CRIME SCENE MANUAL

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Revision History

Revision #	Description of Changes
1	First Qualtrax revision. Changes to table of contents and section headings: Section 5 now "Crime Scene Security and Precautions", Section 6 now "Crime Scene Investigation Methodology", Section 7 now "Observations and Notes", Section 8 now "Photography", Section 9 now "Diagrams", Section 10 now "Presumptive Blood Tests", Section 11 now "Biological Evidence Collection", Section 12 now "Blood Enhancement Chemicals", Section 13 now "Recognition and Documentation of Evidence in Bloodshed and/or Shooting Scenes", Section 14 now "Latent Print Development and Preservation", Section 15 now "Impression Evidence", Section 16 now "Trace Evidence", Section 17 now "Firearms and Tool Mark Evidence", Section 18 now "Vehicle Processing", Section 19 now "Human Remains and Buried Body Excavations", Section 20 now "Entomology", Section 21 now "Fire and Arson Investigation", Section 22 now "Documentation and Evidence Collection from Victims, Subjects, and Suspects", Section 23 now "Validation", Section 24 now "Forms", Section 25 now "Equipment Calibration and Maintenance", Section 26 now "Chemicals, Supplies, and Reagent Preparation", Section 27 now "Report Writing", Section 28 now "Review", Section 29 now "Proficiency Testing", and Section 30 now "Safety." Addition of Presumptive Blood Testing (section 10), including addition of safety sections, clarifying language, and formatting changes. Addition of Organization and Management (section 3), Personnel (section 4), Crime Scene Investigation Methodology (section 6), Observations and Notes (section 7), Biological Evidence Collection (section 11), Latent Print Development and Preservation (section 14), Impression Evidence (section 15), Trace Evidence (section 16), Vehicle Processing (section 18), Validation (section 23), Forms (section 24). Change of manual name. Addition of references. Formatting and grammatical changes throughout.
	Addition of Firearms and Tool Mark Evidence (section 17), Documentation and Evidence Collection from Victims, Subjects, and Suspects (section 22), Scene Security and Precautions (Section 5), Diagrams (Section 9), Blood Enhancement Chemicals (Section 12),

	Buried Body Excavations and Scattered Human Remains(Section 19), Review (Section 28), Proficiency Testing (Section 29), Fire Scenes (Section 21), Tools and Equipment (Section 25), Recognition and Documentation of Evidence in Bloodshed and/or Shooting Scenes (Section 13). Section 7.5.5.4.1 was added for bindings and ligatures. Section 7.6.2.1 added for use of markers. Section 27.2 added for ILIMS entries. Section 11.11 was modified to add menstrual cups and period panties. Section 8.24.4.3 was added to clarify photography of evidence in a crime scene. Section 8.7.1 was modified to include documentation of unintended photos. Section entitled "Chemicals, Supplies, and Reagent Preparation" was deleted; subsequent sections renumbered. Additions to definitions: Crime Scene, Defect, Evidence, Shotshell case/hull, and Transient Evidence. Update name of digital imaging system from Foray to Adams Web throughout. Update VIN list to include years 2020-2022. Title of Section 29 changed to Buried Body Excavations and Scattered Human Remains. Add additional references, formatting, clarifying language, and grammatical changes throughout.

1.0 Introduction

1.1 Statement of Purpose/Background

The purpose of the Idaho State Police (ISP) Crime Scene Response Unit is to provide an evaluation and examination of the crime scene for the purpose of recovering physical evidence and documenting the scene's condition for use by the criminal justice system. The ISP Quality Manual and the ISP Crime Scene Manual provide the structure for these objectives.

1.2 Objectives/Scope:

1.2.1 To develop and maintain, through annual review and revision, a system of quality procedures, analytical methods, and controls.

1.2.2 To ensure that personnel have quality, relevant, and timely training in the subjects for which they'll conduct analyses at crime scenes.

1.2.3 To remain scientifically neutral by basing evidence collection and analysis decisions, case reports, and testimony on scientific rationale.

1.2.4 To provide high quality training, technical and informational assistance, analyses, written reports, and testimony.

1.2.5 To provide services in a timely and cost effective manner.

1.3 References

1.3.1 Idaho State Police Forensic Services – Quality Manual Section 2.0 NORMATIVE REFERENCES.

1.3.2 Practical Crime Scene Processing and Investigation, Second Edition, Ross M. Gardner

1.3.3 Practical Homicide Investigation, Fourth Edition, Vernon J. Geberth

1.3.4 Principles of Bloodstain Pattern Analysis, Theory and Practice, Stuart H. James, Paul E. Kish, and T. Paulette Sutton

1.3.5 Practical Crime Scene Analysis and Reconstruction, Ross M. Gardner and Tom Bevel

1.3.6 United States Department of Labor, Occupational Safety and Health Administration (OSHA) website (www.osha.gov)

1.3.7 A Short Course in Photography, Third Edition, Barbara London and Jim Stone

1.3.8 Association of Firearm and Toolmark Examiners (AFTE) Glossary, 6th Ed.

1.3.9 International Association for Property and Evidence, Inc., "Professional Standards", REV March 8, 2015, (http://home.iape.org/)

1.3.10 Advances in Fingerprint Technology, Henry Lee and R.E. Gaensslen.

1.3.11 Scott's Fingerprint Mechanics, Robert D. Olsen, 1978.

1.3.12 Fingerprint Techniques, Andre A. Moenssens, 1971.

1.3.13 Manual of Fingerprint Development Techniques Home Office Police Scientific Development Branch, 1998.
1.3.14 Friction Ridge Skin, Comparison and Identification of Fingerprints, James F. Cowger, 1993.
1.3.15 "Decoding a Sample VIN", DMV.ORG
1.3.16 Ada County Sheriff's Office, Crime Scene Analytical Method, Impression Evidence.
1.3.17 "Latent Print Development", The Fingerprint Sourcebook, US Department of Justice, 2011, Section 7.10.4, Brian Yamashita and Mike French.
1.3.18 "Buried Body & Surface Skeleton Workshop" course notebook, "Handbook of Forensic Archaeology & Anthropology", edited by Dan Morse, Jack Duncan, and James Stoutamire, 1983.
1.3.19 ISPFS quality and analytical methods for various disciplines, including latent prints, biology, fire, and firearms.

2.0 Definitions

ABRASION – An injury to the skin in which the superficial epithelial layer of the skin (the epidermis) is removed due to friction against a rough surface with resultant scraping away of the superficial portions of the epidermis; wearing away of the skin in small shreds by friction.

ABRASION COLLAR – the circular perforation and blackening effect on the edges of the skin as the bullet passes through the skin.

ACTION – the working mechanism of a firearm; the combination of the receiver or frame, the breech bolt, and the other parts of the mechanism by which a firearm is loaded, fired, and unloaded.

ADHESIVE LIFTER – any variety of adhesive-coated material or tapes, commonly used to lift fingerprints or footwear impressions; may also be employed to lift trace materials from a surface.

ADIPOCERE – waxy, soap-like substance formed during the decomposition of animal bodies buried in moist places; consists principally of insoluble salts of fatty acids; also called “grave wax”.

AIRBORNE PATHOGENS – infectious disease-causing microorganisms, which may be present in biological fluids, and are spread through the air via coughing, sneezing, talking, spitting, etc.

AIR GUN – a gun that uses compressed air or gas (carbon dioxide) to propel a projectile.

ALTERNATE LIGHT SOURCE (ALS)/FORENSIC LIGHT SOURCE – light source that produces a high-intensity light, ranging from ultraviolet to infrared, which may be used to facilitate the recovery of evidence such as latent prints, hairs, fibers, and bodily fluids.

AMBIENT LIGHT (AVAILABLE LIGHT) — the light that already exists (as opposed to being added by the photographer) where a photograph is to be made.

AMBIENT TEMPERATURE – the temperature of the air circulating around a given location.

AMMO/ AMMUNITION – one or more loaded cartridges consisting of a primed cartridge case, propellant, and with or without one or more projectiles; often abbreviated as AMMO.

ANTEMORTEM – before death.

ANTERIOR – (Ventral) the front; indicates the front or belly side of the body.

ANGLE OF IMPACT – The acute or internal angle formed between the direction of a blood drop in flight and the plane of the surface it strikes.

APERTURE – the lens opening formed by the iris diaphragm inside the lens. The size is variable and adjusted by the aperture control.

APERTURE PRIORITY MODE – an automatic exposure system in which the photographer sets the aperture (f-stop) and the camera selects a shutter speed for normal exposure; often designated by the letter “A” on the camera mode dial.

AREA OF CONVERGENCE – the area to which stains within a bloodstain pattern can be reconstructed on a two-dimensional surface determined by tracing the long axis of well-defined bloodstains within the pattern to a common area.

AREA OF ORIGIN – The three-dimensional area to which stains within a bloodstain pattern can be reconstructed in space using the common area of convergence and the angles of impact.

ARTERIAL PATTERN – A pattern resulting from blood exiting the body under pressure from a breached artery.

AUTOMATIC EXPOSURE – a mode of camera operation in which the camera automatically adjusts either the aperture, the shutter speed, or both for normal exposure.

AUTOMATIC FLASH – an electronic flash unit that uses its light-sensitive cell or the camera’s to determine the duration of the flash for normal exposure by measuring the light reflected back from the subject.

AUTOPSY – the internal and external examination of the body after death.

BACKSTRAP – the exposed metal strip at the rear of a pistol or revolver grip.

BALL – typically refers to a cylinder-shaped bullet with either a rounded or pointed nose and is typically used with muzzle-loaded firearms.

BALLISTICS – the study of projectile motion and effects.

BACK SPATTER – Blood droplets directed back toward the force or energy that caused the spatter, often associated with gunshot wounds of entrance.

BARREL – that part of a firearm through which a projectile or shot charge travels under the impetus of powder gasses, compressed air, or other like means; a barrel may be rifled or smooth.

BARREL ARRANGEMENT – the relationship to each other, in which multiple barrel systems are positioned in firearms (e.g. over and under, side-by-side, etc.).

BB – the designation of spherical shot having a diameter of .180” used in shotshell loads; also used to designate steel or lead air gun shot of .175” diameter.

BIOHAZARD BAG – a red plastic bag with the biohazard logo or insignia imprinted on it; appropriate disposal method for items exposed to blood or biological fluids that may contain contamination.

BIOLOGICAL FLUIDS – Blood, semen, saliva, vaginal fluid, urine, mucous, perspiration, etc.

BIRD SHOT – refers to shotgun projectiles that have a diameter less than 0.24”.

BLACK POWDER – the earliest form of firearm propellant; modern form is smokeless powder.

BLOODBORNE PATHOGENS – pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

BLOODSTAIN – A stain on a surface caused by blood.

BOLT ACTION – a firearm in which the breech closure is in line with the bore at all times, manually reciprocates to load, unload, and cock, and is locked in place by breech bolt lugs and engaging abutments, usually in the receiver.

BORE – the interior of a barrel forward of the chamber.

BOUNCE LIGHT – indirect light produced by pointing the light source at a ceiling or other surface to reflect the light back toward the subject; softer and less harsh than direct light.

BRACKETING – taking several photographs of the same scene at different exposure settings, some greater than and some less than the setting indicated by the meter, to ensure at least one well-exposed image.

BUBBLE RING – Vacuoles in bloodstains that form when blood containing air bubbles dries and retains the circular configuration of the original bubble.

BUCK SHOT – refers to shotgun projectiles that have a diameter of 0.24” or greater.

BULLET – a non-spherical projectile for use in a rifled barrel.

BULLET CORE – the inner portion of a jacketed bullet often made of lead.

BULLET JACKET – the envelope enclosing the core of a projectile that is typically of metallic construction.

BULLET WIPE – the discolored area on the immediate periphery of a bullet hole, caused by the transfer of residues from the bearing surface of the bullet.

BUTT – in handguns, it is the bottom part of the grip; in long guns, it is the rear or shoulder end of the stock.

CABLE RELEASE – an encased wire that attaches at one end to the shutter release on the camera and has a shutter release button on the other end that the photographer depresses to activate the shutter; used to avoid camera movement or to activate the shutter from a distance.

CALIBER – a term used to designate the specific cartridge for which a firearm is chambered; the approximate diameter of the circle formed by the tops of the lands of a rifled barrel, typically expressed in hundredths of an inch (38 caliber) or millimeters (9mm caliber); in ammunition, caliber is a numerical term, without the decimal point, included in a cartridge name to indicate the nominal bullet diameter.

CAMERA BODY – the light-tight box that contains the camera mechanisms and protects the sensor from light until an exposure is made.

CANNELURE – a circumferential groove generally of a knurled or plain appearance on a bullet or cartridge case.

CARTRIDGE – a single unit of ammunition consisting of the cartridge case, primer, propellant, and with or without one or more projectile(s).

CARTRIDGE CASE – the container for all the other components which comprise a cartridge.

CAST-OFF PATTERN – A pattern, usually linear in configuration, created when blood is released or flung from a blood-bearing object in motion.

CASTING – the filling of a three-dimensional footwear, tire track, or tool mark impression with material that takes on and retains the characteristics that were left in the impression by the original footwear, tire, or tool.

CAUSE OF DEATH – any injury or disease that produces a physiological derangement in the body resulting in death.

CEREBROSPINAL FLUID – the fluids around the brain and spinal cord.

CESSATION CAST-OFF PATTERN – A pattern resulting from the rapid deceleration of an object wet with blood.

CENTER WEIGHTED METER – a through-the-lens exposure meter that measures light values from the entire scene but gives greater emphasis to those in the center of the image area.

CHAIN OF CUSTODY – refers to the chronological documentation of the seizure, custody, control, transfer (temporary or permanent), and disposition of evidence.

CHAMBER – the rear part of the barrel bore that has been formed to accept a specific cartridge or shotshell; in a revolver, the holes in the cylinder represent multiple chambers.

CLIP – a container that holds a group of cartridges, which may either be transferred or inserted into a firearm.

COMPRESSION – a means of reducing the size of a digital image file in order to reduce storage requirements for transmission time across a network. “Lossy” techniques permanently eliminate some information to obtain highly compressed, very small files. Lossless techniques compress images without losing any information in the file.

CONCENTRIC FRACTURES – fractures or cracks in glass or other similar brittle or ceramic material that take a generally circular form around the bullet hole or impact site in such materials.

CONING EFFECT – the characteristic cone shape on the exit side of a projectile hole through a relative brittle medium (e.g. glass, bone, etc.) caused by the spalling around the exit.

CONTACT WOUND – an injury that occurs when a firearm is pressed against a surface of the body. Gases from the explosion expand between the skin and the bone, producing a bursting effect and a ragged wound. Gas, soot, metallic particles, vaporized metal from the bullet and cartridge case, primer residue, and powder particles can all be driven into the wound track.

CONTRAST – the difference between the light and dark parts of a scene or photograph.

CLOT – A gelatinous mass formed as the result of a complex mechanism involving red blood cells, fibrinogen, platelets, and other clotting factors.

CRIME SCENE – An area or person that contains potential evidence of a criminal incident.

CROP – to trim the edges of an image, often to improve the composition. Cropping can be done by moving the camera position while viewing a scene, during image editing, or by trimming the finished print.

CYLINDER – the rotating component of a firearm that contains the chambers.

CYLINDER GAP – in a revolver, the maximum space between the cylinder and the barrel.

DAGGER – a short weapon for stabbing that is usually considered to be double edged.

DECOMPOSITION – postmortem degeneration of the body.

DEFENSE WOUNDS – cuts, abrasions, and contusions of the hands, wrists, forearms, and arms, which occur during a violent struggle as the victim attempts to ward off the attacker.

DEFLECTION – *as differentiated from ricochet*: a deviation in the projectile's normal path through the atmosphere as a consequence of an impact with some object; *as a consequence of ricochet*: is used to describe any lateral component of the ricocheted projectiles departure path relative to the plane of the impacted surface as viewed from the shooter's position and with the plane of the surface normalized to a horizontal attitude; *as a consequence of perforating or striking an object*: is used to describe deviations in any direction from the projectile's normal flight path as a consequence of perforating or string an object rather than rebounding off of surfaces.

DEPTH OF FIELD (DOF)– the distance between the nearest and farthest points that appear in acceptably sharp focus in a photograph. Depth of field varies with lens aperture, focal length, and camera-to-subject distance.

DERRINGER – the generic term applied to many variations of small one-, two-, or even four-shot pistols, using both percussion caps and cartridges.

DIAPHRAGM (IRIS DIAPHRAGM) – the mechanism controlling the size of the lens opening, therefore the amount of light that reaches the sensor. It consists of overlapping metal leaves inside the lens that form a circular opening of variable sizes. The size of the opening is referred to as the f-stop or aperture.

DIFFUSED LIGHT – light that has been scattered by reflection or by passing through a translucent material; an even, often shadowless, light.

DIGITAL CAMERA – a camera that records an image directly in digital form, instead of on conventional silver film.

DIRECT LIGHT – light shining directly on the subject and producing strong highlights and deep shadows.

DIRECTIONAL/DIFFUSED LIGHT – light that is partly direct and partly scattered; softer and less harsh than direct light.

DOUBLE BARREL – two barrels in a firearm mounted to one frame; may be vertically (over-under) or horizontally (side-by-side) aligned.

DRAWBACK EFFECT – the presence of blood in the barrel of a firearm that has been drawn back into the muzzle.

DRIP PATTERN – a bloodstain pattern created by free-falling drops of blood striking already-existing blood on a surface commonly associated with satellite spatter. The parent stain on the surface is larger than what would be associated with a single free-falling drop and is usually associated with satellite spatter.

DRIP STAIN – a bloodstain resulting from a falling drop that formed due to gravity.

DSLR – digital single lens reflex; a type of camera with one lens that is used both for viewing and for taking the picture. A mirror inside the camera reflects the image up into the viewfinder. When the picture is taken, this mirror moves out of the way, allowing the light entering the lens to travel directly to the sensor.

EJECTION PORT – an opening in the receiver or slide to allow for ejection of a cartridge, cartridge case, or shotshell.

EJECTOR – a mechanical device of a firearm which expels a cartridge, cartridge case, or shotshell.

ELECTRONIC FLASH (STROBE) – a camera accessory that provides a brief but powerful flash of light; a battery-powered unit requires occasional recharging or battery replacement but can be used repeatedly.

ELECTROSTATIC LIFTING DEVICE – a device consisting of a high-voltage supply used with a special conductive lifting film to transfer a dry origin footwear impression electrostatically from a surface to a film.

ELIMINATION PRINTS – exemplars of friction ridge skin detail taken from a person who had access to an item of evidence.

ENTOMOLOGY – branch of science dealing with the study of insects.

EPIDERMIS – the outermost layer of the skin.

EVIDENCE – a physical item that may be used to prove or disprove a fact.

EXEMPLARS – the prints of an individual, associated with a known or claimed identity, and deliberately recorded, by ink, or by another medium (also known as known prints).

EXPIRATED BLOOD – blood that has been blown from the nose, the mouth, or a wound in the respiratory system as the result of air flow or pressure.

EXPOSURE – the act of allowing light to strike a light sensitive surface; the amount of light reaching that surface, controlled by the combination of aperture and shutter speed.

EXPOSURE METER (LIGHT METER) – an instrument that measures the amount of light and provides aperture and shutter-speed combinations for correct exposure. Exposure meters may be built into the camera or they may be separate instruments.

EXTRACTOR – a device that pulls (hooks) cartridge cases out of a chamber.

FILE – a quantity of data storage on a computer. Each digital image is saved as a single file.

FILE FORMAT – one of several standard ways a digital image can be encoded digitally. See JPEG, TIFF, and RAW.

FINGERPRINT – an impression of the friction ridges of all or any part of the finger.

FIREARM – an assembly of a barrel and action from which a projectile(s) is propelled by products of combustion.

FIRING PIN – that part of a firearm mechanism which strikes the primer or rim of a cartridge to initiate ignition in order to fire a cartridge or shotshell.

FIRING PIN IMPRESSION – the indentation of the primer of a centerfire cartridge case or in the rim of a rimfire cartridge case caused when it is struck by the firing pin.

FIXED BLADE – any knife in which the blade does not fold or retract into the handle.

FLASH – 1. A short burst of light emitted by an electronic flash unit or strobe to illuminate the scene being photographed. 2. The equipment used to produce this light.

FLOW PATTERN – a volume of blood on a surface that moves in one or more directions as a result of the influence of gravity.

FOCAL LENGTH – the distance from an internal part of the lens to the image plane when the lens is focused on infinity. The focal length is usually expressed in millimeters (mm) and determines the angle of view (how much of the scene can be included in the picture) and the size of objects in the image. A 100mm lens, for example, has a narrower angle of view and magnifies objects more than a lens of shorter focal length.

FOCUS – 1. The point at which the rays of light coming through the lens converge to form a sharp image. The picture is “in focus” or sharpest when this point coincides with the focal plane. 2. To change the lens-to-sensor distance until the image is sharp.

FORWARD SPATTER – blood droplets directed away from the force or energy that caused the spatter, often associated with gunshot wounds of exit.

FRAME – In photography, a single exposure or image; the edges of an image. In revolvers, pistols, and break-open guns, the basic unit of a firearm which houses the firing and breech mechanism and to which the barrel and grips are attached.

FRICTION RIDGE SKIN – A specialized type of skin present on the palmar portion of the hands and the plantar portion of the feet.

F-STOP – A numerical designation (f/2, f/2.8, etc.) indicating the size of the aperture (lens opening).

FULL METAL JACKET (FMJ) – a projectile in which the bullet jacket encloses the entire bullet, with the usual exception of the base.

GAUGE – a term used in the identification of a shotgun bore. The gauge is equal to the number of round lead balls of bore diameter that equal one pound.

GRAY CARD – a card that reflects a known percentage of light falling on it. Often has a gray side reflecting 18% and a white side reflecting 90% of the light. Used to take accurate exposure meter readings (meters base their exposures on a gray tone of 18% reflectance).

GRIP – in handguns, the handle; in long guns, the portion of the stock located behind the action which is normally grasped by the shooter's trigger hand; in knives, the part of the hilt that is normally held in the hand.

GRIP SAFETY – an auxiliary locking device on the grip of some handguns which prevents firing until it is depressed, typically accomplished by grasping the grip correctly.

GUIDE NUMBER – a number rating for a flash unit that can be used to calculate the correct aperture for a particular ISO speed and flash-to-subject distance.

GUNPOWDER – any of various powders used as the propellant in a cartridge or shotshell.

GUNSHOT RESIDUE (GSR) – the total residues resulting from the discharge of a firearm.

HAMMER – a component of the firing mechanism which strikes the firing pin or primer.

HANDGUN – a firearm designed to be held and fired with one hand.

HAND HOLD – to support the camera with your hands rather than with a tripod or other fixed support.

HEADSTAMP – numerals, letters, and symbols (or a combination thereof) stamped into the head of a cartridge case or shotshell to identify the manufacturer, caliber, gauge, or other additional information.

HILT – the handle of a sword or dagger.

HINGED FRAME ACTION – a design wherein the barrel(s) is pivoted on the frame. When the action is open, the barrel(s) may pivot up, down, or sideways for loading or unloading. When the action is closed, the breech of the barrel(s) swings against the standing breech.

HISTOGRAM – a graph that shows the distribution of tones or colors in a digital image.

HOLLOW POINT BULLET – a projectile with a cavity in the nose to facilitate expansion.

HOMICIDE – the killing of a human being by another human being.

HOT SHOE – a clip on the top of the camera that attaches a flash unit and provides an electrical link to synchronize the flash with the camera shutter, eliminating the need for a sync cord.

IDENTIFICATION PHOTOGRAPH – a photograph taken to distinguish an item of importance within the scene, often something to be collected as evidence.

INCISION – a wound inflicted by an instrument with a sharp cutting edge; characteristically longer than it is deep.

INCLINOMETER – a device for measuring or displaying the angle of a surface relative to the horizontal or vertical plane.

INFINITY – the farthest distance marked on the focusing ring of the lens, generally about 50 feet. When the camera is focused on infinity, all objects at that distance or farther away will be sharp.

INFRARED – wavelengths of electromagnetic radiation, like light but slightly longer than those in the visible spectrum. Photographs can be made from reflected infrared radiation with special equipment.

INTERCHANGEABLE LENS – a lens that can be removed from the camera and replaced by another lens.

INTERMEDIATE TARGET – refers to something located between the firearm and the target at the time of shooting.

ISO – a numerical rating that indicates the sensitivity (speed) of a sensor.

JPEG – a “lossy” format for saving digital images that compresses data to preserve space in the computer’s memory.

LACERATION – a split or tear of the skin produced by blunt force.

LAMINATED GLASS – layers of glass bonded to a plastic material; may also be referred to as safety glass.

LATENT PRINT– transferred impression of friction ridge detail not readily visible; generic term used for questioned friction ridge detail.

LCD – liquid crystal display; the kind of thin, flat visual display screen often used for on-camera monitors and data displays.

LEAD-IN MARK – a visible, thin, elongated deposition of bullet wipe transferred to a surface as a bullet first makes contact with that surface at a shallow incident angle; is useful in establishing the direction of fire and travel of the projectile.

LENS – one or more pieces of optical glass used to gather and focus light rays to form an image.

LENS HOOD – a shield that fits around the lens to prevent unwanted light from entering the lens and causing flare.

LENS TISSUE – a soft, lint-free tissue made specifically for cleaning camera lenses.

LEVER ACTION – a design wherein the breech mechanism is cycled by an external lever generally below the receiver.

LIFT – An adhesive or other medium used to transfer an impression (e.g. fingerprint, footwear impression) from a substrate.

LIGATURE – anything which binds or ties.

LIGHT EMITTING DIODE (LED) CAMERA DISPLAY– a display in the viewfinder of some cameras that gives you information about aperture and shutter-speed settings or other exposure data.

LIVIDITY (LIVOR MORTIS) – postmortem discoloration of the body due to the settling of blood in the dependent areas of the body.

LOADED – a firearm with ammunition in the firearm magazine or chamber.

LONG-FOCAL-LENGTH LENS (TELEPHOTO LENS) – a lens that provides a narrow angle of view of a scene, including less of a scene than a lens of normal focal length and therefore magnifying objects in the image.

LONG GUN – any firearm fitted with a stock and designed to be used while held with both hands and supported by a shoulder.

MACRO LENS – a lens specifically designed for close-up photography and capable of good optical performance when used very close to a subject.

MACRO PHOTOGRAPHY – production of images on the sensor that are life size or larger.

MAGAZINE – a container for cartridges which has a spring and follower to feed those cartridges into the chamber of the firearm.

MAGAZINE RELEASE – the device that retains or releases the magazine in a firearm.

MAGAZINE WELL – that opening in a firearm that receives the detachable magazine.

MAJOR CASE PRINTS/ COMPLETE FRICTION RIDGE EXEMPLARS – A systematic recording of all of the friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, joints, tips, and sides of the fingers. Under special circumstances, complete friction ridge exemplars may also need to be taken from the plantar portion of the feet.

MANNER OF DEATH – explanation as to the cause of death; medicolegal manners of death are homicide, suicide, accidental, natural, and undetermined.

MANUAL EXPOSURE – a nonautomatic mode of camera operation in which the photographer sets the aperture, shutter speed, and ISO; often designated by the letter “M” on the camera mode dial.

MANUAL FLASH – a nonautomatic mode of flash operation in which the photographer controls the exposure by adjusting the size of the camera’s lens aperture.

MEMORY CARD – an in-camera, removable, and reusable storage device that records and saves images captured by the camera until transferred to a computer or other storage device and reformatted.

MIRROR – a polished, metallic reflector set inside a DSLR camera body at a 45 degree angle to the lens to reflect the image up onto the focusing screen. When a picture is taken, the mirror moves out of the way so that light can reach the sensor.

MISFEED – any malfunction during the feeding cycle of a repeating firearm resulting in the failure of a cartridge or shotshell to enter the chamber completely.

MISFIRE – a failure of the priming mixture to be initiated after the primer has been struck an adequate blow by a firing pin or the failure of the initiated primer to ignite the powder.

MISTING – blood that has been atomized to a fine spray by the application of force, usually associated with a gunshot or explosion event.

MULTIPLE FLASH – a technique used in low-light situations in which the photographer sets the shutter release to open and adds light to the scene by repeatedly cycling a flash unit or by setting up multiple flash units within a scene.

MUSHROOMED BULLET – a projectile that has expanded upon impact to a mushroom-like shape.

MUZZLE – the end of a firearm barrel from which the projectile emerges.

MUZZLE IMPRINT – a general term describing the marks produced by the muzzle, front sight, magazine tube, spring housing, etc., and caused by the contact discharge of a firearm.

NEGATIVE CONTROL – A test performed to demonstrate that no false positives result from the performance of a procedure.

NOISE – pixels of random colors and brightness, most often appearing in the dark areas of a digital image.

NON-POROUS – Non-absorbent.

NORMAL FOCAL LENGTH (STANDARD LENS) – a lens that provides about the same angle of view of a scene as the human eye.

OBLIQUE LIGHTING – light positioned at a low angle of incidence relative to the surface being examined or photographed; also referred to as side lighting.

OPEN UP – to increase the size of the lens aperture; the opposite of stop down.

ORIENTATION PHOTOGRAPH – a photograph taken to document the general condition and layout of the scene; also referred to as an overall photograph.

OVEREXPOSE – to make an exposure with too much light, making a picture that is too bright/light.

OVERALL PHOTOGRAPH – a photograph taken to document the general condition and layout of the scene; also referred to as orientation photographs.

OVER AND UNDER – a firearm with two barrels, one placed over the other.

PAINT BY LIGHT – a technique used in low-light situations in which the photographer sets the shutter release to open and adds light to the darker areas of an object or scene, often using a flashlight or other type of constant light.

PALM PRINT – an impression of the friction ridge of all or any part of the palmar surface of the hand.

PARENT STAIN OR DROP – a bloodstain from which satellite spatter or wave cast-off stains originate.

PASSIVE BLOODSTAINS – stains and patterns whose physical features indicate that they were created without any significant outside force other than gravity and friction.

PATENT PRINT – a friction ridge impression of unknown origin, visible without development.

PATTERN – the distribution of shot fired from a shotgun.

PELLETS – the common name for the spherical projectiles loaded into shotshells; a nonspherical projectile used in some air rifles and air pistols.

PENETRATING INJURY – caused by an object entering but not exiting the body.

PERFORATING INJURY – caused by an object passing through the body.

PERIMORTEM – near or around the time of death.

PETECHIAE – round purplish-red spots of blood, pinpoint to pinhead in size, that appear on the skin as a result of bleeding into layers of the skin.

PINCH POINT – in painted metal surfaces, a small area of surviving paint that was pinched between the initial contact point of a low incident angle bullet and the painted metal surface. The pinch point establishes the entry side of an impact or ricochet mark and thereby the bullet's direction of travel.

PISTOL – a handgun in which the chamber is integral with the barrel.

PIXEL – short for picture element; the smallest unit, usually square, of a digital image that can be displayed or changed.

PLASTIC PRINT – a friction ridge impression of unknown origin that is impressed in a soft substrate to create a three-dimensional impression, visible without development.

POLARIZING FILTER – a filter placed in front of the camera lens to reduce reflections from nonmetallic surfaces like glass or water, or to darken the sky.

POROUS – Absorbent.

POSITIVE CONTROL – A test performed prior to or in parallel with evidentiary samples that is designed to demonstrate that a procedure works correctly.

PPI – pixels per inch, a measure of the resolution of an image that has a physical size.

POSTERIOR (DORSAL) – indicates the back side of the body.

POSTMORTEM – after death.

POWDER STIPPLING – small hemorrhagic marks on the skin produced by the impact of gunpowder particles.

POWDER TATOOING – the embedding of unburned and partially burned gunpowder particles in the skin or other tissue with accompanying hemorrhagic marks associated with living tissue.

PRIMER – the ignition component of a cartridge.

PROGRAMMED AUTOMATIC – a mode of automatic exposure in which the camera sets both the shutter speed and the aperture for a normal exposure; often designated by the letter "P" on the camera mode dial.

PROJECTED BLOODSTAIN PATTERN – spatter created as the result of a force other than impact.

PUGILISTIC ATTITUDE – position that a body often assumes in fire deaths in which the muscle fibers contract due to the heat of the fire, causing the limbs to be drawn in.

PUMP ACTION – see slide action.

PURGE FLUID – decomposition fluid that drains from an orifice of the body; may be mistaken for blood.

PUTREFACTION – postmortem decomposition of soft tissues by bacteria, fermentation, and enzymes.

RADIAL FRACTURES – the fractures or cracks that radiate out from an impact side in non-crystalline material such as glass, ceramics, bone, and certain plastics.

RAW/CAMERA RAW – a digital camera file that contains picture information exactly as it is acquired. Most RAW file formats used in cameras are proprietary, or specific to the camera manufacturer, and must be interpreted before editing.

RECEIVER – the basic unit of a firearm which houses the firing and breech mechanism and to which the barrel and stock are assembled; in revolver, pistols, and break-open firearms, it is called the frame.

REFLECTOR – any surface- a ceiling, a card, an umbrella- used to bounce light onto a subject.

RELATIONSHIP PHOTOGRAPH – a photograph taken in order to frame an item of evidence in conjunction with some obvious landmark present within the scene.

RELOAD – a cartridge which has been reassembled with a new primer, powder, projectile(s), and/or other components.

RESOLUTION – the total number of pixels in a camera sensor; the number of pixels per unit length, generally a measure of maximum image quality; usually measured in pixels per inch (PPI).

REVOLVER – a firearm, usually a handgun, with a cylinder having several chambers so arranged as to rotate around an axis.

RICOCHET – the continued flight of a rebounded projectile and/or major projectile fragments after a low angle impact with a surface or object.

RIFLE – a firearm with a rifled bore designed to be fired from the shoulder.

RIGOR MORTIS – rigidity or stiffening of the muscle tissue of the body after death.

SABOT – a lightweight carrier in which a subcaliber projectile is centered to permit firing in a larger bore firearm.

SAFETY MECHANISM – a device on a firearm intended to help provide protection against accidental discharge under normal usage when properly engaged; such a mechanism is considered "on" when the position of the safety device is set in a manner to provide against accidental discharge under normal usage; such a mechanism is considered "off" when it is set to allow the firearm to be discharged by a normal pull of the trigger.

SCALLOPING – a serrated edge characteristic of bloodstains.

SD CARD – Secure Digital card; a memory card format utilized with digital cameras.

SEMI-POROUS – a substrate that demonstrates both absorbent and non-absorbent properties.

SERUM STAIN – a yellowish stain resulting from the separation of serum from the retraction of a blood clot.

SHARP – describes an image or part of an image that shows crisp, precise texture and detail; the opposite of blurred or soft.

SHOE – a clip on a camera for attaching a flash unit.

SHORT-FOCAL-LENGTH LENS (WIDE ANGLE LENS) – a lens that provides a wide angle-of-view of a scene, including more of the subject area than a lens of normal focal length.

SHOT – generally, spherical pellets used in loading shotshells or cartridges.

SHOTGUN – a long gun designed to shoot from the shoulder, typically having a smooth bore and designed to fire shotshells.

SHOTSHELL – a complete round of ammunition having a plastic body, a base wad that may or may not be a single unit, and a metallic head.

SHOTSHELL CASE/HULL – an empty plastic shell that previously held components (case); an empty plastic shell that is used to load components (hull).

SHUTTER – a device in the camera that opens and closes to expose the sensor to light for a measured length of time.

SHUTTER PRIORTY MODE – an automatic exposure system in which the photographer sets the shutter speed and the camera selects the aperture (f-stop) for normal exposure; often designated by the letter “S” on the camera mode dial.

SHUTTER RELEASE – the mechanism, usually a button on the top of the camera, which activates the shutter to expose the sensor.

SHUTTER SPEED CONTROL – the camera control that selects the length of time the sensor is exposed to light.

SIDE-BY-SIDE – a firearm with two barrels arranged adjacently in the horizontal plane.

SILENCER – a colloquial term used to describe a device attached to the barrel of a firearm designed to reduce the noise of discharge; such a device is more accurately identified as a sound suppressor.

SIMULTANEOUS IMPRESSION – Two or more friction ridge impressions from the same hand or foot deposited concurrently.

SKELETONIZED BLOODSTAIN – a bloodstain that consists of a darkened outer peripheral rim with the central portion of the stain having been removed by wiping through the partially dry stain. A skeletonized bloodstain is also produced by the flaking of the central portion of a completely dried stain.

SLIDE ACTION – an action which features a movable forearm that is manually actuated in a motion parallel to the barrel by the shooter; also known as pump action.

SLUG – a single projectile for shotshells; a slang term for a fired bullet.

SPATTER – bloodstains that exhibit directionality and variation in size and are associated with a source of blood being subjected to external force(s).

SPATTER PATTERN – a distribution of individual spatters on a surface that can be traced to a common area of origin.

SPINES – an edge characteristic of bloodstains consisting of narrow, elongated projections from the central area of the stain.

SPLASH – a bloodstain created by a free-falling volume of blood in excess of 1.0 ml onto a surface from a distance of at least four inches, OR an altered bloodstain pattern characterized by a preexisting volume on a surface that has been subjected to additional force creating elongated narrow spines, such as stepping into blood.

STAB WOUND – injury caused by sharp instrument; wounds are deeper than they are wide.

STAGED SCENE – a crime scene in which the perpetrator purposely alters the crime scene to mislead or redirect the investigation.

STELLATE – star-shaped wound; characteristic of contact wounds in regions of the body where only a thin layer of skin and tissue overlies the bone (e.g. head).

STOCK – the wood or plastic component(s) to which the metal parts of a firearm are attached to enable the shooter to hold the firearm.

STOP – an aperture setting that indicates the size of the lens opening; a change in exposure by a factor of 2. Changing the aperture from one full setting to the next full setting doubles or halves the amount of light reaching the sensor.

STOP DOWN – to decrease the size of the lens aperture; the opposite of open up.

STOVE-PIPE – a failure to eject in which the cartridge case is caught in the ejection port by the forward motion of the bolt or slide.

STIPPLING –pinpoint hemorrhages due to the discharge of burning gunpowder against the skin; also referred to as tattooing.

SWIPE – the transfer of blood associated with motion onto a non-bloody surface.

SYNCHRONIZATION (SYNC) CORD – a wire that links a flash unit to a camera's shutter-release mechanism.

SYNCHRONIZE – to cause a flash unit to fire while the camera shutter is open.

TANG – the metal portion which projects into the handle of fixed blade knives.

TARGET – a surface on which blood has been deposited.

TELEPHOTO LENS – see LONG-FOCAL-LENGTH LENS

TERMINAL VELOCITY – the maximum velocity that a free-falling drop of blood can accelerate in air, determined to be approximately 25.1 feet per second.

THROUGH-THE-LENS (TTL) METER – an exposure meter built into the camera that takes light readings through the lens.

TIFF – a lossless, open-source (non-proprietary) format for saving digital images that is readable by most graphic software.

TOTAL METAL JACKET (TMJ) – a projectile made by copper plating a lead core to create a jacket that encloses the entire bullet.

TRACE EVIDENCE – evidence such as hairs, fibers, glass fragments, wood splinters, and other microscopic evidence.

TRAJECTORY – the curved, aerial path traveled by a projectile.

TRANSFER – the deposition of blood onto a surface as the result of contact.

TRANSIENT EVIDENCE – evidence that is changing over time, which may be affected by the scene conditions; evidentiary value will be lost if not preserved, protected, or documented (e.g. smells, a wet surface that is drying).

TRIGGER – that part of a firearm mechanism that is moved manually to cause the firearm to discharge.

TRIGGER GUARD – a rigid loop which partially surrounds the trigger to prevent damage or an accidental discharge.

TRIPOD – a three-legged support for the camera.

UNDEREXPOSE – to make an exposure with too little light, making a picture that is too dark.

UNIVERSAL PRECAUTIONS – approach to infection control to treat all human body fluids as if they were known to be infectious.

VOID – the absence of blood in an otherwise continuous bloodstain pattern that suggests the presence of an intermediate target that may have been removed.

WAD – a felt, paper, cardboard, or plastic component used in a shotshell for various purposes.

WAVE CAST-OFF – a small stain that has originated from a parent stain as the results of the wavelike action of the original drop striking a surface at an angle of less than 90 degrees.

WHITE BALANCE – the color balance of a white light source; a setting or adjustment on a camera that adjusts the overall image colors for the light source in which it was captured.

WIDE ANGLE LENS – see SHORT-FOCAL-LENGTH LENS

WIDE-ANGLE DISTORTION – an unusual perspective caused by using a wide-angle lens very close to a subject; objects appear stretched out or farther apart than they really are.

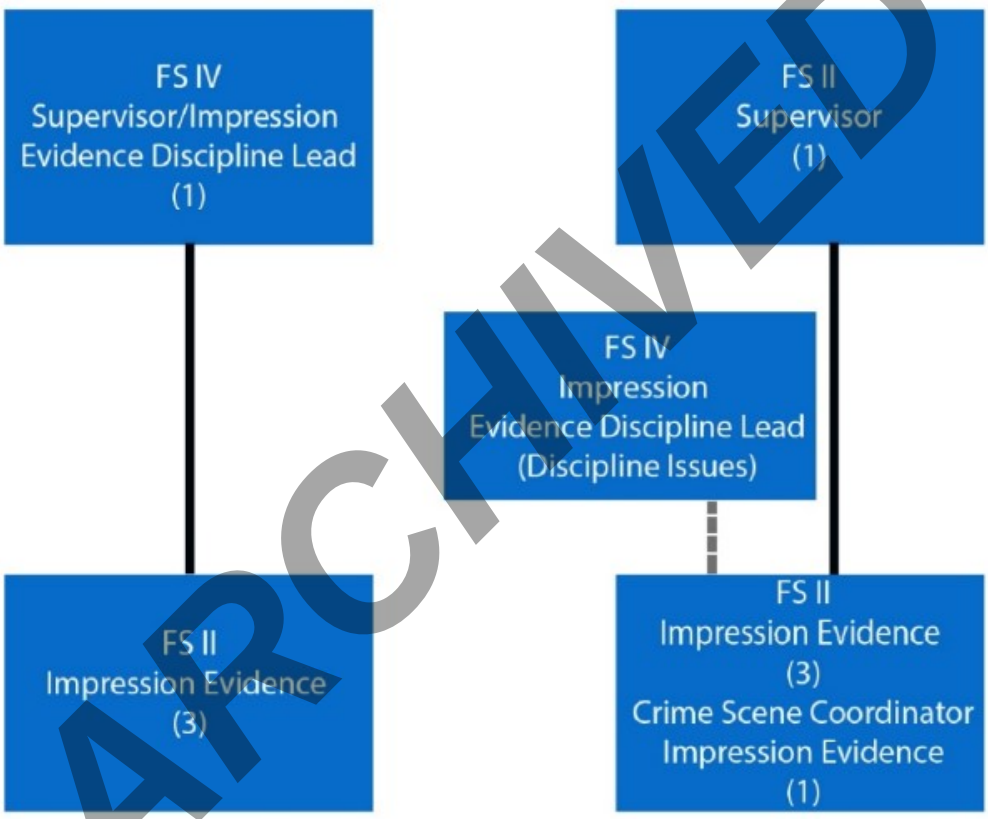
WIPE – an alteration of a preexisting wet or partially dry bloodstain caused by movement through the existing stain.

3.0 Organization and Management

3.1 An organizational chart for the Idaho State Police appears in the ISP Policy Manual.

3.2 An organizational chart for ISP Forensic Services (ISPFS) appears in the ISP Forensic Services Quality/Procedure Manual.

3.3 The organizational chart that includes the Crime Scene Coordinator position appears in the Latent Prints Quality Manual.



4.0 Personnel

4.1 CRIME SCENE COORDINATOR

4.1.1 The Crime Scene Coordinator is responsible for coordinating ISPFS responses to crime scenes state-wide.

4.1.2 The Crime Scene coordinator participates in routine quality control measures, equipment maintenance, and troubleshooting; supplies crime scene gear, PPE, supplies, and equipment state-wide; develops and maintains crime scene methods and manuals; provides assistance at complex crime scenes.

4.1.3 The Crime Scene Coordinator shall ensure that analysts' training records are on file with the Quality Manager.

4.2 CRIME SCENE RESPONDERS

4.2.1 Crime Scene responders are responsible for adhering to established methods, safety practices, and policies/procedures.

4.2.2 Crime Scene responders come from different disciplines within the lab system. If a responder has specialized training as a part of his/her primary discipline (e.g. bullet strike testing, acid phosphatase testing, development of bloody impressions with blood-reactive chemicals), then he/she can perform those tests/analyses at crime scenes.

4.2.3 Crime Scene responder duties may include, but are not limited to:

- 4.2.3.1 Documentation of crime scenes through photography, notes, and sketches/diagrams;
- 4.2.3.2 Conducting presumptive blood tests;
- 4.2.3.3 Collection and preservation of evidence;
- 4.2.3.4 Recognition and documentation of evidence in bloodshed and/or shooting scenes;
- 4.2.3.5 Latent print processing;
- 4.2.3.6 Processing vehicles;
- 4.2.3.7 Buried body excavations;
- 4.2.3.8 Documentation and evidence collection from persons;
- 4.2.3.9 Issuing reports of crime scene activities;
- 4.2.3.10 Performing technical and administrative casework reviews;
- 4.2.3.11 Satisfactorily completing annual proficiency tests;
- 4.2.3.12 Presenting expert testimony in court.

4.2.4 As the pool of crime scene responders grows, responders may be tasked with learning aspects of disciplines outside of their primary discipline in order to elicit a more efficient and timely response for our customers.

4.2.5 If a responder is going to learn to do tests/analyses that are not part of a discipline for which s/he has completed training, then s/he must go

through a training process, be competency tested on the tests/analyses, and be regularly proficiency tested.

4.2.6 When testifying about tests/analyses performed at a crime scene, the responder can only rely on his/her training and not the accreditation of the lab as a basis for their expertise. If questioned about the lab's accreditation, the responder must specify that the discipline of crime scene has not yet sought accreditation.

5.0 Scene Security and Precautions

5.1 Crime scenes should be secured by the agency investigating the crime scene.

5.1.1 The investigating agency should supply enough personnel to adequately manage the security of the crime scene, including access points, the perimeter, and possible routes of entry/exit.

5.1.2 The scene should be cordoned off with crime scene tape.

5.1.2.1 Case circumstances may be such that crime scene tape is not necessary or appropriate.

5.1.3 An officer with an entry/exit log may be positioned near the entry of the crime scene area. When present, responders will check in with the officer and provide information for the crime scene log.

5.2 The investigating agency should be aware of any hazards present in the scene upon responders arrival; responders should inquire about hazards before entering a scene.

5.2.1 Hazards may be present as a result actions taken in the crime scene (e.g. carbon monoxide, structural damage due to fire, etc.) or may be natural hazards (e.g. uneven terrain, cliffs, bodies of water, etc.).

5.2.2 Responders will not enter a crime scene until any hazards have been mitigated to allow for safe exposure to the scene.

5.2.3 When working a scene on a roadway in which traffic is still moving through the area, safety equipment (e.g. cones, flares, reflective vests, etc.) should be utilized.

5.3 Responders should not enter a scene until it is static and all involved living parties (e.g. victim, suspect, witnesses, family members, etc.) have been removed from the scene.

5.3.1 If a living subject/suspect/victim is still on scene and s/he must be documented prior to removal, s/he should be moved away from areas containing evidence to avoid contamination.

5.4 When searching a crime scene for evidence, responders will be cautious as to hidden hazards (e.g. needles, razor blades, etc.) that may be inside other items.

5.5 Responders will follow safety guidelines as outlined in the ISPFS Quality Manual.

6.0 Crime Scene Investigation Methodology

6.1 There is no one right way to process a crime scene. The methods and the order in which those methods are employed is determined by the particulars of the scene and the experience of the responders. The purpose of processing the crime scene is to collect as much information and evidence as possible, in as pristine a condition as possible. Evidence collection is more than the physical collection of items from the scene; cataloging the interrelationships of where items are in the scene, noting the physical layout of the scene, and documenting observations of things that cannot be physically collected are all integral parts of collecting evidence. Content and context of the scene are both important aspects.

6.2 At any crime scene, the responder will proceed through six actions.

6.2.1 Assessing

6.2.1.1 Before any action is taken on the scene, the responder should assess the circumstances in order to decide on a proper course of action. This assessment includes resource determination, risks, and task/procedure determination. Assessment is an ongoing process as well. The responder should continuously assess the situation and adjust the processing plan as necessary. Remaining flexible is a critical aspect of responding to and dealing with the crime scene.

6.2.2 Observing

6.2.2.1 Looking at and mentally registering the condition of the scene and artifacts found in the scene is the most basic aspect of crime scene processing. During observations, the responder must move around in the scene, which may alter the scene. In most cases, observation is not intrusive. However, when combined with search efforts, it may become an intrusive act. After proper documentation has been completed, more intrusive observations may be undertaken.

6.2.3 Documenting

6.2.3.1 Documentation includes written recordings of observations, photography of the scene, and the creation of sketches and/or diagrams. Documentation must be undertaken from the least intrusive to the most intrusive. In this way, documentation of observations should precede photography; photography should precede sketching and measuring; detailed photography and reconstruction

documentation should be the last types of documentation completed. Documentation is the critical component; it is through documentation that we can properly preserve the original condition and context of the scene, before any significant alteration. Documentation must be ongoing as searching, collecting, and processing of the scene take place.

6.2.3.2 Items should be documented as to their condition as found (e.g. shirt inside out, shoes laced, etc.). The condition may be relevant and should not be altered until documentation is complete, and ideally, not altered at all.

6.2.4 Searching

6.2.4.1 The nature of any search and associated activity is intrusive, so it should not be undertaken until documentation is complete. During searches, items may be moved to be more thoroughly examined, which alters the scene. Multiple searches, at varying levels of depth, may be conducted throughout the scene, as appropriate.

6.2.4.2 Crime scene searches should be methodical (i.e. ordered and systematic). The type of search to be conducted should be determined based on the nature of the terrain/area being searched, lighting conditions, environmental conditions, and the size of the item(s) being searched for (if applicable).

6.2.4.3 Circle/Spiral searches are common when searching interior scenes. Generally, the responder starts at the perimeter of the room and works inward in a spiral pattern.

6.2.4.4 Strip/Line searches are often used when searching exterior scenes (e.g. parking lot, yard). The area is divided into parallel strips based on an area that can be examined by a single searcher. When a searcher has finished searching a strip of land, s/he would move one strip over, and repeat the process, until each strip had been searched. If multiple searchers are utilized, they may go through their strips side-by-side, until all strips are searched.

6.2.4.5 Grid searches are a variation of the strip/line search. Instead of only searching in one direction like in a strip/line search, the area is divided into two sets of strips that are perpendicular to one another. Once the searcher has moved through the strips in one direction, s/he begins

a second search, using the strips that run perpendicular to the first strips.

6.2.4.5.1 When conducting grid searches, it may be helpful to assign letters and numbers to the rows and columns created, so that the location and/or orientation of evidence can be more quickly ascertained.

6.2.4.6 Zone searches are conducted by breaking an area into smaller sections. A zone search may be utilized in a small areas (e.g. inside a vehicle) where the other types of searches could not be conducted. A vehicle may be broken down into driver's area, front passenger area, rear driver side area, rear passenger side area, cargo area, trunk, and engine compartment, or other similar areas, based on the vehicle design. A zone search may also be utilized to break a very large area into smaller sections that can be searched by another method, such as when searching a residential street. The street may be broken down by lanes, and the residences on the street may be broken down by front yard, driveway, side yard, etc.

6.2.5 Collecting

6.2.5.1 Physical collection of items in the scene is always an intrusive process. Once an item has been moved, the context of the scene is changed forever. If an item is moved prior to the completion of documentation, significant notes should be made as to the items original location/orientation and the reason for moving it. An item should not be returned to its original location/orientation to attempt to photograph it.

6.2.5.2 Ideally, an item should not be altered prior to collection (e.g. inside-out jeans should not be righted). Some items (e.g. firearms) may be altered prior to collection for specific reasons (e.g. safety). If an item's condition is inadvertently altered during collection, it should be noted.

6.2.6 Processing

6.2.6.1 The act of chemically or physically processing the scene is significantly intrusive, so it should almost always be one of the last actions undertaken.

6.3 The process of documentation and searching is cyclical. As additional items of evidence are discovered during searches, additional documentation is necessary.

This process continues throughout the scene until the scene has been searched in its entirety.

6.4 Before releasing a scene, the response team should review their actions taken in the crime scene. Notes, sketches, photography, and evidence should be checked against one another to ensure that all information has been documented and all evidence has been collected.

7.0 Observations and Notes

7.1 Documentation of observations in the scene requires significant effort. Overall observations are best documented via handwritten notes.

7.2 Investigative notes are a staple of any crime scene investigation. Notes should begin with notification of the crime, identify involved personnel, note conditions and actions upon arrival, and provide a clear and detailed record of all observations and actions taken while in the scene. Descriptions of techniques employed, areas where the techniques were employed, who employed them, and the results of such techniques should all be included in the notes.

7.2.1 It is important to note areas that are undisturbed or in which nothing significant was observed. The absence of activity or disturbance may be relevant.

7.2.2 Some information present in a scene is transient. Observations of transient evidence (e.g. smells, rain washing away apparent blood, wet footprints that are drying, etc.) should be documented when observed to be certain that they are recorded before they are lost.

7.2.3 When describing items, be careful to remain objective. For example, describe a chair as resting on its right side, not as being overturned, which would imply a particular action.

7.3 Description of vehicles, buildings, and other scenes

7.3.1 Vehicle descriptions will include the year, color, make, model, license plate number, and Vehicle Identification Number (VIN). The vehicle's location and the condition of any seals will be noted, including the time the seals were broken. The general condition of the vehicle and its contents will be noted. Note if the license plate and/or VIN plate/sticker is missing.

7.3.2 Building descriptions will include the type of building, the number of stories, the direction it faces, the type of location, and the number and types of rooms contained therein. The general condition of the building and rooms of importance will be noted. Specifically note any damage or absence of damage that may be pertinent to point of entry or exit or to the crime itself.

7.3.3 Other types of scenes will be described using cardinal directions referenced from a landmark or location or described generally, including GPS coordinates.

7.4 Description of rooms of importance

7.4.1 Starting with the doorway to the room, moving around the room (either clockwise or counterclockwise), describe the furniture and items in the room, including structures. Note condition of lights (on, off), window shades (up, down, open, closed), appliances, etc.

7.4.2 The description of the furniture and structure of the room may be more easily accomplished by making a sketch. If a sketch is used, it should be supplemented by handwritten notes for observations not easily referenced in a sketch.

7.5 Description of deceased person(s)

7.5.1 Until the Coroner arrives, the body cannot be moved or altered in any way, as the Coroner has jurisdiction over the body.

7.5.2 Describe the body's position in the scene, including the general direction of the head and feet. The way the head is turned, the position of an arm or leg, whether straight or bent, etc. should be noted.

7.5.3 Describe all clothing, visible jewelry, and accessories. Note their position and condition, if unusual and/or relevant.

7.5.4 Note the location of any visible injuries and note the presence of apparent blood or other fluids, if present.

7.5.5 Once the Coroner is on scene, you may ask their assistance in additional examinations and/or documentation that would require moving the clothing and/or body.

7.5.5.1 If photographing using an ABFO scale, take care to keep it from touching the body.

7.5.5.2 If there is evidence on the clothing that could be destroyed during transport (e.g. bloodstain pattern, GSR, etc.), ask to remove the clothing. If removing any clothing, care should be taken to avoid cutting through any patterns and/or defects related to the cause of death.

7.5.5.3 If there is evidence on the body that could be lost during transport (e.g. hairs, fibers, broken fingernail), ask to collect that prior to moving the body.

7.5.5.4 Any evidence or items being removed from the body at the scene will be carefully documented via notes and photography so that the doctor performing autopsy has images to review, since they won't be able to examine the body in situ.

7.5.5.4.1 Any bindings or ligatures are not to be disturbed on the body. If they attach the body to the scene, they should be cut in an area away from the body so that the ends on the body are not altered. The number of cuts should be minimized and the cuts made during the investigation should be labeled.

7.5.5.5 If any decisions are made regarding evidence collection from the body, or removal of items from the body, note who specifically gave authorization for those actions.

7.5.5.6 Best practice is to place clean paper bags over the hands of all deceased persons to preserve evidence on the hands. Paper bags can be secured at the wrists by wrapping tape around the bag; it should be tight enough that the bag won't slide off the hands, but not so tight as to impart artifacts into the skin. If continued blood loss could saturate the paper bags, plastic bags may be loosely placed over the paper bags to keep them from becoming saturated.

7.5.6 Note the name and County of the Coroner who took custody of the body. Indicate the time of removal, and by which mortuary/funeral home (if applicable). If the body bag is sealed, note the seal number; the seal may be photographed for additional documentation.

7.6 Description of items of evidence in the scene

7.6.1 When describing an item of interest, the following aspects of the item should be noted: quantity, size, color, material, item, identifying features, condition, and location (e.g. two small black plastic fragments, stained with apparent blood, on the floor east of the dresser; one black metal bar, bent in half, with apparent blood, tissue, and hair adhering to one end, on the floor southwest of the victim's head).

7.6.2 Describe the item of evidence sufficiently enough that it can be distinguished from other similar items of evidence. Use serial numbers or identifying numbers, brands, or labels, as applicable. Include evidence markers with descriptions. If the investigating agency assigns their own item number to an item of evidence, that number may be included so that the items can be easily correlated with that agency's reports.

7.6.2.1 In large scenes (e.g. schools, hospitals, commercial buildings), it may be helpful to assign groups of letters and/or numbers based on location. For example, numbers 1-99 may be used inside the waiting room, 100-199 may be used in the nurses' station, and 200-299 may be used in the cafeteria. By utilizing this type of grouping, one can easily determine the area of recovery based on the item number. If all of the numbers of a particular grouping are not utilized, it must be noted.

7.6.2.2 Evidence placards/labels can be used in different ways in a scene. Generally, for evidence on horizontal surfaces (e.g. floors, tables, car seats, etc.), placards should be utilized. For evidence on vertical surfaces (e.g. bloodstains, bullet holes, etc.), adhesive evidence labels should be utilized.

7.6.2.3 Evidence placards/labels are available with numbers or letters. Generally, evidence numbers should be utilized for

evidence that will be collected and evidence letters should be utilized for evidence that will be documented (e.g. footwear, tire tracks, bloodstain patterns, bullet holes) but cannot be picked up and collected.

7.6.3 Size may be important when documenting an item. While some items are only manufactured in one size, other items are made in a variety of sizes. Approximate sizes should be noted for items in which size may be significant (e.g. knives, tools, items used in blunt force injuries).

7.7 Results from testing and/or processing

7.7.1 Results from all tests conducted will be noted, whether positive, negative, or inconclusive. The "Presumptive Blood Testing Notes" page may be utilized, if desired, when performing presumptive blood tests.

7.7.2 Results from all types of processing conducted will be noted.

7.7.3 Evidence may be collected after testing and/or processing an area or item. The method of collection (e.g. swabs, comparison photograph, gel lift, etc.) will be noted.

7.8 Collection of evidence from the scene

7.8.1 All items that are collected by ISPFS personnel will be noted. The "Evidence Collection Notes" page may be utilized, if desired.

7.8.2 Note whether or not the evidence was sealed by ISPFS personnel; evidence packaging may or may not be sealed prior to turning the evidence over to the investigating agency, based on that agency's policy.

7.8.3 When items of evidence are turned over to the investigating agency, the date, time, and person receiving the evidence will be noted.

7.8.4 Document any damage that was done by ISPFS personnel in the collection of evidence (e.g. cut out section of drywall to remove bullet fragment, staining of surfaces processed with amido black, etc.).

8.0 Photography

8.1 Crime scene photography will be in accordance to the ISPFS Quality Manual.

8.2 The intent of crime scene photography is to document the condition, orientation, and spatial relationships in the scene and to show details of specific items found in the scene in order to provide analysts, investigators, and ultimately, the jury, with a visual representation of the elements and nature of the scene.

8.2.1 Crime scene photographs should lead the viewer of the photographs through the scene, from an overall perspective up to the details of specific items of evidence.

8.3 Photographs taken for general crime scene documentation are considered part of the note taking process.

8.3.1 All photographs taken at a crime scene will be uploaded to Foray or equivalent digital imaging system in a folder named the same as the lab number associated with the response (e.g. M2018-9876).

8.3.2 All photographs taken at a crime scene will be provided to the initiating agency. Images may be saved to digital media (e.g. compact disc, removable drive, SD card), downloaded from the camera's memory card to the agency's digital imaging system, or other equivalent transfer.

8.3.2.1 If the images are transferred directly to the agency, the date, time, and name of person conducting/facilitating the transfer will be noted.

8.4 Photographs taken for comparison purposes, such as those taken of latent prints, footwear impressions, and tire impressions will be treated as evidence as per the ISPFS Quality Manual.

8.4.1 All photographs taken at a crime scene will be uploaded to Foray or equivalent digital imaging system in a folder named the same as the lab number associated with the response (e.g. M2018-9876).

8.4.2 If ISPFS has a discipline which will be conducting the comparisons (e.g. latent prints), then an assignment will be created in the ILIMS case utilizing "digital media" as the item type.

8.5 ISPFS utilizes digital single lens reflex (DSLR) cameras to capture digital images (i.e. photographs) at a crime scene or other related field services response.

8.6 Digital images are numbered sequentially as they are captured. In the camera's Shooting/display menu, "File number sequence" will be set to "ON"; this allows the image file numbers to continue sequentially from 0001 to 9999 before recycling image numbers.

8.6.1 The file numbers of images captured for each scene will be documented in the case notes and in ILIMS.

8.7 Digital images will not be deleted. If an image is not as the photographer intended (e.g. flash didn't fire, image not focused, etc.), s/he will retain the unintended image and will take additional images as necessary to capture the subject.

8.7.1 If there is any possibility of confusion between intended photographs and unintended photographs (e.g. unintended photograph of our vehicle's trunk while photographing a vehicle being processed), a notation should be made in the case notes or in Adams Web.

8.8 Digital images can be stored in different file formats, which affect the quality of the images. File formats include JPEG, TIFF, and RAW. Image quality changes can be selected from the shooting menu of the camera.

8.8.1 JPEG images are of sufficient quality for general crime scene documentation. An image quality of "JPEG fine" is preferred.

8.8.2 RAW images are of ideal quality for comparison quality photographs.

8.8.3 In order to concurrently capture both a documentation photograph and a comparison quality photograph of a subject, the "NEF (RAW) + JPEG fine" (Nikon camera) or similar option can be selected from the image quality menu.

8.9 Memory cards will be utilized to store all images taken when using the camera, rather than saving images to the camera's internal storage.

8.9.1 Memory cards will be formatted prior to use. Simply deleting images from memory cards is not sufficient to completely erase all digital artifacts.

8.10 Prior to starting photography of a scene, the analyst will check the camera's settings and adjust them as necessary, based on the scene lighting and the types of photograph(s) to be taken.

8.10.1 A quick reference guide for camera settings is included in each camera case.

8.10.2 The date automatically updates and should be current. The time does not adjust for daylight savings time. These settings may be checked prior to beginning photography to confirm correctness.

8.11 The camera should be turned off prior to adding or removing any auxiliary equipment.

8.12 Camera lenses can be adjusted to either manual focus or auto focus. The analyst must be cognizant of which area in the composed photograph is in focus; this can be monitored by the indicator(s) that illuminate(s) when looking through the viewfinder.

8.13 White balance should be set to "auto" unless the analyst has received specialized training in the proper use of alternate settings.

8.14 Depth of field is adjusted by changing the f-stop setting. The analyst should adjust the f-stop setting based on what elements of the scene should be in focus.

8.15 Taking photographs with the camera in Manual mode is the preferred setting so that all elements of the photograph capture can be adjusted.

8.15.1 Analysts may choose to select aperture-priority mode, shutter priority mode, and/or programmed auto mode as is appropriate for the scene.

8.15.2 Analysts may choose to select Auto mode as is appropriate for the scene or for their experience level.

8.16 The exposure necessary to accurately photograph the crime scene is dependent upon the lighting conditions present at the scene. The exposure can be controlled using the ISO, f-stop, and shutter speed settings within the camera and external lighting, utilizing either an electronic flash and/or other lighting methods.

8.16.1 The exposure should be adjusted so that the resulting photograph is neither over nor under exposed.

8.16.2 Intentionally over or under exposing an image may be necessary to capture details of the scene, but will not be the regular photographic practice.

8.16.3 Electronic flash and/or other lighting methods should be placed in a way that eliminate bright, over exposed areas in the photograph.

8.17 ISO is a numerical rating that indicates the sensitivity of a sensor. Increasing the ISO setting increases the amount of light captured by the sensor.

8.17.1 At a very high ISO setting, there is the possibility of digital noise in the image.

8.18 F-stop is a numerical designation that indicates the size of the aperture (i.e. lens opening). Because the f-stop is a fraction, f/2 is a larger lens opening than f/22.

8.18.1 While the f-stop affects the amount of light hitting the sensor based on the size of the aperture, it also affects depth of field.

8.18.2 A setting of f/2 would allow for the greatest amount of light through a wide-open aperture, but would have the shortest depth of field. A setting of f/22 would allow for a small amount of light through a small opening in the aperture, but would have a much greater depth of field.

8.19 Shutter speed is the amount of time that the lens is open, exposing the sensor to light. Shutter speed is measured in fractions of seconds (e.g. 1/250) or in whole seconds (e.g. 2”).

8.19.1 If the shutter must be open longer than a certain amount of time (e.g. 30 seconds), the shutter speed setting will read “bulb”, which indicates that the shutter will be open for as long as the shutter release button is pressed.

8.19.2 At a very long shutter speed setting, there is the possibility of digital noise in the image.

8.19.3 When taking a very long exposure, the best practice is to use a shutter-release cable to eliminate potential movement of the camera that would occur by pressing the shutter release button on the camera body.

8.20 Electronic flashes may be utilized to provide a brief flash of light.

8.20.1 Electronic flash settings can be set to manual, automatic, or by through-the-lens (TTL) metering; flashes will be set to TTL metering unless the analyst has received specialized training in other settings.

8.20.2 Electronic flashes can be operated manually or by synchronizing them with the camera.

8.20.2.1 A flash may be operated by manually pressing the test fire button on the flash body. This should be utilized when the shutter is open for an extended period of time (multiple flash technique).

8.20.2.2 A flash may be synchronized with the camera unit by connecting the flash unit into the hot shoe clip on the camera for a fixed location flash. It may also be synchronized by utilizing an off-shoe cord, which attaches to the hot shoe clip on the camera and the corresponding clip on the flash unit, allowing the flash to be hand-held and moved around.

8.20.3 Electronic flashes can be positioned so that the light emitted hits against a wall or ceiling, creating a bounce light effect.

8.20.4 Electronic flashes have a diffuser that can be pulled over the flash unit so that the light is scattered, reducing the potential for hot spots. When not in use, the diffuser can be retracted into the flash body.

8.21 Additional sources of light, such as flashlights, may be utilized to illuminate an area in order to get a properly exposed photograph.

8.21.1 With the shutter release open, the analyst can use a flashlight to direct light over an area or object that has less light than the other areas of the scene (i.e. paint by light technique).

8.22 When hand-holding the camera, the shutter speed should not be set to slower than 1/60 of a second.

8.22.1 If the shutter speed must be set to slower than 1/60 of a second, the camera should be mounted on a tripod.

8.22.2 A shutter-release cable should be utilized to eliminate potential movement of the camera that would occur by pressing the shutter release button on the camera body.

8.23 A header card should be filled out with case information and should be photographed as the first photograph in the series from a crime scene.

8.23.1 If multiple scenes and/or vehicles are to be photographed subsequent to one another, the photographer may use a new header card between each separate scene/vehicle, if desired.

8.24 Photographs will be taken in a systematic method. The photographs will include three types of photographs: Orientation, Relationship, and Identification.

8.24.1 The photographer should take photographs systematically, such as moving clockwise or counter-clockwise around a room, so that there is a logical flow in the photographic sequence.

8.24.2 The purpose of overall photographs is to depict the general condition and layout of the scene. These photographs capture how the scene is oriented, where major landmarks (e.g. doors, furniture, etc.) are located, and the condition of the scene prior to any significant alteration.

8.24.2.1 Overall photographs are generally taken with a wide-angle lens to capture a wider field of view in a single photo.

8.24.2.2 The camera should be positioned to take photographs in a landscape orientation for the majority of overall photographs; the camera may be turned to a portrait orientation as is necessary, based on the scene.

8.24.2.3 Overall photographs are taken so that they overlap one another, creating a panoramic view of the area.

8.24.2.4 The most common way to take overall photographs is the corner method. The photographer goes to one corner of the room and takes several photographs as s/he rotates. S/he then proceeds to each corner and repeats the process until the room has been completely photographed.

8.24.2.5 The side method is when the photographer positions him/herself at the approximate middle of the wall and shoots a similar series of photographs as described in the corner method.

8.24.2.6 The smaller the room, the more significant the difference will be in choosing between methods; the corner method actually shows more square feet per photograph than the side method.

8.24.2.7 Overall photographs must be taken at least twice. The first occurs prior to the introduction of any scales, evidence markers, etc. The next occurs after evidence markers and/or scales have been placed, and may be repeated as additional evidence markers are placed. By doing two different sets of photographs, the photographer shows the scene as it was found, unaltered, and also shows that the addition of evidence markers isn't obscuring anything.

8.24.2.8 If, during processing of the scene, areas are significantly altered (e.g. application of blood reactive chemicals) or damaged (e.g. cutting out a section of drywall), photographs of the altered/damaged areas should be taken prior to leaving the scene.

8.24.3 The purpose of relationship photographs is to frame the evidence item in conjunction with some obvious landmark evident in the overall photographs.

8.24.3.1 When dealing with a number of similar items (e.g. cartridge cases), the addition of an evidence marker allows the viewer to discern one item of evidence from another. By photographing each of those items in relation to a landmark within the scene, the viewer can then determine the location of each of those items of evidence within the scene.

8.24.4 The purpose of identification photographs is to distinguish an item of importance within the scene, often something to be collected as evidence.

8.24.4.1 The analyst should fill the frame with the item of interest.

8.24.4.2 If the evidence marker doesn't have an incorporated scale, or evidence markers aren't used, there are numerous times in which the addition of a scale in the photograph would be prudent.

8.24.4.3 If an item of evidence is going to be photographed once it has been moved from its original location, it should be set on a clean surface (e.g. butcher paper, plain evidence sack, plain envelope, etc.) to avoid contamination or cross contamination.

8.24.5 The photographer should be cognizant of potential contamination of scene photographs. Other personnel, analyst tools and/or materials, response vehicles, and other items that are not material to the scene should not be contained in the photographs. If a person or item is inadvertently photographed, the image should be captured again with the person or item out of the frame.

8.24.5.1 Mirrors and other reflective surfaces (e.g. framed art, windows) can present problems when photographing a scene. If the photographer cannot position him/herself in such a way as to prevent his/her reflection from being captured, a tripod should be utilized to capture the image.

8.25 Comparison quality photographs are most often taken as a way to capture evidence that may not be collected, or whose collection may not fully document the details of the evidence; they are often taken of impression evidence, such as latent prints, footwear impressions, tire impressions, and tool mark impressions.

8.25.1 Comparison quality photographs should be taken in a lossless format; TIFF is the minimum quality, RAW is preferred.

8.25.2 When capturing a comparison quality photograph, the camera should be mounted on a tripod, with the lens at a 90 degree angle to the plane of the evidence, using a remote shutter release, utilizing a scale at the same depth as the impression, and at the greatest depth of field possible.

8.25.3 When photographing footwear and tire impressions, the tripod should be positioned higher than necessary and the lens adjusted in order to fill the frame with the impression. If the tripod is low, the lens adjustment is wider than necessary, which creates distortion in the image.

8.26 Indoor scenes may contain numerous rooms or areas. An analyst should photograph the entire scene for overall location and condition, but may not need to take relationship and identification photographs if there are no relevant items in a room/area.

8.27 The location of a scene will be documented by a street address, a business sign, or other equally identifiable marking.

8.27.1 House numbers are often located on the front face of the house, on the mailbox, or on the curb.

8.27.2 Business numbers are often located on the front face of the building, on the mailbox, or on the curb. Businesses often have a sign identifying the location as a business. Business signs are often located on the front door, front window, or on a stand-alone sign in an area adjacent to the business.

8.28 The location of outdoor scenes may be difficult to document photographically, as they don't necessarily have identifying markings readily visible.

8.28.1 When available, use landmarks such as street signs, power line towers, or other items as a point of reference to document the location, as well as to be an anchor point for photography.

8.28.2 If identifying markings are a distance from the area of interest, the photographer should consider taking a series of photographs that show the path from the identifying marker to the area of interest (e.g. series from mile marker on the roadway to the body under a tree, which isn't visible from the roadway).

8.29 When photographing a living person, identification and condition photographs should be taken.

8.29.1 To document the identification of a person, a minimum of five photographs should be taken: front of person (head-to-toe), left side of person (head-to-toe), back of person (head-to-toe), right side of person (head-to-toe), and a close up of the person's face.

8.29.2 When the condition of a person's clothing or body is important to document, relationship and identification photographs should be taken.

8.29.3 If there is a defect in the clothing or an injury to the person, the area should be photographed both without and with a scale for reference.

8.29.4 Depending on the nature of the injury, it may be necessary to photograph it as found and then photograph again after it has been cleaned; each set of photographs should be taken both without and with a scale for reference.

8.30 When photographing a vehicle, identification and condition photographs should be taken.

8.30.1 To document the exterior of a vehicle, a minimum of four photographs should be taken of the body of the vehicle: front, left side, back, and right side; ideally, four additional photographs, taken from each corner of the vehicle, each showing one end and one side, should also be taken.

8.30.2 The vehicle identification number (VIN), located on metal plate on the driver's side dashboard and on a sticker on the driver's door edge, will be photographed if present.

8.30.3 The front and rear license plates will be photographed if present.

8.30.4 The overall condition of the interior of the vehicle will be photographed as general documentation.

8.30.5 The condition of the exterior of the vehicle will be captured in the overall documentation photography; if areas of damage exist that are relevant to the investigation, the investigating officer should direct the photographer as to the photography necessary.

8.30.6 Relationship and identification photographs should be taken of any evidence collected by ISPFS analysts, utilizing a scale where relevant.

8.31 Filters may be used to allow the photographer to capture information that would not be captured otherwise.

8.31.1 An ultraviolet (UV) filter should be kept on the primary camera lens (e.g. 18-200mm, 18-105mm) at all times unless its use conflicts with the use of another filter or a photographic process.

8.31.2 When photographing a pool of water, a reflection of light on the surface is captured; a polarizing filter may be utilized in order to visualize below the surface, into the pool of water.

8.31.3 When utilizing an alternate light source (ALS), a colored filter that corresponds to the color of viewing goggle(s) utilized with the ALS will be installed on the lens in order to visualize the area reacting to the ALS.

8.32 In crime scene investigations, witness vantage points may be important.

8.32.1 Overall photographs should be taken of the area from which a witness is reported to have seen something.

8.32.2 The camera lens should be set to approximately 34mm in order to photograph the approximate equivalent to what a human eye sees.

8.32.3 Photographs should be taken from the witness location, documenting his/her point of view.

9.0 Diagrams/Sketches

9.1 A diagram or sketch of the crime scene serves as a graphic document to show the layout, orientation, and interrelationships of the scene and the evidence. It depicts pertinent portions of the scene and supports the photographs and notes taken at the scene.

9.1.1 The term "sketch" often refers to a hand-drawn depiction that is created on scene. The term "diagram" often refers to a formally drawn or computer-created depiction of the scene that is created at a later date. The terms may be used interchangeably.

9.2 A diagram/sketch should include five basic elements: heading, diagram area, legend, title block, and scale and direction notations.

9.2.1 A heading indicates why the sketch was created. A heading may be as simple as the title of the room depicted (e.g. Master Bedroom), or may note a particular type of evidence (e.g. Firearms Evidence, Blood Stains, etc.).

9.2.2 The diagram area is the drawing itself. The diagram/sketch should depict the scene and primary evidence. Items of furniture, structural elements (e.g. doors, windows, closets, etc.), and items of evidence should be included.

9.2.2.1 Measurements should be included in the diagram/sketch. Measurements may be included in the diagram area or they may be listed in another area of the diagram/sketch, such as in a table. The type of measurement notation will be determined based on the number of items in the diagram/sketch and the creator's preference. If noting measurements in the diagram area would make the diagram/sketch difficult to read, a table or other similar notation should be used.

9.2.2.2 For excessively cluttered scenes, a representation of non-pertinent items may be made (e.g. pile of clothes) without drawing each individual item.

9.2.2.3 Colored pens/pencils may be used in sketches/diagrams to more accurately represent the details of the scene.

9.2.3 A legend indicates what the various labels used in the diagram/sketch depict. Letters, numbers, symbols, colors, etc. may be used as labels.

9.2.3.1 If using evidence markers with letters or numbers in the scene, those letters or numbers should be used in the diagram.

9.2.3.2 A letter or number should not be used in the diagram/sketch that is for a different item than the same evidence markers was used for in the scene.

9.2.4 The title block provides information relevant to the location of scene and the creator of the diagram/sketch. The title block should include the lab number, agency case number, the physical address of the scene, the name of the person who created it, and the date it was drawn.

9.2.5 A direction notation should indicate, at a minimum, the direction of North in relation to the scene. If a scale of reference is used, usually in a final diagram, the scale reference should be indicated. Whether a scale reference is used or not, a notation of "not to scale" must be included.

9.2.6 When creating a final diagram, it is preferable to make one version that includes the "shell" of the scene, representing the structure and furniture, and a second version that includes all of the pertinent evidence.

9.2.6.1 The first version may be utilized in court testimony without concern for biasing the jury, while the second one is useful for the responder and/or other involved parties to reference when discussing the details of the case.

9.3 The standard crime scene sketch is a bird's-eye view of the scene. In some instances, additional viewpoints may be necessary to fully document the scene.

9.3.1 A cross-projection or exploded diagram/sketch combines the bird's-eye view of the horizontal surfaces of a room, while at the same time "laying down" a wall or walls in order to depict evidence present on the vertical surfaces. This type of diagram/sketch is often effective when dealing with walls that have bullet holes or blood stains on them and shows the interrelationships of the evidence on the horizontal and vertical surfaces.

9.3.2 An elevation diagram/sketch depicts a side view of a portion of the scene, typically an interior wall or similar vertical structure. This type of diagram/sketch may be utilized when dealing with vertical surfaces that have bullet holes or blood stains on them. It may also be used when a particular vertical surface is the area of focus.

9.4 In order to create an accurate scene diagram/sketch, there must be supporting documentation that defines the size of the scene and the location of items within the scene. By taking these measurements, each element's location may be fixed within the scene.

9.4.1 The type of scene (e.g. outdoor, indoor, no landmarks) may determine which measuring methodology would be most effective.

9.4.2 Furniture should be documented by measuring its length, width, and height, in addition to its location in the scene.

9.5 The rectangular coordinates (i.e. rectangulation) method is best suited for scenes with clear and specific boundaries (e.g. interior walls).

9.5.1 Generally, items are measured against two walls; north/south and east/west, depending on the area.

9.5.2 Measurements may be taken from center mass, unless the specific position of an item is relevant; in that case, measurements are taken from different locations on the same item (e.g. end of barrel and butt of handgun).

9.6 The triangulation method utilizes measurements from two distinct landmarks in the area to two distinct points on the item. Each pair of measurements create a triangle.

9.6.1 Typical landmarks used in triangulation are base corners of walls and doors. In complex scenes, a reference point (RP) may be established and its location documented; the RP may then be used to measure against within the scene. Multiple RP's may be established, depending on the scene circumstances. The location of RP's should be noted in the diagram.

9.6.2 Measurements may be taken from center mass, unless the specific position of an item is relevant; in that case, measurements are taken from different locations on the same item (e.g. end of barrel and butt of handgun).

9.7 The baseline method is best suited for exterior scenes without evidence landmarks, although it can be used indoors.

9.7.1 Baseline begins by determining a reference point (RP) from which the baseline will extend; it is then extended along a cardinal direction (i.e. north, south, east, west) as far as necessary. This is frequently accomplished by extending an actual tape measure. The location of RP's should be noted in the diagram.

9.7.2 Once the baseline is established, each item can be measured to its location along the baseline (i.e. distance from the RP), and then is measured at a right angle to the baseline. For example, if the baseline is extended north in a scene, an item would be measured by the distance north of the RP, and then the distance, either east or west, off the baseline.

9.7.3 Measurements may be taken from center mass, unless the specific position of an item is relevant; in that case, measurements are taken from different locations on the same item (e.g. end of barrel and butt of handgun).

10.0 Presumptive Blood Tests

10.1 Background/References

10.1.1 Most screening tests for blood depend on the catalytic action of the heme group. To minimize false positives, the test is frequently performed as a multi-step test. A good overview is found in the first reference.

10.1.2 References

10.1.2.1 Gaensslen, R. Sourcebook in Forensics Serology, Immunology, and Biochemistry. (1983) U.S. Dept. of Justice, Washington, D.C., p. 101-105.

10.1.2.2 Burdett, PE (October 1976) "Presumptive Tests for Blood – A Comparative Survey", CRE Report, No. 201.

10.1.2.3 Culliford, BJ and Nicholl, LC (1964) "The Benzidine Test: A Critical Review", Journal of Forensic Sciences, 9:175-191.

10.1.2.4 Higaki, R.S. and Philip, W.M.S. A Study of the Sensitivity, Stability and Specificity of Phenolphthalein as an Indicator Test for Blood, (1976) Canadian Journal of Forensic Science, Vol 9, No. 3, p. 97-102.

10.2 Scope

10.2.1 To provide a method for the localization and presumptive identification of bloodstains.

10.3 Equipment/Reagents

Cotton swabs or filter paper
Balance (must be calibrated annually by an outside vendor)
Phenolphthalein Working Solution/Pre-prepared Phenolphthalein Test Kit
3% Hydrogen Peroxide
Sterile/Nanopure, de-ionized, or distilled H_2O
0.3% Ortho-Tolidine Stock

10.4 PHENOLPHTHALEIN

10.4.1 Preparation of reagents
(the following may be made in different amounts using appropriate ratios)

Phenolphthalein	2.0g
KOH	20.0g
Zinc (granular)	20.0g

Phenolphthalein, KOH, and 100mℓ of dH_2O are refluxed, in a fume hood, with Zinc until solution is colorless (producing phenolphthalein in ~4 hours). Store stock solution refrigerated in dark bottle to which ~5g mossy zinc has

been added to keep the solution in its reduced form. Remove for working solution as needed.

Working solution: Mix 2mℓ stock solution with 8mℓ Ethanol

10.4.2 Phenolphthalein Safety

10.4.2.1 Zinc is flammable. The unreacted portions and used filter paper are to be disposed of properly.

10.4.2.2 Chemicals/Reagents will be labeled using NFPA labels in accordance with the Health and Safety Manual.

10.4.3 Phenolphthalein Procedure

10.4.3.1 Positive (known bloodstain) and negative control samples are processed, prior to testing any forensic samples (on the day of testing), to ensure the working solution and/or kit reagents are functioning properly. If a swab is moistened with H_2O to collect the positive control sample, then H_2O shall be added to the swab for the negative control sample.

10.4.3.2 Cotton swabs or a folded piece of filter paper are used to collect the suspected blood onto the tip. A swab may be moistened with H_2O if necessary.

10.4.3.3 If using a Pre-prepared Phenolphthalein Test Kit, follow the procedure provided by the manufacturer. If using lab-prepared Phenolphthalein, follow steps 10.4.3.4 and 10.4.3.5.

10.4.3.4 To the swab or filter paper with the suspected blood, add 1-2 drops of phenolphthalein working solution. Wait 10-15 seconds to detect potential false positives.

10.4.3.5 Add 1-2 drops of 3% H_2O_2 and note appearance or absence of bright pink color. Color reaction should occur rapidly (≤ 1 minute).

10.4.3.6 Document result in case notes. Record positive (+), as indicated by the development of the above color change, or negative (-) as indicated by the absence of the color change. Analyst may use other descriptive word(s) as well (e.g. strong, weak, slow, etc.).

10.4.4 Phenolphthalein comments

10.4.4.1 Only those responders who have been trained and competency/proficiency tested to use Phenolphthalein may use it.

10.4.4.2 Direct testing of a small cutting/sample may also be performed.

10.4.4.3 Color changes occurring prior to the addition of 3% H_2O_2 are generally considered inconclusive.

10.4.4.4 Color changes occurring after 1 min. are generally considered negative.

10.4.4.5 The Presumptive Blood Testing Notes page may be used to assist in note-taking related to tests performed.

10.5 ORTHO-TOLIDINE (O-TOLIDINE)

10.5.1 Preparation of O-Tolidine reagents
(the following may be made in different amounts using appropriate ratios)

O-Tolidine	0.6g
Glacial Acetic Acid	100mℓ
Ethanol	100mℓ

Dissolve O-Tolidine in Acetic Acid/Ethanol mixture consistent with ratios above. O-Tolidine is light sensitive and should be stored in dark reagent bottle and kept refrigerated when not in use.

10.5.2 O-Tolidine safety

10.5.2.1 O-tolidine is designated as a potential carcinogen and should be used with caution.

10.5.2.2 Chemicals/Reagents will be labeled using NFPA labels in accordance with the Health and Safety Manual.

10.5.3 O-Tolidine Procedure

10.5.3.1 Positive (known bloodstain) and negative control samples are processed, prior to testing any forensic samples (on the day of testing), to ensure the working stock reagents are functioning properly. If a swab is moistened with H_2O to collect the positive control sample, then H_2O shall be added to the swab for the negative control sample.

10.5.3.2 Cotton swabs or a folded piece of filter paper are used to collect the suspected blood onto the tip. A swab may be moistened with H_2O if necessary.

10.5.3.3 To the swab or filter paper with the suspected blood, add 1-2 drops of o-tolidine working solution. Wait 10-15 seconds to detect potential false positives.

10.5.3.4 Add 1-2 drops of 3% H_2O_2 and note appearance or absence of blue-green color. Color reaction should occur rapidly (≤ 1 minute).

10.5.3.5 Document result in case notes. Record positive (+) as indicated by the development of the above color change, or negative (-) as indicated by the absence of the color change.

Analyst may use other descriptive word(s) as well (e.g. strong, weak, slow, etc.).

10.5.4 O-Tolidine comments

10.5.4.1 Only those responders who have been trained and competency/proficiency tested to use O-Tolidine may use it.

10.5.4.2 Direct testing of a small cutting/sample may also be performed.

10.5.4.3 Color changes occurring prior to the addition of 3% H_2O_2 are generally considered inconclusive.

10.5.4.4 Color changes occurring after 1 min. are generally considered negative.

10.5.4.5 The Presumptive Blood Testing Notes page may be used to assist in note-taking related to tests performed.

10.6 Results/Conclusion statements

10.6.1 There are numerous ways to report the results of presumptive blood testing. Reporting format may vary based on the number of items/surfaces tested or the number of results. The following are suggested wording examples and can be modified as necessary, depending on circumstances. (Blanks and items in parentheses indicate a choice or description should be entered).

General Statements:

Results from presumptive chemical tests for the presence of blood were negative.

Results from presumptive chemical tests for the presence of blood were positive, indicating the presence of blood.

Results from presumptive chemical tests for the presence of blood were inconclusive.

Statements that group by location:

I performed a presumptive test(s) for the presence of blood on (number) items from (locations). Positive results, indicating the presence of blood, were obtained on (number) stains from (locations). Negative results were obtained on the other items tested. Swabs were collected from (locations).

Results from presumptive chemicals tests for the presence of blood were (negative/inconclusive) for (locations).

Statements that group by evidence marker numbers:

I performed a presumptive test(s) for the presence of blood on items from marker numbers (numbers). Positive results, indicating the presence of blood, were obtained from items at marker numbers

(numbers). Blood was not detected on the other items tested. Swabs were collected from marker numbers (numbers).

Results from presumptive chemicals tests for the presence of blood were (negative/inconclusive) for items at marker numbers (numbers).

11.0 Biological Evidence Collection

11.1 The type of biological evidence most commonly encountered in crime scenes is in the form of liquid or dried blood, semen, and saliva. Other biological evidence that may be encountered includes hair, urine, feces, bone, teeth, and other tissues. Biological evidence may lead to the identification of a victim or a suspect, so proper collection and preservation is imperative. Biological evidence must be protected from possible contamination from scene responders and possible cross-contamination from other evidence in the crime scene.

11.2 All biological evidence should be treated as infectious. Appropriate personal protective equipment (PPE) should be utilized.

11.2.1 Gloves should be changed frequently to avoid cross-contamination from items in the crime scene.

11.3 Biological evidence should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to collection.

11.3.1 Documentation of blood stain patterns for reconstruction should be conducted as outlined in Section 13 of this manual.

11.3.2 Small or light colored stains may not be easily visualized in photos. Evidence markers (e.g. stickers, placards) may be utilized to help visualize stains in scene photography.

11.3.3 Relevant biological evidence will be described in notes and may be included in sketches (if used); descriptions may include color, size, orientation, state (e.g. liquid, dried, flaky), and distribution. If evidence markers were used, the numbers/letters will be included in the description. The results of any presumptive blood tests will be included in notes and may be included in sketches (if used).

11.3.4 Crime scene diagrams may include references to large areas of biological evidence, such as a blood pattern distribution on a wall, or a pool of blood on a floor.

11.3.5 Crime scene sketches may be used to augment notes by detailing areas containing biological evidence within a scene.

11.3.5.1 A detailed sketch of one area may be made without sketching other adjacent areas that do not contain relevant biological evidence.

11.3.6 Colored pens/pencils may be used in sketches/diagrams to more accurately represent the details of biological evidence.

11.4 It may be difficult to locate very small stains, dilute stains, or stains in a scene that has been altered/cleaned.

11.4.1 A high intensity white light should be one of the first tools utilized to search for biological evidence.

11.4.2 An alternate light source (ALS) may be utilized when searching for biological fluids such as semen and saliva.

11.4.2.1 The most appropriate wavelength to search for bodily fluids is 430-515 nm, utilizing orange goggles/barriers.

11.4.2.2 An ALS may only be utilized by those responders who have training in the appropriate and safe use of an ALS.

11.4.3 A volume of blood may flow into floorboard cracks or be absorbed into carpet padding and may not be visible at the surface.

11.4.4 Blood enhancement chemicals may be used as outlined in section 12 of this manual.

11.5 Collection of biological evidence is often determined based on the size of the item containing the evidence.

11.5.1 If an item is small enough to be collected, the entire item should be collected.

11.5.2 If an item is large, a piece of the item may be taken (e.g. seat cushion of a chair) or an area may be removed from the item (e.g. cutting fabric from a mattress, cutting out a piece of drywall from a residence, etc.). Authorization from the primary detective or investigating agency must be obtained prior to removal; note who specifically gave authorization for those actions.

11.5.2.1 If an item or area is damaged in the collection of evidence (e.g. cutting a piece of drywall from a residence), it should be documented in notes and with photos.

11.5.3 If collection is not possible or appropriate, the item may be swabbed in order to collect the biological evidence.

11.6 COLLECTION OF SWABS

11.6.1 When swabbing an item/area, appropriate water sources and swabs will be used.

11.6.2 If a swab must be moistened to collect a sample, water from a sterile water ampule/bottle will be utilized.

11.6.3 Cap-Shure swabs are sterile swabs whose ends are enclosed with a breathable plastic capsule. Cap-Shure swabs may be utilized to collect a variety of types of biological evidence.

11.6.3.1 After collection, Cap-Shure swabs may be placed in an evidence envelope without allowing the swab to dry due to the capsule design.

11.6.4 Standard wood/plastic shaft sterile swabs may be utilized to collect a variety of types of biological evidence.

11.6.4.1 After collection, standard swabs should be placed in a vented swab box or a small, coin-type envelope; time should be allowed for the swab to dry. It is effective to tent

the envelope to keep it somewhat open in order to facilitate swab drying.

11.7 COLLECTION OF LIQUID OR SEMI-LIQUID STAINS

11.7.1 When collecting a stain that is liquid or semi-liquid, the following guidelines should be followed.

11.7.2 When possible, two swabs should be collected simultaneously.

11.7.3 The cotton end of an appropriate swab should be placed into the liquid in order to absorb the liquid into the swab.

11.7.4 The swab should be dried appropriately based on swab type.

11.8 COLLECTION OF DRIED STAINS

11.8.1 When collecting a stain that is dried, the following guidelines should be followed.

11.8.2 When possible, two swabs should be collected simultaneously.

11.8.3 The cotton end of an appropriate swab should be slightly moistened.

11.8.3.1 Do not saturate the swab. If a swab is inadvertently over-saturated, it should be discarded.

11.8.3.2 Do not touch the tip of the water ampule to the swab.

11.8.4 The swab should be held at approximately 90 degrees to the stain in order to concentrate the material onto the end/tip of the swab.

11.8.5 The swab should be rubbed against the stain until a sufficient amount of material has been collected.

11.8.6 The swab should be dried appropriately based on swab type.

11.9 COLLECTION OF POSSIBLE DNA MATERIAL

11.9.1 "Possible DNA material" refers to a likely, but not necessarily visible, deposition of DNA, based on the details of the case.

11.9.2 When collecting possible DNA material from a person (e.g. finger swabs, penile swabs) or surface, the following guidelines should be followed.

11.9.3 When possible, two swabs should be collected simultaneously.

11.9.4 The cotton end of an appropriate swab should be slightly moistened.

11.9.4.1 Do not saturate the swab. If a swab is inadvertently over-saturated, it should be discarded.

11.9.4.2 Do not touch the tip of the water ampule to the swab.

11.9.5 The swab should be held at approximately 90 degrees to the surface in order to concentrate the material onto the end/tip of the swab.

11.9.6 The swab should be rubbed against the surface until a sufficient amount of material has been collected.

11.9.6.1 When swabbing fingers, two swabs should be used for one entire hand (e.g. one set of swabs for the left hand, one set of swabs for the right hand). Do not separate the hand into sections for collection (e.g. swabs from right index finger, swabs from right middle finger, etc.) Extra attention should

be paid when swabbing areas where potential DNA material may collect, such as under the edge of the fingernails and around the nail bed.

11.9.6.2 When collecting penile swabs, two swabs should be used for the entire genital area. Do not separate the genitals into sections for collection (e.g. base, shaft, scrotum, etc.).

11.9.7 The swab should be dried appropriately based on swab type.

11.10 COLLECTION OF POTENTIAL DNA MATERIAL

11.10.1 "Potential DNA material" refers to a potential, but not necessarily visible, deposition of DNA, based on how something/someone may have been handled.

11.10.2 When collecting potential DNA material from a surface (e.g. door handle, gear shift knob, etc.) or person, the following guidelines should be followed.

11.10.3 When possible, two swabs should be collected simultaneously.

11.10.4 The cotton end of an appropriate swab should be slightly moistened.

11.10.4.1 Do not saturate the swab. If a swab is inadvertently over-saturated, it should be discarded.

11.10.4.2 Do not touch the tip of the water ampule to the swab.

11.10.5 The swab should be held at approximately 90 degrees to the surface in order to concentrate the material onto the end/tip of the swab.

11.10.6 The swab should be rubbed against the surface until a sufficient amount of material has been collected or until a sufficient area of the surface has been swabbed.

11.10.7 The swab should be dried appropriately based on swab type.

11.11 COLLECTION OF MENSTRUAL PRODUCTS (SANITARY PADS, TAMPONS, MENSTRUAL CUPS, PERIOD PANTIES)

11.11.1 Sanitary pads and tampons may contain DNA from both the victim and the suspect. When collecting pads or tampons, the following guidelines should be followed.

11.11.2 If the adhesive surface of the sanitary pad is exposed, it should be affixed to a paper envelope to keep the adhesive portion from adhering to other areas of the pad.

11.11.3 The pad should be placed in a paper envelope (inner packaging). This paper envelope should then be placed in an evidence envelope or sack (outer packaging).

11.11.4 A tampon should be placed in a paper envelope (inner packaging). This paper envelope should then be placed in an evidence envelope or sack (outer packaging).

11.11.5 Menstrual cups would only be considered for examination on a case-by-case basis. If the menstrual cup contains liquid blood which may also

contain semen, the contents should be absorbed into a sterile piece of gauze, sterile swabs, or as a last resort, poured onto a sterile sanitary pad.

11.11.6 A menstrual cup should be placed in a paper envelope (inner packaging). This paper envelope should then be placed in an evidence envelope or sack (outer packaging).

11.11.7 Period panties should be placed in a paper envelope (inner packaging). This paper envelope should then be placed in an evidence envelope or evidence sack (outer packaging).

11.11.8 All menstrual products should be dried prior to packaging.

11.12 COLLECTION OF CONDOMS

11.12.1 Condoms may contain DNA from both the victim and the suspect. When collecting condoms, the following guidelines should be followed.

11.12.2 The condom should be handled as minimally as possible to prevent transfer of DNA between the interior and exterior surfaces.

11.12.3 Condoms often have lubricant on their surfaces. While the biological materials may dry on the interior and exterior surfaces, the lubricant may not fully dry and can be absorbed into paper packaging.

11.12.4 The best practice is to store condoms frozen. If a condom cannot be frozen, it should be refrigerated. Condoms should be put into cold storage as soon as possible.

11.12.5 If cold storage is available in a reasonable time frame, the condom may be packaged in plastic.

11.12.5.1 If the condom is pliable, it can be placed into a screw top plastic vial. The plastic vial should then be placed in an evidence sack.

11.12.5.2 A notation should be made on the exterior evidence packaging indicating the need to freeze/refrigerate the evidence.

11.12.5.3 If the condom is not pliable, it should be packaged as outlined in 11.12.6.1.

11.12.6 If a condom cannot be stored in a cold environment, it should be packaged in order to facilitate drying.

11.12.6.1 The condom should be placed in a paper envelope (inner packaging). This paper envelope should then be placed in an evidence envelope or sack (outer packaging).

11.12.7 If there is concern that the liquid contents of the condom may leak out, one piece of sterile gauze should be placed inside the condom to absorb any liquid.

11.13 OTHER BODILY FLUIDS (e.g. VOMIT, URINE, AND FECES)

11.13.1 Some types of bodily fluids have a very limited forensic value; vomit, urine, and feces may be collected if determined to be probative.

11.13.2 Vomit may be collected if poisoning, ingested drug use, or an oral sexual assault is suspected.

11.13.2.1 Dried vomit may be collected on the source (e.g. clothing, bedding, etc.) or a large sample may be swabbed or collected and placed into a plastic screw top container.

11.13.2.2 Wet vomit should be collected in a plastic screw top container.

11.13.2.3 ISPFS can test vomit for ingested drug use. ISPFS does not have protocols for testing wet vomit for poison, alcohol, or semen.

11.13.3 Wet or dry urine samples on clothing, bedding, etc. have limited forensic value.

11.13.3.1 ISPFS can test urine for drugs. Liquid urine samples may be submitted following the established toxicology protocols.

11.13.4 Fecal material generally has a limited forensic biology value.

11.13.4.1 If DNA analysis is needed on fecal matter (e.g. missing child case), then the exterior of the feces, near the "pinch" point, may be swabbed. The feces as a whole should not be collected. Swabs should be dried appropriately based on swab type.

11.13.4.2 If a fecal sample appears to contain potentially probative blood or semen, the suspected blood or semen should be collected by swabbing. Care should be taken to minimize fecal contamination of the swabs. Swabs should be dried appropriately based on swab type.

11.13.4.3 If potentially probative blood or semen is observed in a diaper and fecal matter is present, a sample may be collected. If there is an isolated stain that may be cut or swabbed from the diaper, it may be removed to avoid contamination and air dried. If the sample is mixed, the diaper should be collected and stored frozen until submission for analysis.

11.13.4.3.1 The diaper should not be rolled or folded tightly in a way that would trap moisture inside. The open diaper should be placed into a paper evidence sack; the interior sides of the front and back panels of the diaper may be in loose contact with one another without any likely moisture issues.

11.14 Biological evidence should be packaged in paper, both for internal and external packaging, unless specifically noted (e.g. condoms).

11.14.1 Internal packaging may include various sizes of paper envelopes.

11.14.2 Plastic jars may be used as internal packaging as outlined in 11.12.5.1.

11.14.3 External packaging may include various sizes of paper envelopes, paper sacks, and cardboard boxes.

11.15 For all evidence containing known biological materials (e.g. blood, semen), the external packaging should have a “biohazard” sticker affixed to it, or should have the word “biohazard” written in bold print.

11.16 For all evidence that requires special storage considerations, the external packaging should have the storage medium written (e.g. “freeze”, “refrigerate”) in bold print.

12.0 Blood Enhancement Chemicals

12.1 Blood enhancement chemicals may be used for the detection and visualization of blood or suspected blood. They are commonly used in scenes that have been altered (e.g. cleaned), scenes that contain impression evidence in blood (e.g. fingerprints, footwear), and/or scenes that have blood stain patterns.

12.1.1 A presumptive blood test should be conducted on suspected blood prior to the application of blood enhancement chemicals.

12.1.2 Consideration for other types of evidence should be considered prior to the application of any blood enhancement chemicals.

12.1.3 If a swab of the blood is to be collected for potential DNA analysis, it should be collected prior to the application of any blood enhancement chemicals.

12.1.4 If there is a potential for latent prints made by substances other than blood, then appropriate latent print processing sequences should be followed.

12.2 The visibility of blood deposits may vary greatly depending on crime scene circumstances.

12.2.1 Finger/palm/sole impressions may vary in appearance based on the number of times they have touched surfaces after encountering a blood source.

12.2.2 Footwear impressions should continually lighten with each step taken away from a blood source.

12.2.3 The appearance of blood on surfaces in a scene (e.g. floors, walls, counters) may vary depending on the amount of cleaning that has taken place.

12.2.4 Surfaces in the crime scene that don't have visible blood stains should be visually examined prior to the application of blood enhancement chemicals in order to determine the most appropriate surfaces/areas to process.

12.2.4.1 A strong white light may be utilized at an oblique angle in order to visualize faint blood deposits. A flashlight or the white light setting on an alternate light source (ALS) are the most common sources for a strong white light

12.2.4.2 When utilizing an ALS at approximately 420nm with a clear UV filter, blood deposits will appear dark, which may help to visualize areas contaminated with blood.

12.2.4.3 Use of an ALS may also create a reaction with the surface, thereby creating contrast, visualizing a blood deposit.

12.2.4.4 An ALS may only be utilized by analysts who have received training in the appropriate use of an ALS.

12.2.4.5 When using an ALS to observe an item/surface, the appropriate goggles will be used, depending on wavelength.

WAVELENGTH	CORRESPONDING FILTER
400-450nm	yellow

12.2.4.6 Permanent eye damage can occur from reflected, refracted, or direct illumination by the ALS to the eye. Extreme care should be taken around highly reflective surfaces. An analyst should never look directly into the light or allow beams to bounce off the surface into his/her own eyes or another person's eyes.

12.3 Any blood deposits that are developed should be properly documented using photography, notes, and sketches/diagrams (as appropriate).

12.3.1 Documentation of blood stain patterns for reconstruction should be conducted as outlined in Section 13 of this manual.

12.3.2 Documentation of impression evidence should be conducted as outlined in Section 15 of this manual.

12.3.3 Small or light colored stains may not be easily visualized in photos. Evidence markers (e.g. stickers, placards) may be utilized to help visualize stains in scene photography.

12.3.4 Relevant blood deposits will be described in notes and may be included in sketches (if used). If evidence markers were used, the numbers/letters will be included in the description.

12.3.5 Crime scene diagrams may include references to large areas of blood deposits, such as a blood pattern distribution on a wall, or a bloody footwear trail through the scene.

12.3.6 Crime scene sketches may be used to augment notes by detailing areas containing enhanced blood deposits within a scene.

12.3.6.1 A detailed sketch of one area may be made without sketching other adjacent areas that do not contain relevant blood deposits.

12.4 Prior to the use of a blood enhancement chemical, positive and negative control tests must be conducted.

12.4.1 Any lot number and/or date of preparation information shall be recorded in the crime scene notes.

12.5 LEUCOCRYSTAL VIOLET (LCV)

12.5.1 Background/References

12.5.1.1 LCV is a biological stain used to dye blood's hemoglobin components an intense purple color. Due to LCV's toxic nature, it should only be used in small quantities with appropriate safety precautions observed.

12.5.1.2 Bodziak, William J., "Use of Leucocrystal Violet to Enhance Shoe Prints in Blood", Forensic Science International, Vol. 82, No.1, September 1996.

12.5.1.3 Chemical Formulas and Processing Guide for Developing Latent Prints, US Department of Justice, 1994, pp 47-48.

12.5.1.4 Fisher, John F., "An Aqueous Leucocrystal Violet Enhancing Reagent for Blood Impressions", Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence, FBI Academy, 1994.

12.5.2 Scope

12.5.2.1 LCV is a biological stain used to dye blood's hemoglobin components an intense purple color.

12.5.2.2 LCV may be used to visualize deposits in blood on non-porous and some porous surfaces.

12.5.3 Equipment/Reagents

Balance
Magnetic stirrer/stirring bar
Graduated cylinder
Glass beaker
Glass tray
Storage bottles
Leucocrystal Violet powder
Sodium acetate
5-sulfosalicylic acid
3% hydrogen peroxide
Distilled water

12.5.4 Preparation of reagents

12.5.4.1 Dissolve 10g of 5-sulfosalicylic acid in 100 ml distilled water.

12.5.4.2 Add 400 ml 3%hydrogen peroxide to sulfosalicylic acid solution. Pour solution into a spray bottle.

12.5.4.3 Measure out 0.75g Leucocrystal Violet; package in a sealed plastic container.

12.5.4.4 Immediately prior to use, add 0.75g Leucocrystal Violet to the solution in the spray bottle; stir vigorously.

12.5.5 Procedure

12.5.5.1 Consider evidence to be collected and/or processed prior to the application of LCV.

12.5.5.2 Conduct positive and negative control tests. The control test can be conducted by making a mark in blood on a slide or swab and following the processing procedure. The area surrounding the intentionally deposed mark shall serve as a negative control.

12.5.5.3 Spray the area using a fine mist sprayer.

12.5.5.4 Development of a dark purple coloration should occur in approximately 30 seconds in the presence of blood deposits.

12.5.5.5 Developed impressions are evaluated to determine their suitability for collection. Impressions deemed to be of value for collection shall be marked, photographed, and and/or lifted.

12.5.5.6 Areas that appear to have been cleaned will be photographed.

12.5.6 Comments

12.5.6.1 Shelf life of the LCV solution is approximately three months.

12.5.7 Safety

12.5.7.1 LCV may be harmful by inhalation, ingestion, or skin absorption; may cause skin and eye irritation; may cause irritation to mucous membranes and upper respiratory tract.

12.5.7.2 LCV should not be used in large amounts.

12.5.7.3 A respirator should be used when working with the dry form. LCV should be prepared and used in a well-ventilated area.

12.5.7.4 The analyst should wear disposable clothing, heavy-duty (non-disposable) gloves, and safety glasses.

12.6 AMIDO BLACK

12.6.1 Background/References

12.6.1.1 Amido Black is also known as Amido Black 10B, Amido Black 12B, Napthol Blue Black, or Napthalene Black. Amido Black is a dye that stains the protein portion of blood a blue-black color.

12.6.1.2 Manual of Fingerprint Development Techniques, British Home Office, (1998).

12.6.1.3 Journal of Forensic Identification, Vol. 45, No. 5 Sept/Oct 1995, “Superglue of Latent Shoe Prints in Blood Prior to Processing”, pages 498-50.

12.6.1.4 Proceedings of the International Forensic Symposium on Latent Prints, “Enhance Latent Prints in Blood With New Staining Techniques”, Paul Norkus and Kevin Noppinger, page 147.

12.6.2 Scope

12.6.2.1 Surfaces may be processed with Amido Black to detect faint deposits. It is generally used on dried blood stains on non-porous surfaces, but has been successful in developing

prints on some semi-porous and porous surfaces as well. When used on porous or semi-porous surfaces, consideration should be given for the potential of excessive background staining.

12.6.2.2 The Amido Black process utilizes a working solution and a rinse solution. Blood must be fixed prior to the application of Amido Black to prevent the liquid solutions used in the process from washing away some or all of the blood deposits.

12.6.3 Equipment/Reagents

Balance
Magnetic stirrer/stirring bar
Pipettes
Beakers
Graduated cylinder
Appropriately sized storage bottles
Spray/squirt bottles
Amido Black
Glacial acetic acid
Methanol
Distilled water

12.6.4 Preparation of reagents

Amido Black Working Solution

12.6.4.1 Weigh out 3-5 grams of Amido Black and place it in a clean, dry beaker.

12.6.4.2 Measure out 100 ml of acetic acid and add to the Amido Black.

12.6.4.3 Measure out 900 ml of methanol and add to the beaker containing the Amido Black and the acetic acid.

12.6.4.4 Stir the solution with a magnetic stirrer for thirty minutes and transfer the solution to a clean storage bottle.

Amido Black Rinse Solution (de-stain)

12.6.4.5 Measure out 100 ml of acetic acid and pour into a clean, dry glass beaker.

12.6.4.6 Measure out 900 ml of methanol and add it to the beaker.

12.6.4.7 Stir the solution for two to three minutes and transfer the solution to a clean, dry storage bottle.

12.6.5 Procedure

12.6.5.1 Consider evidence to be collected and/or processed prior to the application of Amido Black.

12.6.5.2 Conduct positive and negative control tests. The control test can be conducted by making a mark in blood on a slide or swab and following the processing procedure. The area surrounding the intentionally deposed mark shall serve as a negative control.

12.6.5.3 Blood deposits may be fixed using heat, methanol, or cyanoacrylate. Blood can be fixed to an object by spraying or pipetting methanol over the item; the Amido Black rinse that contains methanol will suffice for fixing the stains. Cyanoacrylate is an effective method for non-porous surfaces, as it will fix all possible latent prints as well as blood deposits. When using a methanol-based solution, the methanol in the solution can act as a fixing agent.

12.6.5.4 Spray or irrigate Amido Black over the surface and allow it to sit for two to three minutes.

12.6.5.5 Irrigate the item with the de-stain rinse solution to remove the excess dye.

12.6.5.6 Blood deposits should be colored a dark blue-black. The application and rinse process may be repeated to improve contrast.

12.6.5.7 Allow the surface to dry thoroughly.

12.6.5.8 Developed stains are evaluated to determine their suitability for collection and/or documentation.

12.6.6 Comments

12.6.6.1 Shelf life of the pre-mixed Amido Black, working solution, and de-stain is indefinite.

12.6.6.2 The methanol-based solution is preferable when processing horizontal surfaces as the methanol will evaporate quickly.

12.6.7 Safety

12.6.7.1 When mixing or using Amido Black, gloves, disposable clothing, goggles, and respirators (if there is a chance of the reagents becoming airborne) should be worn.

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

12.6.7.3 Methanol is flammable; it must be handled carefully with gloves during the mixing and use of Amido Black. Methanol is toxic in quantities as small as 30 ml and should not be allowed to come in contact with the skin, eyes, or mouth. It

is possible for methanol to be absorbed through the skin. If methanol comes into contact with the eyes or mouth, the area should be flushed with generous amounts of water and a doctor may be consulted. Inhalation of methanol vapors should be kept at a minimum and the solution should be used in a well-ventilated area.

13.0 Recognition and Documentation of Evidence for Reconstruction

13.1 Reconstruction is the use of scientific methods, physical evidence, deductive and inductive reasoning, and their interrelationships to gain explicit knowledge of the series of events that surround the commission of a crime.

13.1.1 Objective data exists in scene context and physical evidence. Crime scene reconstruction works from the evidence backwards; by considering the data, one can determine actions that occurred during an incident, as well as the order of those actions.

13.1.2 Each action has something that precedes it, something that occurs during, and something that follows it; nothing just happens.

13.2 Evidence related to bloodstains and/or shootings should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to collection of any evidence.

13.2.1 General documentation of biological evidence should be completed as per Section 11 of this manual.

13.2.2 General documentation of firearms and related evidence should be completed as per Section 17 of this manual.

13.2.3 For reconstruction purposes, additional detailed documentation of blood stains and shooting artifacts must be undertaken.

13.3 BLOODSTAINS

13.3.1 In order to fully document bloodstains for reconstruction, the analyst must first recognize their existence in the scene.

13.3.2 A flashlight may be utilized at an oblique angle in order to visualize small stains. A flashlight with a yellow cast to it may be preferable to one with a white light when searching for bloodstains.

13.3.3 Presumptive tests for the presence of blood should be conducted as per Section 10 of this manual.

13.3.3.1 When selecting a stain for testing that is part of a pattern on a vertical surface (e.g. wall), any stains whose tail points downward would be ideal as they would not be considered during reconstruction, since they have been affected by gravity.

13.3.4 Bloodstains may be present as individual stains, a group of stains, or a trail of stains, based on the events that created them.

13.3.5 Groups of bloodstains that were created by the same event should be documented together as a pattern. Patterns may overlap; if possible, each pattern should be documented separately.

13.4 Bloodstains and/or bloodstain patterns may be labeled differently depending on whether the stain is being recorded for reconstruction or whether the stain is being collected as evidence.

13.4.1 For bloodstains that are being documented for reconstruction, letter placards and/or stickers should be utilized.

13.4.1.1 For example, if there are three areas of bloodstains in patterns on the north wall, the pattern areas could be labeled as A, B, and C. The bloodstain pattern on the east wall could be labeled D. The bloodstain pattern on the floor in the northeast corner of the room could be labeled E.

13.4.2 For bloodstains that are being collected as evidence, number placards and/or stickers should be utilized.

13.4.2.1 For example, a bloodstain on the interior side of the front door handle could be labeled 18, a single drop on the sidewalk south of the front door could be labeled 19.

13.4.3 For bloodstains that are being documented for reconstruction, but which contain an area to be collected for evidence, both letter and number placards/stickers should be utilized.

13.4.3.1 For example, swabs of blood will be collected from area B on the north wall and area D on the east wall. In the area from which the swabs will be collected, marker 22 would be added to area B and marker 23 would be added to area D, near the stain that is being swabbed for collection.

13.4.4 By labeling areas for reconstruction differently than areas for collection, an analyst can quickly determine how that evidence was utilized in the scene and differentiate between documentation and collection efforts.

13.5 For reconstruction purposes, the size, shape, distribution, and appearance of bloodstains must be documented. These details are important factors in determining the type of event that caused the stains, the location of the blood source, the trajectory of the bloodstains' flight in air, and other scene factors.

13.5.1 BLOODSTAIN NOTES

13.5.2 The description of size should include a measurement of the diameter in mm. For a pattern including varying sizes of stains, a range of sizes can be indicated (e.g. stains varying in size from 3mm to 6mm in diameter). Measurements should be rounded down to the nearest mm.

13.5.3 The description of shape may include descriptors like circular, elliptical, spiny, and scalloped.

13.5.4 The distribution of bloodstains may include descriptors like linear, circular, conical, pooled, and saturated. When describing the distribution of stains on vertical surfaces (e.g. walls), start from the left and proceed to the right.

13.5.5 The appearance of bloodstains may include descriptors like color (e.g. red, red/brown), dry, wet, and flaky. Additionally, bloodstains that are caused by alterations (e.g. transfer stains) or affected by alterations in the scene should be noted.

13.5.6 Descriptions of bloodstains should be recorded in notes as indicated. For analysts who have had Bloodstain Pattern Analysis (BPA) training, and who feel comfortable using BPA language, the names of stains may be used (e.g. drip stain, swipe, spatter, etc.). The term "apparent" may be used when describing stains (e.g. apparent wipe pattern, apparent misting, etc.).

13.5.7 A disturbance in the distribution of bloodstains may be important. A void in the area of a pattern indicates that an item may have been in place during the bloodshed event, but was moved some time after the event.

13.5.8 The texture of the surface bearing bloodstains should be noted, as the surface may affect the appearance of bloodstains.

13.5.9 BLOODSTAIN PATTERNS AND LOCATIONS

13.5.10 The location of blood droplets and bloodstain patterns, as well as the size of bloodstain patterns, should be documented by taking the measurements of their locations within the crime scene.

13.5.11 Ruler tape may be used to outline areas of bloodstain patterns so that they may effectively be documented. It may also be used to document the location up from the floor, down from the ceiling, or from any reference point (RP) utilized in the scene.

13.5.11.1 Because ruler tape adheres to surfaces, its placement can easily be maintained during the examination of the crime scene. The use of ruler tape may be beneficial because it can be done by one person, without assistance.

13.5.11.1.1 Ruler tape should be applied in no less than one foot sections. However, ruler tape may be cut so that the tape may be applied in a way that does not obscure the bloodstain patterns.

13.5.12 Other types of measuring devices, such as freestanding measuring tapes, paper/disposable measuring tape, and measuring sticks may also be utilized around areas of bloodstain patterns. The use of these measuring devices usually requires the assistance of a second person.

13.5.13 Measurements made from any RP or designated surface (e.g. floor, ceiling, southwest corner of living room) should start at zero, and should measure to the area of interest. When outlining an area of interest, one

measuring tape should be perpendicular to the ceiling or floor, and the second should be level to the ceiling or floor.

13.5.14 When outlining areas of bloodstain patterns, the area should ideally be one to two feet in width. If the size of the bloodstain pattern is larger than two feet wide, additional lengths of measuring tape should be utilized; this will affect photography methodology.

13.5.15 BLOODSTAIN PHOTOGRAPHY

13.5.16 In order to be able to see the bloodstain pattern detail clearly, and to potentially be able to utilize reconstruction software for analysis, the area of bloodstains photographed cannot exceed two feet in width.

13.5.17 The focal length of the camera should be adjusted so that an area measuring no wider than two feet is visible through the viewfinder.

13.5.18 If a bloodstain pattern, or an area of overlapping patterns, measures wider than two feet, it must be photographed in sections. Each section to be photographed must include the marker designation assigned to the pattern. The photos should overlap slightly so that a panoramic effect is created.

13.5.19 BLOODSTAIN SKETCHES

13.5.20 Sketches of bloodstain patterns may be completed on the general crime scene sketch, or may be completed as a stand-alone sketch.

13.5.21 A cross projection sketch may be valuable to show bloodstains and/or evidence in relationship to one another on both the horizontal (e.g. floor) and vertical (e.g. wall) surfaces.

13.5.22 An elevation sketch may be valuable to show the details of bloodstain patterns on the vertical surfaces (e.g. walls, doors) of a location.

13.5.23 BLOOD ENHANCEMENT CHEMICALS

13.5.24 Blood enhancement chemicals may be used to visualize faint marks thought to be made by a surface bearing blood.

13.5.25 Blood enhancement chemicals will be used as outlined in Section 12 of this manual.

13.6 Collection of blood should be conducted as per Sections 11.6-11.8 of this manual.

13.7 SHOOTING INCIDENTS

13.7.1 In order to fully document shooting artifacts for reconstruction, the analyst must first recognize their existence in the scene.

13.7.1.1 A flashlight may be utilized at an oblique angle in order to visualize small defects.

13.7.2 Bullet strikes, impacts, penetrations, and perforations may be present as a defect from a single projectile (e.g. bullet fired from handgun) or may be present as a grouping of defects from multiple projectiles (e.g. pellets fired from shotgun).

13.7.3 Groups of defects that were created by the same event should be documented together as a pattern. Patterns may overlap; if possible, each pattern should be documented separately.

13.8 Bullet impacts and/or impact patterns may be labeled differently depending on whether they're being recorded for reconstruction or whether they're being collected as evidence.

13.8.1 For bullet impacts that are being documented for reconstruction, letter placards and/or stickers should be utilized.

13.8.1.1 For example, if there are three areas of impact in the north wall, they could be labeled as F, G, and H. The impact in the east wall could be labeled J. The impact in the floor in the northeast corner of the room could be labeled K.

13.8.1.2 When a bullet perforates a surface, it is helpful to designate the difference between entrance and exit along the bullet's path. A bullet may enter and exit multiple surfaces along its path. The initial entrance could be labeled with the letter, such as F. Once it is determined that it exited, the exit hole could be labeled F2. If it enters another surface, that could be labeled F3; the next exit could be labeled F4, and so on. By labeling in this manner, one can easily see which holes are related to bullet entrances (odd numbers) and which holes are related to bullet exits (even numbers).

13.8.2 For cartridge components that are being collected as evidence, number placards and/or stickers should be utilized.

13.8.2.1 For example, a cartridge case on the living room floor could be labeled 7, a bullet fragment on the bathroom counter could be labeled 8.

13.8.3 For impacts that are being documented for reconstruction, but which contain an item to be collected for evidence, both letter and number placards/stickers should be utilized.

13.8.3.1 For example, bullet fragments will be collected from area F on the north wall and area J on the east wall. In the area from which the evidence will be collected, marker 10 would be added to area F and marker 11 would be added to area J, after the area had been opened to recover the evidence.

13.8.3.2 When cutting into a surface in order to recover a bullet/fragment, collection should be conducted as per section 17.7.2 of this manual.

13.8.4 By labeling areas for reconstruction differently than areas for collection, an analyst can quickly determine how that evidence was utilized in the scene and differentiate between documentation and collection efforts.

13.9 For reconstruction purposes, bullet impacts, bullet holes, cartridge/shot components, firearms, ammunition, and other related evidence must be considered in order to determine the possible location of a firearm when it was discharged in a scene.

13.9.1 SHOOTING NOTES

13.9.2 The description of size of a bullet hole should include a measurement of the diameter in mm. Measurements should be rounded down to the nearest mm.

13.9.3 The area around the bullet hole should be described including damage to the surface, which may indicate the direction a bullet was traveling at the time of impact.

13.9.3.1 Bullets that ultimately ricochet off of a surface can leave a lead-in mark that represents the entry side of a ricochet. Lead-in marks are generated when the projectile first encounters a surface and creates a small mark before burrowing deeper into that surface.

13.9.3.2 When painted metallic surfaces (e.g. automobiles) are impacted, visual cues may help identify the bullet's direction of travel. A pinch point represents the entry side of a ricochet on painted metallic surfaces. On some such surfaces, the ricochet may leave "waves" (i.e. cracks in the paint) that recede away from the direction of travel (i.e. like waves following a boat traveling across the water).

13.9.3.3 Automobile metal is strong, and tends to bend significantly before allowing a bullet to pass. This bending often results in a hole through an automobile body being much larger than the projectile that caused it.

13.9.3.4 Plugs are often mistaken as a piece of fired bullet. Using a magnet, one can discern a piece of car metal (usually steel, which will adhere to a magnet) from a bullet fragment (usually copper or lead, which will not adhere to a magnet).

13.9.4 The location of bullet strikes/holes should be documented by taking the measurements of their locations within the crime scene.

13.9.5 Ruler tape may be used to outline areas with multiple bullet holes or defects from a grouping of projectiles (e.g. pellets from a shotgun). It may also be used to document the location up from the floor, down from the ceiling, or from any (RP) utilized in the scene.

13.9.5.1 Because ruler tape adheres to surfaces, its placement can easily be maintained during the examination of the crime scene. The use of ruler tape may be beneficial because it can be done by one person, without assistance.

13.9.6 Other types of measuring devices, such as freestanding measuring tapes, paper/disposable measuring tape, and measuring sticks may also be utilized around areas of bullet holes. The use of these measuring devices usually requires the assistance of a second person.

13.9.7 Measurements made from any RP or designated surface (e.g. floor, northwest corner of room), should start at zero, and should measure to the area of interest. When outlining an area of interest, one measuring tape should be perpendicular to the ceiling or floor, and the second should be level to the ceiling or floor.

13.9.8 Sketches of areas containing bullet strikes/holes may be completed on the general crime scene sketch, or may be completed as a stand-alone sketch.

13.9.9 A cross projection sketch may be valuable to show bullet strikes/holes and/or evidence in relationship to one another on both the horizontal (e.g. floor) and vertical (e.g. wall) surfaces.

13.9.10 An elevation sketch may be valuable to show the details of bullet holes/strikes on the vertical surfaces (e.g. walls, doors) of a location.

13.9.11 IMPACT ARTIFACTS

13.9.12 Bullets may impact numerous different surfaces before they finally come to rest. Areas of possible ricochet, strike, and/or deflection should be documented to aid in determining a possible flight path of a bullet.

13.9.13 A description of the surface impacted (e.g. smooth, rough, metal, asphalt, etc.) will help to correlate which bullet(s) may have impacted that surface, based on the artifacts present on the bullet.

13.9.14 BULLET HOLES

13.9.15 Bullet holes may be circular or irregularly shaped, depending on what the bullet may have impacted, if anything, before penetrating/perforating a surface/object.

13.9.16 PRESUMPTIVE TESTS FOR BULLET STRIKES AND BULLET HOLES

13.9.17 Presumptive tests for the presence of lead or copper may be utilized to determine if a defect was likely caused by a bullet impact, penetration, or perforation.

13.9.18 TRAJECTORY

13.9.19 Trajectory is a term that describes a fired bullet's path. Over long distances, a bullet's path will be curved. Over short distances, the curvature is small enough that the bullet's path is assessed as a straight line.

13.9.20 A laser light or a trajectory rod, connecting two impact locations, can provide a visual representation of the bullet path.

13.9.21 Once two (or more) suitable bullet impacts have been located, photographed, documented, and possibly chemically tested, one can begin to record the angles involved. Every trajectory has a horizontal and a vertical angle.

13.9.22 Angles can be measured using a "zero-edge" 180 degree protractor, an angle finder, and a plumb bob. Angles should be measured manually, even if measurements are being taken using a total station or similar system.

13.9.23 It is often helpful to draw a sketch of the top view (horizontal angle) and the side view (vertical angle) of the trajectory being measured.

13.9.24 ANGLE OF IMPACT

13.9.25 Horizontal angle is the North, South, East, or West component of the shot. When facing a bullet hole surface (e.g. wall), the position to the left of the bullet defect can be assigned as zero degrees and the position to the right of the defect can be assigned as 180 degrees; this is what a protractor placed against the wall would show. Results are recorded as from left to right, as read from the protractor.

13.9.25.1 To measure the horizontal aspect, connect two impact sites with a rod and place the center of a 180-degree protractor at the base of the rod. The protractor must always be held flat and level. It is always measured with the protractor parallel to the ground and level. The tip of the rod must be read against the protractor scale. While aligning the center point of the level protractor against the base of the rod, the plumb is held along the edge of the rod and the angle indicated at the intersection of the hanging plumb against the protractor is recorded as the horizontal angle.

13.9.25.2 Horizontal angle can also be recorded using a plumb bob to translate the positions of the base and tip of the rod onto the level ground below. Place the plumb bob at the base of the rod and let the weight drop to the ground and mark that position. Next place the plumb out toward the tip of the rod and mark that second position on the ground. Connect the two points translated onto the ground. This angle can be translated onto paper that can be labeled and saved with scene notes.

13.9.26 The vertical angle is the up/down component of the trajectory. Vertical angles may simply be described as "x" degrees upward or "x" degrees downward.

13.9.26.1 For this measurement, the protractor must be held straight up and down (aligning with the plumb bob will help) with the zero point of the protractor at the base of the rod. For vertical measure, the protractor should be "rolled" to meet alongside the rod and the angle read directly.

13.9.26.2 A second and easier technique for recording the vertical angle is by placing an angle finder along the vertical aspect of the rod and simply reading the information directly from the device.

13.9.27 SHOOTINGS INVOLVING VEHICLES

13.9.28 Shots into vehicles may be difficult because of the curved surfaces on vehicles. Logos, hood ornaments, inside rearview mirror, or inside brake light are engineered to be at the centerline of a vehicle. These natural landmarks can be used as a baseline when taking measurements.

13.9.29 To provide external reference lines around a vehicle, one must find two relatively parallel positions along one of the sides of the vehicle. A fixed measure (e.g. 3" out from the center of the hub of the front and back wheels) can be marked on the ground. Connecting these points constitutes a straight baseline that represents the side of the car. Extend it beyond both ends of the car to make it complete around the car. Hang a plumb from the center of the front or back of the vehicle & mark that position. Connect the plumb position to the side baselines by extending a line all the way across the front or back of the vehicle. Use a carpenter's square to ensure the lines intersect at 90 degrees. Marking these positions on one side and one end of the vehicle can be used to reference all evidence on all sides of the vehicle.

13.9.30 Vehicles are mobile and may be hit from any side during the same event, so assignment of angles of trajectory can get confusing. Assign the front center of the car as zero degrees and make all trajectories based on a clockwise assignment of a 360 degree circle.

13.9.30.1 When describing these trajectories, it may be described as something like "the bullet that caused trajectory 'A' originated from approximately 228 degrees and was traveling downward at approximately 10 degrees".

13.9.31 IMPACTS AND TRAJECTORY PHOTOGRAPHY

13.9.32 When photographing horizontal angles, the photographer must be positioned directly above (or below) the protractor; the camera lens should be perpendicular to the level protractor. Photographing the protractor while the plumb is in place will document the angles for future reconstruction.

13.9.33 When photographing vertical angles, the image should be recorded with the plumb bob in the picture and the photo taken while the camera is parallel to the rod. If the base of the rod is near the camera lens and the tip of the rod is far from the lens, distortion will result in the incorrect angle being recorded. If the angle finder is utilized, the angle readout from the device should be photographed. For the vertical angle, the photograph should be taken perpendicular to the rod itself.

13.9.34 A laser may be used when it's difficult/impossible to insert a rod through two points. It may be photographed by darkening the scene so that the laser light is more easily seen. A white card (e.g. latent lift card) can be held towards the camera so that the laser light hits against it, and with the shutter open, a person can walk quickly through the trajectory, highlighting the laser light.

13.9.34.1 In order to photograph the laser light, the camera should be mounted on the tripod.

13.9.34.2 The camera settings should be adjusted so that the exposure will be appropriate with the shutter open, using the bulb setting, or by locking down the shutter release button on the remote shutter release cord.

13.9.34.3 Depending on the distance being covered in the trajectory, the depth of field may need to be adjusted by the f-stop setting so that the entire trajectory, and the items around the scene, are all in focus.

13.9.34.4 It may be helpful to do one flash discharge toward the ceiling for overall illumination after the laser light has been visualized, and before the shutter has been closed.

14.0 Latent Print Development and Preservation

14.1 Latent prints are one of the most common types of physical evidence found at crime scenes and are valuable in terms of identifying subjects and associating people with locations and/or objects related to a crime.

14.1.1 The term "latent" refers to prints that are not visible prior to utilizing a development method; however, all prints recovered from a crime scene or items of evidence are often referred to as latent prints.

14.1.2 Latent prints found at crime scenes are made when the friction ridge skin of the fingers, palms, or soles of the feet come in contact with a surface and leave an impression on that surface.

14.1.3 Latent prints may be made from a variety of residues, including sweat, oil, blood, and any other substance that may cover any portion of the fingers/palms/soles prior to coming in contact with a surface.

14.1.4 Patent prints are those impressions that are visible prior to any development (e.g. print in blood).

14.1.5 Plastic prints (i.e. three-dimensional impressions) may be present if friction ridge skin comes in contact with a soft substance in the scene.

14.2 Items that are thought to contain potential latent print evidence, which are small enough to be collected, should be collected for processing at the lab. Surfaces in the scene that are not easily removed (e.g. doors, windows, floors, walls, furniture, etc.) should be processed at the scene unless it is a critical piece of evidence that would benefit from lab processing techniques. The determination to collect large items or elements of a building/vehicle (e.g. windows) for submission will be left to the analyst's discretion.

14.3 Only those responders who have been trained and competency/proficiency tested to process evidence for latent prints may conduct latent print processing on crime scenes.

14.4 Latent print evidence should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to collection.

14.4.1 Due to the small size of some latent prints, they may not be easily visualized in photos. Evidence markers (e.g. stickers, placards) may be utilized to help visualize latent prints in scene photography.

14.4.2 It is best practice to photograph all latent prints that are thought to have value prior to collection.

14.4.2.1 All latent prints that will be collected should be photographed for documentation prior to attempting any lifts.

14.4.2.1.1 Dry erase markers may be utilized, depending on the surface, to mark the location of latent prints.

14.4.2.1.2 An arc may be used to note the top of a finger impression and a bracket may be used to note an area of palm, sole, unknown friction ridge skin, or unknown orientation.

14.4.2.1.3 The marking, when lifted, will help to authenticate the location of the print in the scene.

14.4.2.2 The analyst will determine which latent prints should be photographed (comparison quality) prior to collection based on his/her training and experience. Comparison quality photographs will be taken as outlined in section 8.25 of this manual.

14.4.2.3 If the nature of the surface bearing the latent print is such that a lift is not likely to be an effective means of collecting the latent print, comparison quality photographs shall be taken before a lift is attempted.

14.4.2.4 If the latent print is visualized using an alternate light source (ALS), the latent print must be photographed using the appropriate color of barrier filter.

14.4.3 Notes will reflect the types of latent print processing that was conducted, the areas/items processed, and the results of each type of processing.

14.4.4 A simple sketch will be made on the latent lift card noting the orientation of the print and the location on the item from which the lift was collected.

14.4.4.1 If a large area/item is being processed, a larger diagram(s) may be utilized to show the locations of multiple latent prints.

14.5 The development of latent prints in a crime scene is dependent upon a number of factors, including the nature of the surface and the composition of the latent print residue.

14.5.1 Analysts may use light based methods, chemical methods, or physical methods to locate and develop latent prints within a scene.

14.5.2 Latent print processing generally starts with methods that would cause the least potential damage to items and proceeds as appropriate.

14.5.3 Prior to processing an item that may have sentimental or inherent value, the analyst will get authorization from the primary investigator; note who specifically gave authorization for those actions.

14.6 VISUALIZING LATENT PRINTS

14.6.1 Latent prints may be visualized through the use of various angles and wavelengths of light. Visualization of latent prints through the use of forensic lighting methods is non-destructive and should be attempted prior to other processing methods.

14.6.2 A strong white light may be utilized at an oblique angle in order to visualize latent prints.

14.6.2.1 A flashlight or the white light setting on an alternate light source (ALS) are the most common sources for a strong white light.

14.6.3 An ALS may be utilized in order to visualize natural substances or contaminants in the latent print residue. An ALS may also create a reaction with the surface, thereby creating contrast, visualizing a latent print.

14.6.3.1 An ALS may only be utilized by analysts who have received training in the appropriate use of an ALS.

14.6.3.2 When using an ALS to observe an item/surface, the appropriate goggles will be used, depending on wavelength.

WAVELENGTH	CORRESPONDING FILTER
<400nm	yellow or clear UV safe
400-450nm	yellow
450-540nm	orange
>540-700nm	red

14.6.3.3 Permanent eye damage can occur from reflected, refracted, or direct illumination by the ALS to the eye. Extreme care should be taken around highly reflective surfaces. An analyst should never look directly into the light or allow beams to bounce off the surface into his/her own eyes or another person's eyes.

14.7 CYANOACRYLATE ESTER

14.7.1 Cyanoacrylate ester (CAE), commonly known as "superglue", is a chemical used to visualize latent prints on non-porous and some semi-porous objects. CAE processing also prepares the surface for the acceptance of powders that may enable further visualization of the latent prints.

14.7.2 On scene, a vehicle, a room, or even a body may be processed using CAE. While most small items will be collected for processing in the lab, there may be instances in which CAE processing is warranted for evidence on scene.

14.7.2.1 Before a body can be CAE processed on scene, the Coroner for that county must be contacted and his/her express consent must be granted. Consent will be documented in notes.

14.7.3 In order to facilitate CAE processing, a proper environment must be able to be established.

14.7.3.1 If using liquid or gel CAE, the area to be fumed must be able to be made relatively airtight, and must be able to be ventilated after processing. The analyst must be able to add humidity to the environment, and may need to add heat to the CAE in order to expedite the process.

14.7.3.2 If using a fuming wand, it must be in a well-ventilated area.

14.7.4 CAE may be utilized in either liquid or gel form or by using a fuming wand. The amount of CAE used will depend on the size of the area being fumed, the fuming rate, and the analyst's preference, based on training and experience.

14.7.4.1 When utilizing the liquid CAE, it can be added to a disposable aluminum dish and placed on a hot plate in order to facilitate the vaporization of the liquid.

14.7.4.2 When utilizing a foil CAE gel packet, the gel will vaporize at a controlled rate when exposed to air. Numerous gel packets may have to be used to obtain the desired results.

14.7.4.3 When utilizing a fuming wand, the cartridge size is selected based upon the size of the area/item to be processed. Fumes from the wand will rise, so it is best to direct the fumes below the item/surface.

14.7.5 Containers of hot water can be added to the environment in order to increase the humidity.

14.7.6 Control tests will be processed with the evidence and should be monitored frequently to prevent over or under fuming. Proper development is achieved when ridge characteristics on the control turn slightly white in color and begin to show good contrast.

14.7.7 CAE fuming should only be conducted in a well-ventilated area. Precautions should be taken to avoid inhaling or allowing the vapors to contact the eyes, as the vapors can be irritating to the eyes, nose, and throat. Persons wearing contact lenses should not open areas containing CAE fumes, including using a fuming wand, unless wearing non-vented goggles.

14.7.8 Gloves should be worn to prevent the CAE from contacting the skin, as adhesion may result.

14.8 LATENT PRINT POWDERS

14.8.1 Latent print powders may be utilized to develop prints at crime scenes. Powder particles physically adhere to latent print residue, allowing the latent print to be visualized. There are a variety of colors/types of powders,

as well as different types of brushes/applicators that may be used, depending upon the surface and potential contaminants (e.g. blood).

14.8.2 Powder is selected based on the type and color of the surface to be processed. Traditional powders are most often effective on non-textured, non-ferrous surfaces, magnetic powders are most often effective on plastics and textured surfaces, and fluorescent powders may be useful on multicolored surfaces.

14.8.3 The type of applicator to be used depends upon the size of area to be processed and the type of powder to be used. Magnetic wands are used with magnetic powder and fiberglass brushes are used for traditional powders and may be used for fluorescent powders. Powder should be applied in a circular motion until detail becomes visualized, and should then be applied consistent with ridge flow.

14.8.4 When the crime scene is contaminated with blood or other biological contaminants, single use brushes and powder should be utilized; their use should be noted.

14.8.5 When using fluorescent powder, an ALS should be utilized during processing to avoid over-powdering the surface.

14.8.6 Latent prints that are developed and are deemed suitable for collection will be marked, photographed, and/or lifted. The collection type will be determined based on the analyst's training and experience.

14.8.7 If fabric, glove, or other similar impressions are developed while processing a crime scene, they should be documented in notes and possibly with photography, depending on the nature of the impressions and the circumstances at the scene.

14.9 SMALL PARTICLE REAGENT

14.9.1 Small particle reagent (SPR) works like a liquid fingerprint powder and can develop prints on a variety of surfaces, including items that are or have been wet. SPR is available in either black or white; the solution color should be chosen based on the color of the item/area being examined.

14.9.2 SPR can be sprayed onto an item. The bottle of SPR should be shaken often to keep the SPR in suspension. If an area is thought to contain latent prints, SPR should be sprayed above the print so the SPR can flow over the print. Excess SPR can be removed by rinsing the surface with water.

14.9.3 Latent prints that are developed and are deemed suitable for collection will be marked, photographed, and/or lifted. The collection type will be determined based on the analyst's training and experience.

14.10 LIFTING METHODS

14.10.1 Lifting methods are effective for the preservation of latent print impressions and are one of the most common and effective methods of

preserving latent prints. There are a variety of sizes, types, and finishes of lifting tape that can be utilized depending on the surface and/or characteristics of the latent print.

14.10.2 All latent lift cards that contain tape lifts will be retained and turned over to the investigating agency for submission for latent print examination; no latent lift cards containing tape lifts will be discarded.

14.10.3 Latent lift cards should be filled out as completely as possible and shall include the date and initials of the person collecting the lift, a case number, and a description and diagram of the surface from which the print was lifted. The lift card should also contain significant information about the orientation and/or position of the latent print on the surface.

14.10.4 If latent prints appear to be simultaneous impressions or are in close proximity to one another, they should be lifted together whenever possible.

14.10.5 Lifts from non-adjacent areas should be placed on different cards.

14.10.6 If multiple lifts are taken of the same latent print, they may be placed on the same latent lift card. A notation indicating the order in which they were lifted should be made on the card.

14.11 Casting compounds (e.g. Mikrosil) may be utilized to lift a latent print on a textured or uneven surface.

14.11.1 Casting compounds may be mixed by hand or by using an extruder gun.

14.11.2 Casting compounds should be applied in a way to prevent air pockets and should be left in place until solidified.

14.11.3 After lifting, casting material can be attached to a latent lift card and the information about the cast can be filled out as detailed in 14.9.3.

14.12 Blood contaminated latent prints may be present in scenes. In order to develop/visualize those latent prints, blood-reactive chemicals may be utilized.

14.12.1 Prior to the application of any blood enhancement chemicals, consideration should be taken for the collection of any evidence for biological analysis.

14.12.2 Blood enhancement chemicals should be used as detailed in section 12 of this manual.

14.13 KNOWN EXEMPLARS

14.13.1 Known exemplars is a term used to describe the intentional recording of an individual's friction ridge impressions that are made for documentation purposes. Impressions may be made using a number of techniques, including, but not limited to, traditional ink/cards and powder/adhesive lift methods. The intent in collecting known exemplars is to produce impressions that are suitable for comparison.

14.13.2 Only those responders who have been trained and competency/proficiency tested in the collection of known exemplars should collect exemplars.

14.13.3 If a subject's hands are overly sweaty/dirty, they should be dried/cleaned prior to attempting to record their prints. If a subject's hands are dry, a small amount of lotion may be rubbed into their hands prior to attempting to record their prints.

14.13.4 It is often helpful to take multiple recordings of each type of exemplar (e.g. finger tips, palm prints, etc.) in case of unintentional smears or defects.

14.13.5 Pre-printed cards for fingers and palms may be utilized for recording inked exemplars. In the absence of pre-printed cards, plain white paper may be utilized. A cylindrical object, such as a piece of pipe or cardboard tube (approximately 3" or bigger in diameter), should be utilized to obtain complete palm print exemplars.

14.13.6 Adhesive lifts may be cut to size based on the area of skin being recorded.

14.13.7 All exemplars should be marked with the date, analyst's name, analyst's signature/initials, case number (if known), subject's name (if known), and subject's signature. It should be noted if the subject refuses to sign the exemplar.

14.13.8 When recording inked fingerprints, the fingerprint card should be placed on a flat surface or in a cardholder.

14.13.9 Beginning with the right thumb, roll the thumb from nail-bed to nail-bed on an inking plate or pad. Roll the thumb in the same manner on the fingerprint card in the space marked "R. Thumb." Roll the thumb with even pressure to avoid smearing. The procedure is continued for each finger, ensuring the prints are placed in the corresponding boxes on the fingerprint card.

14.13.10 Ink the right and left thumbs and place a plain impression in the corresponding box at the bottom of the fingerprint card. Repeat the procedure with the right and left four fingers simultaneously placing the plain impression in the corresponding boxes at the bottom of the fingerprint card. Ideally, when taking plain impressions, fingers will be rolled up to include tip information.

14.13.11 If an amputation, deformity, or injury makes it impossible to print a finger, a notation shall be made to that effect in the individual finger block. If a portion of the finger is not covered with the bandage, rolling the finger should be attempted.

14.14 POST-MORTEM EXEMPLARS

14.14.1 Post-mortem exemplars may be recovered from the deceased at autopsy in the same manner as described in 14.12. However, due to injury, decomposition, or other circumstances, traditional methods may not yield satisfactory results.

14.14.2 For individuals who are recently deceased, the methods described in 14.12 may be utilized after the body has been warmed to room temperature (ideally), the hands cleaned/dried, and rigor mortis has been broken.

14.14.3 For individuals who have advanced decomposition or in which the body was submerged in water, there may be separation of tissue on the hands.

14.14.3.1 After cleaning/drying the hands, photography, ink, and/or powder methods may be utilized as outlined in section 14.12 of this manual. A postmortem print spoon, printing strips, and ink may be utilized as well.

14.14.3.2 If the skin has separated from the hand, it may be cleaned and placed under a piece of glass for photography. If a large portion of the skin has separated, it may be placed over the analyst's gloved hand to attempt photography, ink, and/or powder methods.

14.14.4 For individuals whose skin has dried and hardened, traditional fingerprinting may not be possible.

14.14.4.1 Photography and/or powder/casting methods may be the most successful.

15.0 Impression Evidence

15.1 Impression evidence is present in crime scenes in the form of shoe and tire marks, bite marks, tool marks, and possibly by marks made from other patterned items.

15.1.1 When impression evidence is located outdoors, care should be taken to avoid loss or destruction due to weather conditions.

15.1.2 If an impression is fragile or could be altered/destroyed by movement through the crime scene, care should be taken to protect the impression.

15.2 Impression evidence should be marked using a letter marker. By using a letter, rather than a number marker, impression evidence can be easily distinguished from other items of evidence marked in the scene.

15.2.1 Letter placards should be utilized for impression evidence on horizontal surfaces. Letter stickers should be utilized for impression evidence on vertical surfaces.

15.2.2 Letter designations shall be included in any comparison photography, on any lifts, and on any casts taken of the impression.

15.3 Impression evidence should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to collection.

15.3.1 The locations and numbers of lifts and casts shall be documented in notes.

15.4 Generally, the first step in the proper documentation and recovery of impression evidence is accomplished with photography.

15.4.1 Comparison quality photographs should be taken as outlined in Section 8.25 of this manual.

15.4.2 Comparison quality photographs shall be taken prior to attempting preservation by other means (e.g. lifting, casting).

15.5 Some types of impression evidence (e.g. shoe impressions in blood) may be enhanced for photography and collection using chemical and/or powder methods.

15.5.1 Blood enhancement chemicals should be utilized as outlined in Section 12 of this manual.

15.5.2 Powder processing techniques should be utilized as outlined in Section 14.7 of this manual.

15.5.3 Any enhanced/processed impressions that are going to be collected shall be documented with comparison quality photographs prior to attempting preservation by other means (e.g. lifting, casting).

15.6 Impression evidence may be physically recovered, depending on the circumstances. The recovery technique will depend on the nature of the impression and the substrate.

15.6.1 If the item containing the impression can be safely collected, without loss of the impression, then the entire item should be collected.

15.6.2 If the impression is a two-dimensional impression on a surface, lifting methods should be considered for collection.

15.6.3 If the impression is a three-dimensional impression, casting should be considered for collection.

15.7 ADHESIVE AND GELATIN LIFTERS

15.7.1 Lifting involves transferring a two-dimensional impression from its original surface to a surface that will provide better contrast, allow easier transportation, and perhaps aid in preservation. Lifting should be utilized when there is a risk that the impression may be destroyed if the item is collected.

15.7.2 Adhesive lifters are usually vinyl adhesive lifts and fingerprint lift tape. Adhesive lifters work best on non-porous surfaces and work well with impressions that have been processed with fingerprint powder.

15.7.2.1 The adhesive lifter may be cut to be slightly larger than the target impression.

15.7.2.2 A vinyl lifter shall be labeled with identifying information which may include, but is not limited to, the following: the letter marker; the orientation, position, and location of the impression; date; case number; and initials of the person taking the lift.

15.7.2.3 To apply the adhesive lifter, place one edge of the lift on the substrate and slowly smooth down the rest of the lifter over the impression, taking care to press out any air bubbles; a roller may assist in this process. Repeat with overlapping tape lifts, if necessary.

15.7.2.4 While the adhesive lifter is in place, documentary photographs should be taken to show the lifter in place in the scene.

15.7.2.5 To remove the lift, carefully lift it by the corners.

15.7.2.6 Place the adhesive lift on a clean fingerprint card, piece of paper, transparency sheet, or other similar product, depending on which is likely to offer the best contrast for later imaging.

15.7.3 Gelatin lifters are thicker than adhesive lifters, may be used on porous or non-porous surfaces, work well with impressions that have been processed with fingerprint powder, and may work with impressions that have been chemically processed.

15.7.3.1 Gelatin lifters should be selected based on contrast between the impression and the backing color. Black gelatin lifts work well for impressions in drywall dust,

while impressions developed with dark fingerprint powder may best appear on a white background.

15.7.3.2 Best practice is to remove the gelatin lift from its package to allow it to come to room temperature for approximately 5-10 minutes prior to lifting an impression.

15.7.3.3 The gelatin lifter may be cut to be slightly larger than the target impression.

15.7.3.4 The gelatin lifter shall be labeled with identifying information which may include, but is not limited to, the following: the letter marker; the orientation, position, and location of the impression; date; case number; and initials of the person taking the lift.

15.7.3.5 To apply the gelatin lift, first remove the transparent cover. Place one edge of the lift on the substrate and slowly smooth down the rest of the lifter over the impression, taking care to press out any air bubbles; a roller may assist in this process.

15.7.3.6 While the gelatin lifter is in place, documentary photographs should be taken to show the lifter in place in the scene.

15.7.3.7 To remove the lift, carefully lift it by the corners.

15.7.3.8 Place the lift on a horizontal surface with the gelatin layer up. Best practice is to take comparison quality photographs as soon as possible, as the impression will fade over time.

15.7.3.9 Once photography is completed, the transparent cover can be affixed to the lift, being careful to avoid air bubbles.

15.7.3.10 Gelatin lifts will melt between 104-113 degrees Farenheit. Objects that have been exposed to the sun or those temperatures should be cooled before attempting to use a gelatin lifter.

15.7.4 Adhesive and gelatin lifts may be stored at room temperature, though storage in refrigeration is preferable.

15.7.5 If multiple lifts are taken of the same impression, the lifts shall be labeled in order to distinguish which was first, second, etc.

15.8 CASTING- DENTAL STONE

15.8.1 Casting is used to collect a three-dimensional impression. Three-dimensional impressions are commonly found in soil, sand, and snow. Casting may be utilized in three-dimensional impressions as there is no way to collect the impression without disrupting the substrate.

15.8.2 Equipment

Dental stone or other similar forensic casting material

Water
Bucket or disposable plastic bag
Stir stick/disposable spoon/tongue depressor
Adjustable metal forms
Flour sifter (or similar device)
Snow Print Wax

15.8.3 General casting method

15.8.3.1 All supplies should be assembled prior to mixing the casting material.

15.8.3.2 Two (2) pounds of dental stone is placed in a large zipper top plastic bag or other similar disposable container. Approximately ten (10) ounces of water is added to the dental stone (amount depends on substrate conditions). The container is closed and the components are thoroughly mixed until it has the consistency of thin pancake batter. More dental stone or water may be added to reach the desired consistency.

15.8.3.3 The amount of casting material will depend on the size of the impression. The ratio listed in 15.8.3.2 will cast an average shoe impression.

15.8.3.4 Metal forms may be placed around the impression to contain the casting mixture.

15.8.3.5 The mixture is gently poured into the impression. A stir stick or similar item may be held at the edge of the impression, with the mixture poured along the stick to direct the flow and reduce damage to the impression.

15.8.3.6 The mixture is allowed to harden. When the cast is firm but still soft, identifying marks may be scratched into the top surface. When the cast has hardened, identifying marks may be written in permanent marker.

15.8.3.7 While the cast is in place, documentary photographs should be taken to show it in place in the scene.

15.8.3.8 The cast should be allowed to dry for at least twenty minutes in warm weather and longer in cold, wet conditions.

15.8.3.9 The cast should be removed carefully. Any debris should be left in place in the cast.

15.8.3.10 The cast should be packaged in a large paper sack or a cardboard box and it should be allowed to dry for an additional 48 hours. The cast should not be packaged in plastic.

15.8.4 Underwater casting method

15.8.4.1 Impressions that are under water may still be cast. Do not attempt to drain away any of the water as it may disturb the impression.

15.8.4.2 Place a metal form around the impression to contain the casting mixture.

15.8.4.3 Sift or lightly sprinkle dry casting material over the underwater impression until covered by about an inch of the casting material. Mix the casting material to a slightly thicker consistency than typical and carefully scoop the mixture onto the impression.

15.8.4.4 Allow to set for at least one hour.

15.8.4.5 If the impression is in very shallow water, the casting material may be mixed to a slightly thicker consistency than typical and applied as normal, as the mixture will displace the thin layer of water.

15.8.4.6 The mixture must be allowed to harden. When the cast is firm but still soft, identifying marks may be scratched into the top surface. When the cast has hardened, identifying marks may be written in permanent marker.

15.8.4.7 While the cast is in place, documentary photographs should be taken to show it in place in the scene.

15.8.4.8 The cast should be removed carefully. Any debris should be left in place in the cast.

15.8.4.9 The cast should be packaged in a large paper sack or a cardboard box and it should be allowed to dry for an additional 48 hours. The cast should not be packaged in plastic.

15.8.5 Casting impressions in snow

15.8.5.1 Method 1: Sift or lightly sprinkle dry casting material over the snow impression until a thin layer is applied. Wait 1-2 minutes for that layer to harden, then sift or sprinkle dry casting material over the impression again. Repeat until there is no more moisture for the casting material to absorb. Mix the remaining casting material with water and apply slowly to the impression.

15.8.5.2 Method 2: Spray a light coat of Snow Print Wax onto the snow impression. After that coat is dry, apply another coat. Repeat until at least three to four layers of wax have been applied. Allow the wax to set for approximately 10 minutes.

Mix casting material with water so that it is slightly thicker than normal mixture that has been cooled.

15.8.5.2.1 When applying Snow Print Wax, be careful not to hold the can so close that the aerosol damages detail in the impression.

15.8.5.2.2 The reaction of dental stone with water is exothermic. When casting in snow, use cold water or some snow when making the mixture.

15.8.5.3 Allow to set for at least one hour.

15.8.5.4 The mixture is allowed to harden. When the cast is firm but still soft, identifying marks may be scratched into the top surface. When the cast has hardened, identifying marks may be written in permanent marker.

15.8.5.5 While the cast is in place, documentary photographs should be taken to show it in place in the scene.

15.8.5.6 The cast should be removed carefully. Any debris should be left in place in the cast.

15.8.5.7 The cast should be packaged in a large paper sack or a cardboard box and it should be allowed to dry for an additional 48 hours. The cast should not be packaged in plastic.

15.8.6 Casting material comments

15.8.6.1 Once forensic casting material has hardened, it is not reversible. Use the mixture quickly after it is mixed or it may harden in the mixing container.

15.8.6.2 Thicker mixtures and warmer temperatures will cause hardening more quickly compared to thinner mixtures and colder temperatures.

15.9 CASTING- MIKROSIL

15.9.1 Casting is used to collect a three-dimensional impression. Mikrosil is a silicone casting material that is commonly used to collect tool mark impressions when photographic methods may not be appropriate.

15.9.2 Equipment

Mikrosil base (brown, black, white, gray)
Mikrosil hardener
Mixing cards/latent lift cards
Wooden mixing sticks/stir stick/tongue depressor
Snow Print Wax

15.9.3 General casting method

15.9.3.1 All supplies should be assembled prior to mixing the casting material.

15.9.3.2 Brown colored Mikrosil is preferred for casting tool mark impressions.

15.9.3.3 Place a line of Mikrosil sufficient to cover the impression on the mixing card. Place a line of harder next to the line of Mikrosil so that both lines are approximately the same length. Thoroughly mix the two components using a mixing stick for approximately one minute.

15.9.3.4 Remove the mixed Mikrosil from the card and apply to the surface, taking care to work the casting material into or on the impression, without allowing the mixing stick to come in contact with the impression. Ideally, a small amount of Mikrosil will extend out onto the surface, adjacent to the impression, to create a small flap/strip of material.

15.9.3.5 The setting time will be approximately five to eight (5-8) minutes at 68 degrees Farenheit and twelve to fifteen (12-15) minutes at 14 degrees Farenheit.

15.9.3.6 While the Mikrosil is in place, documentary photographs should be taken to show it in place in the scene/on the item.

15.9.3.7 The cast should be removed carefully to avoid damaging it. The flap/strip portion of the cast can be stapled to the front of a latent lift card or the cast can be placed in a small coin envelope/evidence box.

15.9.3.8 If utilizing a latent lift card, it should be filled out as completely as possible and shall include the date and initials of the person collecting the cast, a case number, and a description and diagram of the surface from which the impression was cast. The lift card should also contain significant information about the orientation and/or position of the impression on the surface, ideally including the location of the flap/strip.

15.9.3.9 If placing the cast in a small coin envelope, identifying information, as outlined in 15.9.3.8, should be included on the outside of the coin envelope.

15.9.3.10 Mikrosil casts may become stuck to one another if packaged in a way that they could contact one another. For this reason, each cast should be packaged separately in a small envelope or box.

15.9.3.11 Multiple casts from the same surface/location (e.g. several pry marks on a window frame) may be packaged in the

same outer evidence envelope/sack as long as the casts are contained in individual inner packages.

15.9.4 Safety

15.9.4.1 Do not allow the hardener to contact the eyes or mucous membranes. In case of contact, immediately flush with plenty of water.

15.10 TIRE EXEMPLARS

15.10.1 The tire exemplar provides a record of the characteristics present on the tire at a given time.

15.10.2 The impression a tire leaves will be slightly different depending on whether or not it is under load. If exemplars are being made for purposes other than elimination, they should include the full circumference of the tire when under load; typically this is between six and eight feet in length.

15.10.3 Partial exemplars may be collected for purposes of elimination of non-suspect vehicle tires or for documentation of an obvious exclusion based on tread design differences.

15.10.3.1 A photograph of the tire tread is a sufficient elimination exemplar; a scale should be included in the photograph. Information about the tire and vehicle should be recorded.

15.10.3.2 A white adhesive lift can be used to take a tire elimination exemplar. A large adhesive lift can pick up residual material from a tire, providing a good representation of a section of the tread design. Information about the tire and vehicle should be recorded.

15.10.4 When it is determined that the collection of tire exemplars is to be performed while processing a vehicle, the analyst should ideally first seek the assistance of a Footwear/Tire Tread examiner.

15.10.4.1 It may be beneficial to provide the Footwear/Tire Tread examiner with images of the impression and/or vehicle tires ahead of time. In some cases, the collection of full exemplars may be deemed unnecessary. This decision shall only be made by someone trained as a Footwear/Tire Tread examiner.

15.10.4.2 If comparison of individual characteristics will be requested, the collection of the tires is required even when tire exemplars have been collected. The conclusions of a subsequent comparison may be limited if the tires are not available for examination.

15.10.5 Equipment

Broom

Kraft paper

Duct tape
Work gloves
Scissors/utility knife
Chart board
Wet media film
Tape or chalk (for marking sidewalls)
Permanent markers
Cloth measuring tape

Method 1 equipment:

Petroleum Jelly or Silicone Oil
Magnetic Fingerprint Powder
Magnetic Fingerprint Powder Brush
Clear Lacquer Spray

Method 2 equipment:

Black Printer's Ink
Clear Plastic Sheeting

15.11 An appropriate facility/surface and several preparatory steps must be completed prior to beginning the collection of tire exemplars.

15.11.1 A facility or an area with an adequate surface to collect tire exemplars must be secured. A smooth area of asphalt or concrete is sufficient and should be swept clean. The size of the area needed will depend upon the vehicle and tires, but will need to be at least long enough to permit one full tire rotation with enough extra room to bring the vehicle to rest off of the exemplar.

15.11.1.1 The vehicle bays in a fire department are often sufficient for this process.

15.11.2 Roll out enough paper to keep the tires from collecting debris while moving. Secure the paper with tape.

15.11.3 Clean the tires by rubbing them lightly while wearing work gloves. Cleaning should be to remove surface debris only. Rocks in the tread or other similar items should be left in place.

15.11.4 Measure the circumference of the tire(s) of interest using a cloth measuring tape.

15.11.5 Measure the wheel base of the vehicle.

15.11.6 Mark the tire with tape at five to six points equidistant around the tire and label them alphabetically (e.g. A-F). The number of points may vary at the Tire Tread Examiner's discretion, depending on the size and design of the tire. Document the location of the labels on the tire with enough detail (e.g. close photography) that the labels can be recreated and/or replaced at a later date.

15.11.7 Record the information from the vehicle and tire side wall:
Make/model/year of the vehicle
Make/model of the tire
DOT number of the tire
P-metric tire size designation
Mold numbers (when possible)

15.12 Making exemplars using the petroleum jelly/silicone oil, fingerprint powder on wet media film method- Method 1

15.12.1 It is important to use only a small amount of petroleum jelly/silicone oil or detail will be lost or obscured. This method provides good detail and a transparent background that facilitates the comparison process.

15.12.2 Tape sections of chart board together to achieve a length slightly longer than the tire circumference, typically four to six extra inches. If using wet media film, secure a length of film on top of one of the lengths of chart board.

15.12.3 Using gloved hands, rub a very small amount of petroleum jelly or silicone oil to coat one or both of your hands.

15.12.4 Thoroughly rub the tread surface of the tire so that an even, thin coating is applied to the full circumference.

15.12.5 Place an end of chart board (with film) just in front of the tire.

15.12.6 Drive the vehicle in a continuous motion over the chart board, depositing an impression on the film. As the tire rolls, mark the locations on the exemplar where the A-F labels on the tire correspond.

15.12.7 Develop the impression by powdering it with magnetic fingerprint powder.

15.12.8 Spray three to four coats of a fixative, such as a clear lacquer, to preserve the exemplar and allow it to dry as per the manufacturer's instructions prior to handling or packaging. The impression will be damaged if it is touched before it is dry.

15.12.9 Mark the exemplar with pertinent case information that includes the location and orientation of the tire.

15.12.10 Two exemplars from each tire are recommended. The exemplars should be off-set so that they do not end in the same location.

15.12.11 Repeat the process for each tire as necessary.

15.13 Making exemplars using black printer's ink- Method 2

15.13.1 Tape sections of chart board together to achieve a length slightly longer than the tire circumference, typically four to six extra inches. Repeat this step.

15.13.2 Apply a thin layer of printer's ink to one of the sets of chart board; this will become an inking pad.

15.13.3 Tape clear plastic sheeting to the other set of chart board.

15.13.4 Line the chart board sets up so that the tire is inked and then rolls over the plastic sheeting.

15.13.5 Drive the vehicle in a continuous motion over the chart board, depositing an impression on the film. As the tire rolls, mark the locations on the exemplar where the A-F labels on the tire correspond.

15.13.6 Mark the exemplar with pertinent case information that includes the location and orientation of each tire.

15.13.7 Two exemplars from each tire are recommended. The exemplars should be off-set so that they do not end in the same location.

15.13.8 Allow the ink to dry prior to packaging; this may take overnight or longer.

15.13.9 Repeat the process for each tire as necessary

15.14 Documentation for tire tread exemplars

15.14.1 The following information shall be recorded in the case notes regarding the exemplars:
Method of exemplar collection.
Number of exemplars collected from each tire.
Tire sidewall information (as outlined in Section 15.11.7)
Vehicle information (as outlined in Section 18.2.2)

15.14.2 The following information shall be recorded on each exemplar collected:
Case #/Lab #
Date of collection.
Initials of the person collecting the exemplar.
Location of the tire on the vehicle (e.g. driver side front, passenger side rear, etc.)
Direction of travel.
Where on the exemplar the specific tire locations designated (e.g. A-F) correspond.
Direction toward the front of the vehicle.
Indication of the outside and inside edge of the impression (as the tire is mounted on the vehicle).

15.15 Tire exemplars must be completely dried prior to packaging.

15.16 Tire exemplars may be rolled for packaging. Tire exemplars should be packaged in an evidence sack, cardboard box, or other similar evidence package sufficient to hold the rolled exemplars.

16.0 Trace Evidence

16.1 Trace evidence consists of a wide variety of materials, is usually very small, and may be a fragment of a larger item.

16.1.1 Trace materials include, but are not limited to, hairs, fibers, glass fragments, metal shavings, wood shavings, paint chips, soil, and vegetation.

16.1.2 Trace materials may be easily dislodged. Care should be taken to avoid loss, contamination, and cross-contamination.

16.2 A strong white light may be utilized at an oblique angle in order to visualize trace evidence. If a particular type of evidence being searched for would react with a different wavelength of light, an alternate light source (ALS) may be utilized.

16.2.1 A flashlight or the white light setting on an ALS are the most common sources for a strong white light.

16.2.2 An ALS may only be utilized by analysts who have received training in the appropriate use of an ALS.

16.2.2.1 When using an ALS to observe an item/surface, the appropriate goggles will be used, depending on wavelength.

WAVELENGTH	CORRESPONDING FILTER
<400nm	yellow or clear UV safe
400-450nm	yellow
450-540nm	orange
>540-700nm	red

16.2.2.2 No one wavelength will affect every type of fiber. When searching for fibers, a wide range of wavelengths should be utilized.

16.2.2.3 Dark colored hairs may not react in the same way as light colored hairs. An ALS may be effective for searching for light colored hairs, but a strong white light may be preferable when searching for dark colored hairs.

16.2.2.4 Permanent eye damage can occur from reflected, refracted, or direct illumination by the ALS to the eye. Extreme care should be taken around highly reflective surfaces. An analyst should never look directly into the light or allow beams to bounce off the surface into his/her own eyes or another person's eyes.

16.3 Trace evidence may be collected using a variety of methods, depending on the type of material and the surface.

16.3.1 Individual items of trace material may be picked up using forceps.

16.3.2 Individual items (e.g. hairs) may be picked up by folding an adhesive paper (i.e. Post-It Note) around the item so that it is sandwiched between the two sides of the adhesive paper.

16.3.3 Adhesive lifts may be used to collect trace from a large surface area.

16.3.3.1 "Lint rollers" and clear adhesive lifts may be utilized to collect possible trace from large areas.

16.3.3.1.1 Clear packing tape (or similar tape) will not be utilized due to the type of adhesive material it has and the damage it may inflict to trace evidence.

16.3.3.2 The lift or roller is applied to the surface and light pressure is applied. The lift or roller may be utilized until its tackiness is reduced or until collection from the surface has been completed.

16.3.3.3 Each adhesive sheet from a lint roller should be placed in a plastic pouch/sleeve to prevent adhesion to evidence packaging. Adhesive lifts should have a clear cover affixed.

16.3.3.4 Lint rollers should be new to avoid any potential cross-contamination.

16.3.3.5 Sheets of trace material will be labeled based on the area from which it was collected. Each adhesive lift or lint roller sheet should be placed in its own envelope to avoid cross contamination.

16.4 Trace materials will be placed in an inner evidence container.

16.4.1 Due to the small nature of trace evidence, it is more likely to be lost in a standard evidence envelope if it is not contained in a smaller inner container.

16.4.2 A druggist's fold, coin envelope, glassine envelope, vial, or similar container may be used as inner packaging for individual trace evidence.

16.4.3 A large manila envelope may be used as inner packaging for adhesive lifts.

16.5 Trace material may be packaged in a variety of outer evidence containers, such as evidence envelopes or sacks, depending on the size/type of inner container utilized.

16.5.1 Multiple containers of individual items of trace evidence may be packaged in the same outer evidence container if they were collected from the same area.

16.5.1.1 For example, three individual hairs taken from the victim's right hand, each placed in their own glassine envelope, may all be placed in one evidence envelope.

16.5.2 Adhesive lifts or lint roller sheets may be packaged in the same outer evidence container if they were collected from the same area.

16.5.2.1 For example, four adhesive lifts taken from the driver's seat in a vehicle may all be placed in one evidence envelope or sack.

17.0 Firearms and Tool Mark Evidence

17.1 Numerous types of firearm related evidence are commonly encountered in crime scenes. Handguns, long guns, cartridges, cartridge cases, bullet fragments, other fragments of ammunition, and gunshot residue may be found when investigating a scene.

17.2 All firearms shall be treated as if they are loaded and ready to fire.

17.2.1 When handling a firearm, it shall not be pointed at the handler or another person.

17.2.2 When handling a firearm, the responder shall consider the setting (i.e. backdrop) and surroundings in the scene.

17.2.3 A responder's finger should never be placed on the trigger. When moving the firearm, the responder shall be mindful of anything that could contact the trigger and engage it.

17.3 Firearms and related evidence should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to collection.

17.3.1 A firearm should not be altered in any way prior to full documentation. If it is altered prior to documentation, the person who altered it, and the reason for such alteration, will be explained in detail in the notes.

17.3.2 Documentation of a firearm, prior to altering it, should include the position of the safety mechanism (if applicable), if a cartridge case is caught in the ejection port (i.e. stove-piped), and any abnormalities to the firearm. Care should be taken to avoid disturbing any evidence (e.g. blood, hairs, fibers, latent prints) on the surface of the firearm.

17.3.3 After documentation is completed as per 17.3.2, the firearm can be rendered safe. If a responder is not comfortable with, or is not physically capable of, clearing a weapon, s/he may ask for assistance from another responder or an officer. Care should be taken to minimize disturbance to potential evidence on the firearm when rendering it safe.

17.3.4 Antique, foreign, and homemade firearms may function differently than modern firearms and may not be cleared as easily.

17.3.5 The following information should be documented for all firearms: make, model, caliber, serial number, color. Any unusual conditions, as well as the absence of identifying information, should be noted.

17.3.6 Revolvers should be documented as follows:

17.3.6.1 Using a permanent marker, marks should be made on the top of the cylinder, on either side of the frame, to show which chamber was positioned under the hammer when the revolver was recovered.

17.3.6.2 When the cylinder is released from the frame, the cylinder rotation, the contents of the chambers (cartridges/cartridge cases) and their relative positions, shall be documented. Documentation should include the headstamp for each cartridge and/or cartridge case. This may be accomplished with a simple diagram and photography.

17.3.7 Semi-automatic handguns should be documented as follows:

17.3.7.1 The magazine should be ejected from the magazine well, but not unloaded. The slide should be moved back so that any round in the chamber is ejected through the ejection port. The contents of the chamber and the magazine well should be documented.

17.3.7.2 Once documented as a unit, the contents of the magazine can be removed. The cartridges should be documented in order as to how the magazine was loaded. Documentation should include the headstamp for each cartridge.

17.3.7.3 An ammunition box may be utilized to maintain control of the cartridges during documentation.

17.3.8 Rifles should be documented as follows:

17.3.8.1 The magazine should be removed from the magazine well, but not unloaded. The bolt/lever should be moved so that any round in the chamber is ejected. The contents of the chamber and the magazine well should be documented. Documentation should include the headstamp for each cartridge.

17.3.8.2 If the rifle doesn't have a removable magazine, the cartridges should be removed from the magazine, one at a time.

17.3.8.3 An ammunition box may be utilized to maintain control of the cartridges during documentation.

17.3.9 Shotguns should be documented as follows:

17.3.9.1 Break action shotguns have a hinged opening where the chamber meets the barrel(s); shotguns may have one or more barrels. The shotgun should be opened so that any shotshell(s) in the barrel(s) can be removed. The contents of each chamber should be documented.

17.3.9.2 Shotshell(s) may project back towards the handler when the shotgun is opened.

17.3.9.3 Most bolt action and pump action shotguns have a magazine tube. Shotshells should be removed from the magazine tube, one at a time.

17.3.9.4 Documentation should include the headstamp for each shotshell.

17.3.9.5 An ammunition box may be utilized to maintain control of the cartridges during documentation

17.3.10 Any measurement taken of a firearm at the scene is considered descriptive and general documentation.

17.3.11 When noting the location/position of the firearm, it may be relevant to note which direction the barrel is pointed relative to the grip of the firearm.

17.4 It may be difficult to locate cartridge cases, bullet fragments, pellets, and/or other small ammunition components.

17.4.1 A high intensity white light should be one of the first tools utilized to search for small firearms components.

17.4.2 Cartridge cases will react differently depending on whether they hit against soft surfaces (e.g. carpet, bedding, clothing) or hard surfaces (e.g. wall, floor, table). A cartridge case may bounce against a hard surface and ultimately come to rest in a location that is unexpected.

17.4.3 Bullets will fragment differently based on their construction and based on the types of surfaces they impact. A bullet may be deflected after impacting a surface or perforating an object.

17.4.4 Pellets are spherical and may roll after landing on hard surfaces.

17.5 If firearms testing may be requested, relevant ammunition from the scene should be collected.

17.6 Gunshot residue (GSR) is the name given to particles of barium, antimony, and lead that are expelled from the barrel, the cylinder gap of revolvers, and the ejection port of a firearm when discharged.

17.6.1 GSR may be collected from people and surfaces using a GSR collection kit.

17.6.2 GSR collection kits include small stubs with an adhesive surface that, when touched against a surface, may collect trace amounts of GSR.

17.6.3 When collecting GSR samples from a subject's hands, the back of the left hand, the left palm, the back of the right hand, and the right palm surfaces should be sampled. The samples should be taken from the entire surface, but should also be focused on the areas that are more likely to contain GSR based on how a firearm is designed to be held (e.g. area around thumb and index fingers). A consistent number of samples should be taken from each surface (i.e. the stub should be touched against each surface the same number of times).

17.6.4 For all GSR samples collected, the surface from which the sample was collected will be noted. If a form is included in the GSR kit, the information requested should be entered as completely as possible.

17.7 Collection of firearm related evidence may be determined based on the size of the evidence, its condition, and any item it impacted, perforated, or penetrated.

17.7.1 If a bullet is lodged in an item that is small enough to be collected, the entire item should be collected.

17.7.2 If a bullet has lodged, penetrated, or perforated a portion of the structure of the scene (e.g. wall, door, floor), the structure may be cut open to retrieve the bullet.

17.7.2.1 Prior to attempting the removal, the area should be fully documented.

17.7.2.2 Authorization from the primary detective or investigating agency must be obtained prior to removal; note who specifically gave authorization for those actions.

17.7.2.3 If the bullet is lodged in the surface, the area to be removed should extend several inches away from the bullet to avoid impacting it with the cutting tool. The piece that is removed should be packaged with the bullet left in place in the surface. A designation should be made (e.g. north, up) so that the cut out from the surface could be placed back into its original position if needed.

17.7.2.3.1 There should be no attempt to extract the bullet from the surface, as tools used for extraction could impart marks to the bullet surface, which could affect examination/analysis.

17.7.2.4 If the bullet has penetrated drywall, but it is uncertain if the bullet has lodged in the wood framing of the wall, or has simply fallen in the void between framing, the drywall should be removed to view the interior of the wall. The drywall should be cut near the bullet defect, and the cut should extend to each side until framing can be found. The drywall can then be cut downward to the floor, parallel to the wood framing. When the drywall is removed, the interior of that section of wall should be visible from the framing on each side, and all the way to the floor.

17.7.2.5 If the bullet has penetrated through a fabric covered item (e.g. car seat, couch), cut three sides of a square a sufficient distance away from the hole and then fold the fabric back.

This will allow the replacement of the fabric back into its original and proper position for documentation purposes.

17.7.2.6 If an area is damaged in the collection of evidence, it should be documented in notes and with photos.

17.7.3 Each cartridge case, bullet fragment, shot cup, wad, or pellet should be packaged in its own inner evidence package (e.g. coin envelope, cardboard box). If numerous pellets are collected from the same area, they may be packaged together in the same inner evidence package.

17.7.4 All of the cartridges collected from a firearm may be packaged together in one evidence envelope.

17.7.5 Any bullet fragment thought to be contaminated with biological fluids should be packaged in paper to facilitate drying.

17.7.6 Each item of firearm related evidence may be packaged individually in an evidence envelope or sack (outer packaging).

17.7.7 Several items from the same area, each in their own inner packaging, may be placed together in an evidence envelope or sack (outer packaging), depending on the scene circumstances and analyst discretion.

17.8 Handguns should be packaged in small cardboard gun boxes and long guns should be packaged in large cardboard gun boxes.

17.8.1 Firearms should be secured to the cardboard box using cable ties to minimize movement in the box.

17.8.2 Cable ties may be placed around the grip or frame, or may be placed through the magazine well/ejection port.

17.8.3 Cable ties should never be inserted into the barrel of the firearm.

17.8.4 An evidence label should be affixed to the exterior of the gun box if it is not printed with labeling fields.

17.8.5 If a firearm was recovered in water, it should be placed in a container of the same water from which it was recovered such that it is completely covered.

17.9 Tool marks are often encountered at the point of entry in crime scenes and may be located throughout the scene, depending on the scene circumstances.

17.9.1 Striated tool marks are caused when the cutting edge of a tool is brought into contact with and slid against a surface (e.g. chisel scraping along door casing).

17.9.2 An impressed mark occurs when a tool is forced into soft material (e.g. side-to-side leverage of a pry bar) or when tools with opposed jaws cut through a surface (e.g. wire cutters).

17.9.3 Saw and drill marks may be present when these tools have been used on a variety of different surfaces, including bone.

17.10 Tool marks should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to collection.

17.11 If a tool is recovered, care should be taken to protect it from the creation of any new marks or loss of any unique markings during transport and storage. There should never be an attempt to "fit" a recovered tool into any tool marks found on scene.

17.11.1 A tool should be packaged in a rigid outer container, such as a cardboard box, and secured with cable ties. The working end of the tool may be covered (e.g. bubble wrap) to prevent any damage that would affect examination/analysis.

17.11.2 Due to the variety of sizes and shapes of tools, creativity may be necessary to create evidence packaging that sufficiently protects the evidence and the evidence handlers. Several types of evidence packaging may have to be joined together to create an adequate package.

17.12 If the item bearing the tool mark cannot be collected, the tool mark may be cast.

17.12.1 Casting is used to collect a three-dimensional impression. Mikrosil and AccuTrans are types of silicone-type casting material that are commonly used to collect tool mark impressions when photographic methods may not be appropriate.

17.12.2 Equipment

MIKROSIL
Mikrosil base (brown, black, white, gray)
Mikrosil hardener
Mixing cards/latent lift cards
Wooden mixing sticks/stir stick/tongue depressor
Snow Print Wax
ACCUTRANS
AccuTrans base (brown, white, transparent)
AccuTrans catalyst (light grey, transparent)
AccuTrans extruder gun
Paper towel
Mixing tip

17.12.3 General casting method

17.12.3.1 All supplies should be assembled prior to mixing the casting material.

17.12.3.2 Brown colored casting material is preferred for casting tool mark impressions.

17.12.3.3 MIKROSIL

17.12.3.4 Place a line of Mikrosil sufficient to cover the impression on the mixing card. Place a line of hardener next to the line of Mikrosil so that both lines are approximately the same

length. Thoroughly mix the two components using a mixing stick for approximately one minute.

17.12.3.5 Remove the mixed Mikrosil from the card and apply to the surface, taking care to work the casting material into or on the impression, without allowing the mixing stick to come in contact with the impression. Ideally, a small amount of Mikrosil will extend out onto the surface, adjacent to the impression, to create a small flap/strip of material.

17.12.3.6 The setting time will be approximately five to eight (5-8) minutes at 68 degrees Fahrenheit and twelve to fifteen (12-15) minutes at 14 degrees Fahrenheit.

17.12.3.7 ACCUTRANS

17.12.3.8 Remove the syringe plug on the syringe and discard. Extrude a small amount of material directly out of the syringe onto a paper towel until it is evident that base and catalyst are being ejected. This ensures proper mixing. Immediately wipe the syringe orifice to remove excess material.

17.12.3.9 Attach the mixing tip to the syringe by aligning the prongs inside the mixing tip with the syringe orifice. Seat onto the syringe and twist clockwise (90 degrees) to lock in place. Apply AccuTrans directly from the syringe. Dispense casting material over the top of the impression. Ideally, a small amount of AccuTrans will extend out onto the surface, adjacent to the impression, to create a small flap/strip of material.

17.12.3.10 The setting time will be approximately four minutes at 68 degrees Fahrenheit and 32 minutes at 14 degrees Fahrenheit.

17.12.3.11 DOCUMENTATION AND COLLECTION OF CASTS

17.12.3.12 While the casting material is in place, documentary photographs should be taken to show it in place in the scene/on the item.

17.12.3.13 The cast should be removed carefully to avoid damaging it. The flap/strip portion of the cast can be stapled to the front of a latent lift card or the cast can be placed in a small coin envelope/evidence box.

17.12.3.14 If utilizing a latent lift card, it should be filled out as completely as possible and shall include the date and initials of the person collecting the cast, a case number, and

a description and diagram of the surface from which the impression was cast. The lift card should also contain significant information about the orientation and/or position of the impression on the surface, ideally including the location of the flap/strip.

17.12.3.15 If placing the cast in a small coin envelope, identifying information, as outlined in 15.9.3.7, should be included on the outside of the coin envelope.

17.12.3.16 Casts may become stuck to one another if packaged in a way that they could contact one another. For this reason, each cast should be packaged separately in a small envelope or box.

17.12.3.17 Multiple casts from the same surface/location (e.g. several pry marks on a window frame) may be packaged in the same outer evidence envelope/sack as long as the casts are contained in individual inner packages.

17.12.4 Safety

17.12.4.1 Do not allow the Mikrosil hardener to contact the eyes or mucous membranes. In case of contact, immediately flush with plenty of water.

18.0 Vehicle Processing

18.1 Vehicles may hold an abundance of evidence, depending on the amount of contact the suspect and/or victim may have had with the vehicle. A vehicle should be examined thoroughly and should be treated in all aspects like a stand-alone crime scene.

18.2 A vehicle should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the vehicle and collection of any evidence.

18.2.1 A vehicle should be photographed as outlined in Section 8 of this manual. Section 8.30 outlines the specific photographs that should be taken of a vehicle.

18.2.2 Notes should include the location and condition of seals, including the time they were broken. Vehicle descriptions will include the year, color, make, model, license plate number, and Vehicle Identification Number (VIN); note if the VIN plate/sticker and/or license plate(s) are missing. The general condition of the vehicle and its contents will be noted.

18.2.3 Sketches/diagrams may be utilized as appropriate, depending on case circumstances. Diagrams of a variety of styles of cars, trucks, vans, and sport utility vehicles are available and may be printed out and used for efficiency. Sketches may be utilized to supplement notes as appropriate.

18.2.4 Consideration should be made to document the location/position of vehicle components (e.g. driver's seat) in case its location/position is relevant to the investigation. During processing, components may be moved/altered.

18.3 The Vehicle Identification Number (VIN) is available on a plate affixed to the driver's side of the dashboard (near the windshield), on the edge of the driver's door, and in the engine compartment.

18.3.1 Current models of vehicles have a standard VIN of 17 characters. Vehicles manufactured prior to 1981 might have fewer characters.

18.3.2 The 10th character of the VIN indicates its model year.

- A: 1980 or 2010
- B: 1981 or 2011
- C: 1982 or 2012
- D: 1983 or 2013
- E: 1984 or 2014
- F: 1985 or 2015
- G: 1986 or 2016
- H: 1987 or 2017
- J: 1988 or 2018
- K: 1989 or 2019

- L: 1990 or 2020
- M: 1991 or 2021
- N: 1992 or 2022
- P: 1993
- R: 1994
- S: 1995
- T: 1996
- V: 1997
- W: 1998
- X: 1999
- Y: 2000
- 1: 2001
- 2: 2002
- 3: 2003
- 4: 2004
- 5: 2005
- 6: 2006
- 7: 2007
- 8: 2008
- 9: 2009

18.4 A systematic approach to searching a vehicle may be accomplished by dividing the vehicle into areas based on the occupants/areas (e.g. driver, front passenger, rear driver side, rear passenger side, third row driver side, third row passenger side, cargo area, trunk, etc.).

18.4.1 Areas associated with the driver should be labeled as "driver", rather than as "driver's side" (e.g. driver's door rather than driver side front door).

18.5 The extent of the examination and/or processing of the vehicle will be dictated by the type of crime and/or types of evidence that may be present.

18.5.1 Areas that are often overlooked include the headliner, visors, sunroof, engine compartment, and undercarriage.

18.6 A strong white light may be utilized at an oblique angle in order to visualize small evidence. If a particular type of evidence being searched for would react with a different wavelength of light, an alternate light source (ALS) may be utilized

18.6.1 A flashlight or the white light setting on an ALS are the most common sources for a strong white light.

18.6.2 An ALS may only be utilized by analysts who have received training in the appropriate use of an ALS.

18.6.2.1 When using an ALS to observe an item/surface, the appropriate goggles will be used, depending on wavelength.

WAVELENGTH	CORRESPONDING FILTER
<400nm	yellow or clear UV safe
400-450nm	yellow
450-540nm	orange
>540-700nm	red

18.6.2.2 Permanent eye damage can occur from reflected, refracted, or direct illumination by the ALS to the eye. Extreme care should be taken around highly reflective surfaces. An analyst should never look directly into the light or allow beams to bounce off the surface into his/her own eyes or another person's eyes.

18.7 Trace evidence may be present on the interior surfaces of the vehicle and/or on items found in the vehicle.

18.7.1 Trace evidence should be examined and collected as outlined in Section 16 of this manual.

18.7.2 One piece of adhesive collection material may be used to collect trace evidence from one area in a vehicle (e.g. driver's seat cushion/backrest, rear passenger side floorboard, cargo area floor, etc.).

18.8 Biological stains may be present on the interior and exterior surfaces of the vehicle and/or on items found in the vehicle.

18.8.1 Biological evidence should be examined and collected as outlined in Section 11 of this manual.

18.8.2 Presumptive blood tests should be conducted as outlined in Section 10 of this manual.

18.9 Latent prints may be present on the interior and exterior surfaces of the vehicle, and/or on items found in the vehicle.

18.9.1 Latent print processing should be conducted as outlined in Section 14 of this manual.

18.10 Gunshot residue (GSR) may be present on the interior and exterior surfaces of the vehicle, and/or on items found in the vehicle.

18.10.1 Collection of GSR samples should be conducted as outlined in Section 17 of this manual.

19.0 Buried Body Excavations and Scattered Human Remains

19.1 Bodies that have either been buried or exposed to the environment for an extended period of time present challenges to crime scene investigation. The greater the amount of time that has elapsed since the body has been in an area, the greater the likelihood that evidence and items associated with the crime may have been dispersed. Evidence items associated with buried bodies or bodies that decompose on the surface over an extended period tend to be widely dispersed in the surrounding soil and vegetation. This demands the application of archeological techniques in an effort to locate and document the evidence and its scene context.

19.1.1 Care must be taken to examine the area for evidence that may help determine whether the death took place in the area, or if the death may have taken place at another location, and the body was taken to the area for disposal.

19.1.2 The examination of a scene containing a buried body or an outdoor skeletal recovery must include consultation with the local coroner's office and should include consultation with a forensic anthropologist, anthropologist, or similarly trained expert.

19.1.3 ISPFS works to maintain partnerships with anthropologists who may be able to attend a scene as an advisor, give instructions for scene methodology, and/or differentiate between human and non-human bones.

19.1.3.1 Consideration must be given for the possibility of a burial related to the recovery of a Native American person and burial sites of possible historical significance.

19.2 Clandestine graves may be discovered by chance or by searching an area based on information provided by a subject. There are a number of different methodologies and tools that may be employed to attempt to detect a clandestine grave in an area.

19.2.1 A visual examination of an area of interest may indicate areas of disturbance. Depending on a number of factors (e.g. the length of time the body has been buried, the type of soil, etc.), the grave may vary in appearance from the surrounding area. There could be disturbed soil, a grave mound, soil compaction, and/or a change in vegetation between the grave and the surrounding area.

19.2.2 Non-invasive techniques used to search for graves include the use of cadaver dogs, magnetometers, ground-penetrating radar, and infrared thermography. Intrusive techniques for locating graves include the use of probes and vapor monitors. These techniques may only be utilized by trained experts.

19.2.3 Shovels may be used to remove topsoil in an area. Care should be taken to penetrate the soil in a shallow, horizontal motion to avoid having the end of the shovel impact anything in the grave. If any item in the grave is inadvertently struck by a shovel, it must be documented in the notes.

19.2.4 The use of heavy machinery in an attempt to locate a grave should be the last option undertaken, when all other attempts to locate a grave have failed.

19.2.4.1 Heavy machinery, such as a backhoe, may be utilized to slowly scrape topsoil in layers from the area in question. If any artifact is discovered, the process is halted, and standard excavation techniques are utilized.

19.3 The area of a potential gravesite should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the area and collection of any evidence.

19.3.1 If available and appropriate, aerial photography should be done in addition to traditional crime scene photography.

19.4 Once a gravesite has been detected or is suspected by any means, consideration for excavation must be undertaken. Additionally, the path in/out of the area, and the possibility of any discarded evidence along that path, must be considered and those areas preserved.

19.4.1 A grid search is often the most appropriate method to search an area involved in an excavation. A reference point (RP), or several reference points (RP's), may be established, depending on the size and elements involved in the terrain.

19.4.2 A physical grid may be established over the area to be excavated. All measurements can be made to the RP's established within the grid itself. Since the grave is a three-dimensional artifact, depth must also be documented for each discovery.

19.4.2.1 The grid should be oriented north/south and east/west as much as practical, given the scene circumstances. Stakes should be driven into the ground at the four corners of the grid.

19.4.2.2 String or flagging tape should be used to connect the four stakes and establish the outer perimeter of the grid. At least one string line should be checked to ensure it is level; it may then be used for depth measurements to items of evidence.

19.5 The surface of the area must be examined first. Any visible items of potential evidence must be documented prior to excavation.

19.5.1 Once surface finds are properly documented and collected, the site should be examined with a metal detector; any hits should be marked for further documentation and excavation; surveyor flags work well for this.

19.5.2 Loose debris (e.g. leaves, twigs, etc.) should be removed by hand and examined for any potential evidentiary value. Care should be taken for any items that have scene context (e.g. sticks fashioned in a cross formation) and to ensure that underlying items of evidence are not disturbed.

19.5.3 Once loose debris is removed, the ground should be reexamined for any objects or items of evidence. Ground plants should be removed by cutting them at ground level, unless a forensic botanist requests the root system to be retained.

19.6 Screens should be used to examine all litter, debris, or soil removed from the excavation site. This will preclude missing small items such as bullet fragments, teeth, small bones, and other small artifacts.

19.6.1 A methodology must be established prior to excavation so that the location from which soil was taken is not lost as screen sifting is undertaken. By doing so, the location of any evidence that's discovered can be documented properly. Additionally, if soil samples are to be collected, their location from the site can be determined.

19.6.2 A two-level screening effort is recommended. The first screen is usually made up of 1/4 inch mesh, while the second is made up of 1/16 inch mesh. Double screening will make it more likely that small objects such as hairs, fibers, or shot pellets are located and recovered.

19.7 Actual excavation of the site should be undertaken in levels. General archeological protocol dictates that excavations proceed in arbitrary levels following the surface contour until an evident stratum is located (man-made or natural).

19.7.1 A stratum may be a layer of some specific type of soil, a layer with some form of particular debris, or any level in which an artifact or artifacts become exposed.

19.7.2 Once excavated and mapped, the process continues for each newly discovered stratum.

19.7.3 The primary tools required for excavation include trowels and brushes. Use of these hand tools helps to prevent damage to the sides of the grave and the evidence contained in the grave.

19.7.4 Because the sequence of artifacts uncovered is important, dirt should be removed in no more than 2 to 4 inch layers. If a layer of a material is less than 2 inches (e.g. 1 inch layer of gravel), then less material should be removed when excavating that stratum.

19.7.5 As the grave sides are exposed, they should be examined for evidence of tool or footwear marks.

19.8 As each artifact is discovered, it must be properly documented using photography, notes, sketches/diagrams, and location from RP's.

19.8.1 Each object's elevation must be measured in relation to the grid RP. Elevation can be easily measured using a string, string level, and plumb bob.

19.9 Upon initial exposure of the body, there may be a desire to expose the remains quickly. However, it is important to maintain elevation control, slowly exposing the body and collecting any artifacts.

19.9.1 There should be a significant number of photographs taken as the body is exposed, documenting each step and the condition of the body.

19.9.2 Once the body is completely exposed, its position is documented in relation to the grid, and any associated articles found on or beside it are documented fully prior to collection. The body may be protecting evidence, including tool and footwear impressions; care should be made to prevent soil from filling in the impressions or compacting any impressions.

19.9.3 Once the body is removed, excavation continues until the base of the grave is reached; at least 2 to 4 inches below the body should be excavated. The total depth of the grave should be measured and documented.

19.10 Scattered or skeletonized remains may appear in two different ways; either a skeleton or badly decomposed body is found relatively complete in a single location or it is widely dispersed over a large area. Dispersal may vary greatly depending on animal activity, erosion, or flooding. Additionally, the body may have been dismembered and scattered intentionally as a countermeasure by the suspect.

19.10.1 While each type of scene will follow the same general processes for documentation and collection of evidence, widely dispersed remains will be more difficult to map.

19.10.2 Scattered remains may be due to a suspect's actions, but is frequently the result of animal activity. Bones found in a remote setting should first be determined to be human before beginning full scene processing; a forensic anthropologist or other appropriately trained person should make that determination.

19.10.3 Once the remains are verified as human, a grid should be established over the primary location of remains. The size and scope of the grid is determined by the amount of scatter.

19.10.4 A line search is effective when dealing with remains scattered over a large area. When searching, any obvious remains should be marked with a flag. If an item is questionable, it should be flagged for consideration; some small bones aren't easily discerned from rocks. Once the search is done, the area should be checked with a metal detector.

19.10.5 After documenting the surface and all obvious remains, the area immediately surrounding the remains should be cleaned and exposed in the same way as a grave. Surface debris and plants should be removed. Care should be taken to document plants growing in and around the body as plant growth may help establish timelines. All items of evidence will be documented, mapped, and collected. Once surface evidence is collected, the area beneath remains should be troweled to a depth of at least 2 inches and the soil should be searched for artifacts.

19.10.6 When dealing with scattered remains, a human skeleton diagram/bone list may be utilized to keep track of which bones have been found and as a reference for the basic anatomy of human bones. Additionally, by keeping track of which bones have been found, the presence of too many bones of one type (e.g. three right femurs) immediately demonstrates the presence of more than one victim.

20.0 Entomology

20.1 Insect activity that takes place in, on, and around a dead body may assist a forensic entomologist in determining time since death.

20.1.1 In the absence of a forensic entomologist on scene, responders can collect specimens to be sent for later analysis.

20.2 Flies may begin laying eggs on the body within 20 minutes of death. Flies target any warm, moist areas of the body.

20.2.1 Flies will lay eggs in the nostrils, eyes, mouth, or any opening that is available on the body. If eggs are present in an area that is not a natural opening to the body, it is likely the site of an injury.

20.2.2 Eggs develop into larvae (i.e. maggots). The maggots will be present together in a mass. When the maggots mature, they leave the body.

20.2.3 When the maggots leave the body, they enter the soil or other surrounding areas where they will pupate, forming a hard casing from which a fly will later emerge.

20.2.4 With careful collection of both living and preserved maggots, pupae casings, and adult flies, a time of death may be determined.

20.2.5 Usually, half of the specimens are preserved, while half are kept alive in order to allow them to mature.

20.3 Insect activity should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the area and collection of any evidence specimens.

20.4 Collection of specimens should occur immediately upon discovery, as adult flies will relocate quickly once the body is disturbed.

20.4.1 Collection of larvae

20.4.1.1 The temperature of the larval mass should be noted. Larvae (~50-60, minimum) can be collected with forceps or by using a moistened paint brush.

20.4.1.2 Live samples (~20-30) should be placed in a container with moisture and a food source (e.g. piece of liver and moistened paper towel).

20.4.1.3 The same approximate number of larvae (~20-30) should be collected for preservation. They should be placed in vials of ethyl or isopropyl alcohol.

20.4.1.4 The site of collection from the body should be noted.

20.4.2 Collection of pupae

20.4.2.1 Pupae are usually found in drier environments, away from the maggot mass; they may be found in clothing and surrounding soil.

20.4.2.2 Live specimens require moisture and air, but also demand careful sealing, as adult flies can emerge from the pupae at any time.

20.4.2.3 Samples collected for preservation should be placed in vials of ethyl or isopropyl alcohol.

20.4.3 Collection of adult flies

20.4.3.1 An insect net can be utilized to catch adult flies.

20.4.3.2 Live specimens require moisture and air, but also must be carefully sealed to avoid escape.

20.4.4 Soil samples from a variety of areas, including beneath the body and at distances of approximately three feet around the body, should be collected and placed in small containers. The location of collection should be noted on the container.

20.5 Considerable notes should be taken to document the environment in which the insects have been living.

20.5.1 Note if the area is shaded or sunlit, the nature of the foliage (e.g. wooded, grassy), the weather conditions (including soil and air temperature), and the condition of the body (e.g. buried, partially buried, clothed).

20.5.2 Each specimen should have a notation as to the date and time collected, the stage of development, and the specific location on the body.

20.6 Entomology samples may be packaged in a variety of outer evidence containers, such as evidence sacks or boxes, depending on the size/type of vial or collection container used.

21.0 Fire Scenes

21.1 Fire scenes are one of the most complex and difficult scenes to work.

21.1.1 Conditions of fire scenes that create difficulties include the fire damage itself, the damage to the stability of the structure, the presence of debris covering items, the addition of water and/or fire retardant, the destruction of the scene/evidence during firefighting efforts, and the fact that dark surfaces do not reflect light well.

21.2 Safety should be the first concern prior to entering a fire crime scene.

21.2.1 Structural concerns may affect the way an analyst can move safely through the scene. Prior to entry, the scene must be determined to be safe by the Fire Marshal or investigating fire department.

21.2.2 Inhalation of dusts and gases are a health concern on scene. In order to prevent exposure, a particulate mask should be utilized (at a minimum), based on the condition of the scene.

21.2.3 The effects of fire and of firefighting may damage the structure and items in the scene. Care must be taken to avoid sharp objects when moving through the scene and moving items to search for evidence.

21.2.4 The fire marshal, fire investigator, or fire department personnel can advise analysts of fire scene safety and areas of concern.

21.3 Investigations of crime scenes involving fire must include coordination with the fire department and/or fire investigator.

21.3.1 Origin and cause determinations are made by the fire investigator. S/he will be helpful in determining areas of focus for documentation and evidence collection.

21.3.2 The fire department should be consulted in order to determine how they altered the scene during their response.

21.3.2.1 During fire suppression, firefighters may force entry into buildings, break windows, tear down walls, or move objects such as furniture.

21.3.2.2 During overhaul, firefighters search for hot spots and eliminate them. In doing so, debris may be removed from the scene.

21.4 Fire scenes should be properly documented using photography, notes, and sketches/diagrams (as appropriate) prior to searching the scene and collection of any evidence.

21.4.1 Camera settings and/or photographic techniques must be altered in order to adequately photograph a scene blackened by the action of fire. Adjustments should be made in order to increase the amount of light gathered while the shutter is open, which can be accomplished through

changes to the ISO, shutter speed, and f-stop in the camera, or by the use of additional lighting techniques.

21.5 Fire patterns leave effects in the scene which may be crucial to origin and cause analysis. While analysts may not be familiar with fire patterns, depending on their training and experience, they should document any patterns relevant to their investigation of the scene.

21.5.1 Fire patterns include char patterns, smoke and soot patterns, and damage patterns.

21.5.2 Fire signs may present themselves as a surface effect, such as bubbling of paint on a wall or the directional melting of glass in a light bulb.

21.6 When working in a fire scene, it may be helpful to begin working in areas with the least amount of damage and move toward areas with greater amounts of damage. By doing so, it can give the analyst a better understanding of the condition of the scene prior to the fire.

21.7 Evidence from fire scenes often include burnt fire debris, liquids recovered at the fire scene, a suspect's clothing, and/or ignitable liquids found in the suspect's possession.

21.8 For scenes in which an accelerant is thought to have been used, an area of substrate that was not affected by the accelerant should be collected separately as a control.

21.9 When collecting evidence from a fire scene, any tools that are used should be cleaned with water between collecting items. The use of an alcohol based cleaner could affect the analysis of the item.

21.10 Fire scene evidence must be packaged in clean, airtight containers.

21.10.1 Debris samples and clothing must be packaged in either a lined friction lid can, a glass jar, or a heat-sealable polyethylene or nylon bag that is designed for use with fire evidence.

21.10.1.1 Friction lid cans should not be filled more than 2/3 full.

21.10.1.2 The groove at the top of the can should be free of debris prior to attaching the lid.

21.10.1.3 The lids of friction lid cans must be hammered down tightly, but not with such force as to damage/buckle the can itself.

21.10.2 Glass vials should be used for liquids suspected of being or containing an ignitable liquid. The glass vial must be packaged in a friction lid can with adsorbent material to prevent the contents of the vial from contaminating adjacent samples and to protect the vial from damage/preserve the sample in case of breakage.

21.10.2.1 Samples packaged in glass vials must be transported to the ISPFS lab via ground transportation.

21.10.3 External packaging may include paper sacks and cardboard boxes.

21.10.3.1 Friction lid cans may be sealed and labeled and submitted without placing the can inside additional packaging.

21.11 For all evidence that requires special storage considerations, the external packaging should have the storage medium written (e.g. “freeze”, “refrigerate”) in bold print.

21.12 Fire evidence should be stored under refrigeration until analysis.

21.12.1 Fire evidence thought to contain substrate materials likely to contribute to the degradation of petroleum products such as manure, vegetation, and/or soil, should be frozen until analysis.

22.0 Documentation and Evidence Collection from Victims, Subjects, and Suspects

22.1 A variety of different people may interact with the victim, suspect, or crime scene. Documentation of their condition and/or collection of evidence from their person may be crucial.

22.2 A person should be properly documented using photography and notes prior to collection of any evidence.

22.2.1 Consideration for the different types of evidence that may be present should be contemplated prior to beginning the collection process.

22.2.2 Ideally, the person should be prohibited from changing their clothes or washing their body prior to evidence collection. If the person altered his/her clothing and/or condition, it should be noted.

22.3 When photographing a living person, identification and condition photographs should be taken.

22.3.1 To document the identification of a person, a minimum of five photographs should be taken: front of person (head-to-toe), left side of person (head-to-toe), back of person (head-to-toe), right side of person (head-to-toe), and a close up of the person's face.

22.3.2 When the condition of a person's clothing or body is important to document, relationship and identification photographs should be taken.

22.3.3 If there is a defect in the clothing or an injury to the person, the area should be photographed both without and with a scale for reference.

22.3.3.1 In some instances, the lack of any defects and/or injuries may be important to document.

22.3.4 Depending on the nature of the injury, it may be necessary to photograph it as found and then photograph again after it has been cleaned; each set of photographs should be taken both without and with a scale for reference.

22.3.5 Scars and tattoos may be important to the investigation. Scars and tattoos should be photographed both without and with a scale for reference.

22.4 Hands are often the location of different types of evidence.

22.4.1 If it is thought that a person may have had considerable interaction with a suspect or victim (e.g. fist fight, defensive movements), greater documentation should be made. This should also bear on the type(s) of evidence that may be present.

22.4.2 Injuries (or lack thereof) may help to corroborate or refute an account of the interaction(s).

22.4.3 The probative value of gunshot residue (GSR), blood, potential DNA, and other evidence must be weighed against one another, as the collection of one may affect the collection of another.

22.4.3.1 GSR should be collected as per section 17.6 of this manual.

22.4.3.2 Biological material should be collected as per sections 11.6-11.10 of this manual.

22.5 Biological materials may be present on other areas of a person's body. Biological material should be collected as per sections 11.6-11.10 of this manual.

22.6 A known DNA sample (i.e. reference sample) may be collected from a person to facilitate future DNA analysis.

22.6.1 Cap-Shure or standard wood/plastic shaft sterile swabs may be utilized to collect a known DNA sample.

22.6.1.1 Wearing disposable gloves, remove the swabs from the sterile packaging. Using two swabs simultaneously, place the cotton tips of the swabs in the person's mouth and vigorously swab the insides of both cheeks. Move the swabs between the gum line and the fold of the check, and under the tongue. Remove the swabs from the person's mouth.

22.6.2 After collection, Cap-Shure swabs may be placed in an evidence envelope without allowing the swab to dry due to the capsule design.

22.6.3 After collection, standard swabs should be placed in a vented swab box or a small, coin-type envelope; time should be allowed for the swab to dry. It is effective to tent the envelope to keep it somewhat open in order to facilitate swab drying.

22.6.4 The external packaging should include the name of the person from whom known DNA swabs were collected, not just an indication of "victim" or "suspect."

22.7 Sexual Assault Kits will not be collected by crime scene responders.

22.7.1 Sexual Assault Kits will be collected in accordance with the "Idaho Sexual Assault Response Guidelines, Best Practices."

22.7.1.1 Best practice for medical forensic examinations are ones performed by a medical provider trained in sexual abuse evaluation. This may include a Sexual Assault Nurse Examiner (SANE), Sexual Assault Forensic Examiner (SAFE), or Pediatric SAFE.

22.8 Finger, palm, and foot print exemplars may be collected from a person to facilitate future comparisons.

22.8.1 Exemplars should be collected as per section 14.12 of this manual.

23.0 Validation

23.1 Procedures for the validation and/or performance verification of methods used in ISP Forensic Services are outlined in the ISP Forensic Services Quality/Procedure Manual.

23.2 Validation/performance verification data, results, and summaries for methods employed for Crime Scene will be maintained in that section.

24.0 Forms

24.1 Form note pages may be utilized to supplement the note-taking process. The use of forms is not required and may be utilized based on responder preference.

24.2 Forms that are being tested may be stored on a shared computer drive. Approved forms are stored in the quality system.

24.3 Approved forms:

- Crime Scene Notes Check List
- Evidence Collection Notes page
- Presumptive Blood Testing Notes page
- Vehicle Diagrams
- Clan Lab Notes Check List

25.0 Tools and Equipment

25.1 When responding to crime scenes, analysts may utilize a variety of tools and equipment. The proper use of tools and equipment ensures that evidence is documented and collected properly and that analysts remain safe.

25.1.1 If an analyst is unsure how to properly use a tool or piece of equipment, s/he should consult another crime scene responder or the crime scene coordinator.

25.2 ALTERNATE LIGHT SOURCE (ALS)

25.2.1 An alternate light source (ALS) is a portable, multi-waveband, and tunable light source that is used to enhance or visualize potential items of evidence. Different substances, such as latent print residue, body fluids, chemicals, or other organic substances may react differently to different wavelengths of light. When a luminescent deposit is excited with a particular wavelength of light, the deposit absorbs the light and re-emits it at a different wavelength. The short-lived light being re-emitted is termed fluorescence.

25.2.1.1 Crime scene response may include the use of an electrical, tunable ALS or ALS flashlights.

25.2.2 An ALS is used to attempt to create contrast between a substance and the surface upon which it is deposited.

25.2.3 Some surfaces may have fluorescent properties and may react to the ALS.

25.2.4 To operate the ALS, first turn on the ALS. Make sure the ALS comes to full operating power (fan and bulb reach consistent speed/brightness).

25.2.4.1 Choose the band-width that corresponds to the color of goggle being utilized.

25.2.4.2 Observe items/evidence with the appropriate wavelength/goggle combination.

WAVELENGTH	CORRESPONDING FILTER
<400nm	yellow or clear UV safe
400-450nm	yellow
450-540nm	orange
>540-700nm	red

25.2.4.3 Turn off the ALS lamp allow to cool completely before powering off ALS unit.

25.2.5 Use of ALS will be recorded in case notes, along with observations. The wavelength and filter combination may be noted, especially if it is unusual.

25.2.6 If the ALS malfunctions, it will be taken out of service until it can be repaired. The ALS shall be tagged indicating that it is out of service.

25.2.7 As with other electrical appliances, guard against electrical shock. Ensure that all connections are proper and that no loose, damaged, or frayed wires exist. Make sure the ALS is unplugged before attempting any maintenance. Do not use outdoors if wet conditions exist.

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

25.3 INFRARED THERMOMETER

25.3.1 A gun-style infrared thermometer can be used to measure the surface temperature of objects or fluids.

25.3.2 For greatest accuracy, the "measurement spot" on the area being measured should be measured at an 8 to 1 ratio (at 8" from the target, the "measurement spot" would be 1" in diameter; at 16" from the target, the spot would be 2" in diameter, etc.).

25.3.3 To operate the thermometer, point it at the surface to be measured (at the appropriate distance) and depress the "trigger" mechanism. The readout screen will display the measured temperature.

25.3.3.1 The temperature can be set to read in either Celsius or Fahrenheit.

25.3.4 The thermometer is set to read in a temperature range of -4 degrees to 605 degrees Fahrenheit and to be accurate to +/- 2%.

25.3.5 The thermometer requires a 9-volt battery for power.

25.3.6 For safety, the infrared thermometer should not be pointed at any person. Personnel should avoid looking at the thermometer's infrared light.

25.4 LASER MEASURING DEVICE

25.4.1 A laser measuring device can be used to take measurements easily and quickly in a crime scene; it can be used indoors or outdoors.

25.4.1.1 Use of the laser measure outdoors may be negatively impacted by bright sunlight.

25.4.2 A laser measure may be preferable to a standard measuring tape in taking measurements because it can be used by one person alone. Additionally, it doesn't have to be deployed across long expanses of potentially contaminated surfaces in the way a standard tape measure would.

25.4.3 The laser measure is pre-set with the rear edge of the unit as the reference point (RP) for measurements.

25.4.3.1 The unit can be set with the RP at the front edge of the unit or to the tripod (if the unit is attached to a tripod). When the unit has powered down and then is powered on again, it will reset the RP to the rear edge of the device.

25.4.4 Once the laser measure is powered on, the laser is automatically activated and the laser measure is measuring.

25.4.5 To take a measurement, place the laser measure against the desired starting point of the measurement (e.g. wall) and aim at the surface to be measured to. Press the measure button (black triangle) to take the measurement.

25.4.5.1 For a highly reflective surface, the laser may not be able to fix itself against the surface. In that situation, the target card or a similar surface can be placed against the target surface in order to collect a measurement.

25.4.6 The last three measurements will show on the unit's display.

25.4.7 The last thirty measurements are automatically stored in the unit.

25.4.7.1 To retrieve stored measurements, press the function button [Func] and use the plus or minus buttons to cycle through the measurements functions until "Memory" is selected; then press the black triangle button. Use the plus or minus button to scroll through measurements recorded.

25.4.8 For safety, the laser should not be pointed at any person. Personnel should avoid looking at the laser light; the laser beam could cause blindness.

25.5 RECHARGEABLE FLASHLIGHTS

25.5.1 Flashlights are an important tool for navigating poorly lit areas in a crime scene and for discovering/locating items of evidence.

25.5.2 Streamlight flashlights feature a multi-function switch for varying lighting effects.

25.5.2.1 Press the switch momentarily to turn the flashlight on at full intensity; release to turn off.

25.5.2.2 Press and hold the switch to cycle through brightness levels; release at desired level.

25.5.2.3 A single press of the switch from any "on" mode will turn the flashlight off.

25.5.2.4 A quick double-click of the switch will activate the strobe function.

25.5.3 After using a flashlight, it should be returned to the charger so that it is ready for the next use.

25.5.4 To charge the flashlight, turn it off and insert it into the black charger/holder. The switch module (below the head) fits into a mating recess in the charger. Many flashlights have both an AC charger and a vehicle charger.

25.5.4.1 When the Streamlight flashlight is properly inserted in the charger, the LED in the switch module will illuminate with the following indication:

25.5.4.1.1 Steady glow- battery is charging.

25.5.4.1.2 Steady flash- charging is complete.

25.5.4.1.3 Rapid flash- problem with charging the battery.

25.6 ADAMS WEB

25.6.1 Digital images (i.e. photographs) are frequently captured for documentation of crime scenes, vehicles, evidence, and people.

25.6.1.1 Photographs will be captured as outlined in Section 8 of this manual.

25.6.2 Adams Web is a digital imaging system that provides a way of storing, filing, annotating, and viewing digital images. The digital image name assigned by the camera will be included in Adams Web as the "File Name." Information about the Event/Location may be entered in the "Description" field. "Tags" may be used to group images for convenience.

25.6.3 All digital images taken during a field services response shall be uploaded to the Adams Web digital imaging system as soon as practical.

25.6.3.1 Folders in Adams Web will be named by the lab case number.

25.6.3.2 When uploading digital images, the lab number, crime and date of crime should be entered.

25.6.4 When images are acquired into a case Folder, they should be acquired in batches, based on the response event/location. If an analyst responds to three different scenes, one batch of images should be uploaded for each of the three events/locations.

25.6.4.1 Adams Web can sort digital images based on groups of images that are uploaded together, which is called a "Set."

25.6.4.2 When uploading digital images, a description can be entered during the acquisition process, which will be applied to every image in that set. By entering a description during the acquisition process, the analyst only has to enter the description once, instead of in each individual image. The description should contain information about the images depicted (e.g. address, vehicle description, subject's name, date of response).

25.6.5 Tags can be used as a way to group images together for reference. Tags are created by editing the image(s) and adding an identifier (e.g. analyst initials, key word) in the "Tag" field.

25.6.5.1 Tag identifiers must be entered exactly the same in each image in order to sort correctly.

25.6.5.2 Multiple images can be selected at once, and a tag can be entered that will apply to all selected images.

25.6.5.3 One image may have multiple different tags.

26.0 Report Writing

26.1 Crime scene documentation and report writing will be according to the ISPFS Quality Manual.

26.2 Reports will be entered in the Field Services matrix of the case assignment in the ILIMS system.

26.2.1 In the "Scene Personnel" panel, a separate entry must be made for each responder, for each response date. In each entry, the total travel time, total time on scene, and number of locations must be entered.

26.2.2 In the "General Crime Scene" panel, a separate entry may be made for each response event or location. Only the pertinent fields must be entered in this panel, based on the processing conducted. If three vehicles were processed at a department's garage, it may make sense to create an entry for each vehicle. If the information can be sufficiently conveyed in one entry, without confusion, then only one entry may suffice.

26.2.3 In the "Autopsy Services" panel, a separate entry should be made for each person. Enter the pertinent fields based on the quantity of each item that was collected at autopsy.

26.2.4 In the "Subject Exemplars" panel, list the quantity for each type of exemplar collected from a person.

26.2.5 In the "General Notes" panel, additional information may be added to the notes for the case.

26.2.6 In the "Report" panel, the case narrative is entered. There is a limit on the number of available characters per entry, so multiple entries may have to be made in order to write a long report.

26.2.7 In the "Verification of Accompanying Personnel" panel, there are three entries to be made. Each accompanying responder must fill out a verification panel. After reviewing the content of the notes and report, any suggested changes or corrections should be entered in the "Notes from Accompanying Responder" field. Once the corrections have been completed, the accompanying responder must fill in the "Information Verified" field (password entry required) and the date field.

26.2.8 Once all accompanying personnel have verified the content of the report, it can be sent for technical review.

26.3 Reports shall be as clear and concise as possible, but shall include enough detail to adequately describe the scene, evidence, and activities performed. The reader

should be able to clearly understand the scene from the report, without having to reference photographs or sketches.

26.4 Reports will be written in the first person and will be in an active voice. If multiple people performed tasks, the report will indicate which people performed which tasks. Only the tasks performed by ISPFS personnel will be included in the report.

26.5 All time notations will be in military time and will include the time zone abbreviation (e.g. MST/MDT, PST/PDT).

26.6 Reports will not contain any information that is not represented in the crime scene notes, which includes the crime scene sketch.

26.7 Reports do not need to be broken down into sections with headings, unless the report is so complicated that the additions of section headings would help the reader to better understand the report.

26.7.1 If headings are used, recommended headings would be “Scene Description”, “Victim(s)”, “Evidence”, and “Scene Activities”.

26.8 Reports will be organized in the following order, including only those sections and information relevant to the activities performed:

26.8.1 Basic scene and response information, including date, time, names of analysts responding to the scene, location, type of investigation, personnel who were present at the scene, how the scene was secured, and environmental conditions.

26.8.2 Description of vehicles, buildings, and other scenes

26.8.2.1 Vehicle descriptions will include the year, color, make, model, license plate number, and Vehicle Identification Number (VIN). The vehicle’s location and the condition of any seals will be noted, including the time the seals were broken. The general condition of the vehicle and its contents will be noted.

26.8.2.2 Building descriptions will include the type of building, the number of stories, the direction it faces, the type of location, and the number and types of rooms contained therein. The general condition of the building and rooms of importance will be noted. Specifically note any damage that may be pertinent to point of entry or exit.

26.8.2.3 Other types of scenes will be described using cardinal directions referenced from a landmark or location or described generally, including GPS coordinates.

26.8.3 Description of rooms of importance

26.8.3.1 Starting with the doorway to the room, moving around the room (either clockwise or counterclockwise), describe the furniture and items in the room, including structures. For fixed items, like doors and windows, use *present tense* to

describe. For items that are moveable, use *past tense* to describe, as the report only indicates their location at the time you were on scene. Note condition of lights (on, off), window shades (up, down, open, closed), appliances, etc.

26.8.4 Description of Victim(s)

26.8.4.1 Describe the body's position in the scene. Describe all clothing, visible jewelry, and accessories. Note the location of any visible injuries and note the presence of apparent blood or other fluids, if present.

26.8.5 Description of items of evidence in the scene

26.8.5.1 Describe the item of evidence sufficiently that it can be distinguished from other similar items of evidence. Use serial numbers or identifying numbers, brands, or labels, as applicable. Include evidence markers with descriptions.

26.8.5.2 If the investigating agency assigns their own item number to an item of evidence, that number may be included so that the items can be easily correlated with that agency's reports.

26.8.6 Scene Activities

26.8.6.1 Photography

26.8.6.1.1 Include a general statement that the scene or vehicle was photographed for overall location, identification, and condition.

26.8.6.1.2 If any victims, suspects, or subjects were photographed, note that they were photographed for overall identification and condition. If there is something specifically photographed that is pertinent to the investigation, it should be specifically included in the report.

26.8.6.1.3 If any photographs are taken of fingerprints, footwear, tire tracks, or tool marks, make note that comparison quality photographs were taken of that evidence, and from what location(s) in the scene.

26.8.6.2 Presumptive Test for Blood

26.8.6.2.1 All items that were tested must be noted. If there are a small number of items, they may be listed individually. If there are a large number of items, they may be grouped to indicate a number

of items from a particular location within the scene.

26.8.6.2.2 Positive results will be reported by individual items, if there were few items, or by quantity and location, if there were numerous items.

26.8.6.2.2.1 Positive results will use the term "indicating" in regards to the presence of blood.

26.8.6.2.3 Negative results will either be reported indicating that for all other items tested, blood was not detected, or that for specific items/areas, blood was not detected.

26.8.6.3 Evidence Collection

26.8.6.3.1 Each item of evidence that is collected from the scene will be listed in the report.

26.8.6.3.2 If multiples of the same type of evidence were collected (e.g. swabs, adhesive lifts, latent lift cards, etc.), they may be grouped to indicate the number of items from a particular location within the scene.

26.8.6.3.3 If the location of a particular piece of evidence is significant, its measurement to a reference point will be included in the report.

26.8.6.3.4 Note the person to whom evidence was turned over and at what time.

26.8.7 Final Notes

26.8.7.1 Note the time that you cleared the scene.

26.8.7.2 If digital images were transferred to the investigating agency, note the person/agency and the time that the images were transferred.

26.8.7.3 Note that all digital images were uploaded to the digital imaging system.

26.8.7.4 If a CD/DVD/thumb drive of images was made for the agency, indicate which type of media was used, to whom it was given, and on what date/time.

26.9 The following are basic report writing examples. There may be situations that do not fit the examples given and wording will be developed as the need arises. (Blanks and items in parentheses indicate a choice or description should be entered).

Basic Scene Information

On (date), (other analyst title/name and) I responded to (location – address, city, county, Idaho) to assist with a (type) investigation. (People/agency) were present upon my arrival and the scene was (cordoned off with crime scene tape/secure). The weather was _____ and the temperature was approximately _____ degrees F.

Description of Scene- Vehicle

Vehicle 1 (V1) is a (year) (color) (make) (model), (license plate state/number), VIN: (17 characters, tenth character is vehicle year). V1 was located at (location) and (each door/trunk/hood) was sealed upon my arrival; I broke the seals at (time).

Description of Scene- Building

(Location) is (single/two/three) story home that faces (direction) in a residential neighborhood. The house consists of (number and type of rooms).

(Location) is a(n) (apartment/condominium) that faces (direction) in a multi-unit complex.

(Location) is a commercial building that faces (direction). The building consists of (number and type of rooms).

Description of Scene- Other

…an undeveloped area (direction) of (landmark, location).
…a (desert/wooded/etc.) area at (GPS coordinates).

Description of Rooms of Importance

The door to the master bedroom is in the northeast corner of the room. South of the doorway, on the east wall, there is a closet door and the door to the master bathroom. There are two windows on the south wall. A freestanding mirror was in the southeast corner of the room, south of the bathroom door. A bed was against the west wall, extending eastward into the room. A nightstand with a lamp (powered on) was against the west wall, north of the bed.

Description of Body

The victim, tentatively identified as (First Last) was lying on the floor, north of the bed, with his head to the west and his feet to the east. His head was turned so that the right side of his face was against the floor. His right arm was bent at the elbow, his right hand resting palm side up, next to his right hip. His left arm was straight at his left side. His right leg was straight, and his left leg was bent slightly at the hip and the knee. The victim was wearing a dark blue hooded sweatshirt, blue jeans with a black belt, gray socks, and gray athletic shoes. A gold colored chain was visible around his neck. There was an area of apparent blood on the left side of his mouth and on his right hand, at the base of his thumb.

The victim, an unidentified (female/male)…

Description of Items of Evidence in the Scene

In the master bedroom, there was a Glock G43 semi-automatic handgun (SN ABC123) on the nightstand (Marker 4/ PPD Item 2), a box of ammunition on the floor (Marker 5), and one cartridge case on the floor (Marker 6). Swabs of apparent blood were collected from the closet door exterior handle (Marker 12), closet door frame (Marker 13), and baseboard south of closet (Marker 14).

Photography

I photographed the (scene/vehicle) for overall location, identification, and condition.

I photographed the (victim/suspect) for overall identification and condition.

I took comparison quality photographs of (footwear/tire track/fingerprints) from (location in scene)

Presumptive Test for Blood

I performed a presumptive test for the presence of blood on (number) items from (locations). Positive results, indicating the presence of blood, were obtained on (number) stains from (locations). Blood was not detected on the other items tested. Swabs were collected from (locations).

Results from presumptive chemicals tests for the presence of blood were (negative/inconclusive) for (locations).

Evidence Collection

I collected twelve latent lifts: four from exterior of the window east of the front door, six from the master bedroom, and two from the kitchen. I collected three (gel lifts) of footwear impressions (Markers A-C) from the floor east of the front door of the residence.

All evidence collected was turned over to (person/agency) at (date/time).

Final Notes

I cleared the scene at (time).

I transferred digital images to (person/agency) on (date).

I uploaded all digital images to the digital imaging system and provided a (CD/DVD) of the images to (person/agency) on (date).

27.0 Review

27.1 Technical and Administrative reviews shall be conducted in accordance with the ISPFS Quality/Procedure Manual.

27.2 Reports will be written as outlined in Section 26 of this manual.

27.3 One report may be written that represents the work of all the analysts who responded to a scene or series of scenes.

27.3.1 If analysts respond to multiple locations, process multiple vehicles, and/or document multiple people in the course of one crime scene response, all of the responses may be included in one report.

27.3.2 If the crime scene response is conducted over several consecutive days, one report may be written.

27.3.3 If additional requests for further crime scene assistance are received at a later date, a separate report should be written for each subsequent response.

27.3.3.1 The subsequent responses should have separate reports from prior responses so that they don't impede the completion and release of the reports from the prior responses.

27.4 Each responder must review the content of the notes and the report prior to the report being considered for review.

27.4.1 Each responder shall initial each page of the notes packet.

27.4.2 Each responder shall verify the content of the report, indicate the need for any corrections and/or changes, and sign and date the Verification of Accompanying Personnel panel in the lLIMS matrix.

27.5 Review may not be completed by one of the analysts who responded to the scene.

27.6 The information in the matrix regarding scene personnel, actions taken, tests performed, etc. must be consistent with the information contained in the field notes.

27.7 Any information present in the report must be contained in the notes, including sketches.

27.7.1 Identifying numbers, including marker numbers, serial numbers, license plate numbers, etc. should be checked for omissions and/or transposals.

27.7.2 Any direction indications should be checked against sketches.

27.7.3 For any presumptive tests that were conducted, results should be clearly indicated in the report.

27.8 Administrative documentation for the case should be attached in the Case info tab in ILIMS.

27.8.1 Copies of search warrants should be attached in the Case Info tab, rather than included in the notes packet.

27.8.2 If the reviewer chooses to print the report and make suggested changes and/or corrections on it, that document shall be scanned and attached to the Case Info tab.

27.9 All photographs taken at the crime scene shall be uploaded to the digital imaging system.

27.9.1 Information may be entered in the description field; it may contain date, location, or other pertinent information related to the images.

27.9.2 A notation should be made in the report that digital images are being retained by ISPFS.

27.9.2.1 A disposition statement should be automatically generated from the ILIMS system upon entry of photography in the general crime scene panel in the matrix. If it does not generate, a statement should be added to the report manually.

27.10 The matrix entries, notes pages, and report should be free of spelling and grammatical errors.

28.0 Proficiency Testing

28.1 Annual proficiency testing will be conducted for any disciplines, processing, or testing for which a training program is in place and an analyst has satisfactorily completed the training program.

28.1.1 Analysts may be trained in different disciplines, processing, and testing that are utilized in crime scene.

28.1.2 Annual proficiency testing shall be conducted in presumptive blood testing.

28.1.3 Analysts who complete annual proficiency testing in their primary discipline will not perform an additional proficiency test for crime scene if they also perform the duties of their primary discipline at crime scenes.

28.1.3.1 For example, a latent print examiner who completes a processing proficiency test in the latent print discipline will not have to complete an additional proficiency test in order to perform latent print processing at crime scenes.

28.2 Testing shall be in accordance with the ISPFS Quality/Procedure Manual.

28.3 Documentation of any mock crime scene, processing, and/or testing that is completed in the course of a proficiency test will be entered in ILIMS in the same way as standard case work.

29.0 Safety

29.1 Safety is a primary concern when responding for field services requests. Analysts should reference the Idaho State Police Forensic Services Health and Safety Manual or seek guidance from the Laboratory Safety Officer regarding general safety procedures.

29.2 Personal protective equipment and clothing should be worn when working in scenes that may have biological or other hazards.

29.2.1 Tyvek suits, booties, disposable gloves, face masks/shields, and safety glasses are available and may be utilized based on the scene hazards.

29.3 Boots that prevent puncture and crushing of the foot should be worn on all crime scene responses.

29.4 Chemicals and reagents used in crime scene processing may be hazardous; the appropriate precautions should be taken prior to the use of any chemical or reagent, especially in confined areas.

29.4.1 Analysts should consult the Safety Data Sheets (SDS) for further safety information for particular chemicals. SDS may be found at: http://www.msds.com or http://www.hazard.com/msds

29.5 Firearms located in crime scenes are often loaded and ready to fire; all firearms should be handled as such.

29.6 When searching a crime scene for evidence, responders will be cautious as to hidden hazards (e.g. needles, razor blades, etc.) that may be inside other items.

29.7 Environmental concerns, such as very high or very low temperatures, can quickly affect responders. Responders should take breaks sufficient to maintain hydration and to avoid heat exhaustion or heat stroke. Responders will follow safety guidelines as outlined in the ISPFS Quality Manual and ISPFS Health and Safety Manual.