



Crime Laboratory Latent Print Standard Operating Procedures

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History

1 Preface

1.1 Purpose

The Latent Fingerprint Unit Standard Operating Procedure Manual serves to inform all employees through measures and guidelines, a system to provide high quality forensic Latent Print services. The SOP Manual is a tool designed to assure that all services, from administrative, analytical, laboratory reporting, and testimony in support of the findings, are all maintained at a high quality. The guidelines, regulations, and procedures contained in this manual are to be followed until they are amended, rescinded, or unless an exception is authorized by the section supervisor or laboratory director. At no time will they supersede the rules, regulations or directives of the Charlotte Mecklenburg Police Department or the CMPD Crime Laboratory Quality Manual. The CMPD Latent Print SOP Manual was developed by the Section Administrator of the CMPD Latent Fingerprint Section, with approval by the Quality Assurance Committee, with text from the US Department of Justice, North Carolina State Bureau of Investigation, Federal Bureau of Investigation, UNMIK Forensic Division, The Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), the Scientific Working Groups on Digital Evidence and Imaging Technology (SWGDE/SWGIT), and the CMPD Quality Manual. All aforementioned text were instrumental in the development of this Standard Operating Procedure. This manual is not to be copied without the permission of the Latent Print Section Administrator or Laboratory Director.

1.2 Scope

- a) Latent Print Processing, Development and Imaging
- b) Fingerprint Comparative Analysis
- c) Individual Characteristics Database - SAFIS, NGI searches

1.3 Glossary

ACETONE

Solvent used as a carrier in reagents; also used as a cleaning agent.

ACETONITRILE

Solvent used as a carrier in reagents; also used as a cleaning agent.

AFIS

Generic term for Automated Fingerprint Identification System consisting of SAFIS and NGI.

ALGORITHM

Mathematical routine used in computer processing, e.g., an AFIS matching algorithm establishes the correlation of Level 2 detail between fingerprints.

ALS

See Alternate Light Source.

ALTERNATE LIGHT SOURCE (ALS)

Any light source, other than a laser, used to excite luminescence of latent prints, body fluids, etc., now commonly referred to as a forensic light source.

AMIDO BLACK

Blue-black protein stain used to enhance bloody friction ridge detail. See Naphthalene Black.

ANALOG

Image representation by waveform variations, e.g., video tape recordings or silver halide photographs of fingerprints.

ANALYSIS

The methodical examination of friction skin impressions.

APOCRINE GLAND

A type of skin gland that is associated with the hair follicles.

APPENDAGE

An attachment or connection within friction ridges.

AQUEOUS

Water based.

ARCH - PLAIN

A fingerprint pattern in which the ridges enter on one side of the impression, and flow, or tend to flow, out the other with a rise or wave in the center.

ARCH - TENTED

A type of fingerprint pattern that possesses either an angle, an up thrust, or two of the three basic characteristics of the loop.

ARDROX

Fluorescent yellow dye used with UV light to visualize cyanoacrylate ester fumed friction ridge detail.

ARTIFACT

1. Any distortion or alteration not in the original friction ridge impression, produced by an external agent or action.
2. Any information not present in the original object/image, inadvertently introduced by image capture, processing, compressions, transmission, display or printing.

AUTHENTICATION

1. Process used to determine whether a digital image has been altered in any way since its capture.
2. Process used to determine whether an electric file has the correct association, i.e. name, unique identifier, friction ridge images and criminal history record.

BALL AREA

The large cushion area below the base of the big toe.

BANDWIDTH

The total amount of data that can be transmitted per second, e.g., bandwidth may limit simultaneous high-speed transmission of digital images by multiple users in an AFIS network.

BASIC YELLOW 40

Fluorescent yellow dye used with selected wavelengths of light to visualize cyanoacrylate ester fumed friction ridge detail. See Panacryl Brilliant Flavone 10GFF. See Maxilon Flavone 10GFF.

BIFURCATION

The point at which one friction ridge divides into two friction ridges.

BIOHAZARD

Biological agent or condition (as an infectious organism or insecure laboratory conditions) that constitutes a hazard.

BIOMETRIC FINGERPRINTING

Digital image capture of friction ridges and/or a template from friction ridges.

BMP

Bitmap. A non-compressed image file format. The “.bmp” suffix is used for bitmap file names.

BRIDGE

A connecting friction ridge between and at generally right angles to parallel running ridges.

BULB OF FINGERS (THUMBS, TOES)

The portion of the friction skin on the tips of fingers, thumbs, or toes in the distal phalanx, from one side of the nail to the opposite side of the nail.

CA or CAE

Cyanoacrylate Ester (Superglue). An adhesive used in a fuming method to develop friction ridge detail.

CARD-SCAN

Electronic recording of friction ridge impressions (fingers and/or palms) from fingerprint cards, palm print cards, etc. Sometimes referred to as dead-scan or flat-bed scanner.

CARPAL DELTA AREA

Area of the palm containing a delta formation nearest the wrist.

CHARACTERISTICS

Features of the friction ridges. Commonly referred to as minutia(e), Galton detail, point, feature, ridge formation, ridge morphology.

CHEMICAL HAZARD

Chemical agent or condition that constitutes a hazard.

CITRIC ACID

Chemical used in the preparation of Physical Developer and other friction ridge development reagents.

CLARITY

Visual quality of a friction ridge impression.

CLASS CHARACTERISTICS

Characteristics used to put things into groups or classes, e.g., arches, loops, whorls.

CLASSIFICATION

Alpha/numeric formula of finger and palm print patterns used as a guide for filing and searching.

CLPE

Certified Latent Print Examiner (IAI)

COMPARISON

The observation of two areas of friction ridge impressions for finding similarities and/or differences.

COMPRESSION

The process of reducing the size of a data file.

COMPRESSION, LOSSLESS

Compression in which no image data is lost and the image can be restored to its original form.

COMPRESSION, LOSSY

Compression in which image data is lost and the image cannot be restored to its original form.

COMPRESSION RATE

The ratio of the original file size compared to the compressed file size, e.g.10 to1.

CORE

The approximate center of a pattern.

COOMASSIE BLUE

Blue protein stain used to enhance bloody friction ridge detail.

CREASE

A line or linear depression; grooves at the joints of the phalanges, at the junction of the digits and across the palmar and plantar surfaces that accommodate flexion.

CRYSTAL VIOLET

See Gentian violet.

CROWLE'S DOUBLE STAIN

Blue protein stain used to enhance bloody friction ridge detail.

CSA

Crime Scene Analyst, (IAI) Intermediate Certification Level.

CSCSA

Certified Senior Crime Scene Analyst (IAI) Advanced Certification Level

CST

Crime Scene Technician, (IAI) First level certification

DCS5

Foster Freeman latent fingerprint Digital imaging workstation

DELTA

That point on a ridge at or nearest to the point of divergence of two type lines, and located at or directly in front of the point of divergence.

DERMAL PAPILLAE

Peg-like formations on the surface of the dermis.

DERMIS

The layer of skin beneath the epidermis.

DFO

1,8-Diazafluoren-9-one. Compound that reacts with amino acids to produce friction ridge detail with fluorescent properties when exposed to excitation wavelengths of 352-591 nm.

DIGIT

A toe or finger.

DIGITAL

Information or data that exists as numerical values.

DIGITAL CAMERA

A camera that records an image electronically as numerical values.

DIGITAL IMAGE PROCESSING

Image display and operations based on numerical pixel values and the application of computer algorithms.

DISCREPANCY

A difference in two friction ridge impressions due to different sources of the impressions (exclusion).

DISSIMILARITY

See Discrepancy.

DISSOCIATED RIDGES

Disrupted, rather than continuous, ridges; an area of ridge units that did not form into friction ridges.

DISTAL

Farthest away from the center or point of attachment. The direction away from the body.

DISTORTION

Variances in the reproduction of friction skin caused by pressure, movement, force, contact surface, etc.

DIVERGENCE

The separation of two friction ridges that have been running parallel or nearly parallel.

DOT

An isolated ridge unit whose length approximates its width in size.

DPI

Dots Per Inch. The printing resolution of an output device. Often referred to incorrectly as PPI (pixels per inch).

DUCT

A tube or canal that delivers secretions or excretions.

DYSPLASIA

Ridge units that did not form complete friction ridges due to a genetic cause.

ECCRINE GLANDS

Sweat glands that open on all surfaces of the skin.

EDGEOSCOPY

Study of the morphological characteristics of friction ridges; contour or shape of the edges of friction ridges.

EFTS

Electronic Fingerprint Transmission Specifications. Documents prescribing content and format for electronic transactions.

ELASTICITY

The ability of skin to recover from stretching, compression, or distortion.

ELIMINATION PRINTS

Exemplars of friction ridge skin detail of persons known to have had access to the item examined for latent prints.

ENCLOSURE

A single friction ridge that bifurcates and rejoins after a short course and continues as a single friction ridge.

ENDING RIDGE

A single friction ridge that terminates within the friction ridge structure.

EPIDERMIS

The outer layer of the skin.

ERRONEOUS IDENTIFICATION

The incorrect determination that two areas of friction ridge impressions originated from the same source, also described as a false positive.

ETHANOL

Solvent used in preparation of reagents, dye stains and rinses (ethyl alcohol).

ETHYL ACETATE

Solvent used in the preparation of reagents and dye stains.

EVALUATION

The determination of the significance, value, or clarity of a friction ridge impression by careful observation and study. And/or the formulation of a conclusion based upon completion of the analysis and comparison of friction ridge prints.

EXEMPLAR

Friction ridge record of an individual, recorded electronically, photographically, by ink or other medium.

EXCLUSION

The determination that two areas of friction ridge impressions did not originate from the same source (non-identification, source exclusion).

FETUS

The unborn offspring from the end of the 8th week after conception (when the major structures have formed) until birth. Up until the eighth week, the developing offspring is called an embryo.

FIBULA

The smaller of the two bones in the lower leg on the little toe side.

FINGER

See Phalange.

FINGERPRINT

An impression of the friction ridges of all or any part of the finger.

FINGERPRINT POWDERS

Powders used to visualize friction ridge detail; can be magnetic, non-magnetic, fluorescent, bichromatic, or a variety of mono-chromatic types.

FLAME TECHNIQUE

Many common materials (e.g. camphor, magnesium, masking tape, nitro-cellulose, pine tar, titanium tetrachloride) burned to produce soot for detection of friction ridge detail.

FLUORESCENCE

Emission of light, resulting from the absorption of radiation from another source.

FLUORESCEIN

Fluorescent reagent used to develop bloody friction ridge detail.

FOCAL POINTS

Those areas that are enclosed within the pattern area of loops and whorls. They are also known as the core and the delta.

FRICTION RIDGE

A raised portion of the epidermis on the palmar or plantar skin, consisting of one or more connected ridge units of friction ridge skin.

FRICTION RIDGE DETAIL (MORPHOLOGY)

An area comprised of the combination of ridge flow, ridge characteristics, and ridge structure.

FURROWS

Valleys or depressions between the friction ridges.

GALTON DETAILS

Term referring to friction ridge characteristics attributed to the research of English fingerprint pioneer, Sir Francis Galton.

GENTIAN VIOLET

Violet stain used to develop or enhance friction ridge detail, which can be viewed by either fluorescence or non-fluorescence. Also known as Crystal Violet.

GLACIAL ACETIC ACID

Chemical used in the preparation of reagents and dye stains.

GRAY SCALE IMAGE

An image type using more than two radiometric values, i.e., 256 shades of gray in an eight bit image.

GUN BLUEING

A solution consisting of acetic acid, selenious acid and cupric salt, used to develop friction ridge detail on metal surfaces.

HENRY CLASSIFICATION

A system of fingerprint classification named for Sir Edward Richard Henry (1850 - 1931).

HEPTANE

Solvent used in the preparation of reagents.

HEXANE

Solvent used in the preparation of reagents.

HYPOTHENAR AREA

The friction ridge skin on the palm, below the interdigital area on the ulna side of the palm.

IAFIS

Integrated Automated Fingerprint Identification System (FBI).
(Terminated-Deactivated and replaced with NGI)

IDENTIFICATION

See source identification.

INCIPIENT RIDGE

A friction ridge not fully developed which may appear shorter and thinner in appearance than fully developed friction ridges (interstitial, nascent).

INCONCLUSIVE

'Inconclusive' is an examiner's conclusion that there is insufficient quantity and clarity of corresponding friction ridge skin features between two impressions such that the examiner is unable to identify or exclude the two impressions as originating from the same source. The basis for an 'inconclusive' conclusion is an examiner's decision that a source identification or source exclusion cannot be made due to insufficient information in either of the two impressions examined.

INFRARED

Light wavelengths longer than the visible spectrum, 700 to 1,000,000 nm.

INHERENT LUMINESCENCE

Luminescence resulting from selected wavelength illumination without chemical treatment.

INKED PRINT (FINGER, PALM, FOOT)

See Exemplar. See Known Print.

INTERDIGITAL

Palmar area below the fingers and above the thenar and hypothenar areas.

INTERVENING RIDGES

The number of friction ridges between two characteristics.

IODINE

Element used as either a vapor or solution; binds with fats and oils to visualize friction ridge detail.

ISOPROPANOL (ISOPROPYL ALCOHOL)

Solvent used in the preparation of reagents.

JPEG

Joint Photographic Experts Group. A compressed image file format. The ".jpg" file name extension used for JPEG file names. Most JPEG images use lossy compression.

KNOWN PRINT (FINGER, PALM, FOOT)

A recording of an individual's friction ridges with black ink, electronic imaging, photography, or other medium on a contrasting background.

LASER

Light Amplification by Stimulated Emission of Radiation. A device that produces a coherent wavelength(s) of light.

LATENT PRINT

Transferred impression of friction ridge detail not readily visible; generic term used for questioned friction ridge detail.

LCV

Leucocrystal violet. Reagent used to detect/enhance bloody friction ridge detail by either fluorescent or non-fluorescent staining.

LEVEL 1 DETAIL

Friction ridge flow and general morphological information.

LEVEL 2 DETAIL

Individual friction ridge paths and friction ridge events, e.g., bifurcations, ending ridges, dots.

LEVEL 3 DETAIL

Friction ridge dimensional attributes, e.g., width, edge shapes, and pores.

LIFT

An adhesive or other medium on which recovered friction ridge detail is preserved.

LIQUI-DROX

Fluorescent yellow solution used to develop friction ridge detail on the adhesive and non-adhesive sides of dark colored tape.

LIQUI-NOX®

Detergent used in a solution to develop friction ridge detail on the adhesive and non-adhesive sides of tape; cleaning agent.

LIVE-SCAN

Electronic recording of friction ridges (fingers and/or palms).

LOOP - ULNAR

A type of pattern in which one or more ridges enter upon either side, recurve, touch or pass an imaginary line between delta and core and pass out, or tend to pass out, on the same side the ridges entered. The flow of the pattern runs in the direction of the ulna bone of the forearm (toward the little finger).

LOOP - RADIAL

A type of pattern in which one or more ridges enter upon either side, recurve, touch or pass an imaginary line between delta and core and pass out, or tend to pass out, on the same side the ridges entered. The flow of the pattern runs in the direction of the radius bone of the forearm (toward the thumb).

LOSSLESS

See Compression, Lossless

LOSSY

See Compressions, Lossy

LPE

Latent Print Examiner

LUMINESCENCE

Emission of light by energy from non-thermal sources (i.e., chemical, biochemical, electrical), including both fluorescence and phosphorescence.

MAJOR CASE PRINTS

A systematic recording of all the friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, and joints, tips and sides of the fingers.

MBD

7-(P-Methoxybenzlamino-4Nitrobenz-2-Oxa-1,3-Diazole). Yellow dye which produces a fluorescent product when exposed to selected wavelengths of light; used to visualize cyanoacrylate fumed friction ridge detail.

MEDIAL

At or near the center.

METHANOL (METHYL ALCOHOL)

Solvent used as a carrier in reagents, dyes, stains, and rinses; also used as a cleaning agent.

MINUTIAE

See Characteristics.

MISSED IDENTIFICATION

The failure to make identification, when in fact, both friction ridge impressions are from the same source.

MMD

Multimetal Deposition. Two step process using a colloidal gold and a modified Physical Developer solution to visualize friction ridge detail.

MOLYBDENUM DISULFIDE

Chemical used in the preparation of Small Particle Reagent (SPR).

MSDS

Material Safety Data Sheet. Manufacturer's information concerning the handling and use of a chemical.

NAPHTHALENE BLACK

See Amido black.

NCIC

National Crime Information Center.

NCIC CLASSIFICATION

An alpha/numeric system of fingerprint classification.

NGI

Next Generation Identification

NINHYDRIN

1, 2, 3-triketohydrindine hydrate. Reagent that reacts with amino acids to develop friction ridge detail.

NIST

National Institute of Standards and Technology, U.S. Department of Commerce.

NITRIC ACID

Acid used in a fuming technique to visualize friction ridge detail on select metal surfaces.

NON-IDENTIFICATION

See exclusion, source exclusion

NON-POROUS

Non-absorbent.

PALM (PALMAR AREA)

The friction ridge skin area on the side and underside of the hand.

PAPILLAE

Peg-like structures of the dermis.

PAPILLARY RIDGES

Orderly rows of eccrine glands positioned along the path of the friction ridge.

PATENT PRINT

Friction ridge impression of unknown origin, visible without development.

PATHOLOGY

The study of causes, nature, and effects of diseases, trauma, and other abnormalities.

PATTERN AREA (CLASSIFICATION)

In the distal phalange of the fingers, the configuration of friction ridges that are utilized in classification.

PATTERN FORMATIONS

Friction ridge skin arrangements formed as early as the third month of gestation.

PETROLEUM ETHER

Solvent used as a carrier in reagents; also as a rinse or cleaning agent.

PHALANGE (PHALANX)

A finger or toe, with proximal, medial and distal segments. Any bones in the fingers or toes.

PHOTO-FLO™

Surfactant developed by Kodak, used in powder suspension techniques for the development of friction ridge detail.

PIXEL

Short for picture element. The fundamental element of a digital image.

PLANTAR AREA

The friction ridge skin area on the side and underside of the foot.

POINTS/POINTS OF IDENTIFICATION

See Characteristics.

POLYMERIZATION

Chaining together many simple molecules to form a more complex molecule with different physical properties.

PORES

Small openings on friction ridges through which body fluids are released.

POROSCOPY

A study of the size, shape and arrangement of pores.

POROUS

Absorbent.

PPI

Pixels per Inch. The spatial resolution of a digital image. Often referred to incorrectly as DPI (dots per inch).

2-PROPANOL

Solvent used in preparation of reagents.

PROXIMAL

Situated at the closest point of attachment; direction toward the body.

QUALITATIVE

The clarity of information contained within a friction ridge impression.

QUANTITATIVE

The amount of information contained within a friction ridge impression.

RADIAL

The smaller of the two bones of the forearm, on the same side as the thumb.

RAM

Combination of Rhodamine 6G, Ardrox, and MBD dyes, which fluoresce when exposed to selected wavelengths of light; used to visualize cyanoacrylate fumed friction ridge detail.

REAGENT

Substance used in a chemical reaction to detect, examine, measure, or produce other substances.

RECOVER LFT

Fingerprint development system for fired evidence.

REDOX

Reduction-Oxidation. Chemical reaction in which one or more electrons are transferred from one atom or molecule to another. An important component of the Physical Developer and Multi metal Deposition processes.

RELATIVE POSITION

Proximity of characteristics to each other.

RHODAMINE(S)

Family of dyes that produce fluorescence when exposed to selected wavelengths of light; used to visualize cyanoacrylate fumed friction ridge detail.

RIDGE (FRICTION)

See Friction Ridge.

RIDGE APLASIA

Congenital absence of friction ridge skin.

RIDGE CHARACTERISTICS

See Characteristics.

RIDGE DISSOCIATION

See Dissociated Ridges.

RIDGE DYSPLASIA

See Dysplasia.

RIDGE FLOW

The direction of a series of adjacent friction ridges. See Level 1 Detail.

RIDGE HYPOPLASIA

Underdeveloped ridges associated with an excess of creases.

RIDGE PATH

The directional flow of a single friction ridge. Also see Classification Terms glossary.

RIDGEOLOGY

The study of the uniqueness of friction ridge skin and its use for personal identification.

RUDIMENTARY RIDGE

See Incipient Ridge.

RUHEMANN'S PURPLE

Colored compound that is the product of the reaction between amino acids and ninhydrin.

RUVIS

Reflected Ultra-Violet Imaging System that allows visualization of friction ridge detail from the ultraviolet spectrum.

SAFIS

State Automated Fingerprint Identification System

SAFRANIN O

Red dye which produces fluorescence when exposed to selected wavelengths of light; used to visualize cyanoacrylate fumed friction ridge detail.

SCANNER

A capture device used to create digital image files from original objects, photographs, etc.

SCAR

A mark remaining after the healing of a wound.

SEBACEOUS GLAND

An oil-secreting gland generally associated with a hair follicle.

SEQUENTIAL PROCESSING

Use of a series of development techniques in a specific order to maximize development of friction ridge detail.

SHORT RIDGE

A single friction ridge beginning, traveling a short distance, and ending.

SILVER NITRATE

Chemical used in the Physical Developer, Multimetal Deposition and Silver Nitrate processes. Used alone, silver nitrate reacts with salt to develop friction ridge detail.

SKIN

The outer covering of the body consisting of the dermis and epidermis.

SODIUM HYPOCHLORITE (HOUSEHOLD BLEACH)

Solution used to clear ninhydrin stains and to darken the silver deposits of Physical Developer.

SOURCE EXCLUSION

'Source exclusion' is an examiner's conclusion that two friction ridge skin impressions did not originate from the same source. The basis for a 'source exclusion' is an examiner's decision that there are sufficient friction ridge skin features in disagreement to conclude that the two impressions came from different sources.

SOURCE IDENTIFICATION

'Source identification' is an examiner's conclusion that two friction ridge skin impressions originated from the same source. This conclusion is an examiner's decision that the observed friction ridge skin features are in sufficient correspondence such that the examiner would not expect to see the same arrangement of features repeated in an impression that came from a different source and insufficient friction ridge skin features in disagreement to conclude that the impressions came from different sources.

SPATIAL DENSITY

A measure of the number of pixels in a digital image, e.g., pixels per inch.

SPATIAL RESOLUTION

The relationship of the individual pixels to the size of the actual area represented. This is similar to the relationship of film grain to individual details in a photograph.

SPECTRAL RESOLUTION

The color bands of light detected during image acquisition, e.g., detection from 520 to 700 nanometers.

SPLIT THUMB

Thumb that has conjoined distal phalanges.

SPR

Small Particle Reagent. Suspension in which molybdenum disulphide adheres to fats and oils, allowing for visualization of friction ridge detail.

SPUR

A bifurcation with one short ridge branching off a longer ridge.

STICKY SIDE POWDER™

Product used to develop friction ridge detail on adhesive surfaces and/or tapes.

STOCK SOLUTION

Concentrated solution diluted to prepare a working solution.

SUBSTRATE

Surface upon which a friction ridge impression is deposited.

SUDAN BLACK

Black dye that stains fats, oils, sebaceous components, and contaminants of friction ridge residue; can enhance cyanoacrylate fumed friction ridge detail.

SUFFICIENT RECURVE

The space between the shoulders of a loop, free of any appendages that abut upon the recurve at a right angle on the outside.

5-SULFOSALICYLIC ACID

Chemical used in fixative solutions for a variety of blood enhancement reagents.

THENAR AREA

The large cushion of the palm located at the base of the thumb.

THERMOPLASTIC POWDER

Toner powder used in copiers and printers.

TIFF

Tagged Image File Format. An image file format. The “.tiff” extension used for TIFF files.

TRAUMA

Injury or damage.

TRIFURCATION

The point at which one friction ridge divides into three friction ridges.

TYPE LINES

The two innermost ridges associated with deltas that are parallel, diverge, and surround or tend to surround the pattern area.

ULNA

The larger of the two bones of the forearm, on the palmar side of the little finger.

ULTRAVIOLET

Wavelengths of light shorter than that of the visible spectrum, between 10 and 400 nm.

UN-DU®

Product used to separate adhesive tapes.

VACUUM CYANOACRYLATE ESTER

Fuming method, conducted under vacuum conditions, in which cyanoacrylate polymerizes on friction ridge residue; used to visualize friction ridge detail.

VERIFICATION

Peer review or confirmation of an examiner's conclusion by another qualified examiner.

VMD

Vacuum Metal Deposition. Process of selective condensation of metals under vacuum conditions; used to visualize friction ridge detail.

VOLAR

Related to the palmar and plantar surfaces.

VOLAR PADS

Palmar and plantar fetal tissue growth that affects friction ridge skin development and patterns.

WEBBED FINGERS

Two or more fingers connected along the sides by skin.

WHORL - ACCIDENTAL

A fingerprint pattern consisting of two different types of patterns, with the exception of the plain arch, with two or more deltas; or a pattern which possesses some of the requirements for two or more different types; or a pattern which conforms to none of the definitions.

WHORL - CENTRAL POCKET LOOP

A type of fingerprint pattern which has two deltas and at least one ridge which makes, or tends to make, one complete circuit, which may be spiral, oval, circular, or any variant of a circle. An imaginary line drawn between the two deltas must not touch or cross any re-curving ridges within the inner pattern area.

WHORL - DOUBLE LOOP

A type of fingerprint pattern that consists of two separate loop formations with two separate and distinct sets of shoulders and two deltas.

WHORL - PLAIN

A type of fingerprint pattern which consists of one or more ridges which make, or tend to make, a complete circuit, with two deltas, between which, when an imaginary line is drawn, at least one re-curving ridge within the inner pattern area is cut or touched.

WORKING SOLUTION

Solution at the proper dilution for processing.

ZINC CHLORIDE

A metal salt used to treat ninhydrin developed latent prints.

ZINC NITRATE

A metal salt used to treat ninhydrin developed latent prints.

1.4 Abbreviations

RP	Right Palm
LP	Left Palm
#1	RT – Right Thumb
#2	RI – Right Index
#3	RM – Right Middle
#4	RR – Right Ring
#5	RL – Right Little
#6	LT – Left Thumb
#7	LI – Left Index
#8	LM – Left Middle
#9	LR – Left Ring
#10	LL – Left Little
ACE-V	Analysis, Comparison, Evaluation – Verification
Elim	Elimination, eliminated
Excl	Exclusion, excluded
Neg	Negative
NIN	Ninhydrin
BP	Black Powder
SG	Super Glue
POE	Point of Entry
AFIS	Automated Fingerprint Identification System
IAFIS	Integrated Automated Fingerprint Identification System (Inactive)
NGI	Next Generation Identification
NIST	National Institute Standards Training
SBI	NC State Bureau of Investigation
FBI	Federal Bureau of Investigation
FP	Fingerprint
LP	Latent Print
PP	Palm Print
MBD	7P-methoxybenzylamino-4-nitrobenz-2-oxa-1-3-diazole

PWD	Fingerprint Powder
Ø	Identification symbol
V	Print of Value
V (int)	Verification
NV	No Value
AV	AFIS, NGI Value
EV	Elimination Value
ALS	Alternate Light Source
DFO	1, 8-Diazafluoren-9-One
IAI	International Association for Identification
CLPE	Certified Latent Fingerprint Examiner
CSCSA	Certified Senior Crime Scene Analyst
CSA	Certified Crime Scene Analyst
CST	Certified Crime Scene Technician
CFP	Certified Forensic Photographer
LPE	Latent Fingerprint Examiner
MAG	Magnetic
PD	Physical Developer
LPU	Latent Print Unit
SWGFAST	Scientific Working Group on Friction Ridge Analysis, Study and Technology (Inactive terminated)
OSAC	The Organization of Scientific Area Committees for Forensic Science

2 Introduction to Latent Prints

The fundamentals of the science of friction ridge analysis in human identification are permanence and individuality (uniqueness). The comparison and identification of two areas of friction ridge impressions are based on the human observation and examination of infinite combinations of ridge structure, individual ridge appearance, minutiae, spatial relationships, pores, and other unique details. There is no scientific basis for requiring that a minimum number of corresponding friction ridge details be present in two impressions in order to determine a source origin. The study and application of Forensic Ridgeology is an applied science, based upon the foundation of biological uniqueness, permanence, and empirical validation through observation. Analysts draw their conclusions by following a specific scientific protocol known as ACE-V. During the process, analysts draw on the foundations of Biology, Chemistry, Genetics, Physics, Mathematics and Psychology, utilizing both qualitative and quantitative analysis. This process is applied regardless of the combination of print types.

2.1 Permanence

Fingerprint ridges are formed during the third to fourth month of fetal development. These ridges consist of individual characteristics called ridge endings, bifurcations, dots and many ridge shape variances. The unit relationship, type and direction of individual characteristics do not naturally change throughout life, except for size during growth, right up until biological decomposition after death. Unnatural changes to fingerprint ridges include deep cuts, burns, or injuries penetrating all layers of the epidermis, as well as some diseases such as leprosy. Permanent scars, disease damage, and temporary changes such as paper cuts appear as jagged edges and sometimes "puckered" ridge detail, in opposition to smooth flowing natural formations. Senile atrophy of friction skin due to old age can sometimes cause the ridges to almost flatten, causing fingerprints with many creases and poorly defined ridges.

2.2 Uniqueness

In the approximately 150 years that fingerprints have been routinely compared worldwide, no two areas of friction skin on any two persons (including identical twins) have been found to contain the same individual characteristics in the same unit relationship. This means that in general, any area of friction skin will contain sufficient individual characteristics, in a unique unit relationship, to enable positive identification to a specific impression source. This has been validated by the billions of comparisons conducted worldwide over the past 150 years, as well as millions of electronic searches conducted by federal, state and local AFIS systems. In all instances, to date, no two areas of friction ridge skin from two different individuals has ever been found to be identical.

2.3 ACE-V

a) Analysis

Analysis includes the assessment of a friction ridge print to determine its “value” by analyzing level one, level two, and, if present, level three detail, in addition to any other relevant information such as substrate, transfer medium, development method, deposition and lateral pressures, and anatomical orientation. The determination “of value” by the examiner indicates that sufficient reliable details are present in the print such that, when compared to another print, a conclusion of identification or exclusion, can be reached. If the print lacks sufficient reliable details to reach a conclusion of identification or exclusion, the print is determined to be of “no value.” Distortion is not a discrepancy and is not a basis for exclusion. The analysis is conducted prior to and regardless of whether comparisons will be conducted.

1) During the Analysis phase the following information is used when available:

- Determine if the print is of friction ridge skin
- Presence of observable detail
- Substrate
- Transfer medium
- Development method
- Deposition pressure
- Lateral pressure
- Preservation method
- Anatomical orientation

2) Level one detail

- Class characteristic
- Can be used for pattern interpretation, can be used to determine anatomical source and orientation, cannot be used to identify
- Can determine a group pattern origin
- Can exclude
- Overall ridge flow, direction
- General morphology (e.g., presence of incipient ridges, size, injury)

3) Level two detail

- Used individually or in conjunction with level one detail to identify or exclude the impression source.
- Individual ridge path
- Direction

- Type
- Presence of ridge path deviation (e.g., ridge ending, bifurcation and dot)
- Absence of ridge path deviation (e.g., continuous ridge)
- Ridge path morphology (e.g., size and shape)

4) Level three Detail

- Used in conjunction with level one and or level two detail to identify or exclude the impression source
- Structure of individual ridges
- Shape of the ridge
- Relative pore position
- Other specific friction skin morphology (i.e., secondary creases, ridge breaks, etc.)

5) Other features associated with friction ridge skin (e.g., creases, scars, warts, paper cuts, blisters)

- May be permanent or temporary
- May exist as level one, two and three detail
- May be used in conjunction with friction ridge detail to identify or exclude

b) Comparison

Comparison is the direct or side-by-side observation of friction ridge detail to determine whether the information in two prints is in agreement, based upon detail, similarity, sequence, direction, rarity, type and spatial relationship.

c) Evaluation

Evaluation is the formulation of a conclusion based upon completion of the analysis and comparison of friction ridge prints. All conclusions are reproducible. Conclusions that can be reached are Identified, Exclusion and Inconclusive

1) Identification (Source Identification)

Source identification is an examiner's conclusion that two friction ridge skin impressions originated from the same source. This conclusion is an examiner's decision that the observed friction ridge skin features are in sufficient correspondence such that the examiner would not expect to see the same arrangement of features repeated in an impression that came from a different source and insufficient friction ridge skin features in disagreement to conclude that the impressions came from different sources. The basis for a 'source identification' conclusion is an examiner's decision that the observed corresponding friction ridge skin features provide extremely strong support for the proposition that the two

impressions came from the same source and extremely weak support for the proposition that the two impressions came from different sources. Source identification is a statement of an examiner's belief that the probability that the two impressions were made by different sources is so small that it is negligible. Source identification is not based upon a statistically- derived or verified measurement or comparison of all friction ridge skin impression features in the world's population.

2) Exclusion (Source Exclusion)

Source exclusion is an examiner's conclusion that two friction ridge skin impressions did not originate from the same source. The basis for a 'source exclusion' is an examiner's decision that there are sufficient friction ridge skin features in disagreement to conclude that the two impressions came from different sources.

3) Inconclusive

Inconclusive is an examiner's conclusion that there is insufficient quantity and clarity of corresponding friction ridge skin features between two impressions such that the examiner is unable to identify or exclude the two impressions as originating from the same source. The basis for an inconclusive conclusion is an examiner's decision that a source identification or source exclusion cannot be made due to insufficient information in either of the two impressions examined.

Inconclusive evaluation results must not be construed as a statement of probability. Probable, possible or likely individualization (identification) conclusions are currently outside the acceptable limits of friction ridge identification science but are currently under research. The CMPD Latent Fingerprint Analysts do not report on fingerprint probabilities.

d) Verification

Verification or peer review is the independent application of the Analysis, Comparison and Evaluation methodology (ACE) to a friction ridge print by another qualified examiner. All identifications must be verified.

The verification should not be conducted by an analyst that has been solicited for consultation regarding opinions or conclusions, or by an analyst who is in training or has not been released for independent casework.

3 Evidence

3.1 Evidence Receipt

- a) In general, evidence submission shall be submitted according to current Lab evidence policies as outlined in the Quality Assurance manual. This mandates specific requirements that shall be adhered to in addition to the policies outlined within this SOP and Departmental Directives.
 - 1) Evidence that is received by the Latent Print Unit shall be properly Packaged and sealed upon receipt. The packaging must be sufficient to assure the integrity and preservation of the evidence. Evidence that does not meet this standard will be rejected and returned to property control.
 - 2) All evidence shall be submitted to the receiving analyst and custody transferred within the PLIMS/Property Control System. The receiving analyst shall verify contents and assure that the evidence submitted is consistent with the description. In the event of a discrepancy, the analyst will return custody of the item to Property Control for correction. If a case assignment is open in PLIMS the employee will enter a notation of the conditions that resulted in the rejection.
 - 3) No evidence shall be accepted by the Latent Print Unit without an active crime lab evidence analysis request or lab assignment, except for routine latent print submissions. The Latent Fingerprint Unit is the custodian of latent fingerprint card submissions and shall receive latents from Property Control daily.

3.2 Evidence Documentation

- 1) All incoming evidence custody shall be transferred through the CMPD PLIMS Barcode Readers.
- 2) Physical evidence packaging and latent print packet form 0-21-PD shall be dated and initialed upon receipt by the receiving analyst in addition to the electronic custody transfer. Items of evidence shall not be intentionally and directly marked, altered, or changed by an analyst of the Latent Print Unit except as specifically authorized by this SOP.
- 3) When analysis is complete the evidence shall be placed in the original packaging if possible and sealed with evidence tape. If it is not possible to utilize the original packaging the item shall be repacked with new packaging. The analyst shall sign and date across the tape. Care shall be taken to not obliterate or cover any previous seals and initials. If item is re-packaged with new packaging the old packaging shall be packed with the evidence.

3.3 Section Routing, Sequence of Processing

- a) In general, some latent print development techniques can be destructive to other types of forensic evidence. When receiving the Lab Analysis assignment, the analyst shall verify that the items submitted are routed to the right lab section.
 - 1) The sequence of processing should be as follows unless there is a specific need to alter this sequence.
 - Biology
 - Questioned Documents
 - Latent Prints
 - Chemistry
 - Firearms
- b) Any evidence that is rejected by the Latent Print Unit will be forwarded to the next lab section or returned to the Property Control Bureau if no further analysis is requested.

3.4 Evidence Storage and Security

- a) Latent fingerprint submissions are maintained within the custody of the Latent Print Unit. These items are subject to frequent requests for comparison. For the purpose of this policy, all latent print lift cards and digital images shall be considered as both evidence in the process of examination and examination records. When not in process of examination latent lift cards and photographs shall be stored as evidence. This shall apply from initial receipt of the items until disposition of the items, archival, or the disposition of the case with the items turned over to the clerk of the court.
 - 1) All evidence received by this Unit shall be stored in such a manner as to assure the integrity of the evidence and restrict access to only persons authorized.
 - 2) Physical evidence submitted for processing shall be stored in the provided lockable storage cabinets located in the processing lab. The cabinets will always remain locked when not in use.
 - 3) Latent Fingerprint cards will be stored in the provided file cabinets located in the AFIS Computer room. Access will be restricted to latent unit staff only. Latents will be stored according to case number. Latents removed from the file will be replaced as soon as the case analysis is complete. Latent prints older than 2 years shall be archived. Homicides and rapes may be stored in the Latent Print Section indefinitely providing space is available, until the case is disposed with the latents being surrendered to the Clerk of the Courts, or storage space is exhausted.

- 4) Latent archiving will be conducted as per current CMPD procedure. All latents archived after 24 months will be documented electronically in the PLIMS system, containerized, and scanned to Latent Print Archives.
- 5) The AFIS latent file room will remain locked during non-working hours. The Latent Print Unit will always remain locked and during non-working hours both entry doors will be double locked.
- 6) Latent lift cards that are in active status may be maintained within the analysts assigned work area or personal storage area. Latent print packets that are in active status may remain unsealed until completion of the case. Active cases are cases that are undergoing screening, evaluation, case examination, or technical/peer review.
- 7) Once the analysis of the evidence is completed, the disposition of evidence received shall be determined by the evidence type and need for additional analysis. Latent impressions and printed images shall be maintained within the Latent Print Section as outlined within section 3 and 4 of this policy. Latent items submitted where all the impressions are of no value, or the impressions were submitted by an outside agency, shall be returned to property control. Other types of physical evidence shall be returned to property control or forwarded to a separate laboratory section for additional analysis. Both internal and external evidence dispositions will be documented in PLIMS under custody. External agencies without access to PLIMS will receive an e mail notification as to the final disposition of their evidence.

3.5 Drugs

- a) Requests for drug case latent processing may only be submitted by CMPD Vice and Narcotics officers, all other requests for services must come from the District Attorney's Office, lab management, or command staff.
 - 1) No drugs will be accepted by the Latent Print Unit if the drugs are not completely sealed and isolated from the drug's external packaging (as opposed to the evidence packaging). The Latent Print Unit will not remove any drugs from packaging or manipulate the packaging in any way that would expose the drugs.
 - 2) Drugs packaged in small baggies or small zip lock bags will not be processed by the Latent Print Unit and will be rejected upon receipt.
 - 3) Any drugs displaying visual contamination or other foreign substance on the external packaging will be rejected apart from used paraphernalia.

- 4) When a drug related case is completed the drug evidence shall be immediately returned to the Chemistry Section. If Chemistry has completed the case, the drug packaging evidence shall be immediately returned to the Property Control Bureau.

3.6 Firearms

- 1) All firearms shall be verified as safe upon receipt and/or prior to latent print processing utilizing the provided bullet trap. In the event a firearm is received by the latent print section that is loaded, the section supervisor shall be immediately notified. It shall then be completely documented and photographed.
- 2) New gloves will be worn by the Latent Print Analyst prior to handling additional weapons to prevent cross contamination of the evidence if weapons will be subject to biological swabbing.
- 3) All firearms will be handled in a safe manner. All unloaded firearms will be handled as always loaded while in the Latent Print Unit's possession.
- 4) All magazines and ammunition will be considered as part of the firearm for processing purposes.
- 5) Firearms seized from a suspect's person or classified as found property will be rejected unless there are specific circumstances that require processing or by direct order of Lab Command Staff. Person means hands, pockets, waistband, etc.
- 6) Firearms may be swabbed by the Latent Fingerprint Unit prior to processing to expedite the case through the lab on a priority basis. Firearms that are rejected or otherwise not processed for latent prints will not be swabbed. Swabs will be documented as a child item and separately packaged and tagged from the parent item.
- 7) Swabbing shall be taken from the grip area, back strap and front strap on handguns. If submitted with a magazine the base plate shall be swabbed.
- 8) Swabbing shall be taken from the stock grip and fore stock on rifles and long guns.
- 9) Any firearms contaminated with apparent blood, or any other biological substance shall not be swabbed by the Latent Print Section and will be returned to the Biology Section for swabbing.

3.7 Biohazards

- 1) Latent print packets containing biohazards (e.g., latent lifts contaminated with possible blood or post-mortem impressions containing biological contaminants) must be labeled with a "Biohazard" label.
- 2) No evidence that is a known biohazard requiring specific storage conditions such as biological fume hoods, refrigerators or freezers will be accepted by the Latent Print Unit.
- 3) All material should be checked and monitored for biohazards upon receipt and handled as contaminated utilizing standard universal precautions until determined otherwise.
- 4) Material that has become wet that has not been rejected shall be thoroughly dried before acceptance by the Latent Print Unit.
- 5) No bio-hazardous material should be accepted or stored in the Latent Print Unit, holding areas or storage lockers unless properly packaged and labeled as a biohazard and proper storage conditions exist within the unit at time of submission.
- 6) No handling of bio-hazardous evidence should be carried out without the employee(s) wearing appropriate protective clothing, such as latex surgical gloves and masks, lab coats and aprons. These should be disposable except for lab coats. Full face protection should be provided if there is any danger of splashing or airborne dispersion.
- 7) After handling bio-hazardous evidence, all protective clothing should be disposed of, and all handlers must wash their hands thoroughly with an appropriate chemical germicide or soap and water.
- 8) To prevent cross contamination of evidence, gloves will be changed when handling different items of evidence.
- 9) Obviously contaminated postmortem prints must be sealed in a clear plastic bag during analysis to prevent office cross contamination and removed from the plastic bag prior to long term storage.

3.8 Currency

- a) These policies shall apply in addition to CMPD Directive 700, but shall not Supersede it.
- 1) All currency submitted to the Latent Print Unit for processing shall be physically counted and inventoried prior to acceptance by both the receiver and submitter.

- 2) The inventory shall be consistent with what is listed PLIMS. Packaging shall be initialed by both the submitter and receiver after inventory, acknowledging accuracy.
- 3) Currency shall be inventoried according to bill denomination, quantity of each denomination, and total dollars and black and white photocopied or photographed for case record.
- 4) After processing, the currency will be immediately returned to the Property Control Bureau after a re-inventory as described above in 1 & 2.
- 5) The Section Administrator shall be immediately notified upon the discovery of any errors or inconsistencies found during inventory.

3.9 Latent Print Cards

- 1) Latent print cards shall be received daily from the Property Control Bureau. Cards will be analyzed on a rotating schedule by the section analysts or divided equally to expedite the process.
- 2) The outside of the latent print packet, 0-21-PD, shall be initialed and dated immediately by the receiving Latent Print Analyst.
- 3) The total number of lift cards received and the total number of lifts of value shall be placed on the outside front bottom of the 0-21-PD latent packet. Those submissions that possess palm impressions shall have a P placed next to the above markings.
- 4) Latent cards will be evaluated and inventoried. All impressions shall be assigned a quality value as per LP4.3.
- 5) Latent lift cards submitted to the Latent Print Section, where all marks contained on the cards are of no value, shall have the parent item description changed to NO VALUE - Latent Fingerprint Submissions in the drop-down menu for Item Type in PLIMS. Child item cards and grandchild item impressions will not be created. No value cases will be returned to Property Control. LFA cards recovered from exterior public access surfaces shall be described as EXTERIOR in PLIMS and shall not be grandchild in PLIMS.
- 6) All latents of AFIS value shall be searched in AFIS. Latents from major cases may be registered to the data base if they do not return a candidate. NGI entry is at the discretion of the analyst. If a database search does not result in identification, the result will be documented on the latent packet indicating the latents were searched with an AFIS X NEG and the negative results will be attached to the case record in PLIMS. A negative AFIS result means that no matching print was located in the database; it does not mean that no

matching print exists in the database. A negative AFIS search will not be peer reviewed. AFIS candidate lists will not be retained.

- 7) Photographic images of latent prints shall be the subject of this same procedure except that they shall be direct child items of the parent, such as a firearm or other item. Grandchild impression items shall be created from the photograph.
- 8) Latent cards that are submitted improperly or not correctly documents as per LP4.8 will be rejected and returned to property control.

3.10 Rejection of Evidence

- a) Evidence submitted to the Latent Fingerprint Unit may be rejected for any one of the following reasons. If a situation is encountered that is not described within this policy acceptance shall be at the discretion of the Section Administrator or receiving analyst.
 - 1) Improper or incomplete documentation of evidence and lift cards.
 - 2) Latent Fingerprint cards displaying something other than friction ridge impressions or where all the impressions contained within the submission are of no value.
 - 3) Improperly packaged evidence.
 - 4) Evidence that has been contaminated or handled without gloves.
 - 5) Evidence that has been previously processed.
 - 6) Evidence that was removed from the suspect's person.
 - 7) Unsealed drugs.
 - 8) Where possession has already been established by the officer/investigator and processing would yield no investigative value.
 - 9) Any cases that will not be prosecuted.
 - 10) Cases previously identified to a suspect without a request from the District Attorney's Office.
 - 11) Cases without victim elimination prints.
 - 12) Wet, putrefied, or decomposing evidence will be assessed on a case by case basis but in general will be rejected.

- 13) Dangerous, explosive, or infectious evidence will be rejected.
- 14) Found Property that is not part of a criminal or administrative investigation.
- 15) Fired shell casings will not be processed as per NIBIN/IBIS Protocol unless they are submitted as part of an investigation conducted by the Homicide Unit. Cases that are excluded from this subsection are ADW with life threatening injuries and Officer Involved Shootings, or evidence that falls under LPU3.12. Live cartridges that are of .22 caliber will not be processed due to surface area limitations.

3.11 Requests for Service

- a) Latent evidence is unique in that it is subject to recurring analytical requests. To properly manage available resources and assure a quality product the following criteria shall be followed.
- b) All requests for analysis must be submitted electronically in the *PLIMS*. This request may be submitted only by employees of CMPD, contracted external agencies, Federal Agencies, the District Attorney's Office, Public Defenders Office, or U.S. Attorney's Office.
 - 1) Requests must be properly completed and electronically submitted by authorized personnel only.
 - 2) If the request is for latent print analysis, the request **MUST** include complete suspect information including SID or PID numbers.
 - 3) If the case involves crimes against property, only one (1) open request per case number will be accepted at a time. A subsequent request may be submitted upon closure if no suspects have been identified.
 - 4) LFA case requests must contain interior surface impressions. Request for analysis on prints from exterior public access surfaces generally will not be accepted.
 - 5) Property crimes that have been previously identified to a suspect other than requests for previously identified AFIS cases that request a different suspect, must include victim eliminations, and be requested by the District Attorney's office.
 - 6) Third requests for property crimes submitted for the same unidentified case may be accepted but will be placed into a hold queue in *PLIMS*. These requests will be assigned as backlog and workload permits and handled on a case-by-case basis, or as ordered by command staff. Once a case is placed

into the hold queue subsequent requests will be returned and not completed. Generally, fourth requests for the same case will not be accepted if the request is for comparative analysis. Crimes against person cases are not restricted by this policy section.

- 7) Mass suspect screenings will not be accepted.
- 8) Requests for latent-to-latent comparisons will not be accepted.

3.12 Fired Evidence

- a) Fired evidence will only be processed with RECOVER LFT if submitted for the following offence types and has been handled with gloves post discharge:
 - 1) Homicides.
 - 2) Aggravated assaults likely to result in death.
 - 3) Officer involved shootings.
 - 4) Mass shootings resulting in injury or death.
 - 5) Any case as ordered in writing by lab command staff.

4 Latent Print Standards

4.1 Evaluation Documentation

- a) Latent fingerprints are submitted to the CMPD Crime Lab daily and are not maintained within the Property Control Bureau. Upon their receipt, all latent prints shall be subject to an initial inventory and quality evaluation. This shall be documented within PLIMS. Latent cards will be scanned into PLIMS as attachments with applicable child and grandchild items created and numbered. Card file attachments will be attached to corresponding property item number.
- 1) All latent fingerprint cards submitted to this unit shall be evaluated as to their quantity and quality entered in PLIMS. Latent cards will be documented separately from the parent submission as child items. Individual latent impressions will be documented separately as grandchild items. Generally, each latent impression will be evaluated individually. When a latent card is received that has many clustered and overlain prints making individual documentation problematic, the individual lift card may be assigned a single value.
- 2) Total number of cards, latents of value and AFIS quality latents shall be written on the lower front section of the submission envelope in ink.
- 3) Each latent print of value and lift card shall be assigned a unique identifier that will be generated by PLIMS. Items will be marked and scanned at this time. Impressions of no value will be scanned into PLIMS but not assigned item numbers.
- 4) The numbering sequence shall be a three number identifier, such as 1.2.3. The first number shall represent the item number or submission envelope of all cards. The second number shall represent the individual cards that shall be numbered in sequence. The third number shall represent the individual impressions contained on the card.

4.2 Latent Impression Quality Assignments

- a) All latent impressions or individual lift cards shall be assigned one of three quality values as listed below. The values shall be abbreviated on the cards around the individual impression, or in a clean area of the card if evaluating the lift card. Evaluations are not a complete analysis and may be revised based on any conclusions reached during any subsequent ACE-V process or further complete comparative analysis. Impressions determined to be of no value shall not be entered into PLIMS but shall be scanned into PLIMS acknowledging their existence and initial evaluation. Evaluation markings may be done in pencil. If all impressions on the card are of no value, then the card may be marked once as a whole with a single NV.

- 1) NV – No Value. This indicates that the impression possesses no technical value for analysis. It may or may not display ridge detail. It may or may not be a friction ridge impression. It cannot be used to identify or exclude.
- 2) V – Value. This indicates that the impression contains sufficient detail to identify or exclude. Impressions of value may not possess sufficient quality for an electronic AFIS search.
- 3) AV – AFIS Value. This indicates the impression is of very high quality and possesses sufficient detail for submission to AFIS for an electronic search.

4.3 Identification Documentation

- 1) All latent prints that have been identified will be recorded and documented at the time of identification and verification on the lift card in ink.
- 2) If not done during the evaluation, latent prints that are identified shall be designated by placing parenthesis () around the latent. Palm prints shall be underlined.
- 3) The identified finger/palm number shall be placed on the lift card next to the latent in ink.
- 4) The analyst shall initial, date, and write the contributors name and/or SID number in an unobstructed location on the latent side of the card. The latent shall also be marked with the identification symbol Ø.
- 5) The verifying analyst shall date and initial the latent print in the same approximate area indicating verification with a capital “V” in ink.
- 6) Multiple identifications on the same lift card shall all be marked individually in ink.
- 7) No latent impressions shall be directly marked in any way that would obliterate any detail, to include latents of no value.

4.4 Case Prioritization

- a) All cases submitted to the Latent Print Unit shall be assigned according to the type of crime and not by the date received. Cases shall be worked in the following priority. This applies to both submitted evidence for processing and request for latent fingerprint analysis.
 - 1) Homicide / Death investigation
 - 2) Assault with a deadly weapon / aggravated assault when death is likely

- 3) Rape / sexual assault / kidnapping
- 4) Assault with a deadly weapon / aggravated assault when death is not likely
- 5) Armed robbery
- 6) CCW / Non-violent weapons cases
- 7) Burglary
- 8) Auto theft / larcenies / miscellaneous property crimes
- 9) Drug cases at the request of the district / US attorneys
- 10) Any cases deemed an investigative priority by CMPD Command staff where there is a documented e mail to prioritize a case.

4.5 Exemplar – Hard Card Requirements

- 1) Latent impressions shall only be compared with valid friction ridge impression exemplars recovered from the NC State AFIS, NGI, inked hard card agency files, cards submitted as evidence, or exemplars collected directly from the contributor/donor on acceptable media.
- 2) All AFIS hits shall be analyzed/peer reviewed to valid exemplars only.
- 3) This section shall not apply to pawn tickets, checks or other inked type impressions such as certified copies.

4.6 Verification and Peer Review

- a) Verification is the independent examination by another qualified examiner and the final phase of the ACE-V methodology.
 - 1) All latent print and ten print identifications shall be verified (peer reviewed) by another qualified analyst authorized for independent casework.
 - 2) Ten print validations for court trial purposes do not need to be verified or subject to peer review when no report is issued.
 - 3) Crimes against person's cases such as murder, rape, and robbery, shall have all conclusions reviewed by another qualified analyst and documented in the case notes prior to final peer review if there have been no previous identifications.
 - 4) Conflicts in conclusions shall be handled as per 4.13 of this SOP.

4.7 Major Case Notifications

- a) Due to the urgency of some major case investigations, the following notification shall apply when fingerprint identifications are made on homicides, rapes, or other high-profile cases. This will apply only after the identification has been peer reviewed. Any case correspondence indicating notification or attempted notification shall be documented in PLIMS.
 - 1) Contact the requesting Detective via telephone for notification. If unable to make contact, follow up with an email.
 - 2) Contact requesting Officer via agency read receipt E-mail advising of the case findings.
 - 3) If negative contact on either 1 or 2 above is made, contact the requesting officer's chain of command.
 - 4) Document contact details in the case record.
 - 5) Exemption to the peer review requirement may be made in the event of analyst off duty call in involving post mortem and in custody ten print analysis. The tentative identification will be peer reviewed as soon as possible.

4.8 Lift Card Submission Documentation

- a) Latent fingerprint submissions will be rejected if they do not contain at a minimum the following documentation when received from the Property Control Bureau.
 - 1) Initials of submitting Technician recovering lift, across tape edge.
 - 2) Specific location of lift clearly documented, in writing and drawing, such as interior, exterior etc.
 - 3) Item/surface recovered from.
 - 4) Date of recovery.
 - 5) Orientation markings/ arrow indicating direction if applicable.
 - 6) Correct case number.
 - 7) Lift cards sequentially numbered on back of cards consistent with item number.

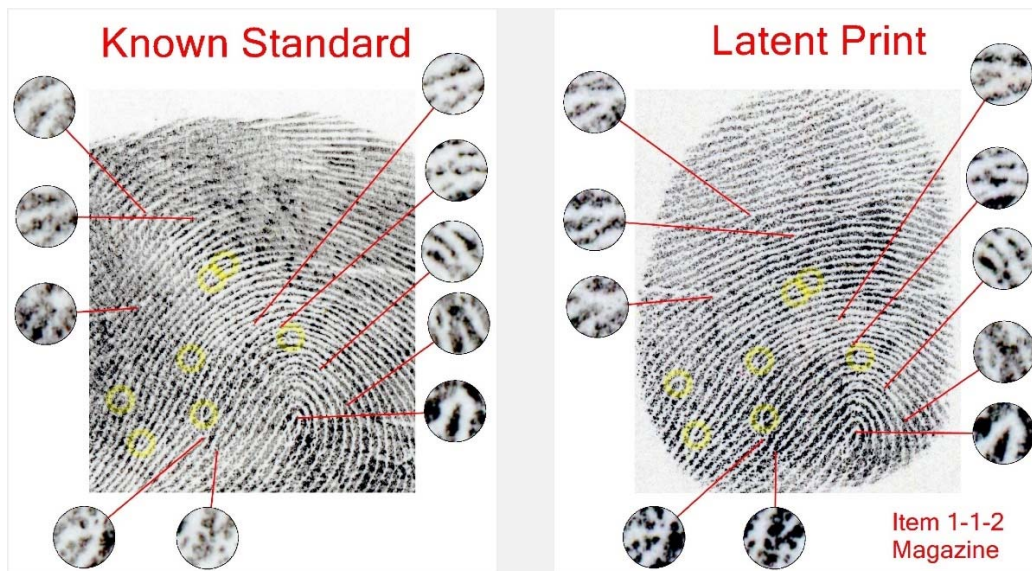
4.9 Minimum Point Standard

- a) The CMPD Crime Lab Latent Print Section does not recognize any minimum point standards to affect identifications. There is no scientific basis for requiring that a predetermined number of corresponding friction ridge details be present in two impressions to effect identification. Human friction ridge identification is supported by the theories of biological uniqueness, permanence, and the observation of the three levels of detail present within the impression.

4.10 Charted Enlargements – Reference images

- a) Charted enlargements shall be used as demonstrative evidence by the Latent Print Analyst during testimony. This will assist the witness to establish that conclusions are based on sufficient facts, are the product of reliable principles and methods, and were applied reliably to the facts in the case. The analyst must clearly explain how they arrived at their conclusion specific to the identified latent impression that is subject to testimony. Charted exhibits are the most easily understandable way for the analyst to explain technical, scientific, and observable detail and the processes used to reach their conclusion to the jury.
 - 1) Charted enlargements will be produced for any identifications subject to expert testimony that will be shown to the jury using CSI-Pix or Adobe Photoshop software.
 - 2) Charted enlargements will not be produced for every identification and will only be created after the analyst has received a subpoena and consulted with the prosecutor.
 - 3) The latent of the highest quality and clarity present in the case will be used for charted enlargements, providing it is relevant to the case.
 - 4) The case analyst testifying will be responsible for creating their own charts in a way they can easily articulate to the jury.
 - 5) Power Point displays, electronic exhibits, posters, and printed images may be used by the analyst dependent on the technology available in the specific court.
 - 6) At a minimum, administrative detail contained within the chart shall display both the latent and the known clearly marked above the representative image with the item number and surface description under the latent image.
 - 7) Technical detail marked in the chart shall be at the discretion of the testifying analyst but shall be sufficient to establish the basis for the conclusion.

- 8) Printed charted enlargements shall be a minimum of 8x10 inch images.
- 9) Impression images shall be printed in black and white or variant gray scales with technical data, lines, numbers, and characteristic marking in color.
- 10) Both latent and inked known standards shall be the same size and resolution.
- 11) The inked known standard shall be cropped to the area displayed in the latent impression.
- 12) All the characteristics visible shall not be marked. The total number shall be determined by the quality and clarity of the impressions and the analyst's preference.
- 13) Chartist enlargements will be attached to the electronic case record as an image file once they are created and it is determined they will be used in testimony.
- 14) Charting example



- b) Reference images shall be used by the analyst when testifying to latent print identifications that are not charted and presented to the jury. This will assist the analyst to explain facts and observations that justify their conclusion specific to each identification. The images may be image scans from the case record or notes, enlarged copies of case scans, or new images produced by the analyst for testimony. The analyst may also testify directly from the original latent lift card or image if sufficient detail is observable in courtroom conditions to articulate the facts justifying their conclusion, specific to that individual latent.

4.11 Latent Print Storage and Access

- 1) Latent prints shall be stored in the provided security cabinets maintained in the AFIS lab or personal storage areas.
- 2) Latents shall meet sealing requirements as per the QM and shall be sealed and stored when not in process.
- 3) Latent prints shall be accessed only by the staff of the Latent Print Unit for official duties.
- 4) All latent prints must be stored with a copy of the original property sheet if applicable. If no property sheet is present latents shall be barcoded.
- 5) After hours the latent prints must be secured behind the locked door of the AFIS lab unless currently in active status, under analysis or review, and in possession of an analyst.
- 6) Latent prints will be archived after two (2) years due to space limitations.
- 7) Latent photographs / digital images shall be stored as above.
- 8) If the original latent prints are signed out by the recovering Officer for court purposes a barcode shall be created for pre PLIMS cases if not done previously. Custody of latent prints and all child cards and grandchild impressions will be transferred together.

4.12 Ten Print Analysis

- 1) Ten print comparisons shall follow the same methodology as latent print analysis apart from ten print validations for court trial purposes.
- 2) Ten print validations for court trial, resulting from of a latent print identification, shall be documented on the inked hard card recovered directly from the contributor, and on the original ten print used in during the latent analysis. A copy of the email indicating the cards originated from the same individual will become part of the case records and scanned into PLIMS. A new analytical report will not be issued unless there is a discrepancy with the origin of the original impressions. Peer review of validations will not be required.
- 3) Ten prints shall be exempt from section 4.5 of this SOP.

4.13 Conflicts in Conclusions

- 1) If there is a conflict between the identifying analyst and the verifying analyst, the case shall be brought to the Section Administrator.
- 2) If the Section Administrator is the verifying analyst, then the case in conflict shall be reviewed by another Certified Latent Print Examiner with an external accredited laboratory. If the conflict is not resolved with the external agency, the impressions will be sent to the Federal Bureau of Investigation Latent Print Unit for a final determination.
- 3) Any errors in casework shall be handled in accordance with the CMPD Crime Lab QM.

4.14 Major Case Prints & Juvenile Exemplars

- 1) Major case prints shall consist of standard ten prints, medial impressions, complete palms, and all side friction ridge surfaces.
- 2) Major case prints shall be recovered at the request of the Case Investigator or the assigned Latent Fingerprint Analyst.
- 3) Individuals subject to collection of major case prints shall be brought to the Latent Print Unit for collection of impressions.
- 4) All fingerprint collection from juveniles must comply with CMPD Directive 600-009.
- 5) All elimination prints collected for victim elimination shall be submitted to Property Control as a separate item of evidence by the individual that collected them and not submitted with the latent impressions.

4.15 Consultations

1. Analysts are encouraged to consult other analysts during casework. If the analyst requires a significant consultation to reach a conclusion (i.e., in the evaluation phase), the consultation must be documented in the case notes matrix. Significant consultations typically occur in two situations; when an analyst finds a region of similarity and needs assistance interpreting the information in the latent print or exemplar print to render a conclusion or the analyst cannot locate the latent print in the exemplars and needs assistance reaching threshold for exclusion. The case notes matrix must reflect who was consulted, the latent prints involved, the date of the consultation and the result of the consultation. If the consultation results in identification, the consulting analyst will not be used as the verifier for that identification unless it is necessary due to such factors as staffing, technical skills with software or analytical skills. Consultations during the

analysis or comparison phase do not need to be documented. Examples of consultations that may occur during the analysis or comparison include suitability for comparison, anatomical region, orientation, target group selection, variability in appearance, search parameters, and distortion interpretation.

5 Case Files & Records

5.1 General Requirements

- 1) An analytical report shall be issued for all latent print comparative analysis or evidence processing that comes to a conclusion or opinion. An electronic case record shall be generated in PLIMS and any required case information shall be attached to the electronic case record. Analytical reports shall not be issued for latent print inventory and intake evaluations, electronic searches when there is no contributing candidate returned and for ten print validations of electronic standards.
- 2) All latent fingerprint analytical reports and case Record/file contents shall meet the minimum requirements of the CMPD Crime Laboratory QM 4.13.2 and QM 5.10. Section 5-2-1-d shall meet the requirement of inconclusive analysis documentations as contained in the report footer and required by QM 5.10.3.7.
- 3) The release of Latent Print case files and records for discovery, prosecutors, defense attorneys or police/investigators shall be managed by the Section Administrator or their designee. The release shall meet applicable QM 5.10.3.3 requirements, as well as 5.5 of this policy.
- 4) Existing original master paper case files issued prior to electronic conversion shall not be released by the latent print section.

5.2 Analytical Reports

- 1) All analytical reports generated by the Latent Print Unit shall clearly display the following statements contained within the footer of the analytical report. This statement shall meet the requirement of QM 5.10.3.7 for inconclusive results.
 - a) This report contains opinions, interpretations and conclusions that are reached using currently accepted methodologies. ACE-V is applied to all comparative analysis examinations. Sequential chemical, physical and digital processing is applied for all latent development examinations. Only latent print impressions of *value* are contained in this report. Other impressions of no value may be present in the original submissions that were not analyzed. Latent prints of value are retained by the lab.
 - b) **Identified** - Indicates that the fingerprint impression originated from a specific known source.
 - c) **Excluded** - Indicates that the fingerprint impression originated from a different source and that the listed subject has been eliminated as the contributor.
 - d) **Inconclusive** - Indicates no conclusion has been reached due to factors such as poor quality, clarity, or insufficient information present in the latent fingerprint or known standard impression.

- e) **Not Identified** - Indicates no identification of an impression has been made and applies only to individual cards that may possess both dissimilar and inconclusive clustered or overlain impressions.
- 2) At a minimum, all analytical reports shall contain the following information if applicable to the specific case. It is understood that all of the required information may not exist for every case, but if such information exists and is legible, it shall be included in the report.
- a) Conclusions
 - b) Subjects.
 - c) Case number.
 - d) Date of report.
 - e) Date received.
 - f) The date and analyst that completed the peer review.
 - g) Type of case analysis.
 - h) Evidence analyzed.
 - i) If identified, the surface the latent was recovered from.
 - j) Any known standards examined as part of the analysis.
 - k) State Identification Number (SID) of identified contributors.
 - l) All latent prints that were analyzed.
 - m) Analyst electronic signature.
 - n) The basis for conclusions is clearly described in LP-2 and shall not be required to be communicated on every analytical report.

5.3 Case Record/File Contents

- 1) Case Record/Files shall contain the following documentation, if applicable, so that another competent examiner or supervisor can evaluate what was done and be able to interpret the data.
 - a) Latent card scans/copies.
 - b) Analytical Report.

- c) Any notes entered to the PLIMS Matrix screens.
- d) Exemplar scans/copies of ten print and palm prints.
- e) Any applicable charts, photos, or graphic displays.
- f) Scans/copies of latent print submission envelope 0-21-PD front and back.
- g) Any existing communications, e-mails, and documented phone calls regarding the case as scanned attachments or directly imported electronic files. These may be scanned to the assignment or entered directly into case correspondence link.

5.4 Technical & Administrative Review

- 1) All case files will be reviewed in accordance with the CMPD Crime Lab QM 5.9.
- 2) All case files resulting in identification shall be technically and administratively reviewed at 100% by the section supervisor or his designee. All reports that do not result in an identification or do not result in physical development of ridge detail will be 100% administratively reviewed by the section supervisor or his designee and at a minimum 10% technically reviewed by the section supervisor or his designee.
- 3) Reviewing analyst/supervisor or designee shall electronically review the case assignment in PLIMS. Clicking on the Review Complete tab in PLIMS indicates successful review of assignment contents. Assignments that are rejected will be sent back to the analyst. Reviews are tracked in PLIMS and do not require an electronic signature.
- 4) Administrative and technical reviews may not be conducted by the author of the test report.

5.5 Release of Case Files & Records

- 1) All release of case files and record information, at a minimum, shall be in accordance with CMPD QM 5.10.3.3.
- 2) All requests for discovery shall be routed through the Latent Print Unit supervisor or his designee.
- 3) All case files and records released shall be documented within the original case file/record. Emails requesting the release of the files/records and emails indicating the files/records were transferred to the requester shall be electronically attached to the case file.

6 Processing Guidelines

6.1 Sequential Processing

Adherence to correct processing techniques increases the probability of developing latent fingerprint impressions. Adherence to the listed sequences contained in this SOP, the FBI Latent Print Processing Guide, and the PSDB Manual of Fingerprint Development Techniques, ensures the best opportunity to develop any surface impressions and minimizes any chances of their destruction. Surfaces on which latent prints are deposited can be divided into two basic categories, porous and non-porous. Listed are the suggested sequential processes for porous, nonporous, semi porous, and some unique and/or difficult surfaces. Depending on the circumstances, all of the suggested processes will not always be performed. This is left to the discretion of the examiner, abilities of the laboratory, availability of equipment and availability of chemical components.

- 1) Non-destructive techniques shall be utilized prior to any destructive techniques.
- 2) The FBI Processing Guide for the Development of Latent Prints, revised 2000 edition, and the PSDB Manual of Fingerprint Development Techniques, 2nd edition 1998, shall be referenced by this section. These manuals shall be referred to for all processes. Processes contained in these manuals are to be considered as validated.

6.2 Porous Surfaces

The following is the recommended sequence for application of processing techniques to porous surfaces such as paper, unsealed wood and cardboard. This is a general guide and may be deviated from depending on surface conditions and available supplies and equipment. These are methods currently in use by the CMPD Crime Lab.

- a) Visual, direct and indirect white light
- b) ALS, Inherent fluorescence
- c) DFO (1, 8-Diazafluoren-9-one)
- d) ALS
- e) Ninhydrin

6.3 Non-Porous Surfaces

The following is the recommended sequence for application of processing techniques to non-porous surfaces such as firearms, glass and other smooth surfaces. This is a general guide and may be deviated from depending on surface conditions and available supplies and equipment. These are methods currently in use by the CMPD Crime Lab.

- a) Visual, direct and indirect white light
- b) ALS - Inherent fluorescence
- c) Cyanoacrylate fuming
- d) ALS
- e) Cyanoacrylate dye stain or powder
- f) ALS
- g) Powder

6.4 Biological Contaminated Surfaces

The following is the recommended sequence for application of processing techniques to Blood/Bio contaminated surfaces. This is a general guide and may be deviated from depending on surface conditions and available supplies and equipment. These are methods currently in use by the CMPD Crime Lab.

- 1) Biologically Contaminated Porous
 - a) Visual
 - b) Inherent fluorescence by ALS
 - c) DFO (1, 8-Diazafluoren-9-one)
 - d) ALS
 - e) Ninhydrin
 - f) Amido black, Diaminobenzidine (DAB)
 - g) Physical developer

2) Biologically Contaminated Non – Porous

- a) Visual
- b) Inherent fluorescence by ALS
- c) Amido Black, Diaminobenzidine (DAB); if not available, use Leucocrystal violet
- d) Cyanoacrylate fuming
- e) ALS
- f) Cyanoacrylate dye
- g) ALS
- h) Powder

6.5 Cyanoacrylate Fuming Chambers

Cyanoacrylate fuming chambers are an effective method of developing latent prints on non-porous surfaces. When vaporized, cyanoacrylate fumes bond to the latent print residue on the item and polymerize the impression, preserving it for further visualization techniques. For operational reference, the manufacturer's service and operations manuals shall be utilized. The CMPD Latent Print Unit operates the following fuming chambers:

- Payton WS-1800-40-A CY-AT Vac.
 - Payton Cyvac M
 - Misonix CA 6000
- 1) Cyanoacrylate fuming chambers shall not be used for any other processes than what they were intended for.
 - 2) Do not wear contact lenses when cyanoacrylate fuming.
 - 3) Never under any circumstances fume any evidence that is under pressure in a vacuum chamber. Example, soft drinks, aerosol cans, etc. without first emptying their contents.

- 4) When fuming evidence in any of the chambers, a control standard shall be placed in the chamber along with the evidence, so development may be closely monitored.
- 5) Water may be introduced into any vacuum chamber. Water is also acceptable for ambient pressure fuming chambers to add humidity to aid development.
- 6) All units shall be maintained in a clean and serviced manner. Background development of the chamber surfaces shall be regularly cleaned as needed.
- 7) Only trained technicians/analysts shall operate the chambers.

6.6 ALS – Crime Scope

The forensic light source is a specialized tool that is utilized for the visualization of trace and latent fingerprint evidence. The system filters light to a specific wavelength. The following procedures shall be followed for proper use of the equipment and safety of the operators.

- 1) It shall be the responsibility of all analysts assigned to the Latent Print Unit to be completely familiar with the operation and maintenance instruction manual for the SPEX mini crime scope.
- 2) The unit shall only be operated by authorized latent print personnel.
- 3) All operators shall verify fan operation immediately after powering up unit.
- 4) Do not re-start the unit while the bulb is still hot.
- 5) All operators shall wear protective goggles while operating the system.
- 6) The light guide shall be pointed in a safe direction at all times when in use and never directed at an individual.
- 7) Direct viewing is dangerous; the light shall never be directed at the eyes.
- 8) The unit shall not be operated without filter wheels attached to the light guide due to extreme heat and fire hazard.
- 9) The light wand shall be extended only to the extent of its natural curve.
- 10) The unit shall be shut down properly by allowing the fan unit to cool the bulb prior to power disconnect.
- 11) MC1049 shall be dedicated to imaging; MC1396 shall be dedicated to visualization. Any deviation shall be documented in the case notes.

6.7 Chemicals

The majority of latent print development processes are chemical based processing techniques. This policy shall set the minimum standards this unit shall follow in regards to the safe handling, preparing and storage of stock and working solutions.

- 1) When mixing chemicals personal protective equipment shall be worn, including gloves, lab coats and eye protection. Ventilation will be active and the fire extinguisher shall be accessible.
- 2) Control standards shall be run on all new working solutions prior to use.
- 3) Chemicals will only be mixed according to the FBI Fingerprint Development Manual.
- 4) Only enough working solution that can be reasonably used within its shelf life shall be mixed.
- 5) All stock solutions shall be marked with the date of receipt, opening, and the initials of the analyst opening the solution.
- 6) All working solutions shall be marked with the date of preparation, identity of working solution, date of expiration, initials of preparer and date of validation/control. In the event the solutions are not consumed, they will be retested and verified at 12 months as per QM 4.6.2 and documented on the solution container.
- 7) Stock and working solutions shall be stored in the provided chemical storage cabinet.
- 8) It shall be the responsibility of all analysts assigned to the Latent Print Unit to be familiar with the chemical Material Safety Data Sheets (MSDS) for the normally used chemicals.
- 9) There will be no eating, drinking, smoking, chewing gum or tobacco in the vicinity of chemicals or in the development lab.
- 10) Inventory will be assessed and re-supplied as needed.

6.8 Calibration & Equipment Inspection

- 1) Calibration of balance (OHAUS Galaxy 400) serial #6850 weight reading must read 1.00 +/- .02 grams at beginning of calibration activity. Calibration of the balance will be performed once a year by an outside agency.
- 2) Verification of balance (OHAUS Galaxy 400) serial #6850 will be

performed each month with the Troemner ASTM SS 1g traceable weight and noted in the calibration log.

- a) Weight shall be placed on the balance.
- b) Reading shall be observed and recorded.
- c) If reading does not fall within 1.00 +/- .02 grams balance shall be taken out of service and the calibration vendor notified for repair.

3) Transportation and Handling of Weights

- a) All weights will be handled with gloves, tweezers or tongs.
- b) All weights will be transported in their original box/container.
- c) All weights will be stored in their original box/container.

- 4) A complete list of all latent fingerprint unit equipment is maintained on the CMPD R drive Crime Lab sensitive documents folder. This spreadsheet shall be updated as equipment is placed into or removed from service by the Section Administrator.
- 5) Unless otherwise specified within this SOP, all Latent Print equipment listed on the laboratory equipment list shall be inspected monthly and documented within the Equipment Maintenance Log located within the Latent Fingerprint Unit. This inspection shall be completed by the Section Administrator or his designee on a monthly basis. Any irregularities, deficiencies or maintenance issues shall be documented and addressed as soon as possible. If the irregularities, deficiencies or maintenance issues could potentially affect the test results of any evidence, the piece of equipment shall be removed from service until repaired and re-inspected.
- 6) Any irregularities, deficiencies or maintenance issues discovered outside of routine inspections shall be immediately brought to the attention of the Section Administrator.

6.9 Validation Testing

- 1) All new processes used for development of latent fingerprints shall be validated according to the CMPD Crime Laboratory QM 5.4 prior to being used on live casework.
- 2) Processes outlined in the FBI Guide to Latent Print Processing and the PSDB Manual of Fingerprint Development Techniques shall be considered as validated and available for immediate application.

- 3) All new working solutions shall be tested for effectiveness on a test standard known to have an intentionally placed latent print on its surface. The development shall be monitored to validate the new solution's effectiveness.
- 4) All fuming chambers shall have a test control strip placed in the chamber with the evidence being processed. The test strip shall contain an intentionally placed latent print on its surface. The development shall be monitored to validate the effectiveness of the process. The test strip shall be changed for each application. All other processes shall be tested as outlined in Sub Section 6.7.2 of this SOP before placed into production.
- 5) For all other chemical processes the test standard shall be consistent with the normal application of the technique to include the following:
 - a) DFO & Ninhydrin shall be applied to a porous test standard such as paper or cardboard.
 - b) Dye stains shall be applied to non-porous test standards, such as cans or bottles, which have been previously exposed to cyanoacrylate fuming process and where a known test print is present.
 - c) SPR shall be applied to a wet non-porous test standard surface such as cans or bottles.
 - d) Powders shall be applied to a dry non-porous test standard surface such as a can or bottle.
 - e) Sticky side powder/crystal violet and tape glow shall be applied to glue side tape standards.
 - f) Blood processing techniques shall be applied to either porous and/or non-porous surfaces utilizing known blood standards when practical.

6.10 Crime Scene Protocol

At the request of the Laboratory Director or his designee, the Latent Fingerprint Analyst may be required to respond to crime scenes as a technical expert. In the event that an analyst is dispatched to a crime scene, the following protocol shall be followed.

- 1) The analyst shall not enter any scene that has not been cleared of suspects and rendered safe.
- 2) The analyst shall confer with the lead detective and validate that the analyst has a legal basis to enter the scene, e.g. search warrant and/or consent, exigent circumstances.

- 3) Prior to entering any crime scene the analyst shall assure that they are properly protected so as not to contaminate the scene or themselves, e.g. gloves, booties, mask, respirators, disposable suits and eye protection in the event of biohazards.
- 4) The analyst shall assess the scene and determine what items of evidence shall be field processed or transported to the laboratory.
- 5) The analyst shall work closely with the CSS technician and/or the lead detective.
- 6) The final determination on all latent print technical, evidentiary, or processing issues shall rest with the analyst.

6.11 Supplies & Services

- 1) Supplies and materials that may affect quality of tests and calibrations must be checked and cleared before use.
- 2) All chemicals shall be of a reagent grade.
- 3) All fingerprint supplies shall be purchased from a reputable vendor who specializes in forensic equipment and supplies.
- 4) Purchased chemicals or reagents prepared in house will be evaluated per Q.M. 4.6.2 prior to use in casework.
- 5) Inventory shall be evaluated monthly and any goods or services required shall be listed by the Section Administrator for purchase.
- 6) Goods and services shall be purchased according to departmental policy and procedure by the Section Administrator, Laboratory Director or designee.
- 7) Materials and supplies that do not meet the minimum quality standards will not be used in case work.

6.12 Peer Review, Processing and Development

Peer review of processing and development cases is performed through a separate and independent visual examination by another qualified analyst after the primary analyst has examined the processed evidence for friction ridge detail.

- 1) Peer review shall be performed by any qualified analyst assigned to the latent fingerprint unit.
- 2) Only homicide and rape cases that are determined to have no latent ridge detail of value shall be peer reviewed.

- 3) The review shall consist of an independent visual examination performed by another qualified analyst to verify that no latent ridge detail of value is present on the item of evidence.
- 4) The reviewing analyst shall use direct examination under white light and a subsequent examination under ALS.
- 5) In the event of a conflict in conclusions between the primary analyst and the reviewing analyst, the item shall be moved forward to the photography phase by the primary analyst and the Section Administrator notified.
- 6) The reporting analyst shall acknowledge the peer review in the notes field in the processing matrix of PLIMS, indicating date and analyst that performed peer review.
- 7) This requirement shall not eliminate or take the place of any subsequent case record technical review.

6-13 Discharged – Fired Evidence

The following is the recommended sequence for application of processing techniques on fired evidence. This is a general guide and may be deviated from at the analyst's discretion. Fired evidence presents some unique challenges for latent impression development. The extremely high temperatures generated during weapon discharge flash any latent matrix from the casing surface. This makes traditional sequential processing ineffective since these processes rely on a matrix being present for development. Fired evidence will be exempt from the sequential processing guidelines in the SOP.

- a) Visual examination, direct and indirect white light.
- b) ALS - Inherent fluorescence.
- c) Fuming, RECOVER LFT.
- d) Visual examination, direct and indirect white light.
- e) If present, forensic imaging.

7 Processing Techniques

7.1 Discussion

This policy section shall contain recommended techniques that are preferred to be used by the CMPD latent Print unit to examine items of evidence for the presence of friction ridge impressions. These techniques are preferred due to their ease of use, low cost, high reliability, and compatibility with a high-volume laboratory. The recommendations of these techniques in no way restricts the analyst from selecting any technique that is approved under this SOP and described in either the current FBI Processing Guide for the Development of Latent Prints or the PSDB Manual of Fingerprint Development Techniques as described in 6-2 of this policy. For working, stock and chemical variations of all application techniques reference the above listed publications.

7.2 Visual Examination

1) Advantages

- a) Proper visual examination of evidence will reveal any latent friction ridge impressions without chemical or physical processing or destructive techniques. White and filtered light is used.
- b) Some constituents of sweat and foreign contaminants can luminesce or fluoresce without any treatment when exposed to filtered light.
- c) Non-Destructive.

2) Disadvantages

- a) Time consuming.
- b) Low success rate with latent deposits.

3) Materials & Equipment

- Butcher paper
- Protective clothing: lab coat, gloves, and protective eyewear
- Fume hood
- Evidence trays
- Bright Ambient light
- High intensity forensic light source with various viewing filters
- Professional fingerprint magnifiers
- Imaging system

4) Procedures

- a) Place the evidence items on clean butcher paper in evidence trays, on the dedicated work bench, or in the fume hood, depending on the evidence type.
- b) Analyze the evidence to determine what specific lighting technique to apply.

- c) Based on experience and training, the examiner selects the appropriate technique and light source based on the reflective nature of the substrate, type of development medium used and color of substrate and matrix.
- d) Examine the item for any indication of visible friction ridge impressions.
- e) Use magnification during the examination in order to ensure an effective result.
- f) Mark latents as per current policy.
- g) Photograph and/or Document Latent Impressions of value.
- h) Visual examination must be performed after further processing and again after each sequential process is applied to the item.

5) Results

- a) The results of the examination are recorded as positive if any friction ridge impressions of value are visible on the item of evidence.
- b) The results of the examination are recorded as negative if no friction ridge impression of value is visible on the item of evidence.

7.3 Conventional Powders

Conventional powders are used to visualize and enhance latent fingerprint deposits on non-porous items of evidence. The Latent Print Unit of the CMPD Crime Laboratory shall use only black powder regardless of the items surface and background color on surfaces where powder is applicable with the exception of fluorescing powders.

1) Advantages

- a) Proper application of conventional powder to the proper surface will adhere to remaining trace amounts of moisture allowing for the visualization of fingerprints.
- b) Fast, cost effective and productive technique for processing immovable objects or large areas such as homes and vehicles.

2) Disadvantages

- a) Can be messy.
- b) Destructive technique.
- c) Biological cross contamination likely if new unopened brush and powder are not used for each item processed.

3) Materials & Equipment

- Conventional black powder
- Camel hair or fiber fingerprint brush
- Bright white oblique light source

- Misonix WS6 down flow workstation
- Laboratory vent hood system

4) Procedures

- a) Charge the fingerprint brush with powder.
- b) Apply the powder to the item with a light circular spinning motion in the direction of the fingerprint ridges (if visible).
- c) Use an oblique light source to visually search for any developed latent fingerprints.
- d) Photograph, document or preserve latent impressions.

5) Results

- a) The results of the process and examination are recorded as positive if conventional powder adheres to any developed latent fingerprints, allowing visualization.
- b) The results of the process and examination are recorded as negative if conventional powder fails to develop any latent fingerprints, with no visualization of ridge detail of value.

7.4 Magnetic Powder

Magnetic powders are used to enhance latent fingerprints on glossy, waxed or sealed porous and non- porous items of evidence. They can also be used with success on smooth paper and smooth cardboard prior to chemical processing.

1) Advantages

- a) Proper application of magnetic powder to the proper surface will adhere to remaining trace amounts of moisture allowing for the visualization of fingerprints.
- b) Fast, cost effective and productive technique for processing sealed porous and non-porous surfaces.

2) Disadvantages

- a) Can be messy.
- b) Destructive technique.
- c) Difficult to use on metal surface.
- d) If not properly applied can destroy ridge detail.
- e) Biological cross contamination likely if new unopened wand and powder are not used for each item processed.

3) Materials & Equipment

- a) Magnetic powder.
- b) Magnetic application Wand.
- c) Oblique light source.
- d) Misonix WS6 down flow workstation.
- e) Laboratory vent hood system.

4) Procedures

- a) Charge magnetic wand with magnetic powder.
- b) Apply powder to the surface with a light brushing action in the direction of the fingerprint ridges (if visible).
- c) Hold the magnetic wand over the powder container and deactivate the brush by withdrawing the magnet.
- d) Pass the clean magnetic wand over the surface as closely as possible without touching the surface. Repeat this step again if an excess of powder remains on the surface.
- e) Use an oblique light source to visually search for any developed latent fingerprints.
- f) Photograph, document or preserve latent impressions.

5) Results

- a) The results of the process and examination are recorded as positive if magnetic powder adheres to any developed latent fingerprints, allowing visualization.
- b) The results of the process and examination are recorded as negative if magnetic powder fails to develop any latent fingerprints, with no visualization of ridge detail of value.

7.5 DFO (1, 8-DIAZAFLUREN-9-ONE)

DFO is a process used to develop latent fingerprints on paper and other various porous surfaces. This process is used prior to any Ninhydrin processing. DFO developed impressions are visible under filtered light.

1) Advantages

- a) Proper application of DFO to the proper surface will react to any trace amounts of amino acids allowing for the visualization of fingerprints once exposed to filtered light.
- b) Fast, cost effective and productive technique for processing porous paper surfaces that may have been wetted.

2) Disadvantage

- a) Can be messy.
- b) Destructive technique.
- c) If not properly applied can destroy evidence.

3) Materials & Equipment

- a) DFO working solution.
- b) Forceps.
- c) Shallow glass pans.
- d) Plastic wash bottle.
- e) DFO Development Control Chamber.
- f) ALS – Alternate Light Source.

4) Procedures

- a) Charge wash bottle with DFO working solution.
- b) Saturate porous evidence with DFO working solution.
- c) Hang item and allow item to dry at room temperature.
- d) Heat the item for 20 minutes at 100 °C in the DFO Development Control chamber, do not humidify.
- e) Carry out a fluorescence examination with mini crime scope visualizing any developed latent fingerprints.
- f) Photograph, document and preserve latent impressions.

5) Results

Results are based on whether a reaction occurs between the DFO and any latent Fingerprint deposits. Results are recorded as positive if latent fingerprints of value are observed and negative if no latent fingerprints of value are observed. Results may be observable under both direct white and filtered light. The results are transient and must be recorded photographically.

7.6 Ninhydrin

Ninhydrin is used to develop latent prints on porous surfaces. Ninhydrin reacts with the amino acids present in perspiration. This process is used after DFO. Ninhydrin is available commercially in spray cans, in a thermal paper formula, and in an acetone or petroleum ether formula.

1) Advantages

- a) Simple to use and very effective.
- b) Possible to detect very old prints.

c) Will react with blood.

2) Disadvantage

- a) Weak or no development on items that have been wetted.
- b) Detrimental to inks and writings.
- c) If contacts human skin will color purple for extended period of time.

3) Materials & Equipment

- a) Ninhydrin working solution or commercially available preparation.
- b) Absorbent paper.
- c) Blotting or tissue paper.
- d) Protective clothing, lab coat, nonporous gloves and safety glasses.
- e) Fume hood.
- f) Shallow pan.
- g) Forceps.
- h) Soft brush.
- i) Wash Bottle.
- j) Ventilated area for evidence drying.
- k) Ambient light.

4) Procedures

- a) Charge wash bottle with Ninhydrin working solution.
- b) Saturate porous evidence with Ninhydrin working solution.
- c) Hang item and allow item to dry at room temperature.
- d) Heating the item at 85 Deg. F and 80% relative humidity can accelerate the development time.
- e) Carry out a visual and fluorescence examination.
- f) Photograph, document and preserve latent impressions.

5) Results

Results are based on if a reaction occurs between the Ninhydrin and any latent fingerprint deposits. Results are recorded as positive if latent fingerprints of value are observed and negative if no latent fingerprints of value are observed. Latents will appear in various shades of purple under direct white light. The results are transient and must be recorded photographically.

7.7 Cyanoacrylate

Cyanoacrylate is used to develop latent friction ridge impressions on non-porous and some porous substrates. Cyanoacrylate fumes react (polymerize) with friction ridge constituents to form a hard, whitish to clear deposit throughout the latent impressions. Processing is referred to as CA fuming. The processing is performed

in a high humidity chamber. Cyanoacrylate is heated to about 120°C to vaporize the liquid. The procedure results in the growth of a microscopically fibrous matted deposit on the friction ridge impression, resulting in the polymerization the latent print deposit.

1) Advantages

- a) The polymerization of the latent impression preserves the latent print by forming it into a hard polymerized deposit.
- b) Cyanoacrylate fuming may help to visualize latent impressions.
- c) Cyanoacrylate treated latent impressions can be enhanced further by dye staining with fluorescent chemicals and powders or traditionally powdered and tape lifted.

2) Disadvantages

- a) Improper application or over-fuming of the items of evidence can result in the latent impressions being over-developed damaged or obliterated.
- b) Not suitable on most porous surfaces or older latent friction ridge impressions.
- c) Less effective on items that have been wetted.
- d) Destructive technique, process is irreversible.

3) Materials & Equipment

- a) Cyanoacrylate.
- b) Control standards.
- c) Aluminum fuming dishes.
- d) Protective clothing, lab coat, non-porous gloves, safety glasses.
- e) Misonix CA-6000.
- f) Payton WS-1800-40-A CY-AT Vac.
- g) Payton CYVAC-M.
- h) Sirchie VAC 200.
- i) Sirchie VAC 100.
- j) Sirchie FR200 AT VAC Chamber.
- k) High Intensity Forensic Light source.

4) Procedures

- a) Select the appropriate fuming chamber based on the evidence to be processed.
- b) Prepare the chamber for use according to the procedures in the vendors supplied operations manuals.
- c) Place the item to be processed in the fuming chamber by clipping lightweight or flimsy item to the hanging rails and placing larger item on the base of the chamber or on shelving, if available. Evidence should be evenly

distributed throughout the chamber and should not be in contact with the walls or other items of evidence.

- d) Place a control sample where it can be observed during the fuming cycle if possible.
- e) Distribute the appropriate amount of cyanoacrylate and place in position based on the relevant instrument instructions.
- f) Begin the fuming process.
- g) The fuming process should start producing results within 5 minutes of fuming.
- h) The time is dependent on the type of substrate, chamber used as well as the matrix, which is usually an unknown factor. Both the control sample and the evidence should be closely monitored.
- i) If no friction ridge impressions develop on the control sample and no accumulation of glue is visible; all processing of evidence in the chamber should be stopped after 20 minutes. The process should be repeated with a different control sample on its own to establish the cause of the unsuccessful result.
- j) Once the friction ridge impressions on the control sample have developed visually, the process must be stopped. To stop the fuming process, follow the appropriate steps as outlined in vendor operations manuals.
- k) Follow the relevant instrument requirements for purging to remove hazardous fumes before opening the chamber.
- l) Remove the processed items and visually examine the evidence using a forensic light source at different wavelengths and angles with subsequent application of the appropriate dye stain.
- m) Photograph, document and preserve latent impressions.

5) Results

Results are based on whether the cyanoacrylate fuming process developed any friction ridge impressions of value on the evidence. Results of the process are recorded as positive if friction ridge impressions developed on the evidence. Results of the process are recorded as negative if no friction ridge impressions of value developed on the evidence.

Note: The decision to re-fume will be at the discretion of the examiner. It is recommended that the cyanoacrylate developed impressions be allowed to cure for 20 minutes before the dye stain is applied. Developed impressions may be visible under direct white and/or filtered light.

7.8 Amido Black

Amido black is a protein stain that is used to develop latent prints and enhance faint visible prints that have been deposited in blood. It can be water or methanol based depending on the application and surfaces that it is intended for.

1) Advantages

- a) Very sensitive to bloody latent print and other blood contaminated transfer impressions.

2) Disadvantages

- a) Methanol vapors are hazardous in confined spaces.
- b) Methanol based formula can be detrimental to painted surfaces.
- c) May destroy latents as well as the underlying surface.
- d) Cyanoacrylate fuming is detrimental to this process.

3) Materials & Equipment

- a) Naphthol blue black.
- b) Glacial acetic acid.
- c) Methanol.
- d) Distilled water.
- e) Citric Acid.
- f) Scales, beakers, graduated cylinder, magnetic stirrer and stirring bar.
- g) squirt bottles or sprayer, clear or dark storage bottles.

4) Procedure

The process is different for each base carrier; refer to the FBI processing manual for the specific chemical carrier. Application is a three-stage process, developer solution, rinse solution and final rinse solution. Apply the developer to the specimen by dipping, spraying, or using a squirt bottle. Leave the developer on the specimen for approximately 30 seconds to 1 minute then apply the rinse. These steps can be repeated to improve contrast. Apply the final rinse of distilled or tap water, then dry the specimen. Photograph, document and preserve latent impressions.

5) Results

Results of the examination are recorded as positive if any friction ridge impressions of value are visible on the item of evidence.

Results of the examination are recorded as negative if no friction ridge impressions of value are visible on the item of evidence. If there is positive development impressions will be visible under direct white light and appear as varying shades of blue/black.

7.9 Gentian Violet

Gentian violet is a surgical dye used to develop latent fingerprints on the adhesive side of tape products. This process dye stains skin cells sloth off into the tape glue

during contact.

1) Advantages

- a) Highly sensitive dye that stains skin cells imbedded into the sticky side of tape glue.
- b) Safe process with few side effects.

2) Disadvantages

- a) Water soluble, adhesive tapes should not be processed with this method.
- b) Can destroy tape and underlying surface if misapplied.

3) Materials & Equipment

- a) Gentian Violet working solution.
- b) Tap water.
- c) Shallow pan.
- d) Forceps.

4) Procedures

- a) Fill a shallow glass pan with one inch of gentian violet working solution.
- b) Gentian violet is applied by dipping. When processing, place the specimen in the gentian violet solution for approximately 1 to 2 minutes.
- c) Rinse the item under slowly running, cold tap water until excess dye has been removed. Any latent fingerprints that react with the dye will be purple.
- d) If developed latent fingerprints appear faint, repeat steps 2 and 3.
- e) Photograph, document and preserve latent impressions.

5) Results

Results are based on the observation of a staining reaction between the gentian violet and any latent fingerprints on the tape glue surface. Results are recorded as positive if purple-colored latent fingerprints of value are observed, negative if no latent fingerprints of value are observed. Impressions must be photographically preserved.

7.10 Sticky Side Powder

Sticky Side Powder is a process used to develop latent impressions on the sticky glue side of tape. This process reacts with the glue by depositing liquid suspended graphite onto the glue surfaces at different volumes, resulting in the observation of ridge impressions.

1) Advantages

- a) Excellent results on duct tape, masking tape, packing labels, adhesive bandages, plastic surgical tape, double-sided foam tape, paper-backed labels, clear plastic tape, reinforced packing tape.
- b) Good / fair results on cloth surgical tape, frosted plastic tape, adhesive edge of 3M™ post-it® notes.

2) Disadvantages

- a) Poor results on black electrical tape (due to poor contrast), some paper labels and tapes and labels with dried-out adhesives, some contact papers or shelf papers.

3) Materials & Equipment

- a) Sticky-Side working solution.
- b) Application brush.

4) Procedures

- a) Apply the sticky-side working solution to the adhesive side of the item(s) with an application brush.
- b) Leave the solution on the item for 10 to 15 seconds and then rinse with tap water to remove excess solution.
- c) Visually examine the item for any developed latent fingerprints.
- d) If developed latent fingerprints appear faint, repeat steps 1-3.
- e) Photograph, document and preserve latent impressions.

5) Results

Results are recorded as positive if the sticky-side powder develops latent fingerprints of value; negative if the powder does not enhance any latent fingerprints of value. Any impressions that are developed will need to be photographically preserved

7.11 Alternate Black Powder

Alternate black Powder is an optional and highly effective process to develop latent fingerprint impressions on the adhesive side of tape and labels.

1) Advantages

- a) Inexpensive.
- b) Highly effective.
- c) Displays very good contrast.

2) Disadvantages

- a) Not suitable for dark or black electrical tape.
- b) Must be mixed properly or will not work.

3) Materials & Equipment

- a) Lightning® black powder.
- b) Liqui-Nox - concentrated liquid detergent or liquid Dawn.
- c) Photo Flo solution.
- d) Application brush.
- e) Petri dish.

4) Procedures

- a) Apply the Alternate Black Powder working solution to the adhesive side of the item with an application brush.
- b) Leave the solution on the item for 10 to 15 seconds.
- c) Rinse with tap water to remove excess solution.
- d) Visually examine the item for any developed latent fingerprints.
- e) If developed latent fingerprints appear faint, repeat steps 1-3.
- f) Photograph, document and preserve latent impressions.

5) Results

Results are recorded as positive if the sticky-side powder develops any latent fingerprint impressions of value; negative if the powder does not develop any latent fingerprints of value. Any impressions that are developed will need to be photographically preserved.

7.12 MBD

MBD is a fluorescent dye used to make cyanoacrylate developed latent prints more visible on various colored surfaces. An ALS is used in conjunction with this process and forensic imaging is used to preserve the impressions.

1) Advantages

- a) Effective technique for visualizing friction ridge detail on items of evidence processed with cyanoacrylate fuming.
- b) Adheres to very miniscule deposits of cyanoacrylate.

2) Disadvantages

- a) Destructive technique.
- b) Permanently alters the matrix of the latent fingerprint.

3) Materials & Equipment

- a) MBD.
- b) Acetone.
- c) Isopropanol.
- d) Petroleum ether.
- e) Methanol.
- f) Scales, beakers, graduated cylinder, magnetic stirrer and stirring bar.
- g) ALS, Alternate Light Source.
- h) Squirt bottle.
- i) Dark storage bottles

4) Procedure

- a) The MBD working solution can be applied by dipping or using a squirt bottle.
- b) This solution is applied to the specimen(s) after the cyanoacrylate fuming process.
- c) Examine under an ALS.
- d) Photograph any developed latent fingerprints of value.

5) Results

Results are based on whether there is visualization of latent fingerprints of value when examined under the ALS. Results are recorded as positive if latents of value are visualized, negative if no latents of value are observed.

7.13 RECOVER LFT

RECOVER LFT is a vacuum processing technique that uses a chemical vapor fuming process to develop latent fingerprints on difficult surfaces, primarily metal surfaces that have been exposed to extreme heat and items that have been wiped, washed, or exposed to adverse post transfer environmental conditions. This process utilizes a proprietary Copper bromide tetrathiatetrazocine fuming process that is not dependent on a latent matrix being present on the substrate for development. This process relies on the corrosion signature present on the metal surface and develops latent marks based on the differences in surface energy.

1) Advantages

- a) Develops fingerprints on metals exposed to extreme temperatures such as fired ammunition cases or vehicles that have been set on fire.
- b) Develops fingerprints on metal surfaces, including surfaces that have been recovered from water or deliberately washed.
- c) Develops fingerprints on nonmetallic nonporous surfaces if latent matrix is present.

2) Disadvantages

- a) Discolors metal surfaces.
- b) Does not work on coated metals such as blued, parkerized or cerakote coated metals.
- c) Cost

3) Materials & Equipment

- a) RECOVER LFT development system.
- b) Precursor charge 1, copper, brass, bronze etc.
- c) Precursor charge 2, Aluminum, steel, nickel etc.
- d) Brass and steel control samples.

4) Procedure

- a) RECOVER LFT cycle
- b) Visual examination
- c) Forensic Imaging

Note: For specific procedural instructions see the RECOVER LFT digital user's manual (2630-0-04) dated November 2020.

5) Results

Results are based on whether there is visualization of latent fingerprints of value when examined. Results are recorded as positive if latents of value are visualized, negative if no latents of value are observed.

F8 AFIS

8.1 Access to System

- 1) The AFIS and NGI shall be accessed by only authorized personnel assigned to the Latent Print Unit. All staff shall be assigned passwords by the State and are to keep their passwords confidential.
- 2) Technicians employed by the equipment vendor or the State Bureau of Investigation shall have access to the systems and equipment as needed, for maintenance, repairs, and general system and software updates.

8.2 Records & Logs

- 1) All AFIS/NGI logs are maintained in the administrative report function of AFIS. As of the date of this SOP, paper logs will no longer be required or maintained.

8.3 AFIS Area Maintenance

- 1) The AFIS lab shall be kept free from obstructions or other hazards that could potentially harm the systems, damage hardware or peripherals, or otherwise damage equipment.
- 2) There shall be no eating or drinking at any of the AFIS workstations.
- 3) Repair or system maintenance shall be performed only by contract maintenance personnel excluding camera calibration and general consumables maintenance such as paper and toner.
- 4) At the end of every shift the AFIS lab door shall be closed and locked.
- 5) In the event of a system malfunction or failure, the Section Administrator or his designee shall be immediately notified of the problem. In the event the Section Administrator or designee is unavailable, the Senior Analyst on duty at the time shall contact the State Bureau of Investigation AFIS Section for guidance or the agencies IDEMIA Representative. (As of 9/17 Morpho-Printrak is IDEMIA)

8.4 Electronic Ten Print Cards

- 1) AFIS/NGI is a search tool that enhances our identification capability by electronically searching fingerprint records contained in remote off-site servers. The systems do not identify fingerprints, they search for potential candidates based on the information contained within the search print and file print. Under no circumstances will any latent fingerprint be identified based solely on an AFIS candidate return without further direct analysis and application of ACE-V.

- 2) When a search image and file image potentially agree, the candidate card shall be printed from NC State AFIS for analysis and confirmation of the hit.
- 3) The candidate list will not be released or retained.

8.5 System Checks & Calibration

- 1) On a monthly basis the AFIS system shall be checked for proper function, including a cursory inspection of the peripherals. Any obvious maintenance issues shall be brought to the attention of the Section Administrator.
- 2) The camera shall be checked for proper function monthly, utilizing the supplied manufacturer's scales and calibrated as needed.
- 3) The results shall be documented in the calibration log by the Analyst performing the check.
- 4) Proper procedures for camera calibration are contained in the Printrak Omnitrak AutoClass and Minutiae Encoding Training Guide Appendix "A" Camera Calibration.
- 5) Proper AFIS system operational procedures are contained in the Printrak Latent Station Users Guide Version 9.9.

9 Imaging

This policy contains the procedures used by the Charlotte-Mecklenburg Latent Print Unit when using the DCS-5 and Adobe Photoshop Digital Imaging Systems for the digital capture of latent fingerprints. These refer to the digital recording and depiction of friction ridge impressions that are present or developed on evidence. Policies and procedures must be in place for the digital capture, storage, retrieval, display and transmission of friction ridge images retained as evidence. These policies and procedures are implemented to provide quality images for comparative analysis and to preserve identity, authenticity, integrity, and security of friction ridge digital images. A certain amount of latitude in the actual capture and enhancement of the images is left to the individual Fingerprint Analyst dependent on the physical conditions present on the evidence at time of recording. No protocol or procedure can replace sound judgment under all situations.

9.1 General

- 1) Latent print image processing (capture & enhancement) will be done utilizing the DCS-5 workstation, Adobe Photoshop Software program, or CSIIPIX Software, and printed utilizing dye sublimation thermal printing to assure image longevity.
- 2) The digital imaging system will be used only by an Analyst of the Latent Print Unit for forensic fingerprint photography and to provide photographic support to other laboratory sections as needed. No other uses are permitted without the permission of the Section Administrator.
- 3) Image processing techniques approved for use on Working Images are those that have direct counterparts in traditional darkrooms. These include, but are not limited to, brightness and contrast adjustment, dodging and burning, color balancing, levels, curves, hue/saturation and invert. Additionally, using mode, channels and FFT filters is acceptable. These tools are typically found with Adobe Photoshop software. The Foster Freeman DCS-5 software is programmed with latent specific tools that assure image integrity.
- 4) Tools prohibited for use on Working Images are those that only add or delete content from the image that serves no analytical purpose. These include, but are not limited to, rubber stamp, clone, airbrush, paintbrush, paint bucket, eraser and blur.
- 5) After the Working Image has been processed and the processes have been recorded, the image processing program is exited and the changes to the image and its history are saved as a separate file from the original in the Photoshop history. DCS-5 software autosaves all image history and tracking as part of the image case file.

9.2 Imaging Glossary

Archive Copy

A copy of data placed on media suitable for long-term storage, from which subsequent working copies can be produced.

Archive Image

Any image placed on media that is suitable for long-term storage.

A bit stream duplicate of the original data placed on media that is suitable for long-term storage.

Archiving

Long-term storage of data.

Artifact

A visual/aural aberration in an image, video, or audio recording resulting from a technical or operational limitation. Examples include speckles in a scanned picture or “blocking” in images compressed using the JPEG standard.

Information or data created as a result of the use of an electronic device that shows past activity.

Authentication

The process of determining whether a recording or image is original, continuous, free from unexplained alterations (e.g., additions, deletions, edits, or artifacts) and is consistent with the stated operation of the recording device used to make it.

Capture

The process of recording data, such as an image, video sequence, or audio stream.

Capture card/frame grabber

A piece of computer hardware that accepts an analog or digital signal and outputs the signal as digital data.

Capture Device

A device used in the recording of data.

Carve

The extraction of a portion of data for the purpose of analysis.

CD/DVD (compact disc/digital versatile disc)

Optical disc formats designed to function as digital storage media.

Chain of Custody

The chronological documentation of the movement, location and possession of evidence.

Color Range

The range of colors that can be detected by a sensor.

Compression

The process of reducing the size of a data file. (See also, “Lossy Compression” and “Lossless Compression”.)

Compression ratio

The size of a data file before compression divided by the file size after compression.

Copy

An accurate reproduction of information.

Data

Information in analog or digital form that can be transmitted or processed.

Digital Evidence

Information of probative value that is stored or transmitted in binary form.

Digital Image

An image that is represented by discrete numerical values organized in a two-dimensional array. When viewed on a monitor or paper, it appears like a photograph.

Directory Listing

A list of all the files on media. It may also contain other information such as the size and dates of the files.

Duplicate

An accurate and complete reproduction of all data objects independent of the physical media.

Erased File Recovery

The process for recovering deleted files.

File Format

The structure by which data is organized in a file.

File Slack

The space between the end of file marker and the end of the last storage unit for that file. Ex: For the FAT file system, the space between the end of the file marker and the end of the cluster.

Forensic

The use or application of scientific knowledge to a point of law, especially as it applies to the investigation of crime.

Format

One or several combined elements that may be used to describe the video recording method. These include tape width (e.g. 8mm, ½ inch, ¾ inch, 1 inch), signal form (e.g. composite, Y/C, component), media (e.g. VHS tape, DVD, CD), data storage type (e.g. analog/digital, AVI/MPEG), and signal standard (e.g. NTSC, PAL, SECAM).

Free Space

Data storage areas available for use by the computer. The area may already contain previously stored information. Also referred to as Unallocated Space.

Format Conversion

To transfer audio and/or video information from one media type to another and/or from one recording method to another.

Image

A bit stream duplicate of the original data.

An imitation or representation of a person or thing, drawn, painted, photographed, etc.

Image Analysis

A sub-discipline of Digital & Multimedia Evidence, which involves the application of image science and domain expertise to examine and interpret the content of an image and/or the image itself in legal matters.

Image Comparison (Photographic Comparison)

The process of comparing images of questioned objects or persons to known objects or persons or images thereof, and making an assessment of the correspondence between features in these images for rendering an opinion regarding identification or elimination.

Image Enhancement

Any process intended to improve the visual appearance of an image or specific features within an image.

Imaging Technology

Any system or method used to capture, store, process, analyze, transmit, or produce an image. Such systems include film, electronic sensors, cameras, video devices, scanners, printers, computers, etc.

Image Transmission

The act of moving images from one location to another.

Intermediate Storage

Any media or device on which data is temporarily stored for transfer to permanent or archival storage.

Log File

A record of actions, events, and related data.

Lossy Compression

Compression in which data is lost and cannot be retrieved in its original form.

Lossless Compression

Compression in which no data is lost and all data can be retrieved in its original form.

Media

Objects on which data can be stored.

Native File Format

The original form of a file. A file created with one application can often be read by others, but a file's native format remains the format it was given by the application that created it. In most cases the specific attributes of a file (for example, fonts in a document) can only be changed when it is opened with the program that created it.

Original Image

An accurate and complete replica of the primary image, irrespective of media. For film and analog video, the primary image is the original image.

Partition

User defined section of electronic media.

Physical Copy

An accurate reproduction of information contained on the physical device.

Primary Image

Refers to the first instance in which an image is recorded onto any media that is a separate, identifiable object. Examples include a digital image recorded on a flash card or a digital image downloaded from the Internet.

Processed Image

Any image that has undergone enhancement, restoration or other operation.

Proprietary File Format

Any file format that is unique to a specific manufacturer or product.

Reproducibility

The extent to which a process yields the same results on repeated trials.

Residue

(c) Data that is contained in unallocated space or file slack.

(a) The residue of a filtered signal is the algebraic difference between the filter output and its signal input.

Storage Media

Any object on which data is preserved.

Traditional Enhancement Techniques

Techniques that have direct counterparts in traditional darkrooms. They include brightness & contrast adjustment, color balancing, cropping, and dodging & burning.

Unallocated Space

Data storage areas available for use by the computer. The area may already contain previously stored information. Also referred to as *Free Space*.

Verification

The process of confirming the accuracy of an item to its original.

Working Copy

A copy or duplicate of a recording or data that can be used for subsequent processing and/or analysis.

Write Block/Write Protect

Hardware and/or software methods of preventing modification of media content.

9.3 Image Documentation

Friction ridge digital images, case notes, or associated data shall include the following:

- 1) Case number.
- 2) Date and initials of analyst.
- 3) Description or identifier of the item bearing the friction ridge impression.

- 4) If available, information about the orientation and/or location of the friction ridge impression on the object through description and/or diagram(s), this may be included on the image, the notes matrix in PLIMS or final report.
- 5) In addition this section shall comply with any additional requirements imposed by the CMPD QAM.

9.4 Image Quality

- 1) Friction ridge impressions should be captured (color or grayscale) at 1000 PPI or higher resolution. Grayscale digital imaging should be at a minimum of 8 bits. Color digital imaging should be at a minimum of 24 bits.
- 2) Friction ridge impression digital images shall be stored and transmitted without compression or with lossless compression.
- 3) Images generated for other lab sections shall comply with that individual lab sections policies and technical requirements if applicable.
- 4) All images generated by the CMPD Latent Print unit shall be stored and archived as TIFF files.

9.5 Image Integrity

- 1) Each primary original digital image shall be stored in a manner which permits authentication. An original unaltered file will be created for every image from which working replicas will be created.
- 2) Original digital images are accurate replicas (pixel for pixel value) of the primary image.
- 3) Subsequent images resulting from digital processing techniques shall not replace, or be considered original images.
- 4) Digital images captured from lifts, or from conventional photographs or negatives, shall not replace the lift or photograph as the original image.

9.6 Image Documentation

- 1) Documentation procedures in general, shall meet the requirements as outlined in LP4.
- 2) Casework documentation in PLIMS shall distinguish friction ridge impression (latent print) digital images from latent lifts in the parent item description.

- 3) The application of digital image processing (enhancement) techniques to a copy of an original digital image for comparison purposes shall be documented. This documentation must be sufficient to enable evaluation or replication of the digital image processing techniques. This standard can be met by software applications bundled with the enhancement software such as in Adobe Photoshop and DCS-5 software.
- 4) Digital images prepared for other purposes do not require digital image enhancement documentation, i.e., demonstrative court exhibits, display projects and training.
- 5) If only minor digital image adjustment are made to the entire image, similar to conventional photography/darkroom adjustment to brightness, contrast and color shift, etc., documentation is not required.

9.7 Image Retention

- 1) Latent print images of no value will not be retained and may be deleted to efficiently utilize available disc space.
- 2) Latent print images of value will not be deleted.
- 3) A master folder will be created for each case containing subfolders for each separate control number and working images.
- 4) Images will be retained indefinitely and archived to the R-Drive, CD or DVD as disc space is needed.
- 5) Original Image files will be backed up on redundant hard drives contained as part of the DCS-5 and Adobe Photoshop digital imaging systems and will be backed up on the CMPD R Drive.
- 6) Working and images that are part of a case report will be attached to the case record in PLIMS.

9.8 Image Storage & backup

- 1) Archiving will be done to CMPD R Drive and CD-R/DVD-R.
- 2) Archived CD/DVD's will be stored in the same manner as archived latent fingerprints.

9.9 Storage medium

Acceptable methods of media and image storage for archival and working storage

shall meet the following conditions.

- 1) Data stored on CD/DVD shall be stored on CD-R/DVD-R write once media or with disc finalization.
- 2) Storage media should be of high quality to ensure long storage life.
- 3) Only industry standard formats shall be used for data/image storage. (TIFF)
- 4) CDs shall be stored in appropriate conditions and be protected from light and moisture.
- 5) There shall be no writing or sticky labels placed directly on either side of the CD/DVD as to protect the dye layer. All documentation shall be on the CD/DVD case.

CMPD Crime Laboratory Division Latent Prints Standard Operating Procedures

Issue Date	Modification
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History

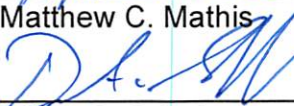
1/24/18	Original Issue of Complete Revision
3/09/18	Updated LP2, LP4, LP5, and LP10 to comply with new DOJ terminology recommendations.
5/2/18	Update LP1 definitions, evaluation.
10/26/18	Updated bullet trap description in LP3.6. Updated charting in LP4. Updated the scope in LP1.2. Removed ASCLD from LP5.1.2 and LP9.6. Removed SOP 10 and replaced it with a Latent Print training manual.
12/15/18	LP3-4 Updated Latent Card Archiving.
10/09/19	Updated LP5.2.1. a report footer
03/24/20	Updated LP5.2.1 report footer and LP5.2.2 report contents
09/05/21	Update LPU4.10 Charted Enlargements – Reference Images
01/01/23	Updated LP1, added NGI to Definitions, Notated IAFIS as deactivated, Replaced IAFIS references with NGI. Added DCS5 and Recover LFT to definitions. Added OSAC to definitions. Updated LPU2, Grammar and formatting corrections throughout. Updated LPU3, Grammar and formatting corrections throughout, added NGI, added attached AFIS negative to PLIMS. Added LPU 3.12 Fired evidence. Updated LPU4, Removed IAFIS and replaced with NGI. Grammatical and formatting corrections throughout. 4.2.a, added scanned into PLIMS. Updated 4.14 Juvenile collections. Updated LPU4.7 Major Case Notifications. Updated LPU5, Added conclusions, grammatical and formatting corrections throughout. Updated LPU6, added 6-13 Discharged - Fired evidence, Grammatical and formatting corrections throughout. Updated LPU7, Added 7.13 RECOVER LFT, Grammatical and formatting corrections. Updated LPU8, Replaced IAFIS with NGI, deleted 8.2.2 tough 8.2.6 logbook, updated 8.2.2 to electronic logs. Updated LPU9 adding DCS-5 digital imaging workstation.
02/08/23	Update LPU6.12 Peer Review Processing and Development.

Director


Matthew C. Mathis

Date: 2/8/2023

Section Supervisor


David C. Schultz

Date: 02/08/23