this process.

9.4 Assignments

9.4.1 Read the following:

- Scientific Working Group on Friction Ridge Analysis, Study, and Technology. (2012). Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V) (Latent). http://clpex.com/swgfast/documents/documentation/121124_Standard-Documentation-ACE-V_2.0.pdf
- United States Department of Justice. (2006) Unclassified Executive Summary of the Office of the Inspector General: A Review of the FBI’s Handling of the Brandon Mayfield Case. <https://www.hsdl.org/?view&did=458960>
- United States Department of Justice. (2011). “Examination Process”. The Fingerprint Sourcebook. Washington, D.C.: U.S. Government Printing Office.

- Kaye, D. (2012). “Latent Print Examination and Human Factors: Improving the Practice Through a Systems Approach”. The Report of the Expert Working Group on Human Factors in Latent Print Analysis. NIST Interagency/Internal Report.
- Vanderkolk, J. (2004). ACE-V: A Model. *Journal of Forensic Identification*. 54 (1), 45-52.
- Langenbrug, G., Champod C. (2011). The GYRO System – A Recommended Approach to More Transparent Documentation. 61 (4), 373-384.

9.4.2 Analyze approximately 50 latent prints developed from the latent print development processing practical exercises and seek feedback from the TC or designee.

9.4.3 Analyze approximately 50 latent prints obtained from actual casework and seek feedback from the TC or designee.

9.4.4 Provide a 10-15 minute presentation, to an audience that should include the TC and the section supervisor, discussing the following topics:

- Is fingerprint comparison an art or science? Support your opinion.
- Explain the use of the GYRO model for documenting the analysis phase.
- Explain each conclusion that can be reached in the analysis phase.

9.5 Practical Exercises

Complete analysis exercise packets 1 through 10.

9.6 Mode of Evaluation

9.6.1 Successful completion of the ACE-V written exam.

9.6.2 The presentation will be evaluated on if the trainee successfully presents the information within the allotted time to the audience with a minimal amount of visible or distracting nervousness and successfully answering questions from the audience. See Appendix B for additional criteria. The trainee will have two attempts to complete this assignment.

10 ACE-V Method – Comparison and Evaluation

10.1 Purpose

To familiarize the trainee with the fundamentals of latent print comparison and evaluation steps in the ACE-V method.

10.2 Objectives

The trainee will be able to:

- Explain the ACE-V methodology for the identification of latent prints.
- Compare and evaluate latent prints to known exemplars.
- Render proper conclusions of identification, inconclusive and exclusion.
- Document all conclusions according to policy and procedure.
- Demonstrate knowledge of the policies and procedures for the examination process.
- Describe the quality assurance measures in place in the ACE-V methodology, policies and procedures in the department.
- Articulate how the identification decision is reached.

10.3 Mode of Instruction

10.3.1 The trainee should develop skills related to conflict resolution and engaging in productive conversations when a difference of opinion occurs in the analysis or comparison phase through conversations with the TC and fellow examiners.

10.3.2 Lecture

- Comparison, Evaluation and Identification of Latent Prints presentation

10.3.3 Demonstrations

10.3.3.1 The trainee should observe experienced examiners comparing latent prints. The purpose of this observation is for the trainee to obtain knowledge regarding an efficient workflow to accurately conduct and document latent print comparisons.

10.3.3.2 The trainee should be observed by experienced examiners conducting comparisons of latent prints. Feedback should be given to the trainee during this process.

10.4 Assignments

10.4.1 Read the following:

- Scientific Working Group on Friction Ridge Analysis, Study, and Technology. (2013). Standards for Examining Friction Ridge Impressions. http://clpex.com/swgfast/documents/examinations-conclusions/130427_Examinations-Conclusions_2.0.pdf
- Ulery, B.T., Hicklin, R.A., Buscaglia, J., & Roberts, M.A. (2010). Accuracy and Reliability of Forensic Latent Print Decisions. Proceedings of the National Academy of Sciences. 108 (19), 7733-7738.
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- Bradford Ulery, et al. (2014). Measuring What Latent Finger Print Examiners Consider Sufficient Information for Individualization Determinations. *PlosOne* 9 (11)

10.4.2 Compare approximately 50 latent prints developed from latent print development processing practical exercises and seek feedback from the TC or designee.

10.4.3 Compare approximately 50 latent prints obtained from actual casework and seek feedback from the TC or designee.

10.4.4 Provide a 10-15 minute presentation, to an audience that should include the TC and the Section Supervisor, discussing the following topics:

- Describe the Scientific Method and how it relates to fingerprint comparison.
- Explain each conclusion that can be reached in the evaluation phase.
- Is it possible for experts to disagree regarding their conclusions? Support your opinion.
- Explain “target group” and “anchor point”
- Differentiate between dissimilarities and discrepancies.

10.5 Practical Exercises

Complete comparison exercise packets 1 through 10.

10.6 Mode of Evaluation

10.6.1 The presentation will be evaluated on if the trainee successfully presents the information within the allotted time to the audience with a minimal amount of visible or distracting nervousness and successfully answering questions from the audience. See Appendix B for additional criteria. The trainee will have two attempts to complete this assignment.

10.6.2 Results for packets 1 through 10 should contain no erroneous identifications and at least 95% expected results for exclusions and inconclusive decisions.

10.6.3 Obtain the expected results on the Final Comparison packet. See Appendix C for details of practical exam.

11 Automated Fingerprint Identification System (AFIS)

11.1 Purpose

Upon completion, the trainee will possess the knowledge, skills and ability to successfully conduct print searches in the Virginia Automated Fingerprint Identification System (AFIS) and the FBI's Next Generation Identification (NGI), as well as generate the required documentation.

11.2 Objectives

The trainee will attain:

- The knowledge of and skills in the operation of the various automated database systems and their limitations.
- The manner in which to input images into each system, capture/encode minutiae, document the locations of the axis, core, and delta, determine the number of intervening ridges, know the limitations of each system's requirements for searching, report information generated by each system, and request known samples for comparison.
- Knowledge and skills to determine which friction ridge prints are suitable for searching in the automated database systems. Several factors should be considered as to which prints will be searched, such as type of evidence and the quality and quantity of minutiae detail.
- An understanding as to why identifications are not made by solely conducting a comparison on-screen of prints searched in the automated database systems.
- Knowledge of quality checks that are to be completed on the automated database systems.

11.3 Mode of Instruction

11.3.1 Demonstrations

The trainee will observe examiners entering latent prints into the various systems in use.

11.3.2 Lectures

- AFIS Module

11.4 Assignments

Read the following:

- NEC Corporation of America. (2014). AFIS21 Global Workstation: GWS-L User Guide. Rancho Cordova: CA. Identification Solutions Division.
- United States Department of Justice. (2016). Universal Latent Workstation User Manual. Washington, D.C.: U.S. Government Printing Office.
- United States Department of Justice. (2011). "Automated Fingerprint Identification System". The Fingerprint Sourcebook. Washington, D.C.: U.S. Government Printing Office.

11.5 Practical Exercises

Enter at least ten latent prints into the VA AFIS and NGI under the supervision of the TC or designee.

11.6 Mode of Evaluation

11.6.1 Demonstration of successfully entering latent prints and declaring hits as applicable.

11.6.2 Successful completion of the Virginia State Police AFIS test.

12 Photography

12.1 Purpose

The preservation of latent prints is essential, and upon completion of this section the trainee will possess the knowledge and skills necessary to preserve images of latent prints utilizing a digital camera and appropriate lighting.

12.2 Objectives

The trainee will attain the knowledge, skills and ability to apply photography to the latent print discipline:

12.2.1 Equipment

- Different types of cameras and lenses
- Full Spectrum Imaging System (FSIS)
- Filters
- Lighting techniques
- Use, maintenance and calibration of cameras and other photographic equipment

12.2.2 Photographic Procedures

- Resolution requirements
- Adjusting for exposure settings including aperture and shutter speed
- Use of lenses
- ISO settings
- White balance
- Use of scales

12.2.3 Photography of chemically developed latent prints.

12.2.4 Photography of latent prints developed with powders.

12.2.5 Photography of patent and plastic prints.

12.2.6 Photography of post-mortem prints.

12.2.7 Fluorescent photographic techniques.

12.2.8 Ultraviolet imaging techniques (e.g., FSIS)

12.3 Mode of Instruction

12.3.1 Lectures

- Exposure / Depth of Field / Focus/ Shutter Speed
- Photographic Theory for the Crime Scene Investigator (VADFS Training Section)
- Nikon Familiarization (VADFS Training Section)
- Latent Print Photography (summary of FBI presentation)
- FSIS Familiarization

12.3.2 Demonstrations

12.4 Assignments

12.4.1 Read the following:

- United States Department of Justice. (2011). “The Preservation of Friction Ridges”. The Fingerprint Sourcebook. Washington, D.C.: U.S. Government Printing Office.
- Cowger, J. (1983). Friction Ridge Skin: Comparison and Identification of Fingerprints. New York, NY: Elsevier. pp. 111-128.
-
- Robinson, Edward M (2010) Crime Scene Photography, Second Edition. Academic Press. Chapter 3 and 4.

12.5 Practical Exercises

Mock evidence will be processed with all techniques listed (it is acceptable to utilize items processed during the processing training) in the Latent Print Manual and images of latent prints photographed on a variety of surfaces.

- Prints developed with cyanoacrylate ester on clear plastic bags, soda cans, dark glass bottles, reflective surface (i.e., CD or mirror) and other commonly encountered surfaces.
- Prints developed with dye stains utilizing the ALS on the above listed surfaces.
- Prints developed on a variety of colored porous papers.
- Patent or visible prints.
- Utilize the FSIS to capture prints prior to and post processing with cyanoacrylate ester.

12.6 Mode of Evaluation

12.6.1 Successful completion of the Latent Print Photography written exam.

12.6.2 Successful completion of practical exam. See Appendix C for details of practical exam.

13 Digital Imaging and Mideo

13.1 Purpose

Upon completion of this section the trainee will have an understanding of the Mideo software and how it is utilized to complete latent print casework.

13.2 Objectives

- 13.2.1 Knowledge and understanding to import and export images.
- 13.2.2 Knowledge and understanding of the folder structure, and, specifically, the information recorded in each folder within the Mideo database.
- 13.2.3 Knowledge and understanding of the field sets (note taking) capabilities.
- What information is recorded in each field
 - Which fields are mandatory
 - What is the help dialog box and how is it accessed
 - How to clear a field
 - How to edit data
- 13.2.4 Knowledge and understanding of the enhancement tools.
- Adobe Photoshop tools and features
 - When is it best to use Photoshop and why
- 13.2.5 Knowledge and understanding of completing an Analysis on a latent print
- GYRO color scheme
 - Use of the Grouping Tool
- 13.2.6 Knowledge and understanding of the steps/methods to complete a Comparison.
- 13.2.7 Knowledge and understanding of creating a comparison workspace to document an identification.
- 13.2.8 Knowledge and understanding of creating a workspace to document an exclusion.
- 13.2.9 Knowledge and understanding of the History Log feature.

13.3 Mode of Instruction

- 13.3.1 The trainee will observe examiners working at least two cases from start to finish to gain an understanding of case approach utilizing Mideo.

The trainee should focus on:

- the importance of developing a consistent approach
- enhancement techniques
- analysis documentation
- comparison methods

13.3.2 The trainee should observe examiners working on the specific features and tools in the Mideo software.

The trainee should focus on:

- navigating in the software
- importing and exporting images
- folder structure
- field sets
- enhancement tools
- grouping tool
- selection tool
- charting tools
- drawing tools
- measurement tools (calibrating an image)
- printing tools
- text tools
- zoom panel
- creating a comparison workspace

13.4 Assignments

13.4.1 The trainee will provide written answers for the following questions:

- Name each folder created for a new case and the purpose of each folder (i.e., what is each folder designed to contain?).
- List the steps to import an image from a CD.
- List the steps to capture and import an image from a scanner.
- List the steps to calibrate an image.
- Explain how to invert an image.
- Explain how to rotate an image.
- Define the GYRO acronym.
- Describe how to zoom in an image (i.e., make the latent appear bigger).
- List the steps to create a comparison workspace.
- List the steps to open an image in Photoshop and how to return it to Caseworks.
- When is it necessary to use Photoshop?
- How are the enhancements done in Photoshop distinguished in the History file from those done in Mideo?

13.4.2 The trainee will provide printed documentation from the Mideo system demonstrating knowledge and skill accomplishing the following specific tasks.

- Clarified image of a visible latent print (no development needed to photograph) with the Analysis documented using the GYRO tools and appropriate fieldsets completed (Analysis note page).
- Clarified image of a latent print developed with Ninhydrin with the Analysis documented using the GYRO tools and appropriate fieldsets completed (Analysis note page).
- Clarified image of a latent print developed with dye stain/ALS with the Analysis documented using the GYRO tools and appropriate fieldsets completed (Analysis note page).
- Clarified image of a latent print developed with Black Powder preserved on a lift card with the Analysis documented using the GYRO tools and appropriate fieldsets completed (Analysis note page).
- A comparison workspace depicting an identification.
- A workspace depicting an exclusion.

13.5 Practical Exercises

- 13.5.1 The trainee will work five mock cases, which include comparisons, from start to finish.
- 13.5.2 The trainee will complete five comparison packets in Mideo.

13.6 Mode of Evaluation

- 13.6.1 The trainee will work the mock cases while being shadowed by an examiner demonstrating the necessary skills and knowledge to complete casework utilizing Mideo.
- 13.6.2 The trainee will obtain the expected result for all Analysis and Comparison conclusions on the latent print images included in comparison packets.

14 LatentSleuth

14.1 Purpose

Upon completion of this section the trainee will have an understanding of the LatentSleuth software and how it is utilized to complete latent print casework.

14.2 Objectives

14.2.1 Knowledge and understanding of importing latent prints and exemplars.

14.2.2 Knowledge and understanding of editing the latent print image.

14.2.3 Knowledge and understanding of reviewing the prioritized list.

14.3 Mode of Instruction

14.3.1 The trainee will observe an examiner completing two cases.

14.4 Assignments

14.4.1 The trainee shall review the Sciometrics LatentSleuth User's Guide and the LatentSleuth Quick Reference Card.

14.4.2 Participate in two work along cases.

14.5 Practical Exercises

14.5.1 The trainee shall complete Practice Packets: C – Medium Low and D – Low.

14.6 Mode of Evaluation

14.6.1 Successful completion of the competency test.

14.6.1.1 The expected candidate must be in the top five on the list for each latent to be considered successful.

15 Legal Aspects and Testimony

15.1 Purpose

Upon completion of this section the trainee will possess the knowledge and understanding of the legal aspects of forensic identification as it pertains to latent prints and be able to effectively present expert testimony.

15.2 Objectives

- 15.2.1 To familiarize the trainee with the functions of a courtroom criminal proceeding.
- 15.2.2 To have the trainee prepare a current curriculum vitae and convey *voir dire* questioning during testimony.
- 15.2.3 To familiarize the trainee with proper methods for presenting expert testimony.

15.3 Mode of Instruction

- 15.3.1 Lectures - LX Expert Witness Testimony presentation
- 15.3.2 Observation of expert testimony.

15.4 Assignments

- 15.4.1 Read the following:
 - Moenssens, A. (1969). *Fingerprints and the Law*. Philadelphia, PA: Chilton Book Company. Chapters 3, 7-11 and Appendix 1.
 - United States Department of Justice. (2011). "Fingerprint and the Law". *The Fingerprint Sourcebook*. Washington, D.C.: U.S. Government Printing Office.
- 15.4.2 Completion of curriculum vitae.
- 15.4.3 Provide a 15-20 minute presentation to the TC and the PM focused on how the discipline meets the challenges (prongs) of Daubert and Virginia's admissibility standards.
- 15.4.4 Provide a 25-30 minute presentation to the TC and the PM focused on how the Department meets the challenges of the 2009 NAS report and discuss the 2016 PCAST report as it relates to latent prints.
- 15.4.5 Written responses to the following questions:
 - Describe the role of the following during a trial:
 - Expert witness
 - Judge
 - Prosecutor
 - Defendant
 - Defense counsel
 - Jury
 - Define the following:
 - *Voir Dire*
 - Direct Examination
 - Cross Examination
 - Redirect
 - Chain of Custody
 - Objection
 - Sustained

- Overruled
- Describe the characteristics of an effective expert witness (i.e., appearance, speech, non-verbal communication, etc.).
- Describe the accreditation process and the benefits of being an accredited laboratory.

15.5 Practical Exercises

15.5.1 Participate in at least one mini-mock trial with the TC focusing on the following aspects of testimony:

- *Voir Dire*
- Chain of Custody
- ACE-V methodology
- Sufficiency
- Scientific certainty
- Bias
- Error rate

Additional sessions may be necessary if deemed appropriate by the TC. This mini-mock is intended to be one-on-one training with the trainee and TC in order to gain practice in verbalizing concepts and to identify areas that may need to be refined prior to the final mock trial.

15.5.2 Participate in at least one mini-mock trial which will encompass all aspects of a potential trial setting.

15.5.3 Provide verbal responses to the following questions:

- What is your name?
- What is your occupation? For whom do you work?
- How long have you been so employed?
- What are your duties in this occupation?
- What education and training do you possess that qualifies you to perform your duties?
- What specific courses have you taken that are directly related to latent print analysis?
- Do you consider yourself an expert in the latent prints?
- What is the definition of an expert witness?
- Is the university/college you graduated from accredited, and if so, by whom?
- Who conducted your training?
- What are their qualifications?
- Are you certified? If not why?
- What literature do you read relating to your job?
- How many latent print comparisons have you performed?
- Do you belong to any professional organizations?
- Explain the ACE-V methodology.
- What is the error rate of the latent print discipline?
- What are the factors affecting the development of a latent print?

15.6 Mode of Evaluation

15.6.1 The presentation will be evaluated on if the trainee successfully presents the information within the allotted time to the audience with a minimal amount of visible or distracting nervousness and successfully answering questions from the audience. See Appendix B for additional criteria. The trainee will have two attempts to complete this assignment.

15.6.2 Successful completion of a final mock trial (as defined in the QM final competency testing requirements).

Appendix A - Individual Training Plan (ITP) Template

For each section listed below include the following information:

- List previous documented training received
- Provide detailed plan, including assignments, exercises, exams and presentations to be completed with dates, for each section.

The objectives listed in the Latent Print Training Manual should be used as a guide for questions during the assessment to determine the individual’s knowledge level.

- History**
- Biology and Physiology**
- Quality Assurance and Quality Control**
- Latent Print Development Techniques**
- Recording Friction Ridge Skin**
- Cognitive Factors in Comparative Analysis**
- ACE-V Method - Analysis**
- ACE-V Method - Comparison and Evaluation**
- Automated Fingerprint Identification System (AFIS)**
- Photography**
- Digital Imaging and Mideo**
- Legal Aspects and Testimony**

The expected completion of this training plan is _____.

Appendix B - Presentation and Paper Evaluation Criteria

Presentations

Trainee	
Appearance	
Presentation:	
Introduction	
Organization	
Graphics	
Typos	
Succinct	
Accuracy	
Presenter:	
Eye Contact	
Use of fillers	

Comments:

Papers

Introduction	
Content	
Grammar	
Typos	
Professional Nomenclature	
Organization	
Conclusion	
Bibliography/References	
Use of tables, pictures, etc.	

Appendix C - Guidelines for Practical Finals

Final Comparison Packet

Contains 10 latent prints and 3 sets of exemplars, which have been previously vetted and agreed upon by the Latent Print Technical Resource Team.

Practical Latent Print Photography Competency

- Consists of six items with one latent marked per item with a P# to ensure the correct latent is captured.
 - latent lift
 - paper processed with ninhydrin
 - clear glass processed with black powder
 - plastic grocery bag processed with cyanoacrylate ester and dye stain
 - firearm magazine processed with cyanoacrylate ester and dye stain
 - clear plastic soda bottle processed with cyanoacrylate ester
- Capture one latent image per item.
- Import the images into the appropriate Mideo folder.
- Name the file lab name (in place of the case number), the item number followed by the latent number.
 - Example: Western W-1 P1
- No enhancement techniques shall be performed on the images.

Appendix D - References

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