LATENT PRINT EXAMINER TRAINING MANUAL

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Revision History

Revision #	Description of Changes
1	*Ready for Qualtrax – no content changes*

1.0 Introduction

The purpose of this manual is to provide an in-house training program that in will result in a competent and qualified expert Latent Print Analyst. This expert shall possess specialized knowledge, skills and training in the sub-disciplines of Latent Print Processing and Latent Print Comparison. In addition to establishing a minimum standard of professional competency, completion of this manual shall aid in maintaining quality and consistency among analysts within the section.

The training program, in its entirety, is designed for the trainee who has little to no prior background or experience in the subject matter. The training program consists of two main segments: Latent Print Processing and Latent Print Comparison. Each segment is composed of a series of modules on specific topics. These modules consist of reading materials, observation and demonstration, and/or practical exercises. Each module has an associated test. Module tests shall test the ability of the analyst to properly perform examinations and may be written, oral, hands-on or a combination thereof. They shall not be reviewed or verified prior to submission to the trainer.

Modules for Latent Print Processing Sign Off

Module 1: History and Background of Fingerprint Identification
Module 2: Other Scientific Personal Identification Methods
Module 3: Safety Training
Module 4: Case Management and Reporting for Processing
Module 5: Digital Preservation of Latent Prints
Module 6: General Latent Print Processing
Module 7: Processing Technique – Alternate Light Sources
Module 8: Processing Technique – Amido Black
Module 9: Processing Techniques 1, 8, Diazafluoren-9-One (DFO) and 1, 2, Indandione
Module 10: Processing Technique – Dye Stains – Rhodamine 6G and RAM
Module 11: Processing Technique – Gentian Violet/Crystal Violet
Module 12: Processing Technique – Iodine
Module 13: Processing Technique – Leuco Crystal Violet (LCV)
Module 14: Processing Technique – Ninhydrin
Module 15: Processing Technique – Powder Development of Latent Prints
Module 16: Processing Technique – Physical Developer (PD)
Module 17: Processing Technique – Small Particle Reagent (SPR)
Module 18: Processing Technique – Stick Side Powder
Module 19: Processing Technique – Sudan Black
Module 20: Processing Technique – Cyanoacrylate Ester (Super Glue®)
Module 25: Introduction to Latent Prints and the State of the Science
Module: 29: Court Procedures, Related Laws, Expert Testimony, Criminal and Civil Procedures Applicable to Latent Prints (reading & processing portions only)

Modules for Latent Print Comparison Sign Off

Module 1: History and Background of Fingerprint Identification
Module 2: Other Scientific Personal Identification Methods
Module 5: Digital Preservation of Latent Prints
Module 21: Digital Imaging
Module 22: Biology and Physiology of Friction Ridge Skin
Module 23: Recording Inked Fingerprints, Palm Prints and Footprints
Module 24: Friction Ridge Pattern Recognition and Interpretation
Module 25: Introduction to Latent Prints and the State of the Science
Module 26: Human Factors
Module 27: Analysis, Comparison, Evaluation, and Verification (ACE-V)
Module 28: Case Management and Reporting for Comparison and/or ABIS
Module 29: Court Procedures, Related Laws, Expert Testimony, Criminal and Civil Procedures Applicable to Latent Prints (reading & comparison and/or ABIS portions only)
Module 30: Introduction to Crime Scenes
Module 31: Recording Post Mortem Exemplars
Module 32: Automated Biometric Identification System

The modules outlined are the minimum requirements for completion of training. Additional exercises or readings may be assigned at the discretion of the technical lead, if necessary. The training may be abbreviated for analysts with prior experience and training or for those individuals who perform only limited duties. The background and experience of each individual will be assessed by the technical lead prior to beginning the training program. Training modules do not need to be completed in sequence. The order of completion may vary depending on the student and/or operational needs.

All cases processed and examinations performed during training will be with the trainee working as "the hands of the trainer" as defined by the ISPFS Quality/Procedure Manual.

External training is used to supplement and/or meet certain portion of the training program. Trainees should attend workshops and/or training classes in the areas of latent print processing, latent print comparison, crime scene processing, courtroom testimony, digital imaging, and photography. Attendance of outside training courses/workshops is subject to course availability and budget constraints. Requests for training shall be approved through the chain of command.

Progress is monitored by the trainer, who reports to the technical lead and/or supervisor. The trainee must pass each written test with a minimum score of 80% and all tests are closed book unless otherwise noted. Practical exercises will be graded "pass" or "fail." In order to successfully complete this manual, the trainee must pass a final competency test and mock court in each of the sub-disciplines: Latent Print Processing and Latent Print Comparison. Training is considered complete upon formal approval by the Quality Manager. This training program is estimated to last 18-24 months. The actual pace of instruction is dictated by agency resources and needs, as well as the trainee's progress and demonstrated proficiency.

2.0 Roles and Responsibilities

2.1 Supervisor

The Supervisor shall maintain an employee training file with all associated authorizations and shall evaluate mock court testimony.

2.2 Technical Lead

The Technical Lead shall assess any prior applicable training, review the current training plan, assign the appropriate modules, and organize the training. The Technical Lead should regularly monitor the Trainee's progress and review their training record for completeness and accuracy, procure final competency tests, and schedule mock courts. The Technical Lead shall provide input regarding mock court performance to the Supervisor and/or other members of management. At the completion of Latent Print Processing and/or Latent Print Comparison training, the Technical Lead shall review all documentation regarding training to determine if the Trainee performed all required training and is competent to perform analysis. If the Trainee is competent to perform analysis, the Technical lead shall forward all required documentation to the Quality Manager. The Technical Lead may designate an onsite trainer.

2.3 Trainer

The Trainer shall provide a copy of the training plan to the trainee with an anticipated timeline for completion. The Trainer is responsible for coordination of practical exercises, demonstrating techniques, reviewing assignments, providing feedback, and administration of module tests. The Trainer should monitor for comprehension and competency in theoretical knowledge and basic practical skills. The Trainer shall communicate progress, delays, or the need for supplemental activities to the Technical Lead and/or Supervisor. Deficiencies should be openly discussed among the Trainee, Trainer, Technical Lead and/or Supervisor in an attempt to rectify them.

2.4 Trainee

The Trainee shall maintain a record of training. This record shall include, but is not limited to: daily training received, observed events, activities performed by the trainee, court testimony observed or performed, field cases observed or worked, completed assignments, and checklists. All steps in training shall be documented as they are completed. The record shall include a list of training samples that are utilized for hands-on processing exercises as well as the methods used to process them. With regards to comparison and/or ABIS training, the record will include a list of cases utilized as practical comparison exercises and associated statistics (number of latents

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examined, number of comparisons performed, and number of identifications). The ILIMS training program will be utilized to record events or specific conclusions during training.

The Trainee should provide a weekly report to the technical lead and/or Trainer to include activities accomplished during the week (readings/exercises completed, casework observed, classes attended, etc.). They should keep the Technical Lead and/or their Trainer informed of any problems or questions that may arise.

At the completion of the Latent Print Processing or Latent Print Comparison segment, the trainee will advance to supervised case work. Supervised case work will not commence until approval has been granted by the Quality Manager. At such time, a record of all cases, associated statistics, and the identity of the supervising analyst will be kept for all Latent Print Processing or Latent Print Comparison supervised case work.

The trainee shall ensure that all training records for outside classes are forwarded to the Quality Manger for inclusion in his/her training file and shall ensure that their curriculum vitae accurately reflects successfully completed training.

3.0 Module 1: History and Background of Fingerprint Identification

3.1 Background and Theory

Fingerprint identification has been relied upon for over 100 years to provide accurate identification. Fingerprints were originally used as signatures when signing business transactions and official government documents. In 1686, Professor Malpighi at the University of Bologna in Italy made observation of spirals, loops and ridges in fingerprints using the newly invented microscope. In 1858, Sir William Herschel was using fingerprints to "sign" documents. It was during this time and he noticed that no two prints were exactly alike and realized that they could be used for personal identification purposes. In the1880's Henry Faulds was studying the permanency of friction ridge skin and was the first to publicly suggest that fingerprints could be used forensically to identify criminals.

In 1888, Sir Francis Galton became the first person to provide evidence that no two fingerprints were exactly the same and that the prints remain the same throughout a person's lifetime. He calculated that the odds of finding two identical fingerprints were 1 in 64 billion. He went on to publish the first book on the subject titled "Finger Prints" in 1892, in which he detailed the first classification system for fingerprints. In his book, he identified three pattern types (loop, whorl, and arch).

The first criminal fingerprint identification in a murder investigation came in 1892 by Juan Vucetich, an Argentine police official. He later developed his own system of classification and published a book "Comparative Fingerprinting" (Dactiloscopia Comparada) in 1904.

In 1896, Sir Edward Richard Henry created a fingerprint classification system of his own in British India, which later spread to England. The Henry Classification system was used to establish a Fingerprint Bureau at Scotland Yard.

In 1902, New York was the first state in the United States to start implementing new fingerprint technology. Within the next year, law enforcement agencies and military branches all over the United States started implementing their own identification departments.

Between 1911 and 1914, Edmund Locard established the first set of rules for fingerprint identification. Locard claimed that if there were 12 points of agreement between prints with no disagreements, the identity was confirmed

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beyond doubt. This standard was formally adopted in many countries except for the United States who moved away from a standard based on counting points.

By the 1990's, AFIS, or Automated Fingerprint Identification Systems, were being widely used. Currently, tens of thousands of individuals are added to repositories daily. These fingerprint collections provide the basis for criminal history records maintained by local, state, and federal law enforcement agencies.

The basic methodology for fingerprint identification has remained relatively unchanged. As other disciplines of Forensic Science continue to develop accurate statistics for their results, fingerprint identification seeks to quantify their own results. While still in its infancy, studies are beginning to surface based around this type of research.

3.2 Objectives, Principles, and Knowledge

- 3.2.1 Understand the purpose of early methods of personal identification (Bertillon system, photography, scars, tattoos, sight recognition, marks, and mutilations).
- 3.2.2 Knowledge of the earliest recorded awareness of fingerprints (cliff dwellers-Chinese).
- 3.2.3 Knowledge of early anatomical observations (Grew, Malpighi, Purkinje, et. al.) and understand the biological significance of friction skin ridge patterns and their formation.
- 3.2.4 Understand the scientific observations and use of fingerprints leading to modern fingerprint identification (Herschel, Faulds, Galton, Vucetich, and Henry).
- 3.2.5 Knowledge of the chronology of the introduction and use of fingerprints in the United States (Thompson, Twain, DeForest, Ferrier, NY Prison System, U.S. Navy and Army, FBI).
- 3.2.6 Knowledge of the current criminal and civil applications of fingerprints, palm prints, and footprints and how these applications developed in the United States.
- 3.2.7 Knowledge of the existence and development of various criminal and civil fingerprint files (FBI, U.S. military medical records, state and local fingerprint and palm print repositories).

3.3 Health and Safety Hazards

- 3.3.1 N/A

3.4 Reading and Practical Exercises

- 3.4.1 Complete Module 1 reading list
- 3.4.2 Practical Exercise: Write a short synopsis of the contributions of each of the following figures: Hershel, Faulds, Galton, Vucetich & Henry.
- 3.4.3 Practical Exercise: visit http://onin.com/fp/fphistory.html
- 3.4.4 Written Test – Module 1

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4.0 Module 2: Other Scientific Personal Identification Methods

4.1 Background and Theory

Great strides have been made with regards to personal identification methods. In the late 1800's to early 1900's, agencies relied upon various methods of personal identification, including photography and anthropometry. The most common of these was the Bertillon method that utilized a person's physical measurements to prove identity. Those systems were replaced in the early 1900's by fingerprint identification. While fingerprint identification is still the most widely used system for personal identification, there are a number of other current personal identification methods of which a practitioner should be aware. These include DNA, odontology, handwriting and voice analysis, as well as various biometric techniques. Biometric verification is becoming increasingly popular in corporate and public security systems due to the rise in security breaches and transaction fraud. Biometrics use distinctive, measureable, physical, and behavioral characteristics to differentiate individuals. The physical characteristics used for biometric authentication include fingerprints, palm veins, facial recognition, DNA, palm print, hand geometry as well as iris or retina recognition. This information is often interpreted by a computer system that confirms identity.

4.2 Objectives, Principles, and Knowledge

4.2.1 Awareness of personal identification methods other than friction ridge skin to include biometrics, iris recognition, face recognition, vascular pattern recognition, hand geometry question document analysis, voice analysis odontology and DNA.

4.2.2 Awareness of the advantages/disadvantages of each.

4.3 Health and Safety Hazards

4.3.1 N/A

4.4 Reading and Practical Exercises

4.4.1 Complete Module 2 Reading List

4.4.2 Written Test – Module 2

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5.0 Module 3: Safety Training

5.1 Background and Theory

Safety in the laboratory is an essential part of the job of a Forensic Scientist. The Occupational Safety & Health Administration (OSHA) was created in 1970 to protect workers. It mandates that each laboratory worker be knowledgeable about bloodborne pathogens, chemical hygiene, universal precautions, biohazard disposal, decontamination, and vaccinations. It requires that all of the applicable information for the lab is given to the employee so that they may maintain safety in the workplace. It is also imperative that employees are able to access the SDS for their laboratory in order to maintain safety around applicable chemicals.

5.2 Objectives, Principles, and Knowledge

5.2.1 Understand safety hazards associated with the latent prints laboratory.

5.2.2 Knowledge of spill procedures/equipment and the use of personal protective equipment.

5.2.3 Knowledge of the potential explosion, fire, and contamination safety hazards associated with latent print development powders, solvents and chemicals.

5.2.4 Proper disposal of chemicals.

5.3 Health and Safety Hazards

5.3.1 N/A

5.4 Reading and Practical Exercises

5.4.1 Complete Module 3 Reading List

5.4.2 Written Test – Module 3

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6.0 Module 4: Case Management and Reporting for Processing

6.1 Background and Theory

In Forensic Science, it is imperative that procedures are accurately followed and documented appropriately. All documentation done for a case is subject to scrutiny by peers, the laboratory system, the courts, and accrediting bodies. It must be as precise and error-free as possible.

It is important that measures are taken to prevent loss, deleterious change or tampering. Evidence should be tracked both internally (within in the lab) and externally, as it transitions from agency to agency or person to person. This is done through chain of custody. When in the custody of an analyst, evidence integrity shall be ensured by properly securing, processing, marking, documenting, and re-sealing.

The system that is used to track all information regarding a case is ILIMS. This system includes the internal chain of custody, information given to ISPFS by the submitting agency regarding the case, case correspondence, analyst generated notes and/or photographs, and all reports generated in relation to the evidence. The ILIMS system was implemented in 2013 to make all evidence processing paperless, efficient, and to afford timely access of records to submitting agencies and officers of the court.

6.2 Objectives, Principles, and Knowledge

6.2.1 Knowledge of, and the ability to demonstrate, proper procedures for maintaining chain of custody (documentation and physical control).

6.2.2 Knowledge of, and the ability to demonstrate, proper procedures for handling and marking physical evidence received for examination.

6.2.3 Ability to navigate and query ILIMS for latent print processing cases.

6.2.4 Ability to demonstrate proper procedures for documentation of latent print processing casework. Documentation shall be such that another qualified Latent Print Examiner could evaluate what was done and why.

6.2.5 Understand how to prevention of contamination.

6.2.6 Knowledge of, and the ability to demonstrate, proper procedures for reporting latent print processing examination findings in an accurate, concise, and clear manner.

6.2.7 Understand release of information policies, i.e. with whom, when, and how results may be given to customers.

6.3 Health and Safety Hazards

6.3.1 N/A

6.4 Reading and Practical Exercises

6.4.1 Complete Module 4 Reading List

6.4.2 Practical Exercise – ILIMS Latent Print Orientation - shadow each available examiner and observe the completion of at least two processing cases from start to finish to include writing latent print processing reports in ILIMS – trainer led discussion and demonstration.

6.4.3 Practical Exercise – Trainee shall independently produce three latent print processing case reports.

6.4.4 Practical Exercise – Technical review training for processing cases - trainer led discussion and/or demonstration.

6.4.5 Practical Exercise – Trainee shall perform administrative and technical review on at least five processing case reports, preferably by different examiners than their trainer. The trainer will be the reviewer of record and ultimately responsible for the review on these cases.

6.4.6 Written Test – Module 4

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7.0 Module 5: Digital Preservation of Latent Prints

7.1 Background and Theory

Photography is widely used in Forensic Science. It dates back to the 1800s, when collections of photographs of criminals would hang in police stations for identification purposes. Today, we use digital photography for documentation of crime scenes, victim injuries and/or death, retrieval of evidence, and processing of evidence. Digital cameras contain a sensor that records color and brightness values. These values are stored electronically and interpreted by computers. In general, the higher the resolution, the more information captured.

As with other evidence related to a case, evidentiary photographs should be properly captured, stored, and tracked to ensure their admissibility in court. Photography may be utilized at any point in the processing of evidence for latent prints, i.e. overall documentation of the evidence item, photographs of particular latents, to show orientation on an object, or final condition of an item. When photographing latent print evidence for comparison purposes, it is important to include both the impression and a scale. A variety of photographic techniques may be employed and will depend largely on the substrate as well as the particular development technique utilized on the item. Some of these techniques will require the use of an alternate light sources (ALS) and specialized camera filters.

7.2 Objectives, Principles, and Knowledge

- 7.2.1 Understand the proper procedures for camera capture and digital scanning of latent and inked print images.
- 7.2.2 Familiarization with common digital photography terminology to include camera parts and function, file types, compression, resolution, depth of field, bracketing, etc.
- 7.2.3 Understand the different types of cameras and their suitability for latent print photography.
- 7.2.4 Understand exposure settings and ability to change them.
- 7.2.5 Knowledge of and ability to apply special requirements for category 1 vs. category 2 images.
- 7.2.6 Understand use of filters and lighting techniques to include the use of alternate light sources.
- 7.2.7 Ability to photograph chemically treated and powder developed latent prints of various colors.
- 7.2.8 Ability to photograph three dimensional impressions (plastic prints).
- 7.2.9 Use and Maintenance of cameras and other equipment.

7.3 Health and Safety Hazards

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7.3.1 As with other electrical appliances, guard against electrical shock. This can be accomplished by ensuring that all connections are proper and that no loose, damaged, or frayed wires exist. Make sure the camera and/or ALS is unplugged before attempting any maintenance and do not use outdoors if wet conditions exist.

7.3.2 The eyes are generally more vulnerable than the skin, and appropriate eye protection must be used to protect them. Permanent eye damage can occur from reflected, refracted, or direct illumination to the eye. Most of the light emitted by an ALS is not absorbed, but is reflected and scattered off the surface being examined. Extreme care should be taken around highly reflective surfaces. Never look directly into the light or allow beams to bounce off the surface into your eyes or the eyes of another person in the vicinity. Filtered goggles or shields shall be utilized when using this equipment as they provide protection from potentially harmful rays and provide additional enhancement for viewing latent prints.

7.3.3 The nature and extent of all potential hazards are not yet known because in-depth assessments have not been made on most of the high intensity light sources used in forensic identification work.

7.4 Reading and Practical Exercises

7.4.1 Complete Module 5 Reading List

7.4.2 Practical Exercise – Photography - trainee will need to familiarize themselves with the camera equipment utilized in the laboratory to include cameras, lenses, copy stand.

7.4.2.1 Trainee will demonstrate to the trainer that they understand the interplay between aperture, shutter speed, and ISO. They will need to define and/or demonstrate bracketing, depth of field, resolution, bit vs. byte, SLR or DSLR, and pixel.

7.4.2.2 Trainee will need to know the advantages/disadvantages to the different file formats (JPEG, TIFF, & RAW (DNG etc.)), and be able to define compression and lossy vs. lossless.

7.4.2.3 Trainee will understand various lighting techniques to include: Oblique lighting, diffuse lighting, ALS lighting with appropriate filters, and bounce lighting, etc.

7.4.3 Practical Exercise – Macro photography. Write a short synopsis on "What is macro photography." Practice taking macro photos utilizing the information garnered from research. Present three photos (one must be evidentiary in nature) to the trainer.

7.4.4 Practical Exercise – Flatbed Scanner - trainer led lesson on digital acquisition devices to include flatbed scanners and cameras. The trainee will utilize these devices on training samples to include patent prints, plastic prints, and prints developed with a variety of processing techniques. Images captured from training samples will be evaluated by the trainer.

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7.4.5 Practical Exercise – Digital Imaging System - trainer led lesson on the digital imaging system to include navigation, features, how to upload, etc. The trainee will acquire training images from multiple devices into the digital imaging system as practice.

7.4.6 The Trainee should attend a week long basic photography course or more specialized latent fingerprint photography if available (attach copy of certificate).

7.4.7 Written Test – Module 5

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8.0 Module 6: General Latent Print Processing

8.1 Background and Theory

Latent print visualization may be achieved using various visual, physical, or chemical processes, most of which have evolved during the past century. There are three types of friction ridge impressions; latent, patent, and plastic. Latent prints are hidden until a physical or chemical process makes them visible. Although latent means hidden, it has become synonymous will all types of crime scene and evidence impressions. A patent print is a visible print: examples of patent prints may be those left in blood, paint, dust, etc. A plastic print is a three-dimensional print, for example, those left in clay, wax, melted plastic, or tacky paint.

Prior to developing the print, a thorough visual inspection of the evidence should be conducted, using a strong light source and an ALS.

Deciding what technique(s) to use to develop latent print evidence depends on several factors: type of latent print residue, type of substrate, texture of substrate, condition of substrate (clean, dirty, sticky), known environmental conditions during or following latent print deposition, length of time since deposition, consequences of destructive processing methods, subsequent forensic examinations, and sequential ordering of reagents.

8.2 Objectives, Principles, and Knowledge

8.2.1 Knowledge of the generally accepted techniques for the detection and visualization of friction ridge impressions.

8.2.2 Knowledge of latent print residue components targeted by different chemical development procedures.

8.2.3 Ability to assess the effectiveness and results of applied processing techniques.

8.2.4 Understand generally accepted preservation methods for friction ridge impressions.

8.2.5 Knowledge of surface and environmental factors effecting selection and sequencing of chemical development procedures.

8.2.6 Knowledge of effects of various solvents on evidence surfaces (inks, plastics, varnishes, etc.).

8.2.7 Knowledge of equipment maintenance relative to chemical development of latent prints.

8.3 Health and Safety Hazards

8.3.1 N/A

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8.4 Reading and Practical Exercises

8.4.1 Complete Module 6 Reading List

8.4.2 Attend Latent Fingerprint Processing/Chemical course (36 hour minimum - attach certificate when completed).

8.4.3 Written Test – Module 6

8.4.4 Processing Competency Test- Trainee will independently process a mock case. A minimum of two item types will be processed using sequential processing. This competency test will be entered into ILIMS, and as such, Trainee will need to complete all appropriate documentation and attachments, and issue a report.

8.4.5 Supervised Cases – Complete 20 Supervised Processing Cases. Trainee shall record all case numbers, associated stats, and the identity of the supervising analyst.

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9.0 Module 7: Processing Technique – Alternate Light Sources

9.1 Background and Theory

As early as 1933, fluorescence examination with ultraviolet (UV) light was suggested as a method for visualizing powder developed latent prints on multi-colored surfaces. Visible light consists of electromagnetic radiation of differing colors and wavelengths. Wavelengths at approximately 700 nm are viewed as red light while wavelengths approximate to 400nm are viewed as violet light. To visualize latent prints via fluorescence, a specific wavelength of radiation is absorbed by either an untreated latent print or one treated with a fluorescent chemical or powder and then re-emitted at a differing wavelength. The wavelengths chosen on the Alternate Light Source (ALS) may be determined by the inherent luminescent nature of the print, the specific chemical or powder utilized for processing, or the luminescent nature of the substrate. Evidence is viewed and photographed with various filters dependent upon the specific wavelength used.

9.2 Objectives, Principles, and Knowledge

9.2.1 Knowledge of luminescence, fluorescence, inherent luminescence, light wavelengths, band-pass filters, and light delivery systems as they relate to ALS detection of latent prints.

9.2.2 Knowledge of the personal safety hazards associated with Alternate Light Sources (ALS) and other non-destructive methods of latent print development.

9.2.3 Knowledge of dye stain procedures used post-cyanoacrylate and the need for ALS processing.

9.2.4 Knowledge of 1, 8-Diazafluoren-9-One (DFO), 1, 2 – Indandione, and the need for ALS processing.

9.2.5 Knowledge of equipment maintenance relative to ALS detection of latent prints.

9.3 Health and Safety Hazards

9.3.1 As with other electrical appliances, guard against electrical shock. This can be accomplished by ensuring that all connections are proper and that no loose, damaged, or frayed wires exist. Make sure the ALS is unplugged before attempting any maintenance and do not use outdoors if wet conditions exist.

9.3.2 The eyes are generally more vulnerable than the skin, and appropriate eye protection must be used to protect them. Permanent eye damage can occur from reflected, refracted, or direct illumination to the eye. Most of the light emitted by an ALS is not absorbed, but is reflected and scattered off the surface being examined. Extreme care should be taken around highly reflective surfaces. Never look directly into the light or allow beams to bounce off the surface into your eyes or the eyes of another person in the vicinity.

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Filtered goggles or shields shall be utilized when using this equipment as they provide protection from potentially harmful rays and provide additional enhancement for viewing latent prints.

9.3.3 The nature and extent of all potential hazards are not yet known because in-depth assessments have not been made on most of the high intensity light sources used in forensic identification work.

9.4 Reading and Practical Exercises

9.4.1 Complete Module 7 Reading List

9.4.2 Practical Exercise – trainer led demonstration on the application and preservation of ALS visualized prints to include inherent luminescence followed by hands-on examination by the trainee utilizing training samples.

9.4.3 Practical Exercise – trainer led demonstration on the application and preservation of RUVIS visualized prints followed by hands-on examination by the trainee utilizing training samples.

9.4.4 Written Test – Module 7

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10.0 Module 8: Processing Technique – Amido Black

10.1 Background and Theory

Blood is composed of red blood cells, white blood cells and platelets, suspended in plasma. Red blood cells contain hemoglobin, a protein that carries oxygen from the respiratory organs to the remainder of the body. This protein is made up of four heme groups. There are two types of blood enhancement methods used in forensics: ones that react with the heme group to infer that blood is present and ones that react with proteins and their breakdown products. The ones that react with proteins are not specific to blood, but still tend to be sensitive methods due to the quantity of protein and protein breakdown products available. Amido black is a stain used in the latent print section to enhance the protein component of bloody prints. If blood is suspected, other presumptive blood testing techniques may need to be utilized.

10.2 Objectives, Principles, and Knowledge

10.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

10.2.2 Demonstrate proper chemical application and preservation of developed prints.

10.2.3 Demonstrate proper mixing, use of controls, documentation, storage, and disposal.

10.3 Health and Safety Hazards

10.3.1 Gloves, lab coats, goggles, and respirators (if there is a chance of the reagents becoming airborne) are worn when mixing or using Amido Black.

10.3.2 Glacial acetic acid is corrosive and extremely irritating to the eyes and respiratory system. Avoid breathing the vapors and use in a fume hood, with a respirator, or with adequate ventilation. Glacial Acetic Acid will cause burns if it comes in contact with skin.

10.3.3 Methanol is flammable. It needs to be handled carefully with gloves during the mixing and use of Amido Black. Methanol is toxic in quantities as small as 30 ml and should not be allowed to come in contact with the skin, eyes, or mouth. It is possible for methanol to be absorbed through the skin. If methanol comes into contact with the eyes or mouth, the area should be flushed with generous amounts of water and a doctor may be consulted. Inhalation of methanol vapors should be kept at a minimum and the solution should be used in a hood or well-ventilated area.In addition, analysts must be aware of the biological hazards associated with blood and other body fluids and take extra precautions to protect themselves.

10.4 Reading and Practical Exercises

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10.4.1 Complete Module 8 Reading List

10.4.2 Practical Exercise - locate and read Safety Data Sheet – Amido Black.

10.4.3 Practical Exercise – trainer led lesson on the mixing of Amido Black.

10.4.4 Practical Exercise – trainer led demonstration on the application and preservation of Amido Black followed by hands-on processing by the trainee, utilizing training samples.

10.4.5 Written Test – Module 8

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11.0 Module 9: Processing Technique – 1, 8-Diazafluoren-9-One (DFO) and 1, 2 – Indandione

11.1 Background and Theory

1,8-Diazafluoren-9-one (DFO) was originally prepared in 1950, but its reaction with amino acids was not explored until 1990, when it was first used as a fingerprint development reagent. It was observed that the application of DFO resulted in pink fingerprints that fluoresced. Fluorescence occurs when energy is supplied by an external source (in this case, an ALS) and is absorbed by a fluorescent chemical, creating an excited electronic state. In an effort to return to its ground state, the chemical emits energy that can be visualized as fluorescence. DFO fluoresces when illuminated between 485nm-510nm. The reagent is now widely used to develop fingerprints composed of amino acids on porous surfaces.

The fingerprint developing qualities of 1,2-Indanedione were first reviewed after a related compound, (6-methyl-thio-1,2-indanedione) was found to produce fluorescent fingerprints. 1,2-Indanedione was found to produce fingerprints similar to DFO. Prints treated with this chemical fluoresce when exposed to wavelengths of 450-570nm. As with DFO, 1,2-Indanedione reacts with the amino acids present in fingerprints and is utilized on porous surfaces.

11.2 Objectives, Principles, and Knowledge

11.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

11.2.2 Demonstrate proper chemical application and preservation of developed prints.

11.2.3 Demonstrate proper mixing, use of controls, documentation, and storage and disposal.

11.3 Health and Safety Hazards

11.3.1 DFO has not been fully investigated for potential health hazards, but is thought to be similar to ninhydrin, which may act as an irritant. Gloves, lab coats, and safety glasses should be worn when mixing and using DFO. The application of the DFO working solution should be performed in a fume hood, well-ventilated area, or while wearing an air-purifying respirator equipped with an organic vapor cartridge.

11.3.2 Glacial acetic acid is *corrosive* and extremely irritating to the eyes and respiratory system. Avoid breathing the vapors and use in a fume hood or with adequate ventilation. Glacial acetic acid will cause burns if it comes in contact with skin.

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11.3.3 Methanol needs to be handled carefully with gloves during mixing and use. Methanol is toxic in quantities as small as 30 ml and should not be allowed to come in contact with the skin, eyes, or mouth. It is possible for methanol to be absorbed through the skin. If methanol comes into contact with the eyes or mouth, the area should be flushed with generous amounts of water and a doctor may be consulted. Inhalation of methanol vapors should be kept at a minimum.1,2 Indanedione may be harmful by: inhalation, ingestion and skin absorption. May cause skin and eye irritation.Zinc chloride is hazardous. Avoid contact with skin and eyes. It is a known irritant, a permeator and is corrosive. It is classified as a possible human mutagen.

11.3.6 Dichloromethane (Methylene Chloride) is hazardous. Avoid contact with skin and eyes. It is a known irritant, permeator and corrosive. Inflammation of the eye is characterized by redness, watering, and itching. It is classified as a possible human carcinogen.

11.4 Reading and Practical Exercises

11.4.1 Complete Module 9 Reading List

11.4.2 Practical Exercise - locate and read Safety Data Sheets – DFO, 1,2 – Indandione, and carrier solvents.

11.4.3 Practical Exercise – trainer led lesson on the mixing of DFO.

11.4.4 Practical Exercise – trainer led lesson on the mixing of 1,2 – Indandione.

11.4.5 Practical Exercise – trainer led demonstration on the application and preservation of DFO followed by hands-on processing by the trainee, utilizing training samples.

11.4.6 Practical Exercise – trainer led demonstration on the application and preservation of 1,2 – Indandione followed by hands-on processing by the trainee, utilizing training samples.

11.4.7 Written Test – Module 9

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12.0 Module 10: Processing Technique – Dye Stains – Rhodamine 6G and RAM

12.1 Background and Theory

Dye stains are chemicals that are used to help visualize or enhance latent prints developed with other methods. They do not develop prints on their own and are generally applied to non-porous surfaces after fuming with cyanoacrylate ester.

Rhodamine 6G is an extremely efficient and highly fluorescent dye stain. Rhodamine must be visualized using an alternate light source and fluoresces between 495nm and 525nm.

RAM is a dye stain consisting of rhodamine 6G, Ardrox and MBD (7-(P-Methoxybenzlamino-4Notrobenz-2-Oxa-1, 3-Diazile). This combination allows the stain to fluoresce across a broad spectrum of wavelengths. Since it can be observed under various wavelengths, problematic backgrounds can be tuned out by using a wavelength that only fluoresces the fingerprint and not the background. As with rhodamine 6G, the print needs to have been previously developed by cyanoacrylate fuming before using the RAM stain.

12.2 Objectives, Principles, and Knowledge

12.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

12.2.2 Demonstrate proper chemical application and preservation of developed prints.

12.2.3 Demonstrate proper mixing, use of controls, documentation and storage and disposal.

12.3 Health and Safety Hazards

12.3.1 Rhodamine 6G, Ardrox P133D and MBD are classified as suspected animal carcinogens, but sufficient evidence of human carcinogenicity has not been established. Rhodamine 6G and RAM are thought to be relatively safe when exposure is at low levels. They should never be inhaled or allowed to get into the eyes or mouth, as they are irritants. If this should occur, the eyes or mouth should be flushed with a generous amount of water and a doctor may be consulted.

12.3.2 Methanol, isopropanol, and petroleum ether are highly *flammable*. All three chemicals need to be handled carefully with gloves during mixing and use of

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the stain. Methanol and isopropanol are toxic in quantities as small as 30 ml and should not be allowed to come in contact with the skin, eyes or mouth. It is possible for methanol and isopropanol to be absorbed through the skin. If methanol, isopropanol or petroleum ether come into contact with the eyes or the mouth, the area should be flushed with generous amounts of water and a doctor may be consulted. Inhalation of vapors should be kept at a minimum and the stain should be used in a fume hood or a well-ventilated area.

12.3.3 Eye protection, a lab coat, and gloves should be worn. All mixing and application of chemicals should be done inside a ventilated laboratory fume hood. Excess reagent shall be collected and placed in the hazardous waste container located in the fume hood.

12.3.4 Acetonitrile may be fatal if swallowed, inhaled or absorbed through skin. It affects cardiovascular system, central nervous system, liver and kidneys and may cause irritation to skin, eyes and respiratory tract. It is also a flammable liquid and vapor.

12.4 Reading and Practical Exercises

12.4.1 Complete Module 10 Reading List

12.4.2 Practical Exercise - locate and read Safety Data Sheet – Rhodamine 6G, Ardrox, MBD and carrier solvents.

12.4.3 Practical Exercise – trainer led lesson on the mixing of Rhodamine 6G (methanol base).

12.4.4 Practical Exercise – trainer led lesson on the mixing of Rhodamine 6G (water base).

12.4.5 Practical Exercise – trainer led lesson on the mixing of RAM.

12.4.6 Practical Exercise – trainer led demonstration on the application and preservation of Dye Stains followed by hands-on processing by the trainee, utilizing training samples.

12.4.7 Written Test – Module 10

13.0 Module 11: Processing Technique – Gentian Violet/Crystal Violet

13.1 Background and Theory

Gentian Violet or Crystal Violet is a biological stain used to dye epithelial cells and fatty components of latent print residues an intense purple color. This reagent is a toxic carcinogen and should only be used in small quantities. It can be used on the sticky side of tape (duct tape, clear plastic tape, packaging tape, black electrical tape) and items that are greasy or oily, to enhance prints.

13.2 Objectives, Principles, and Knowledge

13.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

13.2.2 Demonstrate proper chemical application and preservation of developed prints.

13.2.3 Demonstrate proper mixing, use of controls, documentation and storage and disposal.

13.3 Health and Safety Hazards

13.3.1 Gentian violet/crystal violet is a suspected human carcinogen. It is known to affect the kidney, ureter, bladder, and thyroid of animals. It can be harmful if inhaled, and is irritating to the eyes and skin.

13.3.2 Gentian violet should not be used in large amounts.

13.3.3 A dust mask or respirator with dust filter should be used when working with the dry form. Gentian violet should be prepared and used in a fume hood or well-ventilated area. The analyst should wear a lab coat, heavy-duty (non-disposable) gloves and safety glasses.

13.4 Reading and Practical Exercises

13.4.1 Complete Module 11 Reading List

13.4.2 Practical Exercise - locate and read Safety Data Sheet – Gentian Violet.

13.4.3 Practical Exercise – trainer led lesson on the mixing of Gentian Violet.

13.4.4 Practical Exercise – trainer led demonstration on the application and preservation of Gentian Violet followed by hands-on processing by the trainee, utilizing training samples.

13.4.5 Written Test – Module 11

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14.0 Module 12: Processing Technique – Iodine

14.1 Background and Theory

Iodine fuming is one of the oldest latent print methods still used today. It was advocated by Pierre Aubert in Paris in 1876. Iodine fuming uses iodine crystals placed in a fuming chamber to develop latent prints. Iodine sublimates at low temperatures and the vapors are absorbed by the fats and oils in the latent print to turn it a yellow/brown color. Due to the sublimation of the iodine crystals, the print does not remain the yellow/brown color for very long. It is essential to photograph the print as quickly as possible after it is developed. It is considered a non-destructive technique.

14.2 Objectives, Principles, and Knowledge

14.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

14.2.2 Demonstrate proper chemical application and preservation of developed prints.

14.2.3 Demonstrate proper use of controls, documentation, storage, and disposal.

14.3 Health and Safety Hazards

14.3.1 Safety is a serious concern when using the iodine fuming method. Iodine is toxic in any form. ALWAYS AVOID INHALING IODINE FUMES.

14.3.2 Iodine fumes may irritate the skin and damage the respiratory tract. Headaches that can last for several days may result from exposure to iodine. Long-term effects to the thyroid gland may result from exposure.

14.3.3 Adequate ventilation when using the method is mandatory as the fumes are corrosive to metals and may discolor other surfaces that they come in contact with.

14.3.4 Iodine shall be purchased in glass ampoules. The ampoules shall stay sealed until use.

14.4 Reading and Practical Exercises

14.4.1 Complete Module 12 Reading List

14.4.2 Practical Exercise - locate and read Safety Data Sheet – Iodine.

14.4.3 Practical Exercise – trainer led demonstration on the application and preservation of Iodine followed by hands-on processing by the trainee, utilizing training samples.

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14.4.4 Written Test – Module 12

15.0 Module 13: Processing Technique – Leuco Crystal Violet (LCV)

15.1 Background and Theory

Leuco Crystal violet (LCV) is a biological stain that reacts to the heme group in blood to cause the impression residues to turn an intense purple color. It should only be applied to thoroughly dried blood impressions. LCV gives an almost instantaneous visualization of latent prints in existing ambient light. Resulting prints should be photographed as soon as possible to avoid over development of the background.

15.2 Objectives, Principles, and Knowledge

15.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

15.2.2 Demonstrate proper chemical application and preservation of developed prints.

15.2.3 Demonstrate proper mixing, use of controls, documentation, storage, and disposal.

15.3 Health and Safety Hazards

15.3.1 Leuco Crystal violet may be harmful by inhalation, ingestion or skin adsorption; may cause skin and eye irritation; may cause irritation to mucous membranes and upper respiratory tract.

15.3.2 Leuco Crystal violet should not be used in large amounts.

15.3.3 A respirator should be used when working with the dry form. Leuco Crystal violet should be prepared and used in a fume hood or well-ventilated area. The analyst should wear a lab coat, gloves and safety glasses.

15.3.4 In addition, analysts must be aware of the biological hazards associated with blood and other body fluids and take extra precautions to protect themselves.

15.4 Reading and Practical Exercises

15.4.1 Complete Module 13 Reading List

15.4.2 Practical Exercise - locate and read Safety Data Sheet – LeucoCrystal Violet and carrier solvents.

15.4.3 Practical Exercise – trainer led lesson on the mixing of Leuco Crystal Violet.

15.4.4 Practical Exercise – trainer led demonstration on the application and preservation of Leuco Crystal Violet followed by hands-on processing by the trainee, utilizing training samples.

15.4.5 Written Test – Module 13

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16.0 Module 14: Processing Technique – Ninhydrin

16.1 Background and Theory

Ninhydrin (triketohydrindene hydrate) was first used in 1910 when Siegfried Ruhemann mistakenly prepared the compound. Ruhemann observed that the new compound reacted with amino acids to produce an intense purple color. Following Ruhemann's discovery, ninhydrin's use spread to analytical chemistry and biochemical applications. As early as 1916, the reaction with amino acids was used as an important test for the presence of protein in biological samples. The technique is now one of the most popular methods for fingerprint detection on paper and other porous surfaces. The combination of heat and humidity accelerates the reaction of the proteins and amino acids with the ninhydrin.

16.2 Objectives, Principles, and Knowledge

16.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

16.2.2 Demonstrate proper chemical application and preservation of developed prints.

16.2.3 Demonstrate proper mixing, use of controls, documentation, storage, and disposal.

16.3 Health and Safety Hazards

16.3.1 Gloves, lab coat, and eye protection shall be worn when using or mixing ninhydrin. Precautions should also be taken to avoid inhalation of the fumes.

16.3.2 The solvent used in the ninhydrin working solution, Hexane, is *extremely flammable* and the solution is to be used or mixed in a fume hood or in another well-ventilated area. Ensure that ninhydrin treated items are completely dry prior to exposing to the heat source.

16.3.3 Glacial acetic acid is *corrosive* and extremely irritating to the eyes and respiratory system. Avoid breathing the vapors and use in a fume hood or with adequate ventilation. Glacial acetic acid will cause burns if it comes in contact with skin.

16.3.4 2-Propanol, also known as Isopropyl Alcohol, is *flammable.* It is an irritant, and can be harmful if inhaled. Avoid breathing the vapors and use in a fume hood or with adequate ventilation.

16.4 Reading and Practical Exercises

16.4.1 Complete Module 14 Reading List

16.4.2 Practical Exercise - locate and read Safety Data Sheet – Ninhydrin and carrier solvents.

16.4.3 Practical Exercise – trainer led lesson on the mixing of Ninhydrin stock and working solutions.

16.4.4 Practical Exercise – trainer led demonstration on the application and preservation of Ninhydrin followed by hands-on processing by the trainee, utilizing training samples.

16.4.5 Written Test – Module 14

17.0 Module 15: Processing Technique – Powder Development of Latent Prints

17.1 Background and Theory

The development of latent prints using powder involves the application of fine particles that physically adhere to the aqueous or oily components in latent print residue. Powder is one of the most common methods of latent print development utilized on non-porous surfaces. It is also one of the oldest dating back to 1891. At that time, available substances including charcoal, lead powder, soot, and cigar ashes, were used for latent print development.

Most commercial powders use two essential elements to provide adhesion to latent print residue: pigment and binder. The pigment in the powder provides effective visualization, giving contrast against the background surface. The binder provides for maximum and preferential adhesion to latent print residue. There are many different kinds of powders including, black powder, magnetic powder, white powder, fluorescent powder, and various colored powders. No powder is universally applicable to all types of non-porous evidence.

There are several different types and sizes of brushes that can be used when applying fingerprint powders. Types include fiberglass, feather and animal hair brushes as well as magnetic wands. Certain types of brushes are used in conjunction with certain types of powders.

17.2 Objectives, Principles, and Knowledge

17.2.1 Understand the basic types of powders and brushes.

17.2.2 Knowledge of surfaces and environmental factors determining brush type, powder type, and color selection.

17.2.3 Understand the proper procedures for using different types of hair, fiberglass, and magnetic brushes.

17.2.4 Knowledge of equipment maintenance and safety procedures relative to powder development of latent prints.

17.2.5 Knowledge of lifting tape, gel lifters, hinge lifters, etc.

17.3 Health and Safety Hazards

17.3.1 Analysts are required to use the hoods or exhaust vents positioned at each workstation when performing powdering and lifting in the laboratory.

17.3.2 When fingerprint powders are to be used for an extended period of time, a dust mask or half face respirator with dust filters should be worn to minimize the inhalation of the powder particles.

17.3.3 Persons using fingerprint powders should monitor reactions (if any) to the fingerprint powders.

17.4 Reading and Practical Exercises

17.4.1 Complete Module 15 Reading List

17.4.2 Practical Exercise – trainer led orientation on powder processing to include standard, magnetic, bi-chromatic, and fluorescent powders.

17.4.3 Practical Exercise – trainer led orientation on lifting techniques to include various tapes (clear, frosted, & 3-M), casting mediums (Mikrosil & Accutrans), and lifts (gel & hinge).

17.4.4 Practical Exercise - hands-on powder and lifting exercises by the trainee utilizing training samples.

17.4.5 Written Test – Module 15

18.0 Module 16: Processing Technique – Physical Developer (PD)

18.1 Background and Theory

Physical developer is a technique to detect fingerprints on wet or dry porous items, including papers, tapes, and cardboard. The process involves an oxidation–reduction (redox) reaction whereby a solution of an iron salt reduces aqueous silver nitrate to finely divided metallic silver. The technique derives its name from the photographic developer used during film processing that undergoes a similar redox reaction. The physical developer develops the fingerprints as dark gray or black images due to the adhesion of metallic silver particles on the fatty acid and lipid components of sweat residue. Prior to the introduction of physical developer in the 1970s, there were no reliable method for recovering prints from water-soaked documents.

18.2 Objectives, Principles, and Knowledge

- 18.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.
- 18.2.2 Demonstrate proper chemical application and preservation of developed prints.
- 18.2.3 Demonstrate proper mixing, documentation, storage, and disposal.

18.3 Health and Safety Hazards

- 18.3.1 Physical developer should only be used in a fume hood or well-ventilated area, as it is irritating to the respiratory tract.
- 18.3.2 Lab coats, gloves and safety glasses should be worn.
- 18.3.3 Standard laboratory protocol is followed for chemical handling.

18.4 Reading and Practical Exercises

- 18.4.1 Complete Module 16 Reading List
- 18.4.2 Practical Exercise - locate and read Safety Data Sheet for physical developer.
- 18.4.3 Practical Exercise – trainer led lesson on the mixing of PD.
- 18.4.4 Practical Exercise – trainer led demonstration on the application and preservation of PD followed by hands-on processing by the trainee, utilizing training samples.
- 18.4.5 Written Test – Module 16

19.0 Module 17: Processing Technique – Small Particle Reagent (SPR)

19.1 Background & Theory

Small particle reagent (SPR) is a technique used to develop latent fingerprints on moist, non-porous surfaces. Two types of SPR are available; the conventional formula consisting of molybdenum (IV) sulfide and commercially available white SPR. This technique relies on the adherence of fine particles, within a suspension solution, to the fatty components of latent print residue. This is the same approach as fingerprint powder. This technique was originally discovered by J.R. Morris in 1981.

19.2 Objectives, Principles, and Knowledge

- 19.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.
- 19.2.2 Demonstrate proper chemical application and preservation of developed prints.
- 19.2.3 Demonstrate proper mixing, use of controls, documentation, storage, and disposal.

19.3 Health and Safety Hazards

- 19.3.1 There does not appear to be any health hazards associated with small particle reagent, but the process should be monitored to see if there are any allergies.
- 19.3.2 Lab coats, gloves and safety glasses should be worn.
- 19.3.3 Standard laboratory protocol is followed for chemical handling.

19.4 Reading and Practical Exercises

- 19.4.1 Complete Module 17 Reading List
- 19.4.2 Practical Exercise - locate and read Safety Data Sheet - traditional and white SPR.
- 19.4.3 Practical Exercise – trainer led lesson on the mixing of traditional SPR.
- 19.4.4 Practical Exercise – trainer led demonstration on the application and preservation of traditional SPR followed by hands-on processing by the trainee, utilizing training samples.

19.4.5 Practical Exercise – trainer led demonstration on the application and preservation of white SPR followed by hands-on processing by the trainee, utilizing training samples.

19.4.6 Written Test – Module 17

20.0 Module 18: Processing Technique – Sticky Side Powder

20.1 Background and Theory

Sticky-side powder is a liquid fingerprint detection method that develops latent prints on adhesive surfaces. Sticky-side powder detects epithelial cells and fatty/oily components of latent print residue left when handling adhesive surfaces. Sticky side powder can be used on almost any tape, but works especially well on duct and electrical tape. Sticky side powder was developed in the mid-1990's when researchers at the National Identification Centre, Tokyo Metropolitan Police, were investigating methods for developing latent fingerprints on the adhesive side of tapes.

20.2 Objectives, Principles, and Knowledge

- 20.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.
- 20.2.2 Demonstrate proper chemical application and preservation of developed prints.
- 20.2.3 Demonstrate proper mixing, use of controls, documentation, storage and disposal.

20.3 Health and Safety Hazards

- 20.3.1 When using the powder in the dry form, precautions should be taken to prevent the powder from becoming airborne and possibly inhaled.
- 20.3.2 Lab coats, gloves, and safety glasses should be worn.
- 20.3.3 Standard laboratory protocol is followed for chemical handling.

20.4 Reading and Practical Exercises

- 20.4.1 Complete Module 18 Reading List
- 20.4.2 Practical Exercise - locate and read Safety Data Sheet – Sticky Side Powder.
- 20.4.3 Practical Exercise – trainer led lesson on the mixing of Sticky Side Powder.
- 20.4.4 Practical Exercise – trainer led demonstration on the application and preservation of Sticky Side Powder followed by hands-on processing by the trainee, utilizing training samples.
- 20.4.5 Written Test – Module 18

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21.0 Module 19: Processing Technique – Sudan Black

21.1 Background and Theory

Sudan Black was originally used in laboratories for biological testing or chemical screening for fatty components. Sudan black was initially reported to detect the oily/fatty components of fingerprint residue by Misui, Katho, Shimada, and Wakasugi of the Criminal Science Laboratory in Nagoya-shi, Japan in 1980. It is a dye stain that produces a blue-black product and is used to develop latent fingerprints on non-porous waxy substrates and surfaces contaminated with grease, dried beverages, and food residue. Sudan black will also enhance latent fingerprints developed by cyanoacrylate fuming.

21.2 Objectives, Principles, and Knowledge

- 21.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.
- 21.2.2 Demonstrate proper chemical application and preservation of developed prints.
- 21.2.3 Demonstrate proper mixing, use of controls, documentation, storage and disposal.

21.3 Health and Safety Hazards

- 21.3.1 The sudan black working solution contains methanol. Methanol is toxic in quantities as small as 30 ml and should not be allowed to come in contact with the skin, eyes or mouth. It is possible for methanol to be absorbed through the skin. If methanol comes into contact with the eyes or mouth, the area should be flushed with generous amounts of water and a doctor may be consulted. Inhalation of methanol vapors should be kept at minimum.
- 21.3.2 Sudan black should be used in a fume hood or well-ventilated area.
- 21.3.3 Lab coats, gloves and safety glasses should be worn.
- 21.3.4 Standard laboratory protocol is followed for chemical handling.

21.4 Reading and Practical Exercises

- 21.4.1 Complete Module 19 Reading List
- 21.4.2 Practical Exercise - locate and read Safety Data Sheet – Sudan Black.
- 21.4.3 Practical Exercise – trainer led lesson on the mixing of Sudan Black.

21.4.4 Practical Exercise – trainer led demonstration on the application and preservation of Sudan Black followed by hands-on processing by the trainee, utilizing training samples.

21.4.5 Written Test – Module 19

22.0 Module 20: Processing Technique – Cyanoacrylate Ester (Super Glue®)

22.1 Background and Theory

Cyanoacrylate ester (CAE), also known as "Super Glue®", is a technique used to develop latent fingerprints on virtually all non-porous surfaces, including glass, metal, coated papers, and all forms of plastics. This method is especially effective on rough or textured surfaces. CAE processing also prepares the evidence for the acceptance of powder and dye-stains that may enable further visualization of the latent prints. Super Glue® was created in the 1950's by researchers who were trying to develop an acrylic polymer for the aircraft industry. In the late 1970's, researchers discovered its latent fingerprint development use, using the fumes of the glue. Shortly thereafter, the Bureau of Alcohol, Tobacco, and Firearms introduced this technique to North America and it quickly gained acceptance worldwide.

CAE fuming works by quickly bonding the CAE monomers to the latent print residues. The monomer on the fingerprint residue reacts with another CAE monomer in the vapor phase to form a dimer on the print. This reacts with another monomer to eventually form a polymer of CAE molecules. The overall development time is fast, especially when volatilization of the glue is accelerated (via heating or pretreatment).

22.2 Objectives, Principles, and Knowledge

22.2.1 Basic knowledge of the chemical, the latent print matrices with which it reacts, potential safety hazards, and appropriate substrates for use.

22.2.2 Demonstrate ability to properly utilize the CAE fuming chambers, wands, and vacuum chambers.

22.2.3 Demonstrate proper preservation of developed prints.

22.2.4 Demonstrate proper use of controls, documentation, storage and disposal.

22.3 Health and Safety Hazards

22.3.1 CAE fuming should only be conducted in a filtered chamber or well-ventilated area. Precautions should be taken to avoid inhaling or allowing the vapors to contact the eyes, as the vapors can be irritating to the eyes, nose, and throat. Persons wearing contact lenses should not open CAE chambers without proper precautions. Non-vented goggles should be worn.

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22.3.2 Precautions include properly sealed CAE chambers and evacuating the fumes from the chambers prior to removal of the questioned and test surfaces.

22.3.3 Gloves should be worn to prevent the cyanoacrylate from contacting the skin. If liquid glue is allowed to contact the skin, adhesion may result. If the skin sticks together, immerse affected areas in warm water. This will loosen the skin so that it can be gently pulled apart.

22.4 Reading and Practical Exercises

22.4.1 Complete Module 20 Reading List

22.4.2 Practical Exercise - locate and read Safety Data Sheet – CAE.

22.4.3 Practical Exercise – trainer led demonstration on the application of CAE using the fuming chamber followed by hands-on processing by the trainee, utilizing training samples.

22.4.4 Practical Exercise – trainer led demonstration on the application of CAE using the fuming wand followed by hands-on processing by the trainee, utilizing training samples.

22.4.5 Practical Exercise – trainer led demonstration on the application of CAE using the vacuum chamber followed by hands-on processing by the trainee, utilizing training samples.

22.4.6 Practical Exercise – Demonstrate to the trainer your ability to preserve CAE developed prints.

22.4.7 Written Test – Module 20

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23.0 Module 21: Digital Imaging

23.1 Background and Theory

Latent print images are frequently captured, processed and stored using digital devices. All of the techniques used in digital image processing have their roots in traditional photography and mathematics. Use of digital image processing can yield information not readily apparent in the original image and can assist in drawing a conclusion that might not have been reached otherwise. Image processing provides for higher image clarity and contrast.

23.2 Objectives, Principles, and Knowledge

23.2.1 Understand the capabilities and limitations of specific technologies that relate to digital imaging and storage of latent and inked prints.

23.2.2 Understand digital enhancement techniques using Adobe Photoshop to improve the visualization of latent print images.

23.2.3 Proficiency in the use of enhancement techniques to including, but not limited to: color reversal, position reversal, layers, contrast, image calibration/resolution, digital filters, and creation of enlargements.

23.2.4 Proficiency in the use of the current digital imaging system.

23.3 Health and Safety Hazards

23.3.1 As with other electrical appliances, guard against electrical shock. This can be accomplished by ensuring that all connections are proper and that no loose, damaged, or frayed wires exist.

23.4 Reading and Practical Exercises

23.4.1 Complete Module 21 Reading List

23.4.2 Attend Digital Imaging course. (20 hour minimum - attach copy of certificate).

23.4.3 Practical Exercise – trainer led lesson on digital image processing to include a demonstration of commonly utilized techniques. The trainee shall practice processing techniques on the training images. Processed images will be evaluated by the trainer.

23.4.4 Digital Imaging Competency Test: Trainee will independently capture, calibrate, process, and document, within the digital imaging system, ten latent prints as assigned by the trainer.

23.4.5 Written Test – Module 21

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24.0 Module 22: Biology and Physiology of Friction Ridge Skin

24.1 Background and Theory

A thorough understanding of the anatomy and physiology of friction ridge skin allows examiners to correctly analyze latent print impressions. Elements of biology and physiology explain why friction ridge skin is unique, why features of the skin persist, how the features of the skin age, how the skin responds to injury and why scars that form are unique. Understanding the pliability of friction ridge skin and how the skin reacts when it contacts a surface also provides valuable assistance during the examination of friction ridge impressions.

24.2 Objectives, Principles, and Knowledge

- 24.2.1 Understand the biology and physiology of friction ridge skin.
- 24.2.2 Understand the basic foundations of the science of friction ridge identification (persistence and uniqueness).
- 24.2.3 Understand the basic anatomy and terminology of the hands and feet.
- 24.2.4 Understand the general chemical composition of human perspiration as a means of understanding the composition of latent print residue.
- 24.2.5 Knowledge of genetic abnormalities of friction ridge skin (e.g. dysplasia, dissociated ridges).
- 24.2.6 Knowledge of alteration and mutilation of friction ridge skin.

24.3 Health and Safety Hazards

- 24.3.1 N/A

24.4 Reading and Practical Exercises

- 24.4.1 Complete Module 22 Reading List
- 24.4.2 Practical Exercise - Find and read two articles (published within the past 10 years) on the biology and physiology of friction ridge skin. Present a synopsis of the papers to the latent print section.
- 24.4.3 Written Test – Module 22

25.0 Module 23: Recording Inked Fingerprints, Palm Prints, and Footprints

25.1 Background and Theory

Recording inked fingerprints, palm prints and footprints is necessary for latent print examinations. These impressions can be made using a number of techniques, including traditional ink, Live Scan, and powder/adhesive lift methods. Care and determination in recording the prints should always be exercised in order to obtain the best quality recordings for classification and/or comparison.

25.2 Objectives, Principles, and Knowledge

25.2.1 Understand the various methods for recording known friction ridges for criminal history or personal identification including knowledge of chemical (inkless) systems, printer's ink, the black powder/adhesive lift (Handiprint®) method and electronic capture systems (Live Scan).

25.2.2 Understand the quality of friction ridge detail produced by each method.

25.2.3 Understand the benefits associated with obtaining victim/elimination prints and complete friction ridge exemplars (major case prints).

25.2.4 Understand the proper method of completing fingerprint and palm print card information, sequence for recording fingers, and method of printing plain impressions.

25.2.5 Demonstrate ability to properly use ink and brayer to record fingerprints, palm prints, and footprints (including equipment maintenance).

25.2.6 Demonstrate ability to properly record complete friction ridge exemplars (major case prints).

25.3 Health and Safety Hazards

25.3.1 N/A

25.4 Reading and Practical Exercises

25.4.1 Complete Module 23 Reading List

25.4.2 Practical Exercise – Rolling Inked Prints - Instruction by Trainer followed by practice on at least three individuals. Exemplars will be evaluated by the trainer.

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25.4.3 Practical Exercise – Taking Major Case Prints (include footprints) - Instruction by Trainer followed by hands-on application. Exemplars will be evaluated by the trainer.

25.4.4 Practical Exercise – Black Powder Adhesive Lift Method - Instruction by Trainer followed by hands-on application. Exemplars will be evaluated by the trainer.

25.4.5 Practical Exercise – Live Scan Terminal Familiarity – Overview lead by Live Scan terminal operator.

25.4.6 Written Test – Module 23

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26.0 Module 24: Friction Ridge Pattern Recognition and Interpretation

26.1 Background and Theory

Friction ridge identification and classification has a long history rooted in scientific research and empirical observations. Various classification systems including Henry, Vucetich, National Crime Information Center (NCIC), have been successfully used for over the past 100 years. Today's classification systems rely mainly upon computers to digitize, categorize, recall, and identify matching 10-print cards. *NCIC became operational in 1967

While the use of computers has modernized fingerprint classification within the criminal justice system and forensic science, it is important that latent print examiners be able to recognize and articulate the various patterns and sub-patterns, their use in analysis and comparison, as well as the history behind them.

26.2 Objectives, Principles, and Knowledge

- 26.2.1 Understand common terminology and definitions associated with friction ridge pattern recognition (arch, loop, and whorl).
- 26.2.2 Ability to differentiate between pattern types.
- 26.2.3 Awareness and understanding of the Henry Classification System to include: origin, FBI extensions, pattern interpretation, & parts of classification.
- 26.2.4 Awareness and understanding of other classification systems (NCIC Classification System, American System, and the Vucetich System)
- 26.2.5 Understand friction ridge formations as they relate to recognition, interpretation, and identification.

26.3 Health and Safety Hazards

- 26.3.1 N/A

26.4 Reading and Practical Exercises

- 26.4.1 Complete Module 24 Reading List
- 26.4.2 Practical Exercise: Fingerprint Classification - Classify three fingerprint cards for both Primary Henry and individual pattern types.
- 26.4.3 Written Test – Module 24

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27.0 Module 25: Introduction to Latent Prints and the State of the Science

27.1 Background and Theory

Forensic scientists are entrusted with a great amount of responsibility. The public and the criminal justice system expect that Forensic Scientists be unbiased, intelligent, and thorough. In order to do so, a scientists must take their responsibility seriously and uphold the ethics and values required for their position. Over the past decade, the news has been filled with stories of incompetence and out right misconduct. Crime labs in nearly every state have been affected and, in turn, the field of forensic science is facing more and more challenges. We are seeing them on multiple fronts from both the court system, in the form of Daubert hearings, to legislation requiring accreditation. Many resources are being put into exploring the state of the science and what the path forward should look like. From the 2009 NAS report on Strengthening Forensic Science in the United States to the formation of the Organization of Scientific Area Committees (OSACs), the field is rapidly changing.

27.2 Objectives, Principles, and Knowledge

- 27.2.1 Knowledge of the professional duties, moral obligations, and code of ethics for Latent Print Examiners.
- 27.2.2 Knowledge of the various professional organizations and certifications.
- 27.2.3 Become familiar with the NAS report and the impact it is having on the field.
- 27.2.4 Become familiar with the Friction Ridge OSAC and its activities.

27.3 Health and Safety Hazards

- 27.3.1 N/A

27.4 Reading and Practical Exercises

- 27.4.1 Complete Module 25 Reading List
- 27.4.2 Practical Exercise - "48 matches exercise."
- 27.4.3 Practical Exercise - Locate and read the "Code of Ethics and Standards of Professional Conduct" for latent print examiners as published by the IAI.
- 27.4.4 Practical Exercise - Make application to the IAI and/or PNWD-IAI.
- 27.4.5 Practical Exercise – visit www.nist.gov/forensics/osac/index.cfm to become familiar with the OSACs. Give a five minute presentation to the latent print section on a topic relevant to them.

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27.4.6 Written Test – Module 25

28.0 Module 26: Human Factors

28.1 Background and Theory

The term "human factors" as it applies to forensic science is the scientific discipline concerned with the understanding of interactions among humans and other elements of the forensic system including products, decisions, procedures, workspaces, and the overall environment encountered at work. It advances an understanding of the nature of errors in complex work settings and attempts to mitigate them by applying theory, principles, data, and method design to optimize overall performance and improve cognitive abilities with respect to judgment and decision making. Human factors research has its roots in post-World War I aviation psychology and was first applied to forensic science and latent print examination in particular in the mid 2000's. By 2008, the National Institute of Justice (NIJ) Office of Investigative and Forensic Sciences (OFIS) and the National Institute of Standards and Technology's (NIST's) Law Enforcement Standards Office (OLES) had put together an Expert Working Group on Human Factors in Latent Print Analysis. The Organization of Scientific Area Committees (OSAC) currently has a Human Factors Committee established to provide advice and guidance on human factors issues in forensics.

28.2 Objectives, Principles, and Knowledge

- 28.2.1 Develop an understanding of the nature of errors in latent print examination.
- 28.2.2 Identify the various human factors that lead to errors.
- 28.2.3 Understand the role of human factors and their contributions to errors in latent print analysis.
- 28.2.4 Understand how environmental conditions effect the quality of latent print examinations.
- 28.2.5 Ability to define the different types of bias: cognitive bias, confirmation bias, contextual bias, etc.
- 28.2.6 Ability to define the different types of errors: false positive, false negative, etc.

28.3 Health and Safety Hazards

- 28.3.1 N/A

28.4 Reading and Practical Exercises

- 28.4.1 Complete Module 26 Reading List
- 28.4.2 Written Test – Module 26

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29.0 Module 27: Analysis, Comparison, Evaluation, and Verification (ACE-V)

29.1 Background and Theory

The scientific method is a method of research in which a problem is identified, relevant data is gathered, and a hypothesis is formulated from the data and then tested. In Forensic Science, it is imperative to have a scientific technique for examination. Doing so ensures that evidence is treated equally and conclusions are reliable and unbiased. The latent print section utilizes ACE-V as part of the examination methodology. ACE-V is an acronym that stands for analysis (A), comparison (C), evaluation (E) and verification (V). It is the process that latent print examiners utilize to reach a conclusion about a comparison examination.

Huber initially discussed ACE-V in 1959 when describing the philosophy of science and the correct use of the scientific method. Huber described hypothesis testing as analyzing, comparing, and evaluating and noted that verification was needed. In 1979, David Ashbaugh noted the applicability of the methodology to the latent print comparison process. In 1998, during the first Daubert hearing on fingerprint evidence, the members of the fingerprint community recognized the need to better articulate how they came to their conclusions. ACE-V was determined to be one such way to do so. Today, ACE-V has gained widespread recognition within the field.

29.2 Objectives, Principles, and Knowledge

29.2.1 Understand the scientific methodology and its application to friction ridge examination.

29.2.2 Understand the individual friction ridge structure (e.g., continuity, texture, pore, and edge definition) for determining the existence of individualizing details.

29.2.3 Understand friction ridge characteristics (dots, ridge endings, and bifurcations) the varying definitions/interpretations assigned to combinations of those three ridge characteristics, and how they may be utilized in effecting identification.

29.2.4 Understand the value of incipient ridge characteristics for use in latent print comparison/individualization.

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29.2.5 Understand the importance of elimination prints and the necessity for completing comparisons of known individuals (e.g. victims) before searching a print in the ABIS system.

29.2.6 Ability to recognize and utilize ridge flow configurations (size, pattern, focal points, etc.), scars, creases, and other friction ridge characteristics to support latent print examination.

29.2.7 Ability to recognize, and if possible determine the area from which the latent fingerprints, palm prints, and foot/toe prints originated.

29.2.8 Understand the nature of color reversals (entire print) and changes (within the same print) and the ability to properly analyze these occurrences when they are encountered in latent print comparisons.

29.2.9 Understand the effects of pressure distortion, slippage, overlays, pre- and post- deposit artifacts (surface scratches, soil, brush strokes, etc.), and the ability to properly analyze such disturbances/distortion.

29.2.10 Understand the different policies and standards that exist regarding what constitutes friction ridge individualization in the U.S. and other countries and why no minimum number of ridge characteristics can be defined to effect an identification (i.e., positive opinion based on personal empirical experience in examining and comparing latent prints).

29.2.11 Knowledge of simultaneous or adjacent impressions and their value for identification.

29.2.12 Ability to analyze fragmentized friction ridge detail to determine its value (comparison/identification, value/no value).

29.2.13 Knowledge of various methods used to record known friction ridge impressions and the ability to properly evaluate ridge structure based on each method.

29.2.14 Ability to properly conduct a comparison.

29.2.15 Ability to render an accurate conclusion and an understanding of what constitutes a valid identification.

29.2.16 Understand the necessity for verification by another qualified latent print examiner.

29.2.17 Understand the role of quality assurance measures in friction ridge examination.

29.2.18 Awareness of the impacts resulting from an erroneous conclusion.

29.2.19 Awareness of basic statistical models and the potential for their integration into the current friction ridge identification procedures.

29.3 Health and Safety Hazards

29.3.1 N/A

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29.4 Reading and Practical Exercises

29.4.1 Complete Module 27 Reading List

29.4.2 Attend an approved Latent Print Comparison Techniques training course (36 hour minimum - attach certificate when completed).

29.4.3 Attend an approved Advanced Ridgeology or Complex Comparison course. (36 hour minimum - attach certificate when completed).

29.4.4 Attend an approved Palm Print training course. (20 hour minimum - attach certificate when completed).

29.4.5 Practical Exercise "100 Prints." Trainee will assess 100 prints as to insufficient ridge detail "IRD," value for exclusion only, or value for comparison, finger pattern type or other area of origin, finger or hand to search first, level of clarity (1, 2, 3), complexity, shape clues, red flags/distortion, and orientation.

29.4.6 Practical Exercise - complete comparison packets 1-10 as assigned by the trainer.

29.4.7 Written Test – Module 27

29.4.8 Comparison Competency Test- Trainee will independently analyze and compare a mock case. Prints may consist of palm prints, low minutia prints, distorted prints, and non-matching prints. This competency test will be entered into ILIMS, and as such, Trainee will need to complete all appropriate documentation and attachments, and issue a report.

29.4.9 Supervised Cases – Complete 20 Supervised Comparison Cases. Trainee shall record all case numbers, associated stats, and the identity of the supervising analyst.

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30.0 Module 28: Case Management and Reporting for Comparison and/or ABIS

30.1 Background and Theory

Forensic Scientists are responsible for documenting the activities, methods, and results of their examinations in the case record. All case records are recorded in ILIMS. All case documentation should be such that another qualified Latent Print Examiner could read the documentation and replicate the work. ABIS searches are also documented in ILIMS with supporting documentation attached so that they too may be evaluated by another qualified analyst.

30.2 Objectives, Principles, and Knowledge

30.2.1 Knowledge of and the ability to demonstrate proper procedures for maintaining chain of custody (documentation and physical control).

30.2.2 Ability to navigate and query the various databases for location of criminal history records, fingerprint and palm print cards.

30.2.3 Ability to navigate and query ILIMS for latent print comparison and/or ABIS cases.

30.2.4 Ability to demonstrate proper procedures for documentation of comparison casework. Documentation shall be such that another qualified Latent Print Examiner could evaluate what was done and replicate any comparisons.

30.2.5 Knowledge of and the ability to demonstrate proper procedures for reporting latent print comparison and ABIS examination findings in an accurate, concise, and clear manner.

30.3 Health and Safety Hazards

30.3.1 N/A

30.4 Reading and Practical Exercises

30.4.1 Complete Module 28 Reading List

30.4.2 Attend Basic ILETS course (attach certificate when completed).

30.4.3 Practical Exercise – Obtain ILETS login and participate in trainer led lesson on searching and obtaining known exemplars.

30.4.4 Practical Exercise – Writing latent print comparison reports in ILIMS – trainer led discussion and demonstration.

30.4.5 Practical Exercise – Trainee shall independently produce three comparison case reports.

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30.4.6 Practical Exercise – Technical review training for comparison cases - trainer led discussion and/or demonstration.

30.4.7 Practical Exercise – Trainee shall perform administrative and technical review on a minimum of five comparison case reports with their trainer. The trainer will be the reviewer of record and ultimately responsible for the review on these cases.

30.4.8 Practical Exercise – Technical review training for ABIS cases - trainer led discussion and/or demonstration.

30.4.9 Written Test – Module 28

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31.0 Module 29: Court Procedures, Related Laws, Expert Testimony, Criminal and Civil Procedures Applicable to Latent Prints

31.1 Background and Theory

One of the most important parts of Forensic Scientist's job is ensuring that the evidence that has been processed and evaluated is acceptable to the court system. ISPFS has numerous procedures to help ensure that evidence is handled and processed in an acceptable manner. It is also important to ensure that analysts are properly trained and prepared to testify as an expert witness within the field.

There are a number of important statutes and legal decisions that impact fingerprint testimony and the admission of evidence. It is important for latent print examiners to be familiar with some Federal Rules of Evidence including Rules 701, 702, 703, and Rule 16. Important court cases include People v Jennings, Frye v. United States, Daubert v. Merrel Dow Pharmaceuticals, US v. Byron Mitchell, US v Llera Plaza, and Mayfield v United States.

31.2 Objectives, Principles, and Knowledge.

- 31.2.1 Understand the role of expert witness testimony.
- 31.2.2 Knowledge of factors regarding the admissibility of evidence.
- 31.2.3 Knowledge of relevant court cases and case histories.
- 31.2.4 Understand the rules of discovery and evidence.
- 31.2.5 Knowledge of applicable legal challenges to admissibility.
- 31.2.6 Understand critical challenges to the discipline.
- 31.2.7 Understand the advantages and disadvantages of different court chart types/methods (points, area bubbles, power point).
- 31.2.8 Select appropriate prints and individual ridge characteristics for charting and create court charts, and utilize the digital imaging system to create court charts/exhibits.
- 31.2.9 Ability to verbally articulate the friction ridge examination process and any resulting conclusions.

31.3 Health and Safety Hazards

- 31.3.1 N/A

31.4 Reading and Practical Exercises

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31.4.1 Complete Module 29 Reading List

31.4.2 Practical Exercise – Write a 3-5 page paper on a recent court developments as it relates to fingerprints.

31.4.3 Practical Exercise – Write one to two paragraphs outlining the arguments, decisions, and impact of each on the Science of Friction Ridge Analysis for each of the following court cases: Daubert v. Merrel Dow Pharmaceuticals, US v. Byron Mitchell, US v Llera Plaza, and Mayfield v United States.

31.4.4 Practical Exercise – Prepare your curriculum vitae utilizing the appropriate template.

31.4.5 Practical Exercise - Prepare a list of court qualifying questions related to latent print processing and provide sample answers to those questions that could be presented in a court of law.

31.4.6 Practical Exercise – Participate in a moot court for latent print processing.

31.4.7 Practical Exercise - Prepare a list of court qualifying questions related to latent print comparison and provide sample answers to those questions that could be presented in a court of law.

31.4.8 Practical Exercise – Participate in a moot court for latent print comparison.

31.4.9 Practical Exercise - Trainee shall generate a list of AFIS related court qualifying questions and provide sample answers to those questions that could be presented in a court of law.

31.4.10 Written Test – Module 29

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32.0 Module 30: Introduction to Crime Scenes

32.1 Background and Theory

Latent print examiners are often tasked with responding to a variety of crime scenes including, but not limited to, homicides, robberies, and clandestine drug labs. No two scenes are ever the same and each will present with its own challenges. When responding to scenes of crimes, it is important that fingerprint evidence be properly documented, processed, and packaged.

32.2 Objectives, Principles, and Knowledge

32.2.1 General knowledge of the science of fingerprints to include processing, comparison and crime scenes.

32.2.2 Understanding of proper procedures for packaging physical evidence for subsequent latent print examination without reducing its evidentiary value.

32.2.3 Understanding of the services offered by the Latent Print Section including evidence processing, comparison, post mortem/victim elimination fingerprinting, ABIS, and clandestine lab/crime scene response.

32.2.4 Understand the documentation requirements for latent print processing at different types of scenes.

32.2.5 Understanding of the personal safety hazards posed by responding to crime scenes and the proper use of personal protective equipment, clothing, gloves, respirators, etc.

32.2.6 Introductory knowledge of various crime scene search techniques, including commonly prescribed searching sequences (grid, spiral, strip, etc.).

32.2.7 Introductory knowledge of basic crime scene documentation techniques including videography, photography, notes, sketches, and measurements.

32.3 Health and Safety Hazards

32.3.1 Analysts shall be aware of the biological hazards associated with blood and other body fluids and take extra precautions to protect themselves at crime scenes.

32.3.2 Analysts shall be aware of any chemical hazards associated with chemical reagents employed in the processing of crime scenes.

32.4 Reading and Practical Exercises

32.4.1 Complete Module 30 Reading List

32.4.2 The Trainee should attend a basic crime scene course (36 hour minimum - attach certificate when completed).

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32.4.3 The Trainee should attend a basic photography course (36 hour minimum - attach certificate when completed).

32.4.4 Practical Exercise – Marking of Latent Print Evidence at the crime scene versus in the laboratory - Trainer led discussion and/or demonstration.

32.4.5 Practical Exercise – Processing Bodies for Latent Prints – independent research and presentation followed by construction of portable glue chamber.

32.4.6 Practical Exercise – Attend at least two crime scenes with a senior examiner (Note field services case number date and accompanying analysts/trainer).

32.4.7 Practical Exercise – Writing a Field Services Report – Instruction by trainer followed by hands-on application.

32.4.8 Practical Exercise Technical Review of Field Services Report - Instruction by trainer followed by hands-on application.

32.4.9 Written Test – Module 30

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33.0 Module 31: Recording Post Mortem Exemplars

33.1 Background and Theory

Various methods and techniques may be used to enable the successful recording and preservation of postmortem friction ridge detail. The condition of the skin will dictate the various methods and techniques that should be used. Recordings of recently deceased persons can generally be performed much like recording the prints of live individuals. Obtaining recordings of ridge detail from skin that is decomposed, mummified, charred, or macerated, is much more difficult.

These prints may be relied upon for identification of the individual or used to identify prints collected at crime scenes. It is important that latent print examiners understand the specific needs associated with each case so that they may obtain prints that are appropriate for the intended purpose.

33.2 Objectives, Principles, and Knowledge

33.2.1 Understand the procedures and equipment used in fingerprinting deceased persons.

33.2.2 Understand the effects and conditions of rigor mortis and stages of decomposition.

33.2.3 Understand the legal considerations and procedures for the removal of fingers or hands and subsequent preservation.

33.3 Health and Safety Hazards

33.3.1 All human tissue shall be treated as if infectious.

33.3.2 Gloves, eye protection, lab coat, and/or protective disposable apron shall be worn at all times when working with any body parts.

33.3.3 Utensils shall be disposed of or cleaned and disinfected after use. Surfaces will be disinfected with a 10% bleach solution or commercially available equivalent.

33.4 Reading and Practical Exercises

33.4.1 Complete Module 31 Reading List

33.4.2 Practical Exercise - Taking prints using post mortem spoon and Injecting post mortem prints (mock exercise) - Instruction by Trainer followed by hands-on application

33.4.3 Practical Exercise - Assist with post mortem prints in the lab or at autopsy on at least two occasions (Note case number, date, and Trainer)

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33.4.4 Written Test – Module 31

34.0 Module 32: Automated Biometric Identification System (ABIS)

34.1 Background and Theory

Fingerprints are used as the foundation for criminal history records throughout the world. In 2016, the FBI's data base was estimated to contain over 100 million fingerprint cards with the Idaho database having a little over half a million persons on file. Data-bases on all levels continue to grow with tens of thousands of individuals added to these repositories daily. These sophisticated computer filed repositories are referred to as Automated Fingerprint Identification System (AFIS) or Automated Biometric Identification System (ABIS). AFIS/ABIS is essentially a two part system: the ten-print system and the latent print system. The ten-print system is tasked with identifying sets of inked or Live Scan fingerprints for criminal identification or employment purposes. The latent system is tasked with solving crimes through fingerprints recovered from crime scenes or off items of evidence.

Idaho is a member of the Western Identification Network, Inc. (WIN). WIN was formed in 1988 to create a multi-state AFIS network. The members of WIN are Alaska, Montana, Oregon, Washington, Nevada, Utah, Wyoming, California and Idaho. WIN offers access to 20 million fingerprint records held within the western United States.

34.2 Objectives, Principles, and Knowledge

34.2.1 Understanding of automation technology and theory of operation to include:
The history of the development of friction ridge automation technology;
Theory of the operation of friction ridge automation technology, to include an understanding of distortion that may occur when three-dimensional friction ridge skin is captured as a two-dimensional image.

34.2.2 Understanding of the function and use of image capture to include:
Types of friction ridge recordings (e.g. rolled, flat, simultaneous, palm);
Methods of friction ridge capture (e.g. ink, live scan);
Types of capture devices (e.g. live-scan, flatbed, camera);
Point of capture variables (e.g. condition of fingers, condition of platen, rolling speed, movement);
Control measures needed to achieve quality friction ridge images (e.g. scan resolution, compression rate, equipment maintenance, calibration),
Procedures for addressing amputations, temporary injuries, skin conditions, and rescans.

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34.2.3 Understanding of the function and use of Automated Biometric Identification Systems (ABIS) to include:
ABIS process related to acquisition, classification, searching, storage, retrieval, identification, and final reporting of friction ridge records;
Friction ridge search criteria (e.g. designated finger search, how many fingers, palm areas);
Importance of quality assurance on maintaining the integrity of friction ridge data;
Quality controls that ensure completeness, image quality, and data integrity.

34.2.4 Gain a working knowledge of the NEC Automated Biometric Identification System (ABIS) and the Integrated Automated Fingerprint Identification System (IAFIS) to include:
Who handles component maintenance and calibration;
System requirements and limitations including text data fields, fingerprint and palm print quality, finger sequence and image replacement, image rotation, and toleration for pattern interpretation;
Minutia recognition, placement, rotation, ridge counts, and other minutiae factors related to searching and matching;
Limitations of system interoperability;
Integration of friction ridge image, mug shot, scars, marks, tattoos, minutiae, other biometrics, as well as personal descriptors, and criminal history information;
Search parameters, pattern classification and referencing, minutiae extraction, search algorithms, significance in the range of candidate scores, threshold scoring, and candidate list comparisons, matching;
AFIS search capabilities in regards to latent print vs. ten print, ten print vs. latent print, latent print vs. latent print, ten print vs. ten print, and palm print vs. palm print;
"Lights out" processing of searches and mobile search capabilities;
Logical search progression (i.e. state, regional, national);
Filtering criteria used to establish logical candidates (e.g. finger position, sex, classification, race, offense, geographic location);
Search result contents (e.g. ranked order, unique identifier, finger or palm position);
Differences between AFIS digital images and original friction ridge impressions (e.g. potential loss of quality due to compression of image, monitor resolution, capture resolution);
Printer technology limitations vs. examinations from original friction ridge documents (e.g. paper quality, inked fingerprint cards);
AFIS processes related to latent print searches;

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Various search options among databases within the system (e.g. image, feature);
Manual and automatic encoding of minutiae;
File penetration benefits and liabilities of partial vs. full data base searches;
Record authentication processes (e.g. correct association of name, unique identifier, friction ridge images, and criminal history record).

34.3 Health and Safety Hazards

34.3.1 N/A

34.4 Reading and Practical Exercises

34.4.1 Complete Module 32 Reading List

34.4.2 Attend an approved AFIS training course. The on-line (spacing) AFIS training course sponsored by West Virginia University is the current approved course. If a previously approved course becomes unavailable, the Latent Section Supervisor will choose or design a new course that meets the training module requirements (attach certificate when completed).

34.4.3 Practical Exercise - Complete 20 ABIS searches through ID/WIN and 5 submissions to the FBI working as "the hands of the trainer" as defined by the ISPFS Quality/Procedure Manual.

34.4.4 ABIS Competency Test: Trainee will independently search 5 mock latent prints through the Automated Biometric Identification System. Competency test prints may consist of palm prints, low minutia prints, distorted prints, and non-matching prints. This competency test will be entered into ILIMS, as such, trainee will need to document searches, attach proper ABIS documentation, and issue a report.

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Appendix I – Reading Lists

Module 1 Reading List: History and Background of Fingerprint Identification

Fingerprint Techniques - Andre Moenssens
Chapter 1 - The History of Fingerprinting _____ _____
Chapter 2 - The Nature of Friction Skin _____ _____

Finger Prints, Palms and Soles - Harold Cummins and Charles Midlo
Chapter 1 – History _____ _____
Chapter 2 - General Considerations _____ _____

Criminalistics, 9th edition - Richard Saferstein
Chapter 14, "History of Fingerprints." Pages 428- 430 _____ _____

Advances in Fingerprint Technology, 2nd edition - Lee, Gaensslen
Chapter 1 - History and Development of Fingerprinting. _____ _____

Friction Ridge Skin - James F. Cowger
Chapter 1 - Introduction _____ _____

Fingerprints and The Law - Andre A. Moenssens
Chapter 1, "History Perspective." Pages 1- 9 _____ _____

The Fingerprint Sourcebook – Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al
Chapter 1 - History _____ _____

Quantitative-Qualitative Friction Ridge Analysis - David R. Ashbaugh.
Chapter 2 - History of Fiction Ridge Identification _____ _____

Module 2 Reading List: Other Scientific Personal Identification Methods

Biometrics Overview http://www.biometrics.gov/Documents/biooverview.pdf
_____ _____

Iris Recognition http://www.biometrics.gov/Documents/IrisRec.pdf
_____ _____

Face Recognition http://www.biometrics.gov/Documents/FaceRec.pdf

Vascular Pattern Recognition http://www.biometrics.gov/Documents/VascularPatternRec.pdf _____ _____

Hand Geometry http://www.biometrics.gov/Documents/HandGeometry.pdf _____ _____

Criminalistics, 9th edition Richard Saferstein _____ _____
Chapter 13, "DNA" Pages 380-418 _____ _____
Chapter 16, "Document and Voice Examination" Pages 496-521 _____ _____

Death Investigator's Handbook by Louis N. Eliopulos,
Chapter 67 "Forensic Odontology Pages 679 – 693 _____ _____

Forensic Science Handbook Volume 1, 2nd Edition, - Richard Saferstein.
"Handwriting and Handprinting Identifications. "Pages 710-717 _____ _____

Module 3 Reading List: Safety Training

Latent Print Section Quality Manual sections:
Safety _____ _____
Ordering of Chemicals/Supplies _____ _____
Preparation of Reagents _____ _____
Equipment, Calibration, Maintenance and Repair _____ _____

Safety for the Forensic Identification Specialist
Nancy E. Masters - 2nd Edition _____ _____

Module 4 Reading List: Case Management and Reporting for Processing

ASCLD/LAB-International Supplemental Requirements for the Accreditation of Forensic Science Testing Laboratories Appendix C- Latent Print Examination Records.

ISO/IEC 17025:2005 General Requirements for the competence of testing and calibration laboratories – Section 4.13 Control of Records _____ _____

ISPFS Quality/Procedure Manual
Section 4.13 Technical records _____ _____
Section 5.3 Accommodations and Environmental Conditions _____ _____

Section 5.9 “Technical Review” and “Administrative Review” _____ _____
Section 5.10 Reporting the Results _____ _____

Latent Print Section Quality Manual - Case Work Documentation and Report Writing
_____ _____

Guideline - SWGFAST Document 5 Standard for Reporting Friction Ridge Examinations (Latent/Tenprint) or the OSAC successor document _____ _____

Module 5 Reading List: Digital Preservation of Latent Prints

User’s manual for the Nikon D810 _____ _____

User’s manual for the Cannon camera _____ _____

User’s manual for the Epson V700/V800 _____ _____

Latent Print Section AM Section - Digital Imaging Procedure _____ _____

Foray Digital Workplace Help Files – current online or printed copy _____ _____

Guideline - SWGFAST Document 6 Standard for Friction Ridge Digital Imaging or the OSAC successor document _____ _____

Guideline - SWGIT Section 8 General Guidelines for Capturing Latent Impressions Using a Digital Camera or the OSAC successor document _____ _____

Guideline - SWGIT Section 19 Issues Relating to Digital Image Compression and File Formats or the OSAC successor document _____ _____

Advances in Fingerprint Technology 3rd Edition - Lee & Gaensslen
Chapter 16 - Digital Imaging _____ _____

A Short Course in Photography, Digital – London & Stone
Chapter 1 - Camera _____ _____
Chapter 2 - Lens _____ _____
Chapter 3 - Light and Exposure _____ _____

Friction Ridge Skin - James F. Cowger, Pages 118-128 _____ _____

National Centre for Forensic Studies - Fingermark Detection & Enhancement 6th Edition– Stoilovic & Lennard, Chapter 6 - Digital Imaging _____ _____

Crime Scene Photography, 2nd Edition – Robinson
Chapter 1 – History of Forensic Imaging _____ _____
Chapter 2 - Composition and Cardinal Rules _____ _____
Chapter 3 - Basic Exposure (non-flash) Concepts _____ _____
Chapter 4 – Focus, Depth of Field, and Lenses _____ _____
Chapter 6 - Crime Scene Photography – "Close up Photographs" 336-341
_____ _____
Chapter 7 – Ultaviolet, Infrared and Fluorescence _____ _____
Chapter 10 - Digital Imaging Technologies _____ _____

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 8 - The preservation of Friction Ridges. _____ _____

Fingerprints and Other Ridge Skin Impressions - Champod, et. al. Section 3.5 – Photography, Pages 76-95 _____ _____

Paper – "Adapting Narrow Bandpass Filters to Photography." JFI, Vol. 62, No. 3, 2012
_____ _____

Paper – "Improved Multiple Exposure and Panoramic Photography of Latent Fingerprints." JFI, Vol. 63, No. 1, 2013 _____ _____

Module 6 Reading List: General Latent Print Processing

Latent Print Section AM - Quick Reference Sequential Processing Guide
_____ _____

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 7 - Latent Print Development _____ _____
Chapter 11 – Equipment _____ _____

Manual of Fingerprint Development Techniques, by Home Office Police Science Development Branch, London _____ _____

Fingerprint Detection with Lasers – Menzel
Chapter 7 – Sections 7.1 & 7.2 _____ _____

Fingerprints and other Ridge Skin Impressions Champod et al
Chapter 4 - Fingerprint Detection Techniques _____ _____

Advances in Fingerprint Technology, 2nd Edition - Lee & Gaensslen
Chapter 4 – Methods of Latent Fingerprint Development _____ _____

Chapter 5 – Fingerprint Development by Ninhydrin and its Analogues

_____ _____

Fingerprints and the Law - Andre A. Moenssens. Chapter 2, Pages 24-26

_____ _____

Fingerprint Techniques, by Andre A. Moenssens.
Chapter 4 – Latent Prints _____ _____
Techniques of Crime Scene Investigation, 6th edition - B. Fisher. Page 99-117

_____ _____

Friction Ridge Skin - James F. Cowger
Chapter 4 -The Evidence Print _____ _____

Paper – Beware of the Possibility of Fingerprint Techniques Transferring DNA," Journal of Forensic Science, Vol.50, No.6, 2005 _____ _____

Module 7 Reading List: Processing Technique – Alternate Light Sources

Latent Print Section AM - Alternate Light Source _____ _____
Latent Print Section AM - Krimesite Imager _____ _____
Krimesite Imager User's Manual/Video _____ _____

Applicable ALS User Manuals _____ _____

Fingerprints and Other Ridge Skin Impressions - Champod, et al., Sections 3.3 & 3.4, Pages 48-75

_____ _____

An Introduction to Lasers, Forensic Lights, and Fluorescent Fingerprint Detection Techniques, by A. Roland Menzel. _____ _____

Fingerprint Detection with Lasers – Menzel
Chapter 9 – Excitation Optimization and Filters _____ _____

National Centre for Forensic Studies - Fingermark Detection & Enhancement 6th Edition– Stoilovic & Lennard
Chapter 2 - General Nature of Light _____ _____
Chapter 3 - Optical Filters _____ _____
Chapter 4 - Optical Examination Techniques _____ _____
Chapter 5 - Forensic Light Sources _____ _____

Note: additional readings for this section were covered in Module 6

Module 8 Reading List: Processing Technique – Amido Black

Latent Print Section AM - Amido Black _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen, Sr.
Chapter 7, "Techniques for Latent Prints in Blood." Pages 323-324 _____ _____

Paper – "Summary of Experiments Investigating the Impact of Fingerprint Processing and Fingerprint Reagents on PCR-based DNA Typing Profiles." _____ _____

Paper – "Chemical Enhancement of Fingerprints in Blood: An Evaluation of Methods, Effects on DNA, and Assessment of Chemical Hazards." _____ _____

Paper – "The Effect of Common Fingerprint Detection Techniques on the DNA Typing of Fingerprints Deposited on Different Surfaces. JFI, Vol. 54, No. 1, 2004 _____ _____

Paper – Presumptive Testing for Blood on a Patent Print Developed with Amido Black."
_____ _____

Paper – "Deposition of Bloody Friction Ridge Impressions." JFI, Vol. 58, No. 3, 2008
_____ _____

Paper – "Developing Fingerprints in Blood: A Comparison of Several Chemical Techniques." Vol. 57, No. 1, 2007 _____ _____

Note: additional readings for this section were covered in Module 6

Module 9 Reading List: Processing Technique – 1, 8-Diazafluoren-9-One (DFO) and 1, 2 – Indandione

Latent Print Section AM - DFO _____ _____
Latent Print Section AM 1,2 – Indandione _____ _____

Fingerprint Detection with Lasers – Menzel
Chapter 8 - Sections 8.3, 8.5, & 8.6 _____ _____

Paper – "Spectral Variations for Reaction Products Formed between Different Amino Acids and Latent Finger mark Detection Reagents on a Range of Cellulose-Based Substrates. JFI, Vol. 59, No. 3, 2009 _____ _____

Paper – "The Effectiveness of 1,2-Indandione-Zinc Formulations and Comparison with HFE-Based 1, 8-diazafluoren-9-one for Fingerprint Development." JFI Vol. 59, No. 6, 2009 _____ _____

Paper – "DFO, Its Usage and Results," Masters, Morgan & Shipp _____ _____

Paper – "1,2-Indandiones: New Reagents for Visualizing the Amino Acid Components of Latent Prints." JFS Vol. 43, No. 4. 1998, pp. 744 – 747. _____ _____

Paper – "Optimisation and Evaluation of 1,2-indanedione For Use as a Fingermark Reagent and Its Application to Real Samples." Forensic Science International. Vol. 168. 2007, pp. 14 – 26. _____ _____

Note: additional readings for this section were covered in Module 6

Module 10 Reading List: Processing Technique – Dye Stains – Rhodamine 6G and RAM

Latent Print Section AM - Rhodamine 6G _____ _____
Latent Print Section AM - RAM _____ _____

Fingerprint Detection with Lasers – Menzel
Chapter 7 – Section 7.3 _____ _____

Note: additional readings for this section were covered in Module 6

Module 11 Reading List: Processing Technique – Gentian Violet/Crystal Violet

Latent Print Section AM - Gentian Violet _____ _____

Paper – "Development of Latent Fingerprints on Sticky Surfaces by Dye Staining or Fluorescent Brightening." _____ _____

Note: additional readings for this section were covered in Module 6

Module 12 Reading List: Processing Technique – Iodine

Latent Print Section AM - Iodine _____ _____

The Science of Fingerprints - FBI. "Iodine Method." Pages 175-177 _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr. Pages 243-256 _____ _____

Note: additional readings for this section were covered in Module 6

Module 13 Reading List: Processing Technique – Leuco Crystal Violet (LCV)

Latent Print Section AM - Leuco Crystal Violet _____ _____

Paper – "Lueco Crystal Violet: A Simple, Effective Blood Enhancement Reagent."
_____ _____

Note: additional readings for this section were covered in Module 6

Module 14 Reading List: Processing Technique – Ninhydrin

Latent Print Section AM - Ninhydrin _____ _____

The Science of Fingerprints - FBI. "Ninhydrin Method." Pages 177-179
_____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr. Pages 273, 276-291
_____ _____

Paper – "Procedure to Develop Latent Prints on Thermal Paper" _____ _____

Paper – "Latent Fingerprints by a Superior Ninhydrin Method" _____ _____

Paper – "Ninhydrin Processing by Pat A. Wertheim" _____ _____

Paper - "The Effectiveness of Ninhydrin Latent Prints Verses Physical Developer Latent Prints, with Regards to Climatic Conditions at the Time of Deposition" _____ _____

Paper – "Improved Results in the Development of Latent Fingerprints on Thermal Paper." JFI, Vol. 58, No. 4, 2008 _____ _____

Paper – "Chemical Fuming: A Practical Method for Fingerprint Development on Thermal Paper." JFI, Vo. 56, No. 3, 2006 _____ _____

Note: additional readings for this section were covered in Module 6

Module 15 Reading List: Processing Technique – Powder Development of Latent Prints

Latent Print Section AM - Powder Detection Methods _____ _____
Latent Print Section AM - Lifting Methods _____ _____

The Science of Fingerprinting - FBI. Chapter 14, "Powdering and Lifting Latent Impressions." Pages 173-174 _____ _____

Fingerprint Techniques, by Andre A. Moenssens, Chapter 4, "Latent Prints," Pages 106-114 _____ _____

Scott's Fingerprint Mechanics - Robert A. Olsen, Sr. Chapter 5, "Latent Finger-Print Powder Techniques," Pages 209-235 _____ _____

Paper – "Evaluation of Fingerprint Powders." JFI, Vol. 56, No. 2, 2006 _____ _____

Note: additional readings for this section were covered in Module 6

Module 16 Reading List: Processing Technique – Physical Developer (PD)

Latent Print Section AM - PD _____ _____

Chemical Formulas and Processing Guide for Developing Latent Prints - FBI. Pages 32-34 _____ _____

Paper – "Physical Developer" - David Burow _____ _____

Paper – "Physical Developer: A Practical and Productive Latent Print Developer" _____ _____

Paper – "PD, Maleic Acid and Synperonic N" _____ _____

Paper – "The Efficacy of Commercial vs. Noncommercial Physical Developer Solutions and the Sequential Enhancement of Friction Ridge Impressions Using Potassium Iodide." JFI, Vol. 60 No. 1, 2010 _____ _____

Paper – "Physical developer method for detection of latent fingerprints: A review." Egyptian Journal of Forensic Sciences _____ _____

Note: additional readings for this section were covered in Module 6

Module 17 Reading List: Processing Technique – Small Particle Reagent (SPR)

Latent Print Section AM - SPR _____ _____

Paper – "Development of Latent Prints Using Titanium Dioxide (TiO2) in Small Particle Reagent, White (SPR-W) on Adhesives." JFI, Vol. 55, No. 3, 2005 _____ _____

Paper - "Report of Validation Testing" Sirchie SPR-W by Albuquerque Police _____ _____

Paper – "Small Particle Reagent" by Pat A. Wertheim _____ _____

Paper – "Lightning Powder Co. Technical Note Small Particle Reagent" _____ _____

Note: additional readings for this section were covered in Module 6

Module 18 Reading List: Processing Technique – Sticky Side Powder

Latent Print Section AM - Sticky Side Powder _____ _____

Paper – "Homemade Solution for Processing Latent Prints on the Adhesive Side of Tape." _____ _____

Paper - "A Black Powder method to Process Adhesive Tapes." _____ _____

Paper – "Anomalous Results with Sticky Side Powder." _____ _____

Paper – "A New Approach to Unraveling Tangled Adhesive Tape or Potential Detection of Latent Prints and Recovery of Trace Evidence _____ _____

Paper – "Adhesive Tape Separation with UN-DU." _____ _____

Paper – "The Use of Un-du to Separate Adhesive Materials." JFI, Vol. 57, No. 5, 2007.

_____ _____

Paper – "Does CA Fuming Interfere with Powder Suspension Processing?" JFI, Vol. 59, No. 2, 2009

_____ _____

Note: additional readings for this section were covered in Module 6

Module 19 Reading List: Processing Technique – Sudan Black

Latent Print Section AM - Sudan Black _____ _____

Friction Ridge Skin, by James F. Cowger, "Locating, Developing, Preserving, and Collecting Evidence Prints." Page 104 _____ _____

Note: additional readings for this section were covered in Module 6

Module 20 Reading List: Processing Technique – Cyanoacrylate Ester (Super Glue)

Latent Print Section AM - Cyanoacrylate Ester _____ _____

Advances in Fingerprint Technology, 2nd Edition - Lee & Gaensslen. Pages 91-92

_____ _____

Paper – "A Modified Cyanoacrylate Technique Utilizing Treated Neutral Filter Paper for Developing Latent Fingerprints" _____ _____

Paper - "Fivis by 3M – Instructions and Notes" _____ _____

Paper - "Effects of Cyanoacrylate Processing on Cocaine HCL Trace Analysis"

_____ _____

Note: additional readings for this section were covered in Module 6

Module 21 Reading List: Digital Imaging

Latent Print Section AM - Digital Imaging Procedure _____ _____

FORAY Technologies user manual _____ _____

Review Current Adobe Photoshop user manual _____ _____

Techniques of Crime Scene Investigation - Barry A. J. Fisher Page 112 _____ _____

Crime Scene Photography, 2nd Edition – Robinson
Chapter 11 - Digital Imaging Processing of Evidentiary Photography _____ _____

A Short Course in Photography, Digital – London & Stone
Chapter 4 - Digital Workplace Basics _____ _____
Chapter 5 - Image Editing _____ _____

Criminalistics 9th edition, An Introduction to Forensic Science - Richard Saferstein. Pages 452-454, 509-510 _____ _____

Advances in Fingerprint Technology, 2nd edition - Lee & Gaensslen. Page 267
_____ _____

Guideline - SWGFAST Document 6 Standard for Friction Ridge Impression Digital Imaging (Latent/Tenprint) or the OSAC successor document _____ _____

Guideline - SWGIT Section 5 Guidelines for Image Processing or the OSAC successor document
_____ _____

Guideline - SWGIT Section 11 Best Practices for Documenting Image Enhancement or the OSAC successor document _____ _____

Paper – "Digital Enhancement of Latent Prints using Adobe Photoshop Black & White Adjustments." JFI, Vol. 59, No. 4, 2009 _____ _____

Paper – "Image Enhancement and Adobe Photoshop: Using Calculations to Extract Image Detail." JFI, Vol. 57, No. 4, 2007 _____ _____

Paper – "Techniques for Digital Enhancement of Latent Prints Obscured by Disruptive Backgrounds." JFI, Vol. 54, No. 2, 2004 _____ _____

Paper – "Computer Fingerprint Enhancement: The Joy of Lab Color." JFI, Vol. 62, No. 5, 2012
_____ _____

Module 22 Reading List: Biology and Physiology of Friction Ridge Skin

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.

Chapter 2 - Anatomy and Physiology of Adult Friction Ridge Skin _____ _____
Chapter 3 - Embryology and Morphology of Friction Ridge Skin _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr., Pages 114-125 _____ _____

Fingerprint Techniques – Andre Moenssens
Chapter 2 - The Nature of Friction Skin _____ _____
Chapter 11, Pages294-297 _____ _____

Finger Prints, Palms and Soles - Harold Cummins and Charlie Midlo
Chapter 10 - Embryology _____ _____
Chapter 12 - Inheritance _____ _____

Advances in Fingerprint Technology, 2nd Edition - Lee & Gaensslen,
Chapter 3 - Composition of Latent Print Residue _____ _____

Quantitative-Qualitative Friction Ridge Analysis - David R. Ashbaugh.
Chapter 3 - Friction Ridge Medium _____ _____

Fingerprints and Other Friction Ridge Skin Impression - Christophe Champod et. al.
Chapter 1 - Friction Ridge Skin _____

_____

Paper – "The Critical Stage of Friction Ridge Skin and Pattern Formation - Kasey Wertheim and Alice Maceo _____ _____

Paper – "Qualitative Assessment of Skin Deformation: A Pilot Study." JFI, Vol. 59, No. 4, 2009
_____ _____

Paper – "Discriminability of Fingerprints of Twins." JFI, Vol. 58, No. 1, 2008
_____ _____

Paper – "Fingerprint Patterns: A Study on the Finger and Ethnicity Prioritized Order of Occurrence." JFI, Vol. 55, No. 4, 2005 _____ _____

Paper – "Permanent Intentional Fingerprint Mutilation" - Kasey Wertheim
_____ _____

Paper – "An Extreme Case of Fingerprint Mutilation." JFI, Vol. 48, No. 4, 1998
_____ _____

Paper – "Fingerprint Formation," Kucken, Journal of Theoretical Biology, Vol. 235, No. 1, 2005
_____ _____

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Module 23 Reading List: Recording Inked Fingerprints, Palm Prints, and Footprints

Latent Print Section AM Section – Taking Known Exemplars _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr.
Chapter 2 - Taking Finger, Palm, and Footprints _____ _____

Fingerprint Techniques - Andre A. Moenssens
Chapter 5, "Recording Prints." Pages 137-145. _____ _____

The Science of Fingerprints - FBI
Chapter 9, "Techniques for Taking Good Fingerprints." Pages 111-115_____ _____
Chapter 10, "Problems in Taking Inked Fingerprints." Pages 116-128 _____ _____

Finger Prints, Palm and Soles - Harold Cummins, Charles Midlo
Chapter 3, "Methods of Printing." Pages 45-55 _____ _____

Friction Ridge Skin - James F. Cowger
Chapter 2, "Taking Inked Prints." Pages 9-33 _____ _____

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 4, "Recording Living and Postmortem Friction Ridge Skin Exemplars," sections 4.1-4.3
_____ _____

Module 24 Reading List: Friction Ridge Pattern Recognition and Interpretation

Criminalistics, 9th edition - Richard Saferstein
Chapter 14 "Classification of Fingerprints." Pages 435-436 _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr.
Chapter 1 Sections 7 Fingerprint Classification," 8 "Space Value on Fingerprint Cards," and 9 "Fingerprint Patterns are Complex Yet Simple." Pages 17-21 _____ _____

Friction Ridge Skin, by James F. Cowger
Chapter 3 - Classification _____ _____

Fingerprint Techniques - Andre A. Moenssens
Chapter 3 - Pattern Interpretation _____ _____
Chapter 6 - Fingerprint Classification in the United States _____ _____

Fingerprints and the Law - Andre Moenssens

Chapter 2, "Fingerprint Principles and Techniques." Pages 10-23 _____ _____

The Science of Fingerprints - The FBI.
Chapters - 2-8. Pages 5-110 _____ _____

The Fingerprint Sourcebook - Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 5 - Systems of Fingerprint Classification _____ _____

Module 25 Reading List: Introduction to Latent Prints and the State of the Science

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 14 - Scientific Research Supporting the Foundations of Friction Ridge Examinations
_____ _____

Executive Summary Strengthening Forensic Science in the United States: A Path Forward By the Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council _____ _____

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 2012 Chapter 1
_____ _____

Module 26 Reading List: Human Factors

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 15: Special Abilities and Vulnerabilities in Forensic Expertise_____ _____

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 2012
Chapters 2 – Human Factors and Errors _____ _____
Chapter – 3 Interpreting Latent Prints _____ _____
Chapter 7 – A Systems Approach to the Work Environment _____ _____
Chapter 8 – Training and Education _____ _____

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Paper "The Authority of Fingerprint Experts: Is it Based on Belief or Science?" JFI, Vol. 56, No. 6, 2009 _____ _____

Paper – "Why Experts Make Errors." Vol. 56, No. 4, 2006 _____ _____

Paper – "A Report of Latent Print Examiner Accuracy During Comparison Training Exercises." JFI, Vol. 56, No. 1, 2006 Paper – "Subjective- The Misused Word." William Leo. JFI Vol. 58, No. 1, 2008

_____ _____

Paper - "Accuracy and Reliability of Forensic Latent Fingerprint Decisions." Ulery et al. PNAS, Vol. 61, No. 4, 2011 _____ _____

Paper - "Latent Fingerprint Quality: A Survey of Examiners." Hicklin et al. JFI, Vol. 108, No. 19, 2011

_____ _____

Paper - "Measuring what Latent Fingerprint Examiners Consider Sufficient Information for Individualization Determinations." Ulery et al. PLoS ONE, Vol. 9, No. 11, 2014

_____ _____

Paper - "Understanding the sufficiency of information for fingerprint value determinations." Ulery et al. Forensic Science International, Vol. 226, No. 1, 2013 _____ _____

Paper - "Inter-examiner variation of minutia markup on latent fingerprints." Ulery et al. Forensic Science International, Vol. 264, March, 2016 _____ _____

Paper - "Repeatability and Reproducibility of Decisions by Latent Fingerprint Examiners." Ulery et al. PLoS ONE, Vol. 7, No. 3, 2012 _____ _____

Paper - "Changes in latent fingerprint examiner' markup between Analysis and Comparison." Ulery et al. Forensic Science International, Vol. 247, 2014 _____ _____

Paper - "The forensic confirmation bias: Problems, perspectives and proposed solutions." Kassin et al. Journal of Applied Research in Memory and Cognition, Vol. 2, 2013_____ _____

Paper – "Confirmation Bias, Ethics and Mistakes in Forensics," JFI,Vol. 56, No. 4, 2006

_____ _____

Paper – Contextual bias and cross-contamination in the forensic sciences: implications for investigations, plea bargains, trials and appeals." Law, Probability and Risk, 2014

_____ _____

Module 27 Reading List: Analysis, Comparison, Evaluation, and Verification (ACE-V)

ISPFS Latent Print Section AM – Friction Ridge Examination Methodology

_____ _____

Guideline - SWGFAST Document 10 Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint) or the OSAC successor document

_____ _____

Friction Ridge Skin - James F. Cowger
Chapter 6 - The Basis for Comparison" _____ _____
Chapter 7 - Comparing Prints _____ _____
Chapter 8 - Some Comparisons of Evidence Prints _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr. Pages 5-46, 171-175_____ _____

Fingerprint Techniques - Andre A. Moenssens,
Chapter 10 - Comparison of Fingerprints _____ _____

Palm Print Comparison Techniques course packet - Ron Smith _____ _____

Advances in Fingerprint Technology, 2nd Edition - Lee & Gaensslen.
Chapter 2 - Identification of Latent Prints _____ _____

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 9 - Examination Process _____ _____
Chapter 12 - Quality Assurance _____ _____

Quantitative-Qualitative Friction Ridge Analysis - David R. Ashbaugh
Chapters 4 - The Identification Process _____ _____
Chapter 5 - Poroscopy and Edgeoscopy _____ _____

Analysis of Distortion in Latent Prints course packet – Alice Maceo _____ _____

Fingerprints and Other Ridge Skin Impressions - Champod, et. al.,
Chapter 2 – The Friction Ridge Identification Process _____ _____

Paper - "Detection of Forged and Fabricated Latent Prints" Pat A. Wertheim, JFI Vol. 44, No. 6. 1994

_____ _____

Paper- "Fingerprints What They Can & Cannot Do!" Allan McRoberts The Print Vol. 10(6), June 1994
Pares 1-3 _____ _____

Paper - "The Ability Equation" Pat A. Wertheim _____ _____

Paper - "Forensic Individualization of Images Using Quality and Quantity of Information." John Vanderkolk, JFI, Vol. 49. No. 3, 1999 _____ _____

Paper - "ACE-V and the Scientific Method." JFI Vol. 60 No.1, 2010 _____ _____

Paper – "The Investigation of the Reproducibility of Third-Level Characteristics," JFI Vol. 61, No.2, 2011. _____ _____

Paper - "Scientific Comparison and Identification of Fingerprint Evidence." Pat. Wertheim. Fingerprint Whorld Vol. 26, No. 101, July 2000 _____ _____

Paper - "Distortion Versus Dissimilarity in Friction Skin Identification." William Leo. JFI, Vol. 48, No. 2, 1998 _____ _____

Paper - "A Performance Study of the ACE-V Process: A Pilot Study to Measure the Accuracy, Precision, Reproducibility, Repeatability, and Biasability of Conclusions Resulting from the ACE-V Process." JFI, Vol. 59, No. 2, 2009 _____ _____

Paper - "Incipient Ridges and the Clarity Spectrum" David R. Ashbaugh. JFI Vol.42. No. 2 1992

_____ _____

Paper - "Level 3 Details and Their Role in Fingerprint Identification: A Survey among Practitioners." JFI, Vol.58. No. 5, 2008 _____ _____

Paper - "The Etiology of ACE-V and its Proper Use: An Exploration of the Relationship between ACE-V and the Scientific Method of Hypothesis Testing." JFI, Vol. 56 No. 3, 2006

_____ _____

Paper – "Palmar Flexion Crease Identification" David R. Ashbaugh Identification Canada Jan/Feb/March 1992 _____ _____

Paper – "Coins in the Pocket: A Simple Explanation of Quantitative – Qualitative Friction Ridge Analysis." JFI, Vol. 55, No. 3, 2005 _____ _____

Paper – "Assessing the Clarity of Friction Ridge Impressions." Forensic Science International, Vol.226, No. 1, 2012 _____ _____

Module 28 Reading List: Case Management and Reporting for Comparison and/or ABIS

Latent Print Section Quality Manual - Casework Documentation and Report Writing

_____ _____

ISPFS Quality/Procedure Manual
Section 4.13 – "Technical records" _____ _____
Section 5.9 - "Technical Review" and "Administrative Review"

_____ _____

Section 5.10 - "Reporting the results" _____ _____

ASCLD/LAB-International Supplemental Requirements for the Accreditation of Forensic Science Testing Laboratories Appendix C- Latent Print Examination Records. _____ _____

Guideline - SWGFAST Document 8 Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V) (Latent) or the OSAC successor document

_____ _____

Guideline - SWGFAST Document 5 Standard for Reporting Friction Ridge Examinations (Latent/Tenprint) or the OSAC successor document _____ _____

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 10 - Documentation of Friction Ridge Impressions from the Scene to the Conclusion

_____ _____

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 2012
Chapter 5 - Reports and Documentation _____ _____

Module 29 Reading List: Court Procedures, Related Laws, Expert Testimony, Criminal and Civil Procedures Applicable to Latent Prints

Guideline - SWGIT Section 17 Digital Imaging Technology Issues for the Courts or the OSAC successor document _____ _____

Friction Ridge Skin - James F. Cowger,
Chapter 9 – Reporting and Testifying to Conclusions _____ _____

Fingerprint Techniques - Andre A. Moenssens, Pages 270-280 _____ _____

Fingerprints and the Law - Andre A. Moenssens
Chapter 9 – The Prosecutor's Approach to Fingerprint Evidence _____ _____
Chapter 10 – The Defense approach to Fingerprint Evidence _____ _____
Chapter 11 – The Fingerprint Witness in Court _____ _____

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 13 – Fingerprints and the Law _____ _____

Law for the Expert Witness - Daniel A. Bronstein _____ _____

Advances in Fingerprint Technology, 2nd Edition - Lee and Gaensslen
Chapter 10 – The Expert Fingerprint Witness _____ _____

Fingerprints and the Law - Andre A. Moenssens
Chapters 7 - Fingerprint Evidence in Criminal Cases _____ _____
Chapter 8 - Fingerprints in Non-Criminal Cases _____ _____

Crime Scene Photography, 2nd Edition – Robinson
Chapter 12 – Legal Issues Related to Photographs and Digital Images _____ _____

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 2012
Chapter 6 – Testimony _____ _____

National Commission of Forensic Science: Presentation of Expert Testimony Policy Recommendations, 2012

Paper – "Qualifying as an Expert Fingerprint Witness: Designing a Set of Questions to Assist in Court Testimony." Pat A. Wertheim. JFI, Vol. 40, No. 2 1990 _____ _____

Module 30 Reading List: Module 30: Introduction to Crime Scenes

The Science of Fingerprints – FBI
Chapter 13 - Latent Impressions _____ _____

Criminalistics,9th Edition - Richard Saferstein
Chapter 2 - The Crime Scene _____ _____

Forensic Science an Introduction to Criminalistics, by Deforest, Gaensslen, & Lee
Chapter 2 - General Crime Scene Procedures _____ _____

Techniques of Crime Scene Investigation 6th Edition, Fisher _____ _____

Paper – "The Effects of Differential Cyanoacrylate Fuming Times on the Development of Fingerprints on Skin." JFI Vol. 59, No. 5, 2009 _____ _____

Paper – "Recovery of Latent Prints from Human Skin" - JFI, Vol. 55, No. 3, 2005
_____ _____

Module 31 Reading List: Recording Post Mortem Exemplars

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 4 –Section 4.4 "Recording Postmortem Friction Ridge Detail"
_____ _____

Friction Ridge Skin, by James F. Cowger
Chapter 2 - "Printing the Deceased." Pages 28-33 _____ _____

The Science of Fingerprints - FBI
Chapter 11 - Problems and Practices in Fingerprinting the Dead _____ _____

Fingerprint Techniques - Andre A. Moenssens
Chapter 5, "Postmortem Fingerprinting." Pages 145-150 _____ _____

Scott's Fingerprint Mechanics - Robert D. Olsen Sr.
Chapter 2 - "Postmortem Fingerprinting." Pages 84-89 _____ _____

Paper - "Using Fingerprint Powder to Record Friction Ridge Details form a Cadaver." JFI, Vol. 59, No. 3, 2009 _____ _____

Paper - "The Boiling Technique: A Method for Obtaining Quality Postmortem Impressions from Deteriorating Friction Ridge Skin." JFI, Vol.57, No. 3, 2007 _____ _____

Module 32 Reading List: Automated Biometric Identification System (ABIS)

The Fingerprint Sourcebook by Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), et al.
Chapter 6 - Automated Fingerprint Identification System (AFIS) _____ _____

Criminalistics, 9th edition - Richard Saferstein
Chapter 14 - "AFIS" Pages 436-440 _____ _____

Advances in Fingerprint Technology 2nd edition Lee, Gaensslen
Chapter 8 – Automated Fingerprint Identification and Imaging Systems_____ _____

NEC – Integra-ID IBW Latent User Guide (current version available on ABIS terminal)
_____ _____

NEC – IBW Latent Quick Reference (current version available on ABIS terminal)
_____ _____

NEC – Integra-ID Archive manual (current version available on ABIS terminal)

NEC – Integra-ID Archive Quick Reference (current version available on ABIS terminal) _____ _____

Universal Latent Workstation Training July 2013 or its successor document _____ _____

Universal Latent Workstation (ULW) Supplemental Instructions Version 6.4.1, October 2015 or its successor document _____ _____

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 2012
Chapters 4 – Looking Ahead to Emerging and Improving Technology _____ _____

PowerPoint "ULW-WEB" _____ _____

Paper – "A Latent Print Examiner's Guide to IAFIS" JFI, Vol. 57, No. 4, 2007 _____ _____

Paper – "Determination of AFIS "sufficiency" in friction ridge examination" Forensic Science International, Vol. 263, 2016 _____ _____

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