

WEST VIRGINIA STATE POLICE FORENSIC LABORATORY



FIELD MANUAL

Revision 2/3/2020

Document approved for use by the WVSPFL Quality Assurance Board.

Quality Manager: *[Signature]* Date: 1/29/2020

Laboratory Director: *[Signature]* Date: 1/29/2020



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1 GENERAL GUIDELINES

This manual has been written to provide law enforcement agencies investigating criminal matters within the State of West Virginia with an overview of forensic services offered by the West Virginia State Police and to provide guidelines for collecting, documenting, preserving, and submitting physical evidence to the West Virginia State Police Forensic Laboratory (WVSPFL).

The value of properly collected physical evidence in a case cannot be underestimated. The credibility and integrity of the evidence are in direct correlation with the proper handling of evidence from its initial observance up to its presentation in court.

This manual has been revised to make it as up-to-date as possible; however it should be noted that the techniques, procedures and capabilities contained herein may change in the future since the field of forensic science is evolving at a rapid rate. Law enforcement agencies are encouraged to keep regular contact with the WVSPFL to keep abreast of any such changes.



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1.1 MISSION STATEMENT

It is the mission of the WVSPFL to provide accurate and impartial scientific support services to all criminal justice agencies operating in the State of West Virginia. Suggestions or comments for improvements to the WVSPFL are encouraged and can be submitted to the Laboratory Director by completion of the WVSPFL Feedback Survey located on the WVSP website.

1.2 INTRODUCTION

The WVSPFL was created by the West Virginia Legislature in 1935 as technical support for law enforcement agencies involved in criminal matters. Under the direction of Captain Charles W. Ray, the first laboratory was located in the basement of the Capitol. It was eventually moved in 1971 to the current location at 725 Jefferson Road, South Charleston.

The WVSPFL has been accredited as a testing laboratory since 1994 by the former American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB), currently ANSI National Accreditation Board (ANAB). The purpose of the accreditation process is an ongoing monitoring of laboratory operations to assure efficiency and proficiency in laboratory functions.

The forensic laboratory is composed of several analytical sections and an evidence receiving section. The analytical sections are comprised of trained technicians, scientists and examiners with each section managed by a supervisor that reports directly to the director of the forensic laboratory. Scientists and examiners conduct examinations on criminal evidence and prepare



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reports of their findings for the investigator. If subpoenaed, the scientists and examiners will give testimony to their results in a court of law.

The following is a list of the WVSP Forensic Laboratory Sections and a brief description of the type of forensic services provided.

Biology/ DNA and Database Section

This section performs the analysis of biological evidence for the presence of nuclear DNA. If a DNA profile is developed, it will be compared to relevant DNA profiles and/or searched in CODIS (COMBINED DNA INDEX SYSTEM). This Section also manages the state's DNA database and participation in CODIS.

Biology/ Processing Section

This section performs screening and preliminary processing of physical evidence for biological material (e.g., blood, semen, saliva).

Seized Drugs Section

This section analyzes solid dose physical evidence to determine if a controlled substance is present and analyzes evidence collected from suspected clandestine laboratory scenes to determine the identification of chemicals and processes used to manufacture controlled substances. Quantitative analysis is not performed by the Seized Drugs Section at this time.



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Firearms/Toolmarks/Impression Evidence Section

This section screens and compares bullets and cartridge cases, determines the caliber of cartridge cases and projectiles, performs distance determination tests, shooting reconstruction, and restoration of obliterated markings. Toolmark analysis compares marks left on items of evidence to test marks from a tool possibly used in a crime. This section also examines and compares footwear and tire track impressions.

Latent Prints Section

Latent print processing is the physical and chemical processing of evidentiary items to develop and preserve friction ridge detail. Latent print comparison is the subsequent comparison of friction ridge detail to an individual. AFIS and NGI databases which are composed of known fingerprint standards are used for searching unknown latent prints.

Toxicology Section

This Section performs qualitative and/or quantitative analysis of blood and urine for the presence of ethanol/ other volatiles and drugs of abuse.

Trace Evidence Section

The section performs analysis in the areas of Gunshot Primer Residue (GSR) and Fire Debris.

The WVSP provides examination of digital and multimedia evidence; however, such examinations are not performed by the laboratory.



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Below is a list of services not provided by the laboratory and what agency to contact for examination of evidence:

Type of examination	Provider
Digital evidence	WVSP Morgantown – Tel: (304)-293-6400 WVSP Huntington – Tel: (304) -691-8973
Multimedia evidence (audio and video)	WVSP Photography Laboratory WVSP Headquarters Tel: (304) 746-2213
Explosive live devices	WVSP Explosive Response Team Tel: (304) 843-4100
Explosive residues	ATF Forensic Laboratory Ammendale MD Tel: (202) 648-6101
Bioterrorism Agents (anthrax, ricin)	WV Office of Laboratory Services Tel: (304) 558-3530
Bone or skeletal material	WV Office Of the Chief Medical Examiner (OCME) Tel: (304) 558- 6920
Paternity	Marshall University Forensic Science Center (MUFSC) Tel: (304) 691-8930
Mitochondrial DNA	FBI (No cost service) Tel: (703) 632-7572
Poisons	NMS Laboratories Tel: 1-800-522-6671 AIT Laboratories Tel: 1-800-875-3894
Fibers, Glass	FBI, (703) 632-8449
Paint	FBI, (703) 632-8441



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Questioned Documents	FBI, (703) 632-8444
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Normal work hours of the forensic laboratory are 8:00 a.m. to 4:30 p.m., Monday through Friday, excluding holidays. Investigators traveling any distance to deliver evidence should call in advance to ensure proper section personnel will be available.

Vehicle submissions must be coordinated with Central Evidence Receiving before being transported to the lab.

Questioned Documents Section

The WVSP Forensic Laboratory no longer has a Questioned Documents Section. If an examination of questioned documents is required, then the FBI Questioned Documents Unit can be contacted at (703) 632-8444 for assistance.

1.3 CRITERIA FOR EVIDENCE SUBMISSION

Examination of evidence will *not* be performed at the forensic laboratory unless the submitted items meet the following criteria:

1. Evidence or material generated in the course of criminal investigations that is intended to support criminal prosecution or to further a criminal investigation.
2. Evidence or material where the examination of such is necessary to further the cause of public safety or welfare.



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3. Evidence or material that was *not* previously examined by another scientist or law enforcement laboratory unless prior approval by the director of the forensic laboratory has been obtained.

4. Laboratory examinations may require reference materials for comparison or additional communications with the investigating officer and/or prosecutor. If a response to a documented request is not received within a reasonable time, the laboratory reserves the right to return the submitted evidence to the investigating agency until an appropriate response has been obtained. Additional information, if necessary, is available in the appropriate discipline section, such as the Biology unit.

The director of the forensic laboratory will refuse to accept evidence that does not meet these criteria or that could endanger the safety of laboratory personnel.

Note: Evidence of a civil nature will not be analyzed.

Cases are generally analyzed in the order in which they are received. For non-routine services or expedited situations, it is the responsibility of the customer to effectively communicate those needs to the laboratory. Investigators/customers should understand that non-routine service requests and expedited situations are discouraged as it will inevitably impact completion of other cases.



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1.4 CONTACT INFORMATION

<u>Section</u>	<u>Contact Number</u>	<u>Email</u>
Laboratory Director	746-2132	lab.director@wvsp.gov
Biology/ DNA	746-2270	biology@wvsp.gov
Biology/ Processing	746-2412	biology@wvsp.gov
Central Evidence Receiving	746-2472	cer@wvsp.gov
Seized Drugs	746-2142	drugs@wvsp.gov
Firearms/Toolmarks	746-2167	firearms@wvsp.gov
Latent Prints	746-2185	latent.prints@wvsp.gov
Toxicology	746-2288	toxicology@wvsp.gov
Trace Evidence	746-2468	trace.evidence@wvsp.gov

1.5 EVIDENCE SUBMISSION

1.5.1 Safety

Investigators must always be aware of the potential dangers attributed to the handling, collection and submission of evidence. Biological materials can possess life threatening diseases such as Acquired Immune Deficiency Syndrome (AIDS), hepatitis and tuberculosis. Proper protection from exposure to biological hazards is a must in collecting specimens, along with proper packaging techniques. Evidence such as blood on clothing, hypodermic needles, etc., should be handled carefully to avoid contracting diseases.



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Consideration must also be given to flammable liquids, toxic chemicals and explosive devices. Situations of this type are very apparent when a clandestine drug laboratory becomes a crime scene. Experts such as drug chemists and bomb technicians may be required to assist in these matters.

Firearms must be handled cautiously. Always keep in mind the potential of injury or death if improperly retrieved. Loaded cartridges must be removed from firearms before submission to the laboratory. (Please refer to the evidence collection portion of the Firearm/Toolmarks Section for proper collection techniques.)

Various illicit drugs can be transmitted through the skin if protective gloves are not used. Toxic fumes could also be inhaled if preventative measures are not taken.

The investigator must have the knowledge and equipment to recognize potential safety issues during a crime scene and for the proper packaging and transporting of evidence to the laboratory. Please see individual sections for specific safety advice.

1.5.2 General Guidelines

Due to accreditation requirements concerning proper submission of evidence, strict adherence to the following guidelines is necessary in order to protect evidence from being lost or contaminated.



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The WVSP Form 53 (Case Submission Form) is available online as a fillable .pdf at http://www.wvsp.gov/about/Documents/CrimeLab/WVSP_53.pdf. The WVSP 53A (DNA Case Supplemental Form) is also available at www.wvsp.gov and is required when submitting cases to the Biology unit.

The Seized Drugs Section and the Biology unit have section specific case acceptance policies which are available at www.WVSP.gov.

The Case Submission Form **must** be placed in a properly addressed envelope and attached to the **outside** of the mailing container. Do not place the Case Submission Form in the sealed container. The envelope should be addressed in the following manner:

West Virginia State Police Forensic Laboratory

ATTN: CER

725 Jefferson Road

South Charleston, WV 25309-1698

Prepare the Case Submission Form (WVSP Form 53) **legibly** and in its **entirety**. A completed WVSP Form-53 form serves as a contract between the investigating officer (customer) and the WVSP Forensic Laboratory. Be accurate when listing evidence on the form. List each item of evidence individually on the submission form along with the examination(s) desired of the laboratory. If you desire more than one section of the laboratory to perform analysis on the evidence, be specific on the Case Submission Form regarding which examination(s) is/are desired for each item. If the number of items submitted does not fit on one Case Submission Form, **use**



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an attached sheet, not multiple Case Submission Forms. NOTE: There are many legal and technical issues associated with the acceptance of evidence in court (i.e. being able to properly and positively identify evidence and the names of involved parties). The primary responsibility for proper identification rests with the investigating officer. Take the necessary precautions to ensure the proper identification of involved parties and to properly preserve, identify and package items of evidence. Amended reports will not be issued based on inaccurate identification of information on the Laboratory Case Submission Form unless authorized by the Laboratory Director.

The forensic laboratory has a Central Evidence Receiving (CER) Section. This section is comprised of evidence custodians that will receive evidence from investigators, disperse evidence and case submissions to designated sections, and be responsible for the final disposition of evidence back to the submitting agency. CER employees may return mailed evidence that does not have a submission form attached to the outside of the package or otherwise violates specific case acceptance criteria.

Each section of the laboratory has specific packaging and submission requirements which may be found in this manual under the respective section's information. Please review the section specific information when submitting evidence for specific sections or refer to the quick reference guide (Table 1) for more information.

Laboratory personnel will evaluate the evidence, requested services, and the case history to ensure that the needs of the customer can be met by the WVSP Forensic Laboratory. A case synopsis or incident report can assist in evaluating the requested services.



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By submitting the WVSP Form 53, you acknowledge and approve laboratory personnel to use the most appropriate and up to date methods authorized by our laboratory. The Submission Form also authorizes the WVSPFL to submit the sample to another competent laboratory to best meet the customer's need. The customer will not necessarily be informed prior to testing of the specific methods used to conduct the analyses or examinations on the submitted evidence. However, the methodology is provided upon completion of testing in the Forensic Laboratory Report.

Multiple items of evidence in a single case may be submitted together in one outer container. ***It is important that each item of evidence be individually packaged and sealed (See section specific information). The list of items on the Case Submission Form must be an accurate inventory of evidence being submitted.***

All evidence ***must*** be secured in containers to prevent loss or contamination. For a proper seal, envelope flaps on individual containers should be taped completely and initialed; with the initials touching both the tape and the container so tampering will be evident.

Once evidence is placed into individually sealed containers, these items must be placed into a larger container for mailing or delivery and properly sealed. ***Do not place the Case Submission Form in the sealed evidence container. The Case Submission Form must be placed in a separate envelope attached to the outside of the evidence container if the evidence is being mailed.***



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Table 1 below is provided as a quick reference guide for evidence packaging. Consult the Section specific to the type of evidence being submitted for proper packaging and sealing of evidence.

Table 1- Evidence Packaging

Packaging Type	Uses
Paper bags or envelopes	Any biological material (blood or semen stained items, condoms etc...) and plant material (marijuana, psilocybin mushrooms). <i>All items are to be air-dried prior to packaging. If unable to air dry, submit to the laboratory as soon as possible and notify Central Evidence Receiving that it is a wet sample</i>
Plastic bags or Ziplocs	A non-biological material such as powder drug samples
Metal Cans	Fire Debris evidence
Glass vials	Liquid drug samples, samples from clandestine laboratories etc...
Paper folds and Post-It notes placed into a larger envelope	Residue amount of powder drugs. Use a Post-It note by placing the evidence on the adhesive and folding the Post-It in half to cover the adhesive
Cardboard boxes	Firearms, knives, surfaces with shoe prints etc....



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1.5.3 Evidence Seals

All evidence submitted to the forensic laboratory *must* be placed into a container that is *properly sealed*. The definition of a “proper seal” is a container of evidence that is secured to prevent access to the contents. If and when access is made, then the sealing mechanism should be obviously broken.

The only seals that will be accepted are:

1. Tape with initials. Initials must be partially on the tape and extending onto the package. Symbols, lines, or dates cannot be used in place of initials.



2. Heat sealed packages with initials across heat seal.
3. Packages with “tamper proof” seals with initials.
Paper and plastic bags can be sealed by closing the opening, folding it over, then taping the opening around the body of the bag. Apply initials to the seal. Cans, jars, boxes and envelopes can be sealed by placing tape over the seams and initialing the seal.

Examples of *improperly sealed* evidence include:

1. Paper bags not closed or closed with staples (*Note: Do not use staples*).
2. Evidence tape on a container without identifying initials.



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3. Bags or envelopes that are sealed, but intrusion can be made easily without detection.
4. Bags or envelopes improperly sealed and containing evidence such as loose powder, controlled substances, etc., that can escape through bag openings or envelope corners.

Note: *The individual that seals the container or package must initial all seals.*

If an evidence container is received in the laboratory that is not sealed or one where access to the evidence can be achieved due to improper sealing, the case may **not** be accepted. If a proper seal cannot be attained, such as with bulky items and vehicles, exceptions can be made for case acceptance. The condition of the seal will be noted upon arrival at the laboratory.

Table 2: Evidence Sealing

Do Use	Do Not Use
Evidence tape (tamper-proof)	Staples
Heat seals	Masking tape or Scotch tape
Manufactured evidence bags with self-adhesive flaps	Paper clips, binder clips, etc...

1.5.4 Labeling of Packaging Containers

1.5.4.1 Identification Labels

A description of the evidence must be placed on the outside of each individual package (i.e., knife, pistol, latent lift from..., swab from..., etc.). For consistency, the descriptions used on



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evidence packages should be the same as those used on the Case Submission Form. The package for each item should be clearly labeled with your case number and the location of collection.

If you also include your item/evidence/exhibit number on the evidence packages, those descriptors may be referenced in the laboratory report.

1.5.4.2 Hazardous Material Labels

Proper labeling of evidence containers will warn laboratory personnel of potential hazardous materials. Be aware of shipping restrictions when using private carriers or the United States Postal Service (USPS) <https://www.usps.com/ship/shipping-restrictions.htm> to deliver packages. Always keep in mind the individual who will be handling or opening the package at the laboratory.

Biohazard Biological samples (blood, urine, semen, etc.) submitted to the laboratory, particularly when using the US Mail, must have a BIOHAZARD label clearly visible on the package. The label requirement can be satisfied by affixing a pre-made biohazard sticker or by handwriting the warning.

Sharps Evidence such as knives, blades, etc., that could cause puncture wounds or cuts should be clearly labeled SHARPS on the container.

Flammable Evidence such as gasoline, kerosene, propane tanks, butane lighters, bottles of liquor, etc. that has the potential of being flammable or combustible should be labeled appropriately.

Fragile Evidence that has the potential of breaking should be packaged properly to avoid breakage and labeled **FRAGILE**.



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1.5.5 Delivering Evidence to the Laboratory

Evidence may be delivered to the laboratory by U.S. Mail, private carrier, personal delivery or into the evidence garage. Personal delivery and evidence garage submissions must be accompanied by an investigating/submitting officer.

The laboratory reserves the right to require agencies to retrieve evidence in person. Delivery and pick-up schedules may be implemented to coordinate routing of evidence to and from the laboratory.

1.5.5.1 US Mail, Private Carrier

Evidence may be delivered via the United States Postal Service (USPS) or by private carrier. The laboratory recommends certified mail with return receipt or registered mail when using the USPS (provided there are no restrictions on the type of material being mailed). Certified mail return receipts and registered mail deliveries are signed by the individual receiving the evidence. Not only does the receipt provide a permanent record of the transaction, but certified and registered mail can be tracked much easier should a package become lost while in the custody of the postal service. As previously recommended, be familiar with US Postal Service and private carrier regulations and restrictions governing certain types of evidence.

Bulk submissions by mail:

The WVSP Forensic Laboratory recommends that evidence be submitted one case/submission per mailed container. In doing so, the Case Submission Form is attached to the outside of the mailing container as previously describe. However, to facilitate cost savings, bulk submissions



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of more than one case/submission per container will be accepted provided the following conditions are met:

- A letter must be placed in an envelope attached to the outer package clearly stating that multiple case submissions are contained in the package.
- Each inner container must be individually sealed with a Case Submission Form placed in an envelope attached to the outside of each inner package, without the need to open evidence or break seals.

1.5.5.2 Personal Delivery , Evidence Garage

Evidence custodians will accept personal deliveries during regular working hours (8:00 a.m. to 4:30 p.m.) Monday through Friday (except State holidays). At the time of delivery, evidence custodians will review the packaged evidence for proper seals, and will review the submission form documents for completeness and acceptability. The delivering officer will be required to sign and print his/ her name, and date the submission form.

Personal delivery submissions are advisable for large items of evidence or for evidence that could be damaged or altered through another delivery process. Due to the possibility of court or other conflicts, investigators should call the Central Evidence Receiving Section in advance of personal deliveries.

The WVSP Forensic Laboratory has a facility to process large items (vehicles, ATVs, ATMs, etc.) that are seized as evidence in criminal investigations. The following is the protocol for submitting a vehicle/large item to the laboratory:



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1. **Prior to submitting a vehicle, contact the laboratory to discuss acceptance policies and, if approved, to make accommodations to receive and store the vehicle. Secure storage space is limited to 2 to 3 vehicles at any given time!**
2. If exterior processing is requested for latent prints and tape must be used to secure the vehicle according to your agency's regulation the tape should be placed under the trim line or not in locations that are normally touched. If your agency does not require you to secure the vehicle, DO NOT USE TAPE.
3. An officer from the submitting agency *must* accompany the vehicle to the laboratory to maintain chain-of-custody and integrity of the vehicle.
4. Arrange to have the vehicle transported to the laboratory. Take into account the weather conditions.
5. Inventory the vehicle prior to submitting it to the laboratory. See DNA Case Acceptance Policy.
6. A Case Submission Form *must* accompany the vehicle with pertinent information and type of analysis desired on the vehicle.
7. Upon receiving the vehicle at the laboratory, a Vehicle Processing Receipt Form will be completed by the submitting officer and receiving scientist/ evidence custodian and a copy will be provided to the officer accompanying the vehicle. The actual transfer of the vehicle will be made to a member of the Central Evidence Receiving Section.



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8. Prior to the commencement of analysis of the vehicle, the investigating officer and scientist(s) must meet (in-person or via phone/email) to discuss the details surrounding the investigation and examination process.
9. Upon completion of processing, the laboratory will notify the submitting agency. *From the time of notification, the submitting agency will have 48 hours to pick up the vehicle and remove it from the Laboratory. Beyond 48 hours, the laboratory cannot guarantee secure storage of the vehicle.*
10. The laboratory will not release the vehicle to anyone other than an authorized representative of the submitting agency. An officer from the submitting agency *must* be present at the laboratory to maintain chain-of-custody and integrity of the vehicle upon release.

1.5.6 CHAIN-OF-CUSTODY

Chain-of-custody is essential for maintaining control of the evidence from the moment it is collected until it is accepted in court.

The investigator should minimize the number of people in the chain-of-custody if at all possible. Limiting individuals in the chain will make it easier to testify in court on evidence custody matters. Ideally, evidence should go from the investigator's hands to the laboratory. While this may not be possible for submission of all evidence to the laboratory, it should be the primary method of submission of evidence in major crimes. Avoid, if at all possible, sending evidence to



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the laboratory via a third person, especially if that individual had no involvement in the investigation. This unnecessarily places that individual on any potential witness list.

The shortest chain-of-custody is usually the strongest chain.

1.6 CRIME SCENE

Crime Scene Response Teams are situated geographically throughout the state and may be available upon request to West Virginia State Police Troop Commanders. Technical support may be provided by the laboratory upon request to the Laboratory Director.

The laboratory recommends the publication *Crime Scene Investigation, a guide for Law Enforcement* which can be downloaded from the National Forensic Science and Technology Center (NFSTC) at: <http://www.nfstc.org/bja-programs/crime-scene-investigation-guide/>

Forensic training specifically designed for law enforcement is periodically provided at the WV State Police Academy, Professional Development Center and by the National Institute of Justice.

For further information, go to: <https://www.nij.gov/training/Pages/law-enforcement.aspx>

2 – BIOLOGY/ PROCESSING

2.1 Introduction

2.2 Glossary of Terms

2.3 Collection Methods

2.3.1 Entire Item

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- 2.7.5 Potential Exposure Situations for Employees of Law Enforcement Agencies
- 2.7.6 Hepatitis B Vaccinations

2.8 Submission of Biological Evidence

2.9 Processing Section Reports

2.1 – BIOLOGY/ PROCESSING

Biology /Processing is the section of the laboratory that examines physical evidence for the presence or absence of biological material. Presumptive tests for blood, seminal fluid, and saliva are performed on items including, but not limited to: sex crime evidence kits, victim and suspect clothing, weapons, and scene samples. When necessary, confirmatory tests for sperm, seminal fluid, and additional testing indicating human blood are performed and samples of biological material are collected and retained for PCR-based DNA analysis in the Biology/DNA Section of the Laboratory.



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The Biology/ Processing Section of the Laboratory will issue a report to the investigating officer providing results of examination, requesting permission to consume evidence if necessary, and requesting known blood or saliva specimens from individuals involved in the case.

2.2 GLOSSARY OF TERMS

- Sources of DNA:** Semen, Blood, Saliva, Hair roots, Tissue, Skin, Sweat, etc.
- Potential Evidence:** Sex crime kit samples, Clothing, Weapons, Cans and Bottles, Chewing gum, Hair with roots, Cigarette filters, Masks, etc.
- Biological Material:** Any material that may contain DNA: blood, semen, saliva, skin, sweat, hair, etc.
- Blood:** Red blood cells, white blood cells, and platelets suspended in plasma.
- Confirmatory Test:** A confirmatory test is used to *identify* a specific biological material. “Semen was *identified* on the...”.
- Convenience Known:** An item such as a cigarette filter or water bottle used only by a person of interest and collected by the investigating officer or designee. The investigating officer must be able to document that no one else used the collected item. A convenience known may be used when there is insufficient evidence to obtain a warrant for a known reference specimen.



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- Known Reference Specimen:** A biological material (blood or saliva) that is known to have originated from a specific person.
- Leucomalachite Green (LMG):** LMG is a *presumptive* test for blood. The test is based on the peroxidase-like activity of heme in blood, which catalyzes a reaction between hydrogen peroxide and LMG, resulting in a deep turquoise color.
- Presumptive Test:** A presumptive test is used to establish the possibility that a specific body fluid is present. “Seminal fluid was *indicated* on the”
- Semen:** Fluid produced by the male reproductive system. Semen is composed of both seminal fluid and sperm cells (spermatozoa).
- Seminal Fluid:** Seminal fluid is produced by glands in the male reproductive system and may be detected from vasectomized or aspermic males.
- Sperm:** The male reproductive cell, which is carried by seminal fluid.

2.3 COLLECTION METHODS

Since the advent of DNA testing on forensic samples, emphasis has been placed on the collection of biological material in a proper manner, to minimize the chances of contamination. Investigators of a crime scene should develop a strategy for collecting evidence. This section will



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provide suggestions for collecting biological material. For information regarding clean technique for evidence collection, see section 2.6. For information regarding safety, see section 2.7.

2.3.1 Collect the entire object

This method is recommended for items which may be placed into paper bags or boxes, unless the potential exists for losing the evidence or a portion of the evidence during packaging or transport. Examples include clothing, knives, guns, and pieces of glass. See section 2.3.5 regarding packaging instructions for different types of items.

1. Document the item (photograph, sketch, etc.) prior to collection.
2. **Make sure the item is completely *air-dried* prior to packaging.**
3. Package each individual item securely in a paper container (box, bag, envelope, etc.) if possible and seal.
3. Label the packaging with an identifier that clearly indicates what item is contained.

2.3.2 Swab the item/stain

This method is used on larger items of non-absorbent materials (metal, tile, concrete, painted wall, or wood) and on liquid samples. The following steps are recommended for collection of this type of evidence:

1. Document the location of the item (and the stain on the item) in regard to its surroundings.
2. Photograph or sketch the location of the stain that is going to be collected.
3. Lightly moisten two sterile swabs with distilled water. **Use distilled water only.**
4. Collect the stain by rubbing the two swabs over the stain simultaneously, attempting to concentrate as much of the material on the tips as possible.



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Note: If there is sufficient amount of sample present, the two swab method should be utilized, as directed above. If the stain is very small, then it is better to concentrate the stain onto the tip of one swab, rather than to have the sample diffused over multiple swabs.

5. **Make sure the swabs are completely *air-dried* prior to packaging.**
6. Label the packaging of the swabs with an identifier that clearly indicates from where they were collected.

Example: "Two swabs from area 1 of the coffee table"

7. Package the two swabs together in a paper container (swab box, envelope, etc.) and seal.

2.3.3 Take a cutting of the item

This is the preferred method if the evidence is present on carpets, car seats, furniture or other large absorbent surfaces capable of being cut. The following steps are recommended for collection of this type of evidence:

1. Document the location of the item (and the stain on the item) in regard to its surroundings.
2. Photograph or sketch the location of the stain that is going to be collected.
3. Cut out the stain using a clean cutting utensil.
4. **Make sure the stain cutting is completely *air-dried* prior to packaging.**
5. Package the cutting into some type of paper container and seal.



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2.3.4 Collection of Hairs

Hairs on items should be collected prior to packaging due to the chance of loss during packaging and transport. Currently, conventional hair examinations are not performed at the WVSPFL. However, hairs can be evaluated for possible PCR-based nuclear DNA analysis (if root is present). If hairs are visible, use the following guidelines for their collection:

1. Document the location of the item (and the hairs on the item) in regard to its surroundings.
2. Photograph or sketch the location of the hairs that are collected.
3. Use a clean pair of tweezers or forceps to collect the hairs.
4. Place the hair(s) onto a clean piece of paper.
5. Tri-fold the paper and place it into a clean envelope; seal the envelope shut.

2.3.5 Packaging of Questioned Biological Material

The packaging of biological materials must maintain the samples in a dried state. Therefore, all questioned biological evidence must be air-dried and packaged in paper. Biological materials are more stable when dried. If biological materials are packaged wet or in plastic (both encourage the growth of bacteria and mold), the materials may be judged unsuitable for analysis by the laboratory and returned unexamined.

Dried biological samples must be submitted to the laboratory in the following manner:

- Package all dried biological samples individually in sealed paper containers. The paper container allows the samples to breathe and encourages dryness.



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- Package all sharp objects in a manner that prevents the possibility of puncture. Knife tubes may be used, provided the item has been properly air dried prior to packaging.
- All packages should be labeled for content and marked with a biohazard label.
- Package clothing or bedding items individually in paper bags and seal with tape.
- Place all packages (bags, wraps, containers, etc.) into single box (container) for shipment or transport to the laboratory.
- Label and seal the shipping/transport box (container). Place a biohazard label on the package or write clearly on the exterior of the box (container), in large letters, the word "BIOHAZARD"

2.3.6 Known Specimens

Known reference samples must be submitted from individuals involved in the incident under investigation. The preferred reference sample is two swabs of known saliva; however, blood may be collected.

1. Ensure the person has not had anything to eat or drink for 30 minutes.
2. Using two sterile swabs together, rub the inner cheek for 10 seconds.
3. Allow the swabs to air dry.
4. Package both swabs together into a swab box.
5. Label the swab box with the full, proper name of the collected individual and seal.

A liquid blood sample must be collected by qualified medical personnel in a purple top vial (EDTA). Collected blood samples should be refrigerated, if possible. Liquid blood samples should be sealed in plastic biohazard bags to prevent the contamination of other evidence and to prevent personal exposure should tubes break or stoppers come loose.



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NOTE: A sample of blood taken from a wound is not an acceptable known sample.

Blood samples submitted for ***DNA analysis*** should be labeled ***BIOLOGY/DNA***. A blood sample submitted for ***alcohol or drug analysis*** should be labeled ***TOXICOLOGY***. A biohazard label must be on the exterior of the shipping package.

A package containing known specimens must be labeled with the full name (including any suffixes) of the person from whom the swabs/samples were collected.

Packages labeled as “known saliva from suspect”, unlabeled packages, or packages with unclear labels will require written communication from the investigating officer regarding the name of the individual who is source of the known specimens.

2.3.7 Packaging of Known Specimens

The packaging and transportation of biological materials must be done in accordance with the United States Postal Service (USPS) rules. The USPS has outlined the regulations and guidelines for packaging biological specimens in the Domestic Mail Manual, Section 601: Mail ability. Liquid samples submitted to the laboratory must comply with this section of the manual. Liquid samples must be submitted to the laboratory in the following manner:

- Seal all tubes or containers with either tape or security labels and initial the seal. Wrap the container with an absorbent material to contain accidental leaks that may occur and place it in a sturdy box for submission to the laboratory.
- Place a biohazard label on the outside mailing container.

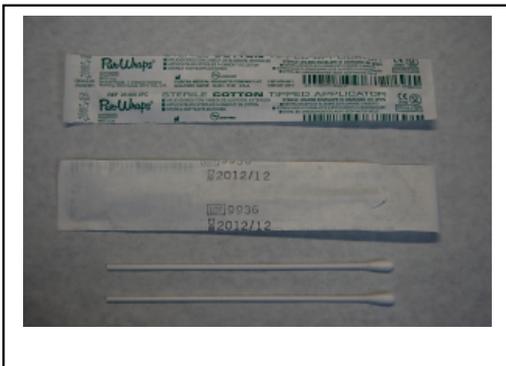
2.4 EVIDENCE COLLECTION EQUIPMENT

In criminal investigations, the proper collection of evidence is essential for the development of quality forensic information, especially in regard to biological material. The sensitivity of DNA



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analysis requires investigators to have sterile supplies for the collection of biological materials. The inadvertent contamination of samples should be a constant concern when collecting biological material for DNA analysis. Every precaution should be taken to minimize possible sources of contamination. ***Contamination can be reduced with the use of clean tools and sterile materials.*** Below are examples of the types of items that an investigator should have readily available for the collection of biological materials.



Applicator swabs may be used to collect either wet or dry samples. Swabs should be lightly moistened with distilled water prior to collecting dried stains. (Do not contaminate your stock bottle of distilled water.)

When possible, collect at least two swabs of a suspected biological material.

When collecting a small stain, attempt to concentrate the stain on the tip of one swab.

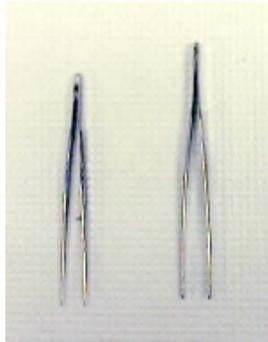
Make sure the swab is completely air-dried prior to packaging.



Do NOT collect samples using culture swabs, which promote bacterial growth. Culture swabs have a hard plastic tube with liquid and are designed to keep the swab wet.



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Various sizes of *tweezers or forceps* are useful to collect hairs or other small items of evidence. These allow investigators to avoid handling items with gloved hands during the collection process. Clean and dry them thoroughly with soapy water or with 10% bleach after each use.



Different sizes of *scissors* and cutting utensils are useful in the collection of evidence. *Razor* type cutting utensils are useful in removing stains from large items or flooring.

It may be necessary to collect the entire item, rather than a sample from it. Some situations may necessitate heavier tools to remove metal or wood from large objects. Clean and dry them thoroughly with soapy water or with 10% bleach after each use. Replace disposable blades after each use.



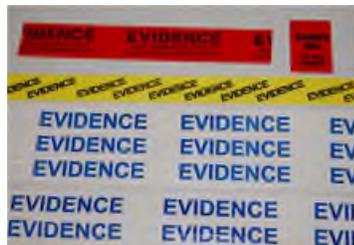
Paper *envelopes and bags* must be used for packaging biological material.



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In general, avoid submitting biological samples in plastic bags, film canisters, or other tightly sealed containers.

Packages should be clearly labeled with your case number, item description, date collected, and any other required information.



Various types of *tapes* may be used to seal packages containing biological material.

After taping the opening closed, place your initials across the seal so that they extend from the tape onto the package itself.

2.5 SEX CRIME KITS

All Sexual Assault Evidence Collection Kits, where consent was given for Law Enforcement involvement, should be submitted to the WVSPFL.

Kits for the collection of sexual assault/abuse evidence are provided by the *Forensic Medical Examination Fund*. The *FMEF* fund is administered by the Prosecuting Attorney's Institute located in Charleston, WV. The sex crime kits are distributed free of charge by the Biology/Processing Section. Hospitals should receive kits by requesting them through the West Virginia



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Sexual Assault Evidence Collection Kit (SAECK) System. Contact the laboratory for more information on the SAECK System.

The *West Virginia Protocol for Responding to Victims of Sexual Assault* is a resource that is available for investigators of sex crimes. The protocol is a multidisciplinary, victim-centered approach offering guidelines for victim support, law enforcement investigators, and hospital personnel. Copies of the protocol can be obtained from the following agency:

West Virginia Foundation for Rape Information and Services, Inc
112 Braddock Street
Fairmont, WV 26554
Telephone: 304-366-9500

2.6 CLEAN TECHNIQUE:

With the increasing sensitivity of DNA analysis, there is a greater chance that contamination can be detected. Contamination occurs most commonly when foreign DNA from sweat, hair or skin cells are introduced onto a sample while collecting or securing it, or when DNA from one piece of evidence is transferred to another within a crime scene. Therefore, every precaution should be taken to minimize the possibility of contamination when evidence is being collected.

- Wear protective equipment when collecting biological evidence; gloves, masks, booties, and gowns.
- Change gloves frequently and between samples.
- Allow all wet samples to dry thoroughly before packaging.
- Package items individually.
- Seal and label all packages thoroughly.



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- Use clean tools with each sample being collected (razors, forceps, swabs, etc.).
- Discard disposable tools (razors, gloves, etc.) properly after use. Do not try to clean or re-use disposable items.

2.7 SAFETY

Use universal safety precautions when processing evidence. *You are responsible for your own safety.* All investigators need to be familiar with all the procedures, techniques, policies and equipment that are available to help them work safely. Also, investigators should assess their health status (i.e. open wounds, vaccinations, etc.) before performing duties that could place them at risk of receiving an exposure to blood-borne pathogens. Below are some general suggestions for the handling of biological evidence.

- Minimize all potential exposures to infectious materials or contaminated items.
- Avoid unsafe practices.
- Be familiar with all hazards of the work area, biological or otherwise.
- Learn what precautions and protective equipment are needed for specific jobs.
- Practice good hygiene.
- Take responsibility for yourself and co-workers.

2.7.1 Potential Exposures

HIV and Hepatitis B are very dangerous viruses that can be contracted when collecting and handling biological evidence.



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AIDS-Acquired Immune Deficiency Syndrome: AIDS is caused by a virus and transmitted through the exchange of body fluids. It is unlikely that the virus is transmitted through casual contact. The virus has been isolated from blood, bone marrow, saliva, lymph nodes, brain tissue, semen, plasma, vaginal secretions, cervical secretions, tears and milk.

HEPATITIS B -- Hepatitis B is a viral disease that is transmitted through the exchange of body fluids. It is a highly contagious disease. The virus has been isolated from blood, urine, saliva, semen, vaginal secretions, and cerebrospinal fluid. Injection into the bloodstream, exposure to mucous membranes and contact with broken skin are the principal entry points. This virus can remain infectious even after the body fluid source has been deposited, dried and exposed to the environment for some time.

2.7.2 Importance of Avoiding Routine Exposures

A majority of biological exposures are the result of small sprays, splashes, or mists. Most of these exposures do not cause an immediate, adverse health effect. Therefore, many individuals do not fully appreciate the hazards faced during the completion of certain work tasks. Investigators must realize that one accidental exposure to blood borne pathogens can result in serious health effects.

2.7.3 Basic Hygiene and Safety

- If accidental skin contamination occurs, the area should be washed with copious amounts of soap and water for 15 minutes. If the eyes or mucous membranes are accidentally contaminated, they should be flushed with water for at least 15 minutes.



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- Loose hair and clothing should be confined when in work areas where potential exposure to blood borne pathogens may occur.
- Horseplay and other such behavior should be avoided.
- All areas of potentially exposed skin should be washed before leaving the work area. Water and a mild soap, or an antiseptic cleanser, should be used for skin cleansing. Solvents should not be used for skin cleansing. They remove the natural protective oils from the skin and can cause irritation and inflammation.
- Eating, drinking, and smoking, in areas where there is a reasonable possibility of exposure to biological material must be avoided.
- Specimens of blood or other potentially infectious materials should be placed in a container that prevents leakage during collection, handling, processing, storage, transport, or shipping. These containers must be closed prior to being stored, transported, or shipped. Equipment needs to be replaced or decontaminated after it is used to collect potentially infectious materials.
- Accidents involving glassware are a significant cause of injuries. Glassware should be handled carefully and stored properly.
- Investigators should not work alone if the procedures being conducted are hazardous.

2.7.4 Personal Protective Equipment

Clothing, gloves, masks, eyeglasses, face shields, gowns, and shoe covers all can serve as individual protective equipment. The following guidelines offer suggestions for the use and disposal of protective equipment.



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- If personal protective clothing is penetrated by blood or potentially infectious materials, the penetrated items must be removed immediately (or as soon as feasible). All protective equipment should be removed prior to leaving the work area.
- Wear latex gloves whenever there is the possibility of biological material being present. Check for leaks, tears, or punctures before each use. Use gloves only one time. Dispose in appropriate waste container.
- Disposable gloves (such as surgical or examination gloves) should be replaced promptly if they are torn, punctured, or their ability to function as a protective barrier is compromised in any way. Disposable gloves should not be washed or decontaminated for re-use.
- Utility gloves (gloves designed for use more than a single time) should not be worn during the collection of evidence.
- Check the condition of disposable gowns before each use. Do not wear gowns that are obviously soiled. Follow standard laundering or disposal procedures for gowns, as appropriate.
- Wear masks whenever there is a likelihood of splash, sprays, mists, or the production of respirable droplets. Ensure that the masks fit properly. Dispose of masks in appropriate containers.
- Wear eye protection or face shields whenever there is an opportunity for exposure to blood, blood products, or other potentially infectious materials. Clean the devices with appropriate antiseptic agents or, if appropriate, dispose of these devices in appropriate containers.



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- Disposable coveralls should be worn during procedures that are likely to generate splashes of blood or other bodily fluids.
- Hands and other skin surfaces should be washed immediately and thoroughly with water and antiseptic cleanser if contaminated with blood or other bodily fluids. Hands should be immediately washed after gloves are removed.
- **Investigators must take precautions to prevent injuries caused by needles, knives, and other sharp instruments or devices.** To prevent needle-stick injuries, needles should not be recapped, purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand. After they are collected, disposable syringes, needles, scalpel blades, and other sharp items must be placed in puncture-resistant containers for transportation.
- Investigators with acne, dermatitis, open wounds, or other skin problems should be extremely cautious when involved in potential exposure situations.
- Clothing which becomes contaminated with blood or other bodily fluids during investigations should be removed immediately (or as soon as possible) and separated from other clothing until properly laundered.
- Areas and equipment that become contaminated with blood or other bodily fluids should be cleaned immediately with a bleach solution (1:10 dilution of household bleach).

2.7.5 Potential Exposure Situations for Employees of Law Enforcement Agencies

The following descriptions are geared toward the general duties associated with law enforcement. Procedures specific to certain operations may not be fully described.

- Accidental self-inoculation and needle sticks.



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- First aid on victims of accidents, violence, or those experiencing medical emergencies.
- Administration of Cardio-Pulmonary Resuscitation.
- Handling uncooperative individuals, being bitten, contact with blood, other bodily fluids.
- Contact with knives and other weapons.
- Processing of crime scene during investigations.

2.7.6 Hepatitis B Vaccinations

A Hepatitis B vaccination is important. Investigators who are routinely exposed to potentially infectious material should receive Hepatitis B vaccine shots (series).

2.8 SUBMISSION OF BIOLOGICAL EVIDENCE

While it is recommended that all possible items of evidence be collected, it is not possible for the laboratory to examine every item of evidence collected. Consequently, the laboratory requests and recommends that items of evidence be ranked based upon their probative values and submitted accordingly. For example, in cases with numerous pieces of evidence, avoid submitting samples that theoretically will provide duplicate information. Initially, Biology/Processing will only accept a limited number of samples in any given case. If the originally submitted items do not prove to be of probative value, then additional items can be accepted for further analysis. As a general rule, analysis of evidence is contingent upon its probative value. If the probative value of evidence cannot be established, the laboratory reserves the right to deny analysis.



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Some forensic examinations can potentially damage or contaminate biological material. Therefore, all items containing suspected biological materials that need more than one forensic examination should be sent to the Biology/ Processing Section first. The only exception to this rule is for items requiring gunshot residue examinations. If items requiring gunshot residue are enclosed in a container marked for Biology/DNA, it is very important that the Case Submission Form clearly identifies which items are to be examined for gunshot residue.

2.9 BIOLOGY/PROCESSING SECTION REPORTS

Reports are issued when initial examinations are completed on the submitted evidence. The following is a list of statements that may help the field investigator understand these types of reports:

Reports

"Biological samples were collected and are being transferred to the Biology/ DNA Section. The remaining items/samples/swabs are being retained pending DNA analysis, and will be returned with the DNA report. Returned items should be preserved for possible future use."

The remaining items (sometimes packaging only) are being retained at the laboratory and will be returned with the Biology/DNA report. Returned items should be preserved for, later analysis, additional analysis, or until it is needed at trial.

"Based on the test performed, blood was indicated on the item."



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The presumptive chemical test for blood (Leucomalachite Green or LMG) yielded positive results.

Non-human blood samples will give a positive result with the LMG test. Therefore, a positive LMG result does NOT indicate that the sample is from a human.

“Based on the test performed, no blood was indicated on the item.”

The presumptive chemical test for blood (Leucomalachite Green or LMG) yielded negative results.

In some situations, the sample may still be suitable for DNA analysis.

“Based on the test performed, human blood was indicated on the item.”

A confirmatory test for human blood yielded positive results.

Some species of animals from the Family Mustelidae (weasels, ferrets, etc.) *may* yield positive results with the confirmatory test for human blood. Therefore, positive results using this test are reported as “human blood was *indicated*.”

“Based on the test performed, semen was identified on the item.”

Two or more spermatozoa were identified and the confirmatory test for seminal fluid yielded a positive result.

“Based on the test performed, seminal fluid was indicated on the item.”



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The confirmatory test for seminal fluid yielded positive results, however, no spermatozoa were identified. This type of sample may still provide useful DNA results.

“Spermatozoa were identified from the item.”

Using a microscopic examination, two or more sperm cells were identified.

“Based on the test performed, no seminal fluid was identified from the item.”

The confirmatory test for seminal fluid yielded negative results.

“Based on the test performed, no seminal fluid was indicated from the item.”

The presumptive test for seminal fluid yielded negative results.

“Samples collected from the ... may be consumed during DNA analysis. If additional testing is desired, written permission to consume the material must be obtained from the county prosecuting attorney’s office and forwarded to the laboratory.”

The laboratory is required to preserve one half of all material for defense or future re-testing. When it is necessary to use the entire sample in order to obtain a DNA result, the laboratory must have written permission from the prosecuting attorney’s office to do so.

“Known blood (EDTA tube) or saliva specimens from all involved individuals should be submitted for comparison purposes, if additional testing is desired.”

The Biology/ DNA Section requires known specimens from all involved individuals in a case. If questioned items were retained as a result of the preliminary examination of evidence, then the Biology/Processing Section will request the needed known specimens in their report.



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“If a suspect is developed, known blood (EDTA tube) or saliva specimens should be submitted for comparison purposes.”

If there is no suspect in a case, DNA analysis may proceed if the questioned samples are CODIS eligible. However, if a suspect is developed during the course of the investigation, please submit known specimens from that individual for comparison purposes.

3- Biology/ DNA

Biology DNA is the section of the laboratory that performs DNA analysis on samples containing biological material using PCR-based analysis. The purpose of DNA analysis is to aid investigations and determine the source(s) of the biological material identified by comparison to submitted reference specimens or by entry into the Combined DNA Index System (CODIS). DNA analysis can be useful in property, sexual, violent, missing person and cold cases.

Generally, evidence submitted to the laboratory will be processed for the presence or absence of biological material by the Biology Processing section. Processing will issue a report detailing the results of their testing and if DNA analysis is appropriate. Cuttings and/or swabs are retained by the Processing section from the bulk evidence and forwarded to the DNA section. DNA analysis will be conducted on the retained material and a DNA report will be issued detailing the results of the testing.

3.1 GLOSSARY OF TERMS

Allele- a form of a gene that is located at a specific location on a specific chromosome.

Artifact- non-allelic peaks that could be PCR products, analytical artifacts, or instrumental limitations.



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Assumed or known contributor- an individual whose DNA is expected to be present on an item of evidence (i.e. consensual sex partner)

CODIS (Combined DNA Index System)- a network of local, state and national DNA databases used to provide investigative information to law enforcement agencies.

Cannot be excluded- alleles (genotypes) from the known profile are present in the evidentiary questioned profile mixture.

Capillary electrophoresis- a method that utilizes a narrow polymer-filled tube to separate DNA molecules by size.

Combined probability of exclusion (CPE)- the percentage of the population that can be excluded as a potential contributor(s) to a DNA mixture.

Combined probability of inclusion (CPI)- the proportion of a given population that could be expected to be included as a potential contributor to a DNA mixture.

Consistent with- agreement with genotypes observed between a partial single source questioned sample and a reference sample.

Deduced profile- a DNA profile subtracted from a mixture of DNA from a sample containing a known or assumed contributor.

Differential lysis- an extraction technique allowing for the selective lysis and isolation of DNA from a sample presumed to contain a mixture of epithelial cells (fraction 1) and sperm cells (fraction 2).

Exclusion- a conclusion that eliminates an individual as a potential contributor of DNA obtained from an evidentiary item.

Extraction- the process by which DNA is removed from the nucleus of a cell and purified.

Gene- a specific sequence of DNA located on a chromosome; the functional unit of inheritance.

Genotype- results of autosomal short tandem repeat (STR) analysis of an individual at one or more genetic loci.

Heterozygous- an individual having different alleles at a particular locus.



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Homozygous- an individual having the same alleles at a particular locus.

Intimate sample- a sample that is collected directly from the body of an individual (i.e. body swab, nail scrapings, etc.)

Inconclusive (uninterpretable)- interpretation or conclusion in which the DNA results from a questioned sample are insufficient for comparison purposes.

Known (Reference)- biological sample taken from an individual to be used as a comparison to a questioned sample.

Locus- the specific physical location of a gene on a chromosome (ex. D18S51).

Major (Primary) contributor- an individual who can account for the major portion of the DNA in a sample that contains more than one contributor.

Match- complete correlation and agreement with genotypes observed between a single source questioned sample and a reference sample.

Minor contributor- an individual who can account for the lesser portion of the DNA in a sample that contains more than one contributor.

Mixture- a DNA result originating from two or more individuals.

Quantitation- the process to determine how much DNA is present in a sample.

Questioned sample- biological sample recovered from a crime scene or collected from persons or objects associated with a crime.

PCR (polymerase chain reaction)- an amplification process that yields millions of copies of DNA.

Partial profile- an incomplete DNA profile in which results are not obtained for all loci due to degradation, inhibition of amplification and/ or low quality DNA template.

Random match probability (RMP)- the probability of randomly selecting an unrelated individual from the population who could be a potential contributor to an evidentiary profile.

STRs (Short Tandem Repeats)- short sequences of DNA that are repeated numerous times.



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Single source profile- DNA results determined to originate from one individual.

Stochastic threshold- the peak height value above which it is reasonable to assume that, at a given locus, allelic dropout of a sister allele has not occurred.

Theta correction- an adjustment made to statistical calculations (RMP) that rely on population databases to correct for substructure within populations.

Unsuitable-(for comparison): uninterpretable results or those that fail to meet quality assurance requirements as defined by the laboratory and as a result are not usable for comparisons

YSTRs- utilized for the isolation of male DNA in questioned samples. YSTRs are located on the Y chromosome and are paternally inherited. Therefore, barring any mutational events, all paternally related male relative could have the same YSTR profile.

3.2 CASE ACCEPTANCE POLICY

To maximize use of the resources available, the following sample testing guidelines have been adopted. The DNA Case Acceptance Policy can be located on the WVSP website under Forensic Laboratory (www.wvsp.gov).

1. ***Cases submitted for DNA analysis must be accompanied by a completed WVSP Form 53A (DNA Case Supplemental Form).*** This needs to be filled out in as much detail as possible and included with every DNA submission. The Form 53A can be located on the WVSP website under Forensic Laboratory (www.wvsp.gov).
2. In order to provide quality and timely forensic services, the DNA lab will limit the number of samples examined per case. These guidelines cover the first submission. Additional submissions may be made with proper justification and documentation.

The following are general guidelines for the maximum sample selection per type of case involving one suspect and one victim.



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1. Homicide: 5 samples
 2. Sexual Assault cases:
 - a. Sexual Assault Kit (SAK): up to 3 samples depending on case scenario and Yscreen results
 - b. No SAK: up to 5 samples depending on case scenario and serology results
 3. Crimes Against Persons: 3 samples
 4. Property Crimes: 2 samples
3. All reference specimens of identified individuals (victims, suspects, elimination knowns, etc.) *should* be collected and submitted prior to DNA analysis. ***The packaging containing the reference material must be properly labeled with the individual's first and last name.*** Written documentation from the submitting agency will be required regarding the named source if the packaging is not properly labeled.
- DO NOT use the DNA Blood Collection Kit or the WV DNA Database Buccal Collection Kit for reference samples submitted for DNA testing. These kits are to be used only for CODIS related collections since they will not be treated as evidence.***
4. Only original cases will be tested. Cases previously submitted to another facility for DNA analysis will not be reexamined without the Laboratory Director's approval.
 5. Unless a significant backlog exists, cases will be analyzed in their order of submission. If a backlog exists, cases with the earliest trial date *or where public safety is a concern* will be examined first. An expedited request should be made in writing.
 6. Only "open" cases that are being actively investigated will be tested. Closed or adjudicated cases will not be examined unless special circumstances arise (e.g. sexual assault cases). Cases



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submitted under the post-conviction DNA analysis law will be examined upon proof that all preconditions have been met.

All sexual assault cases should be submitted to the laboratory for testing unless there is proof that a crime was not committed or the victim recants.

7. Only cases that are of a criminal nature will be examined. Civil cases will not be examined. Criminal paternity cases will be referred to Marshall University Forensic Science Center (MUFSC) <http://forensics.marshall.edu/Relationship/Relationship.html>.
8. The laboratory will strive to preserve at least half of the sample for future testing. Should it be necessary to consume more than half of the sample being tested, a consumption letter from the prosecutor giving the laboratory permission to consume the sample is required before testing can begin.

For samples that have insufficient material for future testing, if there is sufficient volume remaining after the testing process is complete, then the sample substrate, extract and reagent control will be preserved for possible future testing. The frozen extracts will be retained for a period of one year from the date of the DNA report at which time they will be destroyed. It is the responsibility of the customer to notify the laboratory in writing within the appropriate timeframe if additional testing is desired.

9. The DNA section requires at least 10 business days to complete a DNA analysis case, barring any unforeseen circumstances and all required information necessary to generate results and render an opinion (i.e. reference samples, consumption order, etc.) have been received.

The 10 business days are only applicable for DNA testing. If the case has to be processed then the laboratory requires at least 30 business days to complete processing through DNA analysis.

3.3 DNA TESTING METHODS



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3.3.1 Extraction

The purpose of DNA extraction is to lyse or break open the cells to release the DNA molecules and then separate the DNA molecules from other cellular material. The Biology DNA section uses silica-based DNA binding chemistries. This process can be performed either manually or using a liquid handling robot.

In sexual assault cases, a differential extraction technique is utilized for the selective lysis and isolation of DNA from a sample presumed to contain a mixture of epithelial cells (fraction 1) and sperm cells (fraction 2). The epithelial cells (e-cells) are first selectively lysed through the addition of chemicals which the sperm cells are generally resistant. Sperm cells are subsequently lysed by treatment with an additional chemical that breaks down the protein disulfide bridges that make up sperm nuclear membranes.

Due to the testing process utilized, the DNA section no longer performs a microscopic evaluation for sperm cells. If a microscopic evaluation is necessary, the laboratory will need to be contacted prior to submission and/or testing to discuss options.

3.3.2 Quantitation

The purpose of quantitation is to determine the amount of human DNA in a sample as well as aid in the downstream process of PCR amplification. The DNA section uses Real-Time Quantitative PCR which monitors the PCR process as it is happening. The chemistry used allows for the detection of total human DNA as well as total male DNA present in a sample.

If no human DNA is detected, the testing of the sample will be terminated and reported as such.



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For intimate sexual assault samples, if no male DNA is detected then the testing of the sample and/or the female reference sample will be terminated and reported as such. If future testing is needed on a case in which the reference sample was terminated at quantitation, the reference sample will need to be resubmitted to the laboratory with the additional evidence.

3.3.3 Amplification

An important development in the field of forensic science was the introduction of PCR-based DNA typing systems for the analysis of biological samples. PCR enzymatically copies specific stretches of DNA through a series of heating and cooling cycles. Each cycle approximately doubles the number of copies of the target DNA sequence. After many cycles the original number of target sequences may be increased a billion fold.

STR (short tandem repeat) loci consist of short, repetitive sequence elements of 3 to 7 base pairs in length. These abundant repeats are well distributed throughout the human genome and are a rich source of highly polymorphic markers that often may be detected using PCR. Alleles of these loci are differentiated by the number of copies of the repeat sequence contained within the amplified region. STR typing is less sensitive to degraded DNA than other typing methods since the amplification products are less than 500 base pairs (bp) long.

The DNA section uses the Applied Biosystems™ GlobalFiler™ PCR Amplification Kit for STR testing. This kit includes 21 autosomal loci: D3S1358, vWA, D16S539, CSF1PO, TPOX, D8S1179, D21S11, D18S51, D2S441, D19S433, TH01, FGA, D22S1045, D5S818, D13S317, D7S820, SE33, D10S1248, D1S1656, D12S391, D2S1338 and three sex determining loci: Yindel, DYS391, and Amelogenin.

The DNA section also performs Y-STR testing. Y-STR testing is useful for sexual assault cases where there are high levels of female DNA in the presence of minor amounts of male DNA (digital penetration, fingernail scrapings, contact body swabs, etc.). This particular test is performed on the Y-chromosome which is found only in males. The Y-chromosome is a lineage marker which means it is passed down



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from generation to generation with changes by mutation only. Therefore, all paternal relatives (grandfather, father, son, etc.) can possess the same Y-STR profile. While it is not as discriminative as autosomal STR testing, it can provide important investigative leads.

The DNA section uses the Promega PowerPlex® Y23 PCR Amplification Kit for Y-STR testing which includes the loci DYS576, DYS389I, DYS448, DYS389II, DYS19, DYS391, DYS481, DYS549, DYS533, DYS438, DYS437, DYS570, DYS635, DYS390, DYS439, DYS392, DYS643, DYS393, DYS458, DYS385 a/b, DYS456, Y-GATA-H4.

3.3.4 Detection

The DNA section uses a genetic analyzer to perform capillary electrophoresis (CE). CE separates the amplified DNA product based on size to permit subsequent identification. Fluorescent dyes are attached to the DNA fragments during amplification. The sample is introduced into the capillary and a voltage is applied to the sample for a defined time. A positive voltage then draws the negatively charged DNA fragments through the capillary. The smaller DNA fragments move faster through the capillary than the larger ones. The fluorescently labeled DNA fragments pass by the detection cell where they are excited by a laser. The fluorescence emitted is then measured by the CCD camera and data is produced for analysis.

3.3.5 Analysis and Interpretation

Analysis is the process of comparing DNA obtained from evidentiary samples to known or reference DNA profiles. If the sample is single source, then it originated from one individual. If the sample is a mixture, then it originated from more than one individual and the assumption will be stated in the report. When an association is made between an individual and an evidentiary sample, a statistical calculation will be provided.



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3.4 DNA REPORTS

A report is issued when the DNA analysis has been completed on the submitted evidence. There are several sections within the report.

- Evidence Received - will describe what was received by the section for possible DNA analysis.
- Methodology - will describe the testing method, amplification kit used and whether technical assistance was provided.
- Results and Opinions - will describe the items tested as well as the results generated.
 - Match- complete correlation and agreement with the genotypes observed between a single source (or deduced single source) evidentiary sample and a reference sample.
 - Consistent with- agreement with genotypes observed between a partial single source (or deduced partial single source) evidentiary sample and a reference sample.
 - Cannot be excluded- alleles (genotypes) from the known profile are present in the evidentiary profile mixture
 - Exclusion – a conclusion that eliminates an individual as a potential contributor of DNA obtained from an evidentiary item.
 - Inconclusive (uninterpretable) – interpretation or conclusion in which the DNA results from an evidentiary sample are insufficient for comparison purposes.
 - No Results – No results were obtained from the evidentiary sample.
- Additional Information – will inform if a sample was eligible for CODIS entry, if reference samples are needed, and information regarding consumption samples.



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3.5 CODIS

The WVSP is responsible for the implementation, maintenance and administration of the Combined DNA Index System(CODIS) in the State of West Virginia. The CODIS program is a network of local (LDIS), state (SDIS), and national DNA databases (NDIS) consisting of offender, forensic unknown (casework) and missing person DNA profiles run by the FBI (<https://www.fbi.gov/services/laboratory/biometric-analysis/codis>). Each state collects and submits DNA profiles from individuals convicted and/or arrested of crimes that have been designated as qualifying offenses for that state's DNA database program (see WV Code §15-2B, <http://code.wvlegislature.gov/15-2B/>).

The CODIS program is designed to provide investigators with leads in unsolved crimes. *The samples collected from offenders cannot be used as a reference sample in a case submitted for testing* because the offender samples do not have the required chain of custody. *If your agency is able to obtain a reference sample from the putative perpetrator, the laboratory requests those be submitted with the evidence at the time of testing.* The CODIS Administrator can confirm if an individual has had a sample collected and whether that sample has been uploaded to the database. Request should be submitted by fax 304-746-2409 or email biology@wvsp.gov on agency letterhead containing the name, known aliases, DOB and SSN of the individual as well as the contact information, including email address, of the submitting officer.

3.5.1 CODIS Eligibility

WVSP Form 53A, required for all DNA analysis requests, is designed to capture the necessary information needed to determine if a DNA profile developed from a piece of evidence is CODIS eligible. *The FBI requires that the WVSPFL provide documented support to the following questions for CODIS eligibility:*

1. **Did a crime occur?** WVSP Form 53 requires that a criminal offense be listed.



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2. **How is the biological evidence tested, related to the criminal offense listed on Form 53?** Any DNA profile developed from the submitted evidence must be related to the criminal offense(s) listed. The information provided on Form 53A should include facts supporting how the biological evidence is related to the listed offense. This could include the location where the evidence was collected, statements from a victim or witness and/or the type of biological material tested.
3. **Why is the evidence tested most likely from the perpetrator and not the victim or other individual?** This could include the location where the evidence was collected, statements from a victim or witness and/or the type of biological material tested. If reference samples from all individuals who may be the source of the material are submitted then this question can be easily answered.
4. **Could the DNA from the perpetrator be present on the tested item unrelated to the crime being investigated?** For example, was the evidence collected directly from the alleged perpetrator, his vehicle or home? If so, the DNA profile may not be eligible for CODIS unless sufficient support is provided to show that the DNA from the perpetrator could only have been deposited by the perpetrator during the crime being investigated.

If sufficient documentation is provided on Form 53A to answer these questions then eligible profiles will be entered into CODIS and will be searched on a regular basis. If not, the investigator will be contacted to provide the required information. If the required information cannot be obtained the DNA profile may not be entered into CODIS.

3.5.2 CODIS Matches

Eligible forensic unknown (casework) profiles are entered into CODIS, even if an association has been made with an individual through the testing process. Cases where the source has been identified prior to CODIS entry can provide informative investigative leads when matched to unsolved cases that have the same casework DNA profile. Forensic unknown profiles are compared to WV offender profiles as well as other forensic unknown profiles at the state level. If the forensic unknown profile meets the eligibility



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requirements for the national level, it will be searched against other state offenders and forensic unknown profiles. The following are matches that may occur through CODIS:

- State Level (SDIS) matches
 - Offender – WV offender matches to a WV case.
 - Forensic – two or more WV cases match to each other
- National Level (NDIS) matches
 - Offender
 - Another state's offender matches to WV case or
 - WV offender matches to another state case
 - Forensic – WV case matches to another state's case

For matches that occur, once the laboratory has performed the appropriate quality control measures, information will be provided to the investigating officer and prosecuting attorney as a possible investigative lead. ***If a name provided to an investigator proves to be probative then the laboratory will require a known reference specimen from that individual be submitted to confirm the CODIS match.***

3.5.3 Missing Persons (MP) and Unidentified Human Remains (UHR)

In addition to identifying the putative perpetrators of crimes and linking investigations, CODIS is also used to identify human remains and provide investigative leads for missing person cases. Evidence submitted in these types of cases could include human remains, items believed to be from the missing person or reference samples from relatives of a missing person. ***The laboratory should be consulted on missing person and unidentified human remain cases to discuss all options available.***

Generally, missing persons/unidentified human remains cases require at least one DNA typing technology in addition to nuclear STR testing before the sample can be searched properly. If the sample is from a male, Y-STR and/or mitochondrial (mtDNA) testing should be performed on the sample. If the sample is female then mtDNA testing must be performed. mtDNA testing will be referred to the University of North Texas Center for Human Identification (UNTCHI - <https://www.untchi.org/>) or the FBI Forensic



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Laboratory (<https://www.fbi.gov/services/laboratory/biometric-analysis/dna-casework>) both of which will perform free of charge. UNTCHI will require the investigator to complete an entry into the National Missing and Unidentified Persons System (NamUs) for the case. NamUs is a national information clearing house for missing persons and unidentified human remains. The FBI may take control of the investigation.

Skeletal human remains will not be accepted by the laboratory because the laboratory does not have a procedure to test bone. Testing of skeletal human remains will be referred to Marshall University Forensic Science Center (MUFSC) or UNTCHI.

Items that should only have a victim's DNA profile present (toothbrush, razor, etc.) can be submitted for testing and entered into CODIS as a Deduced Missing Person. Profiles from items tested for this category should be compared to profiles generated from relatives of the missing person to filter out any profiles not from the missing person. This comparison would require relationship testing which is not performed by our laboratory. Relationship testing will be referred to Marshall University Forensic Science Center (MUFSC) <http://forensics.marshall.edu/Relationship/Relationship.html>.

Reference profiles from relatives of missing persons may have their profiles entered into CODIS. Relatives of Missing Persons reference samples can be submitted with or without other evidence related to a missing person investigation. The most informative relatives are parents, children (and spouse) and siblings. ***These samples must be accompanied by paperwork indicating that the samples were given voluntarily and what the familial relationship is to the missing person.*** Reference samples submitted by relatives of missing persons are not searched against the offender or forensic databases. These reference samples will be removed from CODIS if one of the following occurs: the missing person is identified, the individual providing the sample is determined not to be a relative of the missing person, or the person requests that their sample be removed.



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3.6 BIOLOGY/ DATABASING

Biology/ Databasing is the section of the laboratory that performs DNA analysis on offender samples collected by a State correctional facility, Sheriff's Office, or other appropriate agent for upload to CODIS. The Database and Databank Act of 1995 allows the WV State Police to *collect samples from individuals convicted of all felonies and other specified crimes* (WV Code §15-2B; <http://code.wvlegislature.gov/15-2B/>). Offender samples received by the Databasing section are not considered evidence and therefore cannot be used as reference samples in a case submitted for testing.

All of the various collection facilities should use the *DNA Blood Collection Kit* or the *WV DNA Database Buccal Collection Kit* to collect offender samples. These kits are provided and distributed free of charge to collection sites. Collection sites can receive kits by contacting the section at laboratory.kits@wvsp.gov. *These kits should not be used to collect reference samples for cases submitted to the DNA section for testing.* In appropriate circumstances, the blood kit may be supplemented by the collection facility with replacement blood tubes (only use EDTA preservative tubes). If the collection facility is unable to obtain a blood sample from an offender then the facility will use a WV DNA Database Buccal Collection kit.

4 – SEIZED DRUGS

Drug evidence includes powders, liquids, tablets, capsules, and plant material samples suspected of being or containing controlled substances. The Seized Drugs Section does not analyze blood, urine, or other pathological specimens for the presence of controlled substances. These should be sent to the Toxicology Section or to the Office of the Chief Medical Examiner.

Identification of controlled substances is necessary to prove violations of the Controlled Substances Act. The major question to be answered by the scientist is what controlled substance(s) and/or regulated chemical(s) are present, if any.



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All cases submitted to the Seized Drugs Section require an agency case number, officer contact information, suspect name, and crime date. Cases involving clandestine laboratory samples require supplemental information describing the original location and original container type of the submitted samples. Some cases submitted may require additional communications with the investigating officer and/or prosecutor. These communications may include clarification of information provided by the officer on the case submission form and possible evidence discrepancies. In the event that the submitting officer and/or prosecutor need to be contacted, a maximum of three attempts will be made with each attempt being approximately a week apart. Upon the second attempt, the scientist will notify the agency that the evidence will be returned unanalyzed if a response is not received. If a third attempt is necessary, the scientist will request to speak to the officer's supervisor and will either obtain the information needed or notify the supervisor that the evidence is being returned unanalyzed. The evidence can be resubmitted with the proper information required, if necessary. If the submitting officer does not work the same hours as the scientist, a detailed message will be left and the officer can leave a voice mail or email with his/her response during his/her working hours.

If a case requiring drug analysis needs to be completed by a specified date a written request from the prosecuting attorney must be submitted to the Seized Drugs Section Supervisor. Expedited requests should be sent 90 days before the anticipated court date. All required samples, documents and communications must be received before expedited analysis can be performed. Requests to expedite cases that do not meet the stated criteria will be considered on a case by case basis.



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Requests for expedited analysis can be mailed or faxed to:

West Virginia State Police
Seized Drugs Section Supervisor
725 Jefferson Road
South Charleston, WV 25309
Fax: 304-746-2174

4.1 COLLECTION OF EVIDENCE

ALWAYS USE CAUTION WHEN HANDLING ANY TYPE OF DRUG EVIDENCE. NITRILE GLOVES ARE HIGHLY RECOMMENDED FOR ALL HANDLING OF DRUG EVIDENCE.

4.1.1 Vegetation

Plant material, which is controlled, includes items such as marijuana, the peyote cactus, the opium poppy, psilocybin-containing mushrooms, and synthetic cannabinoids.

1. Do not place fresh samples in plastic. **Use paper bags or envelopes.** With fresh samples, there is a large quantity of moisture present in the leaves. It is best to package such plant samples in paper. Wet plant material in plastic will cause condensation of moisture and fungal growth. A common fungus in such samples can cause serious respiratory diseases. Fungal and bacterial degradation can turn a leaf sample into an unidentifiable rotten mass. Rotten or molded samples will not be analyzed.
2. Samples from separate locations should be individually packaged.
3. Do not submit potted or large, whole marijuana plants to the laboratory. Take only a sample as described in the next paragraph and place in an envelope.



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4. In those cases involving the cultivation of marijuana in which the quantity of five (5) or more plants is significant, it is recommended that a sample from several of the plants be removed and placed in individual envelopes. Please indicate if random sampling was used during collection.
5. Do not send smoking devices if there is already a measurable amount of marijuana in the case.

4.1.2 Tablets and Capsules

1. Tablets and capsules should be counted and each type separately packaged. This will prevent cross contamination in handling. If the same type of tablet or capsule is found in more than one location, separate packaging will be required.
2. Use a crush proof container when mailing such evidence, and use spill proof packaging so that any such crushed items will not leak out.
3. Each container should be marked for identification (i.e. initials, date, etc.).
4. Factory sealed, tamper proof, or sealed blister packs will not be routinely accepted.
5. Tablets and capsules in prescription bottles, prescribed to the suspect and listing the items contained, will not be routinely accepted.

4.1.3 Powders

1. Powders are best collected using vials or plastic bags (without holes!). If the items are pre-packaged (ex. small plastic bags of Cocaine or Methamphetamine ready for



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distribution), then the small plastic bags should be placed in a larger plastic bag or other sealable container.

2. Each container should be marked for identification (i.e. initials, date, etc.).
3. Due to the dangerous nature of Fentanyl and Fentanyl analogs, extreme caution should be taken when packaging and handling drug evidence. Always wear proper PPE (nitrile gloves and mask) and perform minimal handling of drug evidence.

4.1.4 Liquids

1. Liquid samples are to be collected in capped vials and placed into larger plastic bottles to prevent spills.
2. Each container should be marked for identification (i.e. initials, date, etc.).

4.1.5 Syringes

Under no circumstances will syringes or liquid from used syringes be accepted. They pose a health hazard to all personnel handling such items. Only in cases of tampering where hospital personnel are suspected of substituting a liquid in place of a factory pre-loaded syringe will syringes be analyzed. These will be analyzed only if the needle is removed and the syringe is unused.

4.1.6 Field Test Kits

Please do not submit field test kits. The chemicals may leak out and contaminate the evidence and cause a serious health hazard to the chemist.

*Please refer to the case acceptance policy for more information on acceptable items to submit to the Drug Identification Section.



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4.2 SEIZED DRUGS REPORTS

Only the controlled substances identified or components of a clandestine laboratory will be reported, along with the schedule and amount, if applicable.

With a few exceptions, all non-controlled substances will be reported as “No Identifiable Controlled Substances”.

The report will reflect any sample that is insufficient for analysis.

The report will reflect any sample not analyzed due to its characteristics, i.e. Lighters.

The report will reflect any samples that do not follow the case acceptance policy.

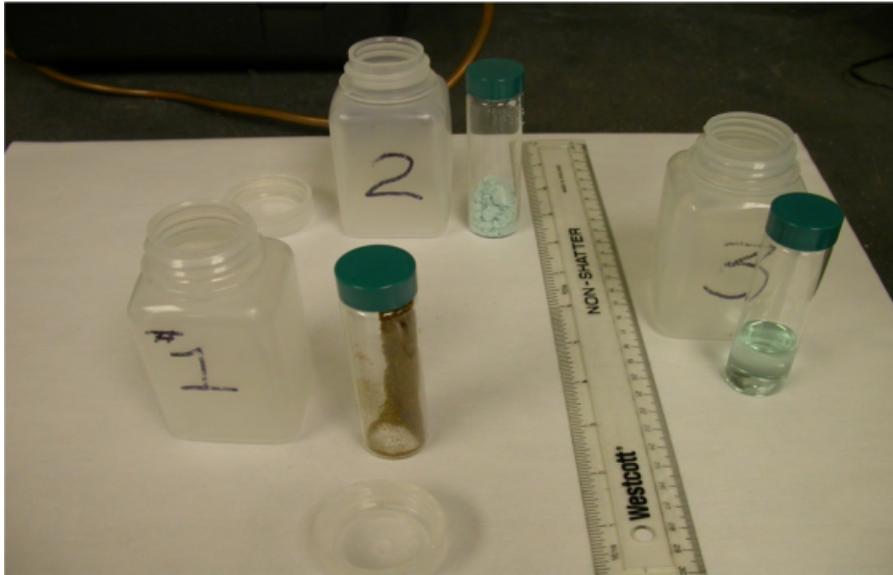
4.3 CLANDESTINE LABS

Clandestine laboratories are dangerous and require specialized training for the officer. There are different methods being utilized in the manufacture of methamphetamine. Some of the common chemicals found at a “clan lab” may consist of, but are not limited to: Coleman fuel, methanol (Heet), lithium (batteries), red phosphorus (match book striker plates), iodine, sulfuric acid (drain cleaner), hydrochloric acid (household cleaning), sodium chloride (rock salt), and sodium hydroxide (red devil lye/drain cleaner). Duplicate items should be grouped together and photographed. Only one sample from the duplicate samples should be submitted to the laboratory. Be aware that the majority of the chemicals associated with “clan labs” are hazardous. Samples submitted to the laboratory should be properly packaged in a glass vial inside of a Nalgene bottle to prevent potential cross contamination. Approximately 25 ml of sample is all that is necessary for analysis. Therefore, original containers (ie mason jars, Heet



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bottles, acetone bottles, etc.) will not be accepted at the laboratory. See the below picture(s) for proper packaging guidelines.



The case submission form should be accompanied with the officer's notes, clean up sheets, sampling form, destruction notice (WVSP cases), etc. in order to give the scientist an idea as to the potential hazards associated with each sample. Upon completion of "clan lab" evidence, the central evidence receiving section of the laboratory will either hold the evidence for destruction (WVSP cases), or notify the investigating officer that the case is finished and needs to be picked up. The completed case should be picked up promptly due to the limited amount of storage available in the central evidence receiving section.

Sampling Requirements:

WVSP Forensic Laboratory Field Manual
Approval Date: 1/29/2020
Approved By: WVSP Quality Assurance Board

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Revision: 2/3/2020

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- A. Duplicate items (containers of camp fuel, acetone, table salt, Heet, etc.) shall be grouped together and photographed.
- B. Only one sample from the duplicate samples should be submitted to the laboratory.
- C. Samples submitted to the laboratory should be properly packaged in a glass vial inside of a Nalgene bottle to prevent cross-contamination.
- D. Approximately 25ml of sample is all that is necessary for laboratory analysis.
- E. Any sample of 6ml or less will not be analyzed.
- F. A copy of the photographs, placed on CD (preferably) or other digital media (i.e. SD card), taken during the sampling process must be submitted with the Laboratory Case Submission form and the Clandestine Evidence Form. No printed photographs are to be sent with samples.

Submission Requirements:

- A. Evidence
- B. Photographs *
- C. WVSP Form 32- Clandestine Laboratory Report Form
- D. Destruction Notice *
- E. WVSP Form 53- Forensic Laboratory Case Submission Form

***- required for WVSP cases**

Components of a clandestine laboratory may rupture or leak, posing severe health threats to individuals in proximity to such components. Further, many of the chemicals associated with



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clandestine laboratories are combustible, toxic or corrosive and very dangerous. Based on the dangers presented by clandestine laboratories and the chemicals associated therewith, the WVSP has adopted a policy to destroy all components and chemicals of a clandestine laboratory upon completion of testing, for all WVSP cases. At the conclusion of the analysis by the WVSP Forensic Laboratory, all WVSP clandestine laboratory evidence will be destroyed by the Clandestine Laboratory Training and Response Coordinator or his/her designee, not including finished methamphetamine. The Forensic Laboratory Report and the finished product will be returned to the investigating officer at the conclusion of testing. This destruction policy is available to non-state police agencies if the above procedures are properly followed.

Please use the following precautions when entering and gathering evidence from a “clan lab”:

1. **Never** enter a laboratory operation. Only certified personnel should enter a lab.
2. **Never** smoke in the laboratory or its vicinity.
3. **Do not** dispose of, or destroy, anything by pouring it into water or by pouring water into it.
4. **Do not** shut off any heaters, stirring motors, or other mechanical or electrical apparatus.
5. **Make the laboratory secure**; give no unauthorized or unnecessary personnel access to the premises.
6. If you have suspected Lithium, take extra precaution. Lithium reacts violently with water.
7. If there are items indicating the presence of children or if there are children present, child protective services needs to be notified.
8. **Contact local task force, BCI, or DEP for assistance.**
BCI (304)766-5560
DEP Spill Line 1-800-642-3074



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Jason Crane cell (304)638-1215 or email questions Jason.s.crane@wvsp.gov

4.4 CASE SUBMISSION FORMS

1. Make sure that all items being submitted are listed on the Case Submission Form. Cases cannot be completed if evidence and inventory do not match.
2. Label any biohazard samples as such.
3. The following fields on the Case Submission Form must be completed: Agency Case No., Crime Date, Suspect, Officer's contact information, and items submitted .

5 – FIREARMS/TOOLMARKS

The Firearm/Toolmark Section of the laboratory receives multiple case submissions throughout the year. Typically, cases received in the Firearm/Toolmark Section will be prioritized based on several factors, which include date received, type of crime, the need of results for investigative leads or warrants, or prosecutor requests for upcoming court dates. When a prosecutor's office submits an expedite request on letterhead with an upcoming court date, those cases will be given top priority over other submissions and worked based on the provided court dates. Unless extreme circumstances apply, rush cases already in progress will be completed before a new case is begun. The best practice will be to notify the Firearm/Toolmark Section at least one month before rush results are needed.

Also, any evidence that is being examined by another section/s (Processing, Latent Prints) **cannot** be examined by the Firearm/Toolmark Section until **all** other sections have completed



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their examinations. Any rush request for a case needing examination by multiple sections will require appropriate additional time for all examinations to be completed

Many examinations are performed in the Firearm/Toolmark Section. Some, but not all, types of examinations are listed below and described further in following sections:

- Firearm Examinations/Comparisons
- Toolmark Examinations
- Shooting Scene Reconstruction/Trajectory Analysis
- Serial Number Restoration
- Distance Determination
- Physical/Fracture Matches
- Footwear/Tire Track Examination

5.1 EXAMINATIONS AND POSSIBLE DETERMINATIONS

5.1.1 Firearm Examinations

1. **Firearm Examination/Comparison:** Determine whether a fired bullet, fired cartridge case, fired shotshell or other fired ammunition components were fired from a specific firearm.
2. **Firearm Function Check:** All submitted firearms go through a general function check examination to determine if the firearm is operable as received. Extensive function check examinations may be specifically requested, to include trigger pull measurements, full auto vs. semi-auto firing, and impact/drop testing. If specific



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- function testing is required, please provide written descriptions of the testing or scenarios you are requesting.
3. **Determination of short barreled shotguns and rifles:** Measure and report barrel and overall lengths for shotguns and rifles.
 4. **General Rifling Characteristics Search:** Examine a fired bullet or fired cartridge case to provide a FBI database generated list of possible firearms (make, model, and caliber/chambering) as an investigative lead.
 5. **Ammunition Component Examination:** Determine if a loaded cartridge was cycled through a particular firearm. Determine if a fired ammunition component is similar to the submitted loaded ammunition.

Note: While every effort will be made to protect and preserve all submitted evidence, if drop testing or impact testing has been requested, there is a possibility that damage may occur to the submitted firearm being tested. A request by the submitting agency for drop testing or impact testing will be considered acknowledgement that damage may occur.

5.1.2 Toolmark Examinations

Given a tool (pry bar, bolt cutters, pliers, hatchet, tire iron, etc.) and a piece of evidence containing a tool mark (door, latch, lock, fence, safe, cable, etc.), the examiner may be able to determine if that specific tool made the toolmark in question.



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5.1.3 Shooting Scene Reconstruction/Trajectory Analysis

Determine possible bullet paths; recover fired bullets and other firearm related evidence found in a vehicle or any other evidence item.

5.1.4 Serial Number Restoration

Restore serial numbers that have been obliterated. Items such as firearms, four-wheelers, motors, electrical devices, power tools, cars, and motorcycles have been successfully examined in the laboratory.

Note: This examination will permanently alter the submitted evidence. Once this examination is performed, the evidence cannot be processed a second time. Requesting serial number restoration will be considered authorization by the submitting agency to alter the evidence.

5.1.5 Distance Determinations

Determine approximate distance of the muzzle to the victim or object based on the microscopic and/or chemical examination of the gunpowder pattern around the bullet hole.

In order to perform a distance determination test, the section must have:

- 1) The firearm used in the shooting.
- 2) Fired evidence (bullets, cartridge cases, shotshells) that we can identify as being fired by the submitted firearm.
- 3) Loaded ammunition recovered with the submitted firearm. Any similar type ammunition recovered from the suspect's home/vehicle should also be collected by the agency for possible submission.



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- 4) The item, typically victim's clothing, to be examined for distance determination purposes. Submit *ONLY* the clothing items that are associated with bullet holes. If the victim was shot in the chest only, do not submit pants, socks, shoes, etc. Also, if the victim was wearing multiple layers of clothing (a jacket over a t-shirt), only the outermost layer needs to be submitted for examination.
- 5) Information about gunshot wound locations on the victim. This can be noted on the submission form or copies of medical examiner's reports may be submitted.

Note: This examination will permanently alter the submitted evidence. Once this examination is performed, the evidence cannot be processed a second time. Requesting distance determination testing will be considered authorization by the submitting agency to alter the evidence.

Bullet passage determinations can be performed on other items of evidence to determine whether holes or damage are consistent with the passage of a fired bullet. This is done through visual examination and chemical processing for gunshot residues.

5.1.6 Physical Match/Fracture Match

Determine if two or more items were once a single piece, such as torn duct tape, fractured metal, fractured glass, fractured plastic, etc.

Note: The above are the basic examinations performed by the Firearm/Toolmark Section.

This does not limit the section to perform other examinations not listed.

5.2 GLOSSARY OF TERMS

The use of proper terminology not only adds to professionalism, but also helps clearly convey



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to the examiner what is to be examined.

1. **Firearms Identification:** Is the discipline of forensic science that has as its primary concern to determine if a bullet, cartridge case or other ammunition component was fired by a particular firearm.
2. **Toolmark Identification:** Is the discipline of forensic science that has as its primary concern to determine if a toolmark was produced by a particular tool.
3. **Tool:** An object used to gain mechanical advantage. Also thought of as the harder of two objects, which when brought into contact with each other, results in the softer one being marked.



Fired Bullet(s): A bullet which has been fired from a firearm. (*NOT* : spent bullet, spent slug, or spent round)



4. **Fired Cartridge Case(s):** A cartridge case which has been fired. (*NOT*: spent casing,



loose round, empty round)



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5. **Loaded Cartridge(s):** A single unit of ammunition consisting of the case, primer, and propellant with or without one or more projectiles. (*NOT*: loaded bullet, live round, or loaded round)



6. **Loaded Shotshell:** A cartridge containing projectile(s) designed to be fired in a shotgun. The cartridge body may be metal, plastic, or paper.



7. **Shot:** Spherical pellets used in loading shotshells or cartridges.



8. **Rifle:** A firearm having rifling in the bore and designed to be fired from the shoulder.





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9. **Revolver:** A firearm, usually a handgun, with a cylinder having several chambers so arranged as to rotate around an axis and be discharged successively by the same firing mechanism.



10. **Pistol:** A handgun in which the chamber is part of the barrel.



11. **Shotgun:** A smooth bore firearm designed to be fired from the shoulder. The shotshells can contain numerous pellets or sometimes a single projectile.



12. **Short Barreled Rifle:** A “sawed-off” rifle that has a barrel length of less than 16 inches or its overall length is less than 26 inches.



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13. **Short Barreled Shotgun:** A “sawed-off” shotgun that has a barrel of less than 18 inches or its overall length is less than 26 inches.

5.3 RECOGNITION, COLLECTION, AND PACKAGING OF EVIDENCE

5.3.1 General Guidelines

1. You only have one chance to collect the evidence.
2. Do not touch anything before you document, video, and photograph everything before handling the evidence. You can never have too much documentation.
3. Take photographs at far distances, medium, and close up. As questions arise in the investigation, proper crime scene documentation may provide answers. When taking photographs of evidence, the following should be in the picture if possible: scale, case number, evidence number, and date.
4. At the crime scene, the investigating officer should mark recovered items and the location in which the items were found should be noted. These should include identification number, case number, date, where found, and initials.
5. Keep all evidence handling to a minimum. Some items may need to be tested for trace evidence, DNA, and/or latent prints. Excessive handling could disrupt, ruin, or lose potential evidence.
6. Do not mail loaded ammunition.



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7. Do not submit firearm or toolmark evidence in an envelope through the mail. Make sure evidence is in a secure container/box before mailing.
8. Be timely in your submission of evidence. Do not wait months after the evidence was collected to send it to the laboratory and expect a report to be completed the next day.
9. Any evidence that requires Firearm/Toolmark Section analysis but also requires examination by another section in the laboratory must be processed in the proper sequence. Include on the case submission **all** tests you desire performed.

Example: A bloody pistol would be processed in the following sequence:

Biology → Latent Prints → Firearm/Toolmark.

5.3.2 Safety

All firearms should be submitted to the laboratory unloaded. If you are unable to determine if a firearm is loaded or not, ask to see someone from the Firearm Section prior to packaging the evidence for submission. They will assist in ensuring the firearm is unloaded for submission.

Be sure to wear latex gloves while handling evidence. This will protect you against biohazardous material that may be on the evidence. Evidence should be handled as little as possible.

5.3.3 Handling of Firearm(s)

Safe firearm handling should be the first concern when handling firearms evidence.



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The procedures below should be followed for handling and documentation of evidence for firearms found at the crime scene. In addition, special concern should be taken to ensure collection and transportation are conducted in a safe manner. With firearms, there is often a need for examination by multiple sections. The firearm should be unloaded with care and concern to protect the potential DNA, trace, and latent print evidence.

In the case of a *revolver*, it should be unloaded paying particular notice to the manner in which the fired and unfired cases were taken from the cylinder of the revolver.

▼ Chamber that was in line with the bore

1

6

5

4

3

2

1

Open the cylinder carefully to make sure the chamber which is in line with the bore is not moved. Mark the cylinder to indicate the chamber position in line with the barrel when recovered. Prepare a diagram numbering clockwise the remaining chambers, indicating where the remaining fired or loaded cartridge cases were located.

Identification Number	Condition	Chamber Position	Manufacturer or Headstamp
#1	Fired	In line with bore	PMC
#2	Fired	#2 position	PMC
#3	Fired	#3 position	PMC
#4	Fired	#4 position	Winchester



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#5	Fired	#5 position	Remington Peters
#6	Fired	#6 position	PMC

In the case of a *pistol*, the magazine should be removed *first* and then the chamber should be cleared. You should initial the magazine and the cartridges. In addition, mark the cartridges with regard to their order in the magazine. If there are no requests for DNA or fingerprint processing, please wipe down blood soaked firearms (especially suicide cases) prior to submission in order to reduce biological hazards in the firearms laboratory.

Long guns should be collected in much the same manner as handguns. Remember to make note of the position of the safety and the position of the hammer or striker before moving the firearm. If there is loaded ammunition still in the firearm, it should be removed. As stated previously, make note as to the order the loaded cartridges were in the firearm.

Submerged Firearms

A firearm recovered under water should be packaged in a water-tight container filled with water from the same environment the firearm was found. Example: A pistol in a 5 gallon bucket of river water.

This container should be tape sealed, initialed by the officer and hand delivered to the Laboratory.

5.3.4 Fired Bullet(s) Recovery

The recovery of fired bullets and shot pellets from the ceiling, walls, floor, furniture, body of victim, etc. should be performed with the greatest of caution so as not to alter them in any way.

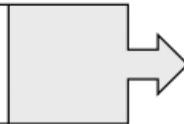


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When bullets are embedded in wood or some other substance it is recommended, if possible, to secure that portion of the substance so that the bullet might be removed at the laboratory. A mistake often made in the field is to try to pry the bullet out of an object with a sharp object or pocket knife. Proper bullet removal does not allow hard objects to come in contact with the surface of the fired bullet.

X-rays are a valuable tool used for checking a body for bullets, bullet fragments, shot, or any other ammunition components.

Take special care to protect this region. This is the main area to be examined.



It is possible to determine the caliber of gun, number of lands and grooves (called rifling), direction of twist, and brand of ammunition from the fired bullet. Often the investigating officer can determine the direction of twist of the firearm and eliminate certain firearms at the scene.

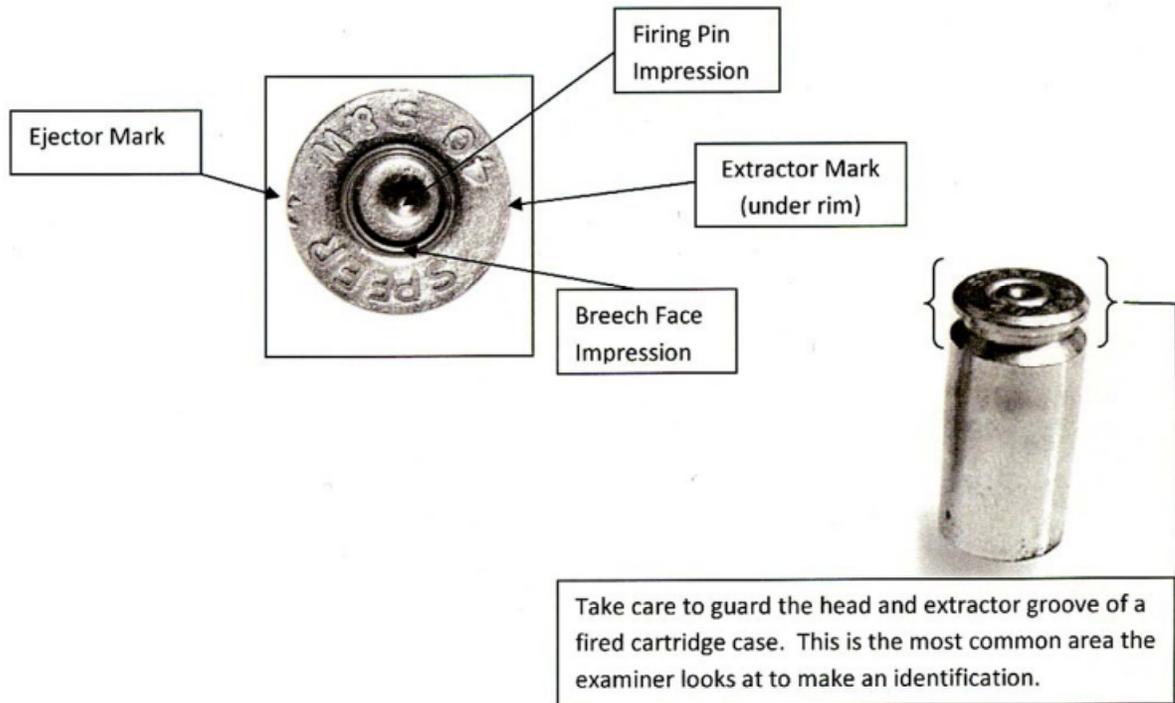
This bullet has a left hand twist.

5.3.5 Fired Cartridge Cases, Shot Pellets, and Wadding

The fired cartridge case can exhibit marks left by the firing pin, ejector, extractor, magazine, chamber, and breech face. These marks can be compared and often matched with test fired cartridge cases from the evidence weapon.



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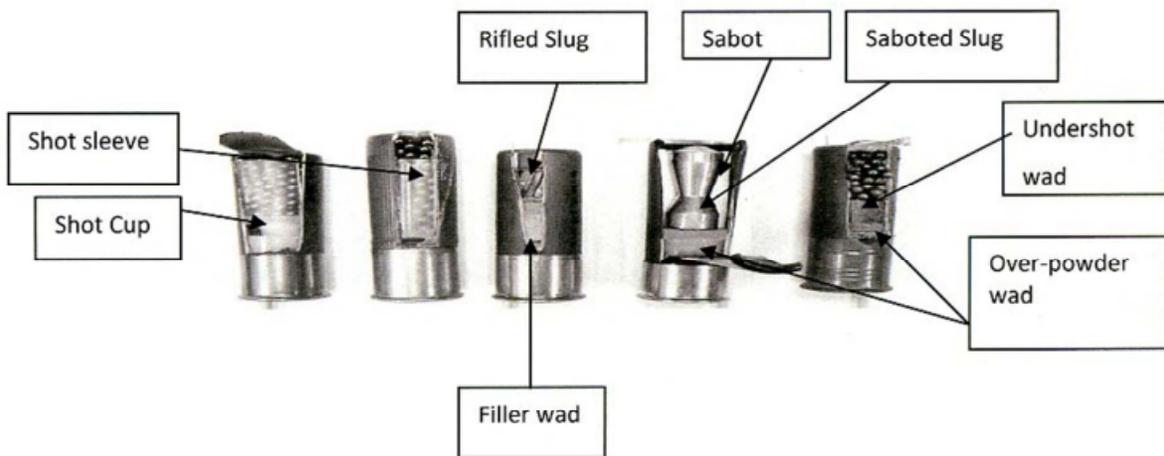


In cases where a shotgun is used, it is possible that more than one shot was fired and more than one size pellet could be present at the scene. Therefore, care should be exercised to keep the recovery of the pellets from each shot separated (within reason). Like the brass cartridge case, the brass portion of the fired shotshell case may display identifying markings. In some instances, the wadding from a shotgun shell could be in the victim. If not, a careful examination of the scene will reveal at least part of the wadding. The wadding can bring to light very interesting information for the investigator, such as the make of the shotgun shell used, the gauge of the gun, and the approximate position from which the shot was fired. One can expect to find the wadding



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within a distance of 0 to 40 feet from where the shot was fired. When recovering wadding from the scene, place wadding in individual containers and label.



Note the different types of components that could be encountered from a shotshell at a crime scene.

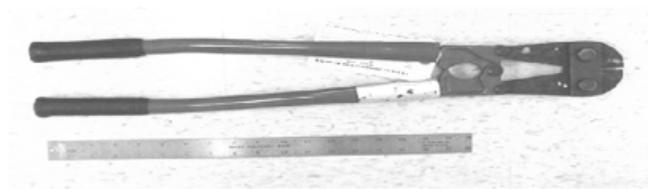
5.3.6 Tools and Toolmarks

Providing that conditions are favorable, an examiner can microscopically match toolmarks made by tools from a pocketknife to a lathe. Marks made by a blunt instrument might also be reproduced with favorable results.

Toolmark evidence should be handled and marked in much the same way as firearm evidence. The tool in question should never be placed directly in contact with the toolmark in question. Contact between the two items could alter the evidence.



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The tool and object having toolmarks should be wrapped in some type of protective garment or material so as to protect the surface from any alterations that could occur during transport to the laboratory.

5.3.7 Distance Determination

In certain shooting cases, it may be important to know the approximate distance between the muzzle of the firearm involved and the victim. The outermost layer of clothing which has been shot through may be submitted for distance determination. Articles of clothing that are to be tested for distance determination should be handled gently as to not remove any burnt or partially burnt gunpowder that remains on them. Each item of clothing should be packaged separately in a paper bag, **not** a plastic bag. Plastic bags do not allow the item to dry, which may result in bacteria developing and hindering the examination of potential evidence. If the clothing is wet with body fluids, it should be *air dried* **prior** to submission. The preferred method of packaging is to spread the dried clothing item out on butcher type paper and roll the clothing in the paper. This can then be folded and sealed in a paper bag. If DNA analysis of the item is required, it should be sent to the Biology/ Processing Section first, with instructions to forward the item to the Firearm/Toolmark Section.

The suspected firearm along with the ammunition used in the crime is crucial to the examiner in distance determination cases. The ammunition used in the firearm must be the same as used in



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the incident if the examiner is to obtain accurate results. Many times fired cartridge cases and fired bullets will allow the examiner to determine the type of ammunition that was used if there are no loaded cartridges found with the firearm. *Remember loaded ammunition cannot be mailed.*

5.3.8 Restoration of Serial Numbers

There are numerous items purchased today by the general public that contain serial or identifying numbers. These items include tools, firearms, motors, office equipment, four-wheelers, vehicles, etc. The criminal will often obliterate or alter these numbers for a variety of reasons.

Common methods used by the criminal to alter or obliterate serial numbers are to grind off all identifying numbers, stamp over existing numbers, or obliterate markings by using a metal chisel to gouge around the serial number area. It is possible, using a variety of methods in the laboratory, to restore some or all of the obliterated serial number. The questioned items should be properly marked for identification purposes. This marking should include date of recovery, investigating officer's initials, and any other identification the officer feels necessary. The evidence should be wrapped with paper or other packing material, and then placed inside a cardboard box or other suitable container. The container should then be taped sealed and initialed. In cases where the items of evidence are too large to be mailed, the laboratory should be notified for assistance.

5.3.9 Castings of Evidence

Often at the crime scene, the investigating officer finds toolmarks in wood, metal, etc., that should be preserved for future examinations. These toolmarks can often be overlooked or discarded without a second thought of their true value. These toolmarks are sometimes found on objects that are too large to be transported to the laboratory for examination. If at all possible,



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that portion of the material containing the depression should be cut away and preserved. If this is not feasible due to possible destruction of an object or possible deformation of the depression, then a cast is necessary. Before any cast is made the impression should first be photographed. Be sure to include a scale in your photograph.

There are several forensic casting materials on the market today. Micro-Sil, Forensic Sil, and Accutrans are two-part silicone rubber casting materials that are easily mixed at the scene, set quickly, and are capable of recovering good detail when used properly. Photographs of the toolmark area should be taken with the casting material in place. Casts should be packaged individually with the packaging marked with relevant case information and toolmark location.

5.4 SUBMISSION OF EVIDENCE

5.4.1 Evidence Packaging for Submission to the Laboratory

Each item sent to the laboratory (i.e.: fired bullets, fired cartridge cases, loaded ammunition, bullet fragments, different size shot, wadding, or any other ammunition component found) should be wrapped separately in some type of packing material and placed in a sealed container. Under no circumstances should several items be placed together where they can rub each other so that the markings might be destroyed. The container should be tape sealed, initialed by the officer, labeled with date, what it contains, and any other pertinent information the officer deems necessary that could aid the examiner. Empty film canisters work well for securing this type of evidence. Use appropriate containers: Evidence bags, boxes, petri dishes from the Medical Examiner's office, plastic bags, or paper bags.

With the exception of film containers **do not** use soda pop bottles, bakery bags, or any other non-evidentiary containers.



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Evidence should be submitted to the laboratory in a timely manner. Do not wait months after the evidence is collected to send it to the lab. The Firearm/Toolmark Section may have a backlog of cases and it could take several weeks to complete the examination and return the final report.

5.4.2 Firearms Evidence

Firearms **MUST BE** unloaded prior to submission to the laboratory. Central Evidence Receiving (CER) **WILL NOT** accept loaded firearms. The Firearm Section must be contacted if you are unable to verify a firearm is unloaded due to being rusted shut.

Be sure to request DNA or Fingerprint Processing first if needed. This evidence may be lost if it is examined in the Firearm Section first.

Before unloading an evidence firearm, we suggest you do the following:

1. Photograph the firearm;
2. Document the safety position (on / off);
3. Document the hammer or striker position (half-cocked, cocked, fired position);
4. Document the position of the gun (in relation to its surroundings/victim/suspect)



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If the firearm is a revolver:

5. Document which chamber was in line with the barrel;
6. Diagram the fired/unfired cartridges in the cylinder;

If the firearm is a semi-automatic:

7. Remove the magazine from the firearm and document the loaded ammunition as you remove it from the magazine. Make sure you submit magazines with the firearms... some firearms cannot function without a magazine and we will not be able to test fire them.
8. Pull the slide or bolt to the rear to verify no ammunition remains in the chamber. Lock the slide or bolt to the rear if possible. Zip ties may be placed through the action or magazine well of a firearm. **DO NOT** place zip ties or any other objects down the barrel of a firearm.

After verifying they are unloaded, place firearms in a sturdy sealed cardboard box. For blood soaked firearms, if you are not requesting processing for DNA or fingerprints, please wipe down the firearms prior to packaging them.

Loaded ammunition recovered with a firearm should be included on the submission form and submitted to the laboratory with the firearm. This ammunition may be test fired in the laboratory if the examiner deems it necessary for comparison purposes. While you may recover boxes of ammunition from the suspect, do not submit these to the laboratory unless you are requesting distance determination testing. Remember, loaded ammunition cannot be mailed using the U.S. Postal Service.



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5.4.3 Clothing Evidence

Clothing and articles bearing bullet holes and shot patterns should be handled as little as possible and with extreme care. Each article of clothing should be wrapped separately with clean brown paper, sealed, and properly labeled. Make sure the clothing is thoroughly dry before packaging in a paper bag or cardboard box. DO NOT seal in plastic.

5.4.4 Tool Evidence

Preferably, tools and toolmark items should be packaged separately. When packaged together the tool and object having toolmarks should be wrapped in some type of protective garment or material to protect the surface from any alterations that could occur during transport to the lab. If wire evidence is to be sent in, the ends of the wire in question should be clearly labeled to show which end was cut by the officer, and which end was cut by the perpetrator. This can be done by coloring, painting, or taping the end cut by the submitting officer. DO NOT paint or tape over the suspect cut end.

For cut/slashed tire cases, submit the suspect tool/knife and the portion of the tire that was cut/punctured. DO NOT submit the entire tire.

On occasions, the officer might encounter toolmarks on an item too large to be shipped to the laboratory. In this case casts should be taken and submitted to the laboratory.

NOTE: If multiple toolmarks are recovered from a scene but no suspect tools are recovered, do not submit those items for examination unless you need assistance determining the type of tool that was used. Due to multiple working surfaces that can be involved with most tools, we do not intercompare toolmarks to determine if they were all made by the same tool.



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5.4.5 Vehicle Evidence

Vehicles that are to be sent to the laboratory should be examined for loose evidence prior to loading and transport. All efforts should be made to ensure that evidence will not be lost during transport to the lab. For any windows (not the front windshield) containing bullet holes, tape the windows with clear packing tape leaving the holes themselves uncovered. Make sure to not press too hard against the fractured glass.

DO NOT tape over bullet holes in the vehicle, this tape may be mistaken for tape seals on the vehicle.

If a trajectory analysis is being requested and bullet holes are present in the seats, DO NOT move the seats. This will change the orientation of the trajectory paths and compromise the analysis.

Call ahead – Contact the Central Evidence Receiving section to check the status of the evidence garages BEFORE transporting ANY vehicle to the laboratory. This includes motorcycles or ATVs being submitted for VIN restoration.

Any officer submitting a vehicle to the laboratory for examination must schedule an appointment with the Section Supervisor or other member of the section to discuss in detail the examinations needed and what permissions will be given for the potential of permanently altering the vehicle (fired bullet recovery).

NOTE: The Firearm/Toolmark Section of the laboratory will NOT be responsible for inventorying the contents of submitted vehicles. Contents of vehicles may be removed from the vehicle during examination and photographed. The contents will then be returned to the vehicle for return to the submitting agency. The Firearm/Toolmark Section will ONLY



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inventory firearm related evidence (Firearms, fired ammunition components, etc.) that will be removed from the vehicle for further examinations.

5.5 FIREARM AND TOOLMARK REPORTS

The Firearm\Toolmark Section issues a variety of reports based on the evidence submitted. Some, but not all, results of examinations are as follows:

5.5.1 Firearm Reports

1. Identification – There was sufficient agreement of the combination of individual characteristics and all discernible class characteristics, allowing the examiner to form the opinion that the submitted fired evidence was fired in or from the same firearm/submitted firearm.
2. **Inconclusive** – There are different ranges of possible inconclusive results that may be reported.
 - i. The fired evidence/test fires had sufficient agreement of all discernible class characteristics and some matching individual characteristics. However, the matching individual characteristics were not sufficient for an identification.
 - ii. The fired evidence/test fires had some apparent differences in class and/or individual characteristics. However, the differences were not sufficient for an elimination.
 - iii. The fired evidence could not be identified *or* eliminated as being fired by the same firearm/submitted firearm. There are no significant differences in the discernible class or individual characteristics, but there is no significant agreement of individual characteristics.



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3. **Elimination** – Class and or individual characteristics present on the submitted fired evidence were different than those found on other items of evidence or on test fired bullets/cartridge cases/shotshells from the submitted firearm.
4. **Not Suitable for Examination or Comparison** – Due to damage, size, or other limiting factors, the submitted evidence does not have suitable class or individual characteristics for examination or comparison purposes.

5.5.2 Toolmark Reports

1. **Identification** – There was sufficient agreement of the combination of individual characteristics and all discernible class characteristics, allowing the examiner to form the opinion that the submitted toolmark was made by the submitted tool.
2. **Inconclusive** – There are different ranges of possible inconclusive results that may be reported.

2.3 The evidence toolmarks and test toolmarks had sufficient agreement of all discernible class characteristics and some matching individual characteristics. However, the matching individual characteristics were not sufficient for an identification.

2.4 The evidence toolmarks and test toolmarks had some apparent differences in class and/or individual characteristics. However, the differences were not sufficient for an elimination.

2.5 The evidence toolmark could not be identified or eliminated as being made by the submitted tool. There are no significant differences in the discernible class or



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individual characteristics, but there is no significant agreement of individual characteristics.

3. **Elimination** – The evidence submitted had toolmarks with significant differences in class and/or individual characteristics when compared with the submitted tool.
4. **Not Suitable for Examination or Comparison** – Due to damage, size, or other limiting factors, the submitted evidence does not have suitable class or individual characteristics for examination or comparison purposes.

5.6 FOOTWEAR/TIRE TRACK EVIDENCE

The Firearm/Toolmark Section is now responsible for the discipline of Impression Evidence which is comprised of footwear and tire track impression evidence. Due to the nature of this type of evidence, the actual questioned impression is rarely able to be recovered and submitted to the laboratory for examination purposes. Good crime scene processing and evidence collection techniques are imperative to a successful examination and comparison of these impressions.

5.6.1 Impression Evidence at the Crime Scene

1. Secure and preserve the crime scene
2. Impression evidence, such as footwear and tire tracks, are often overlooked. To avoid contamination, search for this type of evidence first!
3. Walk the crime scene from the perimeter inwards
 - a. Interpret crime scene footwear and tire track impressions for assistance in reconstructing events of the crime. For example, direction of travel by



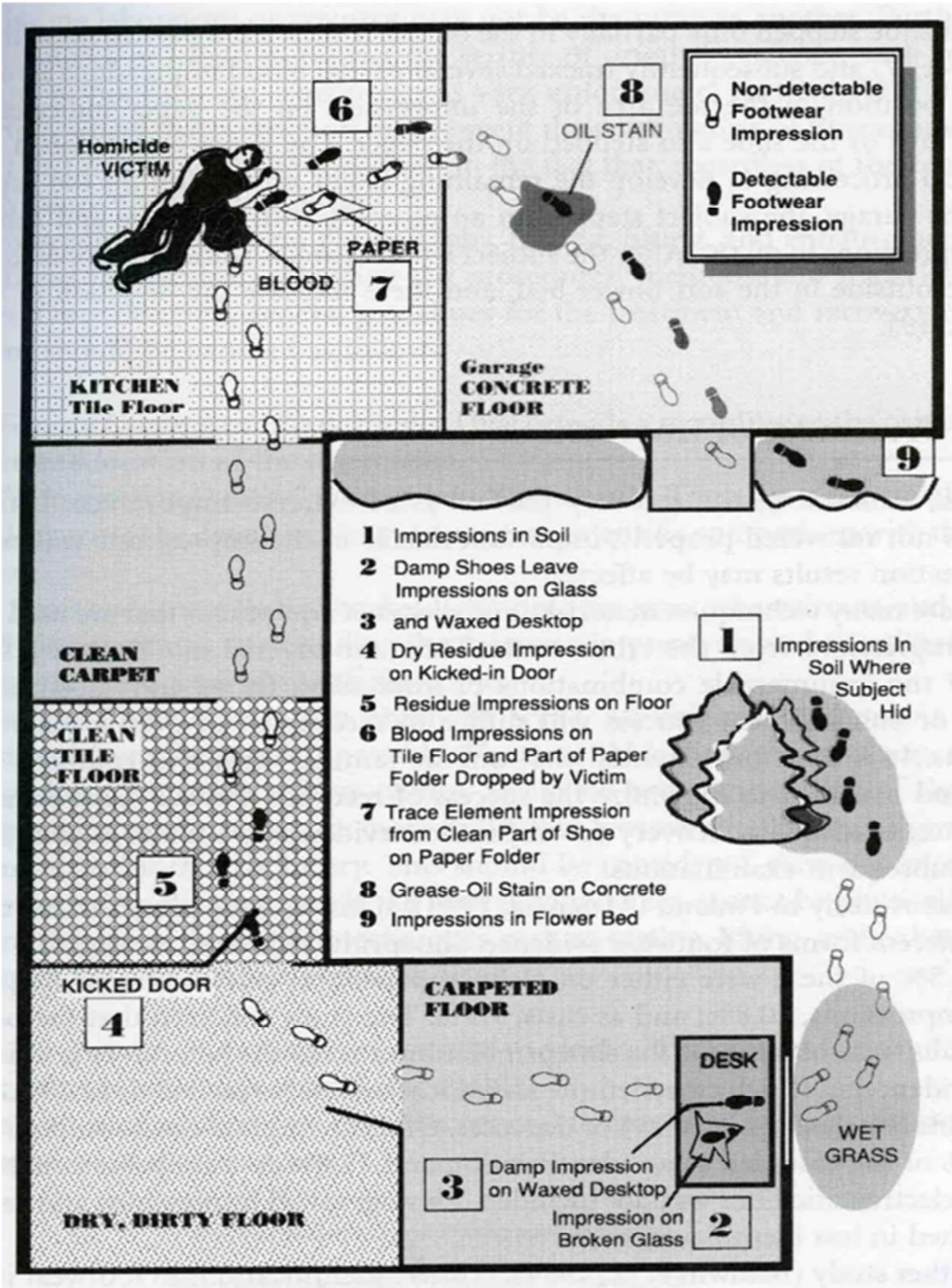
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suspect(s) and/or victim(s) to, from and while at the scene may be determined. Also the number of suspects involved at the scene may be determined.

- b. Use any video surveillance or witness accounts to pinpoint searches for impression evidence.
 - c. Mark the impression(s) with a numbered cone or card for reference when taking any crime scene photographs.
4. Visualization techniques
- a. Oblique light with flashlight or other light source — in low light or total darkness if possible.
 - b. Electrostatic Dust Print Lifter.



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WHENEVER POSSIBLE SUBMIT ORIGINAL EVIDENCE!

5.6.2 Recording/Recovering Impression Evidence

It is imperative that you **ALWAYS** take examination quality photographs before using any chemical or physical enhancement techniques or attempt to take lifts or casts of an impression.

1. Photography equipment used for impression evidence documentation

- Camera
- Tripod
- Finely divided rigid scale(s)
- Placards
- Dark cloth or material to block sun or ambient light
- Flash with 6ft extension

2. Photographing Shoeprint and Tire Tread Impressions

General crime scene photographs should be taken to relate the impressions to the crime scene. Examination-quality photographs should then be taken to obtain maximum detail for forensic examination. All impressions should be photographed using both methods.

General Crime Scene Photographs: Normally taken from two or three distances, providing a zoom-in effect; they provide the following:

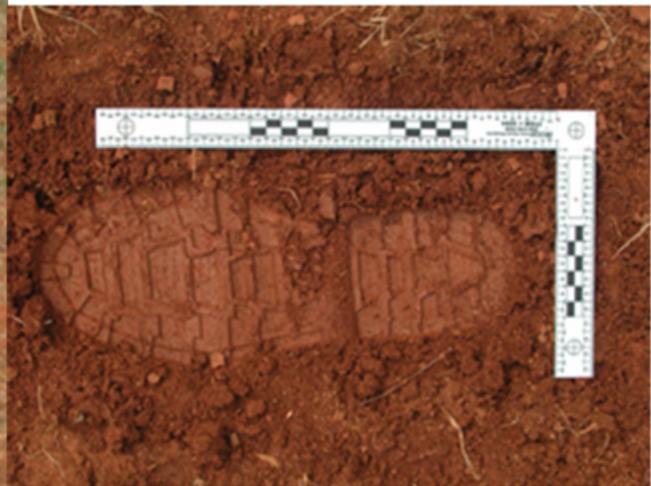
- Mid-range photographs that show a closer view of a certain area
- Long range photographs that show the overall scene



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- Close range photographs that concentrate on a particular area or object as it relates to its surroundings

Examination-Quality Photographs: taken from directly over the top of and sufficiently close to the object, to fill the frame with the area or object being photographed and to capture the maximum amount of detail. This method allows for use of the photographs in scientific comparisons.





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Comparison quality photographs should be taken as follows:

- Identify the impression you wish to photograph and place a good linear scale next to and on the same plane as that impression. This may mean digging into the impression material (dirt, snow, etc.) to get the scale at the same level as the bottom of the impression. **BE CAREFUL** not to disturb the material of the impression itself.
- Place a label in the picture to identify which impression you are photographing, all case information (date, case number, etc.), the evidence number of that impression and any information about the tire that you can determine (i.e. direction of travel, tire position on the vehicle)
- Place the camera on a tripod and position it directly over the impression. Adjust the height of the camera or adjust the zoom lens so the frame is filled with the impression and ruler. Make sure the camera is positioned so the camera lens is parallel to the impression. Cellular phone cameras **ARE NOT SUITABLE** for examination quality photographs.
- Check the f/stop. For 3-d impression the f/stop should be set on f/16 or higher.
- Take an existing light photograph along with oblique lighting photographs.
- Attach the flash to the camera using a 6 foot or longer extension cord. With a flashlight or lamp determine the height of the oblique light that is best for each impression. Other light sources may be substituted for the flash. **DO NOT** use the flash on the camera itself.



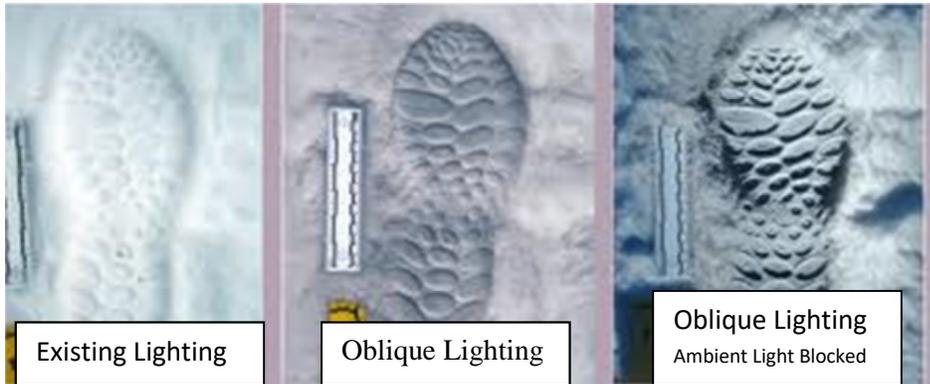
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- Block out any bright ambient light with a screen or cover to maximize the benefit of using oblique light.
- Focus the camera. THE FOCUS SHOULD BE ON THE BOTTOM OF THE IMPRESSION, NOT ON THE RULER.
- When using the oblique light or other light source, hold the flash 4-5 feet from the impression, at varying heights, and aim the flash evenly across the surface of the impression.
- Use a remote or set the camera on an automatic timer to prevent movement of the camera during exposure.
- Move the light to another angle and take additional photographs.
- If the impression is long, photograph in 12 to 18 inch segments with a slight overlapping until at least a 3-foot length is recorded. Again, focus on the bottom of the impression.

Remember to use a scale in every photograph and always focus.



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3. Lifting Techniques for various two-dimensional surfaces

Lift or Technique	Non-porous Dry-origin Original impression	Non-porous Wet-origin Original impression	Powdered impression	Porous – Dry origin Original impression	Porous – Wet origin Original Impression	Comments
Electrostatic	Yes	No	No	Yes	No	Electrostatic lifting is a non-destructive Treatment. It will not harm the impression. Also useful for searching for latent impressions of dry origin.
Adhesive (white/black)	Yes	Yes	Yes	No	No	Primarily used to lift powdered impression from non-porous surfaces
Adhesive Transparent	No	No	Only with fluorescent powders	No	No	Does not provide adequate contrast with original impressions
Strips of Adhesive tape on white card	No	No	Yes	No	No	Larger footprint size lifts are preferred
Gelatin White and Black	Yes	Yes	Yes	Yes	Yes	Versatile on all surfaces



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4. Casting Techniques to Recover Three Dimensional Impressions

Importance of casting:

- Casts are capable of capturing details and qualities that are not present through use of photography
- Life-size mold of the impression
- No focus or lighting problems.
- In the courtroom it's a tangible piece of evidence that is easily displayed and understood by the jury.
- Recovers the maximum amount of detail from an impression.

Mixing:

- Simply involves the combination of proper proportions of water and casting powder; mix these together, pour the mixture in a mold or impression and allow it to set up, then dry.
- Casting materials begin to set as soon as the water and powder come together; its therefore necessary to combine proper amounts and being mixing at once.

Recloseable Bag Method:

- Plastic bags with zipper locks are recommended; should be approximately 2 lb of dental stone powder and 8 oz of water.
- Bag is used to both mix and pour the dental stone mixture.
- Add the measured amount of water to the bag with the stone and thoroughly mix for 3



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minutes; make sure all the material in the bag (corners) is mixed.

- Viscosity should be that of pancake batter.

Pouring:

- Pour the material outside the impression on the high ground and let it flow into the impression; never pour directly into the impression which can damage it.
- Always pour into the dental stone about an inch or two behind the flowing portion.

Drying:

- Casts dry by a chemical reaction that removes the water; this also occurs while mixing and is the reason that the pouring of the material must be quickly done.
- Allow approximately 30 minutes of drying time (60 in snow) before removing them. Then allow 48 hours of room temperature to complete the drying of the cast BEFORE you package it. DO NOT PACKAGE THE CAST IN PLASTIC.

Cleaning:

- DO NOT CLEAN THE CAST. Submit to the laboratory as is and the laboratory will clean it.

4.1 Underwater Casting

- If only partially under water the impressions can be cast with regular casting procedure; pouring the dental stone mixture will simply displace the water in the impression
- If totally underwater the impression can also be cast but these directions should be followed:
 - Place a full casting frame around the impression that is large enough for an extra 2 in of



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space minimum from the impression

- Lightly sift the dental stone powder over the areas of the impression that are underwater until 1 inch of the casting powder covers that area
- Prepare a mixture of dental stone in a separate container in the same manner as dry impressions. Prepare enough so that it will fill the framed area with a 2 in thickness of dental stone
- Add to the framed impression by carefully pouring it into that area allowing it to settle through the water and onto the impression
- Dry for 60 minutes

4.2 Rules to follow

Cast all impressions. The full length of a tire track is needed (3 foot length is desired).

Avoid pouring the mixture directly into the impression. At a low height, pour the dental stone material onto a small piece of cardboard, directing the flow to the impression. Allow the material to pour to the side of the impression, letting the casting material flow into the impression. Once material has flowed into the impression you can pour the casting material into the impression area.

Let the mixture slowly flow into the entire impression with at least 1/2" depth of dental stone.

Allow cast to "set up" for 20-30 minutes.

Photograph the cast at a distance to show location before it is removed.

After the cast is poured, and during hardening, note by an arrow the travel direction of the vehicle (if this can be determined). Also include the date of the cast and your initials. Pry the cast



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carefully to avoid breaking and defacing, and allow to air dry for 48 hours.

Do not package the cast **in plastic!**

DO NOT CLEAN THE CAST! The Lab will do this.

4.3 For impressions in snow - spray the impression with snow print wax (following the manufacturer's instructions), then cast by placing snow in the dental stone to keep mixture cool. Dental stone should be thicker than normal pancake consistency. Cast can be lifted in 60 minutes.

5. The laboratory prepares its own known impressions... submit known vehicles to the lab. It is permissible to take quick photos of the known tires from the suspect vehicle to see if any of the tires could have made the questioned impression.

6. Database search possibilities:

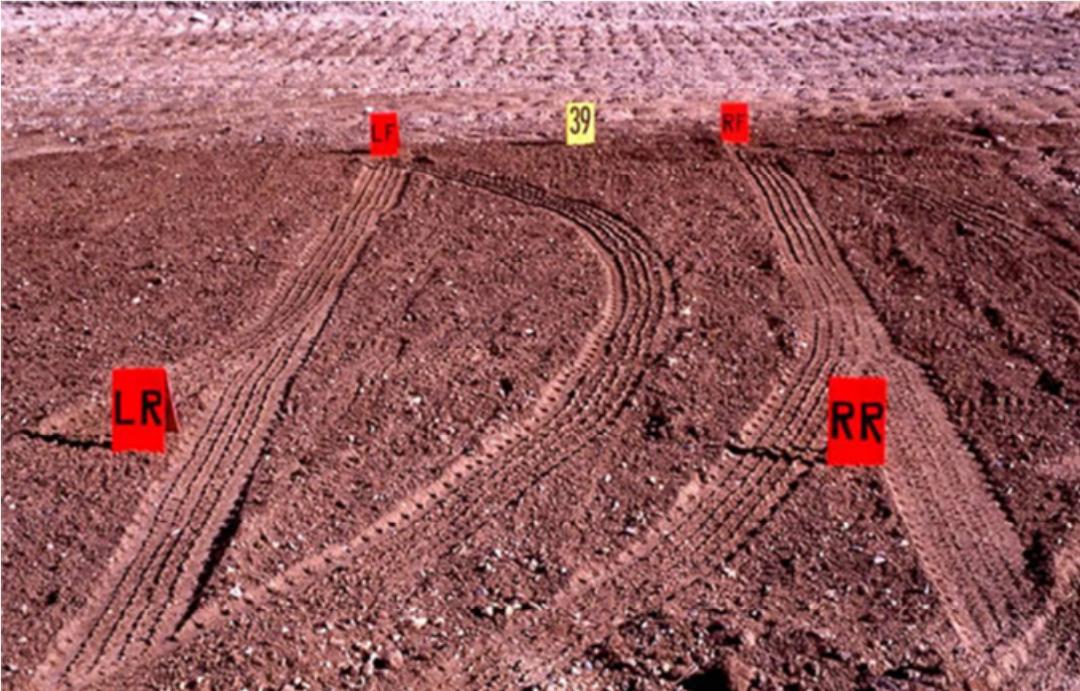
- Footwear - Use the approved FBI request form at the end of this section
- Tire Track - Send the impression to the WVSP lab

7. Submit any and all original evidence: such as shoes, tires, photos, photographic negatives and lifts.

8. Basic Tire Measurements at Crime Scene —Wheelbase, Front and Rear Track Width, Turning Diameter



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Vehicle Turning Sequence Showing Tire Tracks

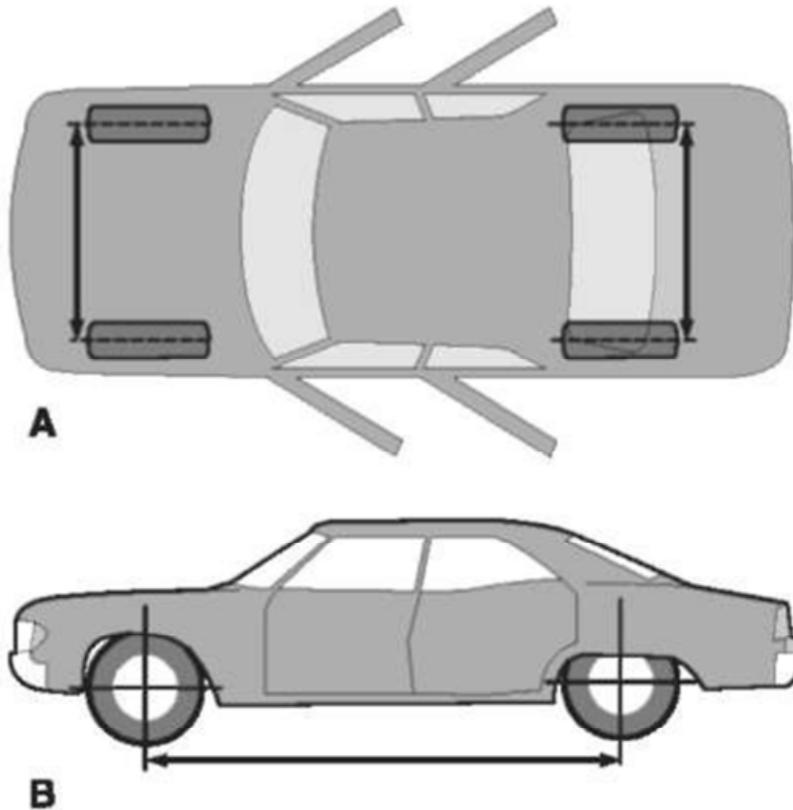
8.1 Track Measurement

A - TRACK WIDTH: Can be measured in four different ways, choose what is appropriate based on the evidence presented:

- Center to center
- Outside to inside
- Inside to inside (plus tread width)
- Outside to outside (minus tread width)



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B – WHEELBASE: Should be measured from the suspect vehicle.

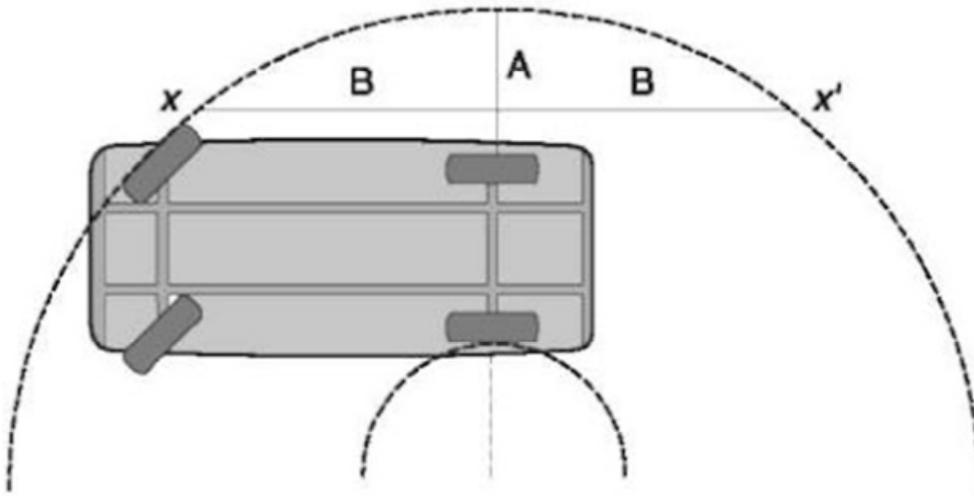
Turning Diameter

The turning diameter is the minimum diameter in which a vehicle turns based on the outer edge of the arc of the front outside tire. Measurements should be obtained from tire tracks when tighter turn tracks are present. This can reduce the number and type of vehicles that would be



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capable of leaving the impressions at the crime scene.



5.6.3 Impression Evidence Reports

1. **Identification** – The evidence impression displays unique damage or defects that, in the examiner's opinion, could have only come from the footwear or tire submitted.
2. **Inconclusive** - There are different ranges of possible inconclusive results that may be reported.



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- i. The evidence impressions and test impressions had sufficient agreement of all discernible class characteristics and some matching individual characteristics. However, the matching individual characteristics were not sufficient for an identification.
 - ii. The evidence impression and test impressions had some apparent differences in class and/or individual characteristics. However, the differences were not sufficient for an elimination.
 - iii. The evidence impression could not be identified or eliminated as being made by the submitted footwear/tires. There are no significant differences in the discernible class or individual characteristics, but there is no significant agreement of individual characteristics.
3. **Elimination** – The evidence impression displays differing design or physical size and dimension as the submitted footwear or tires. The footwear or tires could not have made the question impression.
 4. **Not Suitable for Examination or Comparison** – Due to distortion, size, or other limiting factors, the submitted evidence does not have suitable class or individual characteristics for examination or comparison purposes.



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QDU-8



FBI LABORATORY SHOE PRINT DATABASE SEARCH REQUEST FORM

The FBI Laboratory maintains a shoe print database which contains images of shoe sole designs. This database is used to identify the brand name or manufacturer of shoes based on the design in shoe impressions left at crime scenes.

All requests for searches should be submitted to the FBI Laboratory with a letter prepared on your department's **OFFICIAL** letterhead and should include your agency's address, telephone number and facsimile number. The best searches can be conducted with quality photographs of questioned impressions. For routine searches, it is recommended that the photographs be submitted to the FBI Laboratory at the below address. Expedite searches may be sent via express mail.

Drawings of impressions and facsimiled photographs often limit the extent of the search. If you choose to facsimile the request, attempt to transmit the best detail possible.

Whether the request is mailed or facsimiled, submit the cover letter together with this form providing the following information:

SUBJECT'S NAME: _____

VICTIM'S NAME: _____

TYPE OF CRIME AND DATE: _____

CONTRIBUTOR'S CASE NUMBER: _____

ROUTINE

EXPEDITE

All evidence being submitted to the Laboratory for examination should be sent to:

**FBI LABORATORY
2501 INVESTIGATION PARKWAY
QUANTICO, VA 22135**

PHONE: 703-632-7314/7315/7288

FAX: 703-632-7316



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5.7 DISPOSITION OF EVIDENCE

Most evidence will be returned via Certified U.S. Mail. Due to postal regulations, loaded ammunition cannot be returned by mail. This type of evidence must be picked up from the laboratory. Large evidence must also be picked up from the laboratory (vehicles, safe doors, etc.) By special request, evidence can be picked up rather than returned by mail on a case by case basis.

6 – LATENT PRINTS

6.1 PRIMARY EXAMINATIONS PERFORMED

1. Latent print processing using physical, chemical, and electronic methods.
2. Latent print analysis, comparison, evaluation, and verification.
3. Non-latent fingerprint comparisons (inked, live-scan, etc.).
4. Automated Fingerprint Identification System (AFIS) searches through the WV and FBI databases.

6.2 GLOSSARY OF TERMS

This glossary is provided to assist in explaining terminology unique to the field of friction ridge skin identification in general and the discipline of latent prints in particular. Please use proper terminology, when applicable, when filling out the Case Submission Form.

AFIS – Acronym for **A**utomated **F**ingerprint **I**dentification **S**ystem. An AFIS is a computer system that can search latent prints through a large finger and palm print database in a relatively



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short time. Such databases are found at the WV Criminal Identification Bureau Records Section (CIB Records) or at the FBI.

Digital print(s) – The recording with a digital device of the friction ridge skin on the fingers and/or palms. Digital prints can refer to standard sets of fingerprints, such as those taken at the time of arrest, and which are electronically submitted to CIB Records. Digital prints can also refer to those taken from a suspect or victim for comparison as known prints in a criminal investigation.

Exemplar – Known finger, palm, or major case prints of individuals to be used in a latent or fingerprint comparison.

Elimination prints – Known finger, palm, or major case prints taken of individuals having legitimate access to an area that has become a crime scene or to an object collected from a crime scene. These are usually victims, residents of a home, or employees of a business.

Fingerprint – (1) Friction ridge skin that covers the first joint of the underside of a finger and is distinguished by the presence of a pattern, commonly a loop, a whorl, or an arch; (2) an impression made by this area

Fingerprint comparison or standard fingerprint comparison – A comparison of the fingerprints contained on one fingerprint exemplar to the fingerprints contained on a second fingerprint exemplar. This examination is most commonly performed in conjunction with the identification of deceased individuals or criminal justice procedures involving the linking of previous convictions supported by fingerprints.



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Friction ridge skin – The corrugated skin that covers the underside of the fingers and hands and the underside of the toes and feet.

Inked print – The recording in ink of the friction ridge skin on the fingers and/or palms. Inked prints can refer to standard sets of fingerprints, such as those taken at the time of arrest, and which are submitted to CIB Records. Inked prints can also refer to those taken from a suspect or victim for comparison as known prints in a criminal investigation. Inked prints can also refer to major case prints.

Known prints – Most commonly digital or inked finger, palm, or major case prints taken of individuals and submitted for comparison to developed latent prints. Known prints can be of suspects or submitted for elimination purposes.

Latent lift – A form of preservation of powder-developed latent prints. The developed latent impressions are physically pulled from an area or object using a specialized lifting tape. The tape is then placed on a background of contrasting color to the powder.

Latent print – A touch impression most commonly made of perspiration and oils deposited by the ridges that cover the underside of the fingers and hands (and the underside of the toes and feet). Usually not readily visible (the word latent means hidden), a latent print must be developed in order for it to be seen clearly and preserved.

Latent print comparison – A comparison of a latent print (finger or palm) recovered from a crime scene to a set of known prints.

Major case prints – The recording of all friction ridge skin contained on the underside of the finger and hands. This includes tips, sides, and joints of the fingers and all portions of the palm.



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Nonporous surface - A surface that does not absorb liquid, such as perspiration or oil. Examples of nonporous surfaces are glass, metal, plastic, and finished wood. Latent print processes used on nonporous surfaces would include powder and super glue fuming.

Patent print – A touch impression resulting in the transfer of visible material that has contaminated the ridges that cover the underside of the fingers and hands (and the underside of the toes and feet). The impression commonly can be seen without developing and is often made from blood or grease. Impressions left in soft surfaces such as window putty are often referred to as plastic prints.

Porous surface – A surface that absorbs liquid such as perspiration or oil. Examples of porous surfaces are paper, cardboard, and unfinished wood. Latent print processes used on porous surfaces would include chemicals such as ninhydrin.

Postmortem prints – Known prints of the dead. Postmortem prints are most often used as elimination prints in homicide investigations or to re-establish the identity of an unknown deceased individual.

6.3 COLLECTION OF EVIDENCE

6.3.1 Safety

In addition to having equipment for developing and preserving latent prints, your crime scene kit should include several items of safety gear. Latex gloves, dust masks, eye protection, and shoe covers are an inexpensive way to provide yourself with basic protection from the risks inherent to crime scene work. You should also keep with you a container for any refuse that you create during your processing (empty powder jars, pieces of tape, powder contaminated gloves, etc.) as



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well as a regulation red biohazard bag for any biological refuse (blood contaminated gloves, shoe covers, etc.). Try to leave as little of yourself at the scene as possible.

Caution: Inhaling powder can irritate breathing passages. If powder processing in a closed-in area, such as a small room or the interior of a vehicle, a dust mask is highly recommended.

Caution: If you are superglue fuming, only do so in a thoroughly ventilated area. Avoid breathing superglue fumes that can, in high concentrations, cause severe irritation to the breathing passages. Superglue is a strong bonding agent that can cause damage if it comes in contact with skin. *Note: Superglue fuming should be attempted only after you have been properly trained to do so.*

Caution: If you are processing with chemicals such as iodine and ninhydrin, only do so in a thoroughly ventilated area such as a laboratory approved ventilation hood. *Iodine fumes are highly toxic and corrosive.* Iodine should not be used on metal surfaces and caution should be exercised to protect camera and other equipment. Iodine is also known to be a skin irritant and is harmful to the mucous membranes. *Ninhydrin is highly toxic and flammable.* Ninhydrin should not be absorbed into the skin, as temporary discoloration will occur.

Note: Iodine fuming and ninhydrin processing is not recommended for field use except under special circumstances. Please submit paper and other porous evidence to the laboratory whenever possible.



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6.3.2 Equipment

The following is a list of items recommended for assembling a latent print field kit. While this does not constitute a comprehensive list of equipment, it does represent a list of essential basic items.

Black Powder (commonly for light colored surfaces)

White, Gray, or Silver Powder (commonly for dark colored surfaces, glass, and shiny metal)

Fluorescent Powder (for multicolored or grainy surfaces)

Use of fluorescent powder requires a black light (UV) or some alternate light source before developed prints can be viewed fully. Caution: Wear UV resistant eye protection when using a black light.

Magnetic powder (black, white, gray, or silver) is a suitable alternative for standard and fluorescent powders.

6.3.2.1 Brushes

Brush selection is a matter of choice. Fiberglass, nylon, or camelhair bristled brushes are most commonly used with standard powders. Feather duster brushes are excellent for applying fluorescent powder. Wands/applicators are used with magnetic powders.

Whatever style of brush is chosen, dedicate one brush per color of powder (the exception to this is the wand/applicator used with magnetic powder which can be used with any color). Failure to do this will result in ruining the powders and the brushes.

6.3.2.2 Lifting Tape or Hinge Lifters



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Lifting tape and hinge lifters come in a variety of widths and sizes. Maintain at least two rolls of each width of tape or a box of each size of hinge lifters. **Choose clear lifting tape rather than frosted.**

Rubber lifters are opaque rubber squares and rectangles containing a lifting adhesive on one side. Because of their flexibility, rubber lifters are often used on round, cylindrical, or oddly shaped surfaces. Since the lifted print is reversed and requires correction through digital imaging or photography, a suitable alternative for rubber lifters is polyethylene tape. It comes in rolls, is clear, and is extremely flexible.

6.3.2.3 Backgrounds (black, white, or clear)

Background cards (black and white) can be purchased in multi-packs and are a convenient way to preserve and record latent lifts. When using these cards, place your lift on the glossy side of the card. White, unlined index cards are an acceptable alternative for black powder lifts.

An alternative to background cards is sheet protectors (use clear and not frosted). Because they are large (8 ½ x 11), sheet protectors can hold many lifts on both sides with plenty of room for labeling and diagramming. For black powder lifts, insert a sheet of plain white paper. For white powder lifts, use the black insert that comes with the sheet protector. **Remember to place the lifts on the outside of the plastic and not on the insert.**

6.3.2.4 Camera

Once the latent print has been developed, it must be preserved. Since photography should always be the first form of preservation, a camera is an essential piece of equipment. Since latent print photography can be challenging, a good high-end digital camera with a tripod is recommended first. If this is not possible, satisfactory photographs can still be taken with a simple digital camera.



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Always use a scale (standard or metric) when photographing a latent print. Place the scale close enough to the impression to be seen in the camera's viewfinder, but not so close as to touch the print.

Photographs must be in focus to be of analytical value. A tripod and a shutter cable can help reduce the effects of vibration.

Photographic prints or digital images on disk are both acceptable for submission. A photographic log of latent print photographs is recommended as part of your crime scene documentation.

6.3.2.4 Flashlight

An important piece of equipment for latent print processing is a light source, such as a standard issue flashlight. Oblique, or side, lighting of a nonporous area or of a piece of evidence with a nonporous surface will often expose the location of latent prints.

6.3.2.5 Collection and Packaging Materials

Paper bags and boxes of varying size and evidence seals and labels are essential for collecting and transporting items from a crime scene.

All the recommended equipment can be purchased through one or more of the numerous crime scene supply companies. Contact the Latent Print Section for a list of names and numbers.

6.3.3 Techniques for Developing Latent Prints

Note: Before you begin processing, carefully remove from the scene pieces of evidence to be submitted to the laboratory for processing, particularly biological and trace evidence. Thoroughly document the location of this evidence (photography, diagrams, notes, etc.) before



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removal and keep a complete log or inventory list of these items. Make sure these items have been packaged to the standards of the respective disciplines as set forth in this manual.

A search for latent prints should start at the perpetrator's perceived point of entry and continue through to the perceived point of exit. Be methodical. Make sure to completely finish in one area before moving on to the next. This will prevent areas from being missed.

Before doing any physical processing, make a visual examination of the area or piece of evidence by using the beam of your flashlight. This technique is most effective when the beam is angled across a surface (oblique or side lighting). Latent print residue can often be seen (though not always), and prints in dust are most often discovered in this manner. Once latent print residue has been exposed with light, physical processing can begin.

Note: Do not powder impressions made in dust or other substances such as blood, grease, putty, etc. Impressions such as these should be carefully photographed.

6.3.3.1 Powder Processing

- To process nonporous surfaces with powder, first choose the proper type and color: most commonly, standard or magnetic black for white or light colored surfaces; standard or magnetic white, gray, or silver for black or dark colored surfaces; and fluorescent (with UV) for multicolored or grainy surfaces. There can always be exceptions to the rule depending on the circumstances; however, in order to see what you are developing, you must create a contrast between the powder being used and the surface upon which the latent sits.

Note: Do not use magnetic powder on ferrous metals.



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- Stir the powder with the handle of the brush to break up clumps (not necessary when using magnetic powder). When using standard or fluorescent powders, lightly coat the bristles of the brush by dipping it into the powder (wide-mouth powder jars are best to prevent unnecessary bending of the bristles). When using magnetic, activate the wand/applicator and attract the powder to the magnet (the powder becomes the bristles of the brush).
- If working above a horizontal surface, lightly sprinkle the powder from the brush over the area to be processed. If working below a horizontal surface, or on a vertical surface, gently apply the powder directly to the surface.
- After applying the powder, begin brushing lightly in a circular motion. If ridge detail becomes visible, change to brushing in the direction the ridges are flowing. If possible, do not brush across the ridges. Remember latent prints on nonporous surfaces are fragile and can be destroyed with excessive or too vigorous brushing.
- Once the latent print has been sufficiently developed, clear photographs with scale should be taken as the first step in preservation. This is particularly true of latent prints developed on grainy or textured nonporous surfaces (vehicle dashboards, painted surfaces, vinyl, etc.) where lifting may not secure the print.
- Now, prepare to lift the print. First, blow away the excess powder from the surface. Then, anchor one end of your lifting tape or hinge lifter to a spot on the surface near the print and slowly and firmly press the tape or lifter over the print. If the tape or lifter is not properly aligned or begins to develop air pockets, do not try to start over once the tape or lifter has been committed to the latent print as this may result in the destruction of



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the print. A second piece of tape or a second lifter overlapping the first can correct alignment problems before you lift, and air pockets can be removed after the lift has been secured to a background.

- Large sections of developed latent prints, such as prints that can be recognized as palm prints or fingers placed down simultaneously, should be lifted as a whole and not in sections. If your lifting tape is not wide enough to cover a large section, overlap pieces of tape to cover the print, place pieces of tape perpendicularly across the tops and bottoms of the overlapping pieces as an anchor, and lift them all together.
- Lifts should be placed on a background that creates sufficient contrast with the powder used. If using fluorescent powder, either a black, white, or clear background will suffice. Lifts should be labeled for court identification. Labeling, at a minimum, should include the area or object from which the latent was taken, the lifter's initials and the date the lift was taken. Additional information can be at the discretion of the individual, but more information is usually better than less.
- Evidence processed in the field should be retained and stored in a secure area. Though the lifts will be what are analyzed in the laboratory, the actual pieces of evidence will have to be produced as the source of the lifts should the case go to trial.

6.3.3.2 Other Processes

Though powder is still the most commonly used latent print process in the field, it is not the only process that can be used.

- Superglue fuming (cyanoacrylate) not only can develop latent prints, it can act as a preservative of latent prints by reducing deterioration. Since superglue fumes harden



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latent print residue on nonporous surfaces (making latent prints less fragile) this process can be used, in many instances, prior to sending items to the laboratory for further latent print processing.

Note: Superglue fuming can interfere with the collection of biological and trace evidence. Do not use super glue on items that you wish to be examined by other sections of the laboratory.

Note: Superglue fuming should never be attempted without proper training. Anyone interested in learning this development and preservation method should seek a qualified instructor. Please contact the Latent Print Section before attempting this process for the first time

- Items consisting of porous surfaces will require chemical processing. It is strongly recommended that chemical processing not be attempted in the field. Not only is there a significant health and safety risk, processing with chemicals may prevent the laboratory from using a full range of processes. Please send all items consisting of porous surfaces to the laboratory.

6.3.4 Packaging

Sufficient collection and packaging materials should be taken to the crime scene. Paper bags and boxes of varying sizes should be used for securing collected evidence for removal from the scene.

Evidence should be handled in such a manner as to prevent the collector's prints from being



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placed on the object (gloves should be worn during the collection process). If wearing gloves, care still needs to be taken by the collector so as not to wipe away any latent prints (particularly on nonporous surfaces). Do not handle items of evidence excessively.

Since anything can be a piece of latent print evidence, there are no specific guidelines for packaging. Common sense and imagination can serve the investigator well during this process.

General guidelines include the following:

- If the evidence has a nonporous surface (glass, metal, plastic, etc.), special care should be taken in how the item is placed in the container. Place only one nonporous item in a container. Do not wrap nonporous evidence, particularly firearms, in blankets or cloth. Firearms should be carefully unloaded and strapped down in a box.
- If packaging a fragile item, such as a light bulb or glass, use packing material sparingly. Hand deliver these items when possible.
- Label the container with the essential information needed for court identification. Also place any necessary warning labels in plain view (biohazard, flammable, combustible, sharps or fragile, etc.).
- Multiple items such as lifts and photographs of latent prints can be placed in a single container.
- All evidentiary containers should be sealed according to laboratory guidelines.

6.4 SUBMISSION OF EVIDENCE



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All submissions to the Latent Print Section must meet general laboratory guidelines. Please review laboratory criteria before submitting evidence. Also be aware of any guidelines required by the U.S. Postal Service and private carriers concerning submission of an item considered to be a biohazard, a flammable, and/or a combustible.

There are no restrictions on the type or number of items that can be submitted for latent print analysis with the exception of evidence associated with clandestine laboratories (see next section).

Turnaround time for evidence submitted to the Latent Print Section will vary depending on the type of crime that was committed, the number of items submitted for latent print processing and analysis, the number of other disciplines that will be analyzing the evidence prior to our analysis for latent prints, and the existing backlog at the time of submission.

In general, for latent print specific cases of small or moderate size, allow at least two weeks for a response. For larger cases, allow at least three weeks.

Cases in which the evidence must be analyzed by another section (Seized Drugs, - Biology/Processing, et al.), will add additional weeks to the above time frame.

Always notify the supervisor of the Latent Print Section when there are specific deadlines that must be met.

6.5 CLANDESTINE LABORATORIES

The Latent Print Section will no longer accept certain types of evidence related to clandestine laboratory operations. Examples of the type of evidence that will not be accepted include



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laboratory flasks, beakers, vials, Pyrex containers, generic glass and plastic containers, or any item containing or contaminated with the drug in liquid or dried form.

This reconsideration is due to the hazardous nature of the residue found in or on items used to prepare and store the product being manufactured. The examiners of the Latent Print Section are not certified in the handling of this type of material. Also, since many of the development techniques used in the Latent Print Section involve chemicals, there is uncertainty how these processing chemicals (cyanoacrylate ester [superglue], fluorescent dye stains, etc.) would react, if at all, to the drug residue in or on the items of evidence. Additionally, there is no adequate temporary storage in the Latent Print Section for clandestine laboratory evidence waiting processing.

Since all law enforcement officers have received basic latent print field processing training through the West Virginia State Police Academy, it is recommended that for items made of nonporous material, traditional powder processing techniques be employed by the investigators at the scene. Not only will this insure that these hazardous items will be handled by those with the most appropriate training, by processing in the field a greater opportunity exists to develop latent impressions since the investigator will be working nearer to the time the latent prints were deposited. The techniques for powder processing are fully explained in this manual. Developed latent prints can be preserved through photography and/or lifting and the latent prints can be forwarded to the Latent Print Section in this format. It is also recommended that equipment used for powder processing of clandestine laboratory evidence at the scene be dedicated to that purpose and not used for general latent print crime scene processing.

The Latent Print Section will continue to accept other types of evidence associated with clandestine laboratories such as manuals, “cookbooks,” paper items, commercial drug packaging,



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or any item not contaminated by drug residue.

If there are any questions pertaining to this type of evidence, please contact the Section Supervisor in the Latent Print Section at 746-2185.

6.6 AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM (AFIS)

The following standards refer to evidence submissions to the Latent Print Section of the WVSPFL.

Responsibilities of the Investigator:

- Evidence should still be collected, secured, packaged, and submitted to the Latent Print Section according to the current guidelines as established by the forensic laboratory and as set down in this manual. Evidence is defined as items to be processed for latent prints, latent print lifts, photographs of latent prints, etc.
- Photographs of latent prints should include a scale. The scale can be standard or metric, but the designation must be clearly visible in the photograph. It is recommended that the scale type be listed on the Case Submission Form. If using a digital camera, include on the Case Submission Form the resolution at which the photographs were shot. *Photographs without scales may not be able to be searched by AFIS.*
- The name and complete descriptive data of known suspect(s) should still be provided on the Case Submission Form when evidence is submitted. Whenever possible, known prints of the suspect(s) should be submitted with the evidence.



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- Elimination fingerprints may be submitted with the evidence. It is preferred that latent prints recovered during the investigation of property crimes involving a personal dwelling, a vehicle, or other non-public locations, first be compared to elimination fingerprints before AFIS searches are conducted. Elimination fingerprints are defined as fingerprints of the victim or anyone else who had legitimate access to the collected or processed evidence.
- Qualified latent fingerprint searches through the FBI database via the Next Generation Identification (NGI) can be sent from the West Virginia AFIS.

Additional Information:

- Currently, the databases of the West Virginia State Police AFIS and the FBI NGI consist of the fingerprint cards taken at the time of arrest and which are submitted to the state CIB or the FBI (the West Virginia database also includes non-criminal fingerprint cards). The West Virginia AFIS and NGI will also have the ability to search latent palm prints.
- Latent prints developed in the laboratory on submitted evidence and which meet AFIS and NGI standards are eligible to be searched through the system(s).
- Investigators may submit or resubmit for evaluation latent prints from old cases *still active*. Any latent prints meeting AFIS and NGI standards are eligible to be searched.
- Latent prints not found in the existing database will be stored in the Unsolved Latent File (ULF) and compared to all fingerprint and palm print submissions to the CIB Records Section and the FBI (fingerprints only). Investigators will be notified should a match



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occur. The latent prints will remain in the ULF and continue to be compared until they are matched or until we are instructed to remove them.

- Negative results of the AFIS and NGI searches may be an indication that the contributor of the latent print does not have known finger or palm prints in the West Virginia database or in the FBI database. Additionally, the AFIS may not have been able to make a match due to a lack of clarity caused by distortion in the latent print, the known database prints, or both. Also the area of the finger or palm that made the latent print may not have been recorded on the known finger or palm print.
- **Because the effectiveness of an AFIS or NGI search is dependent upon the quality of the finger and palm prints placed in the database, the taking and submitting to CIB of high quality prints of individuals at the time of their arrest is crucial to the success of the system when used in a criminal investigation.**

6.7 MAJOR CASE PRINTS

Often, the latent prints that are recovered from crime scenes are only fragments of the whole, many times no larger than a few millimeters. If the latent fragment is determined to be of comparison value by the latent examiner, and if a fingerprint pattern or part of a pattern is visible within the perimeters of the fragment, then usually a quality set of standard inked fingerprints should suffice for a comparison.



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However, if the fragment is void of a pattern, then most likely the latent print will have been made by a part of a finger that is not recorded on a standard fingerprint card. There is also the possibility that the latent print could have been made by a part of the palm. It is this type of latent print that will require major case prints.

Full major case prints can be defined as the clear recording of all friction ridge skin on the fingers and hands. This includes finger pads, sides, tips, joints, palms and sides of palms. Though these finger and palm impressions taken as a whole are called major case prints, they can be used in any type of case in which identifiable latent prints are developed.

The procedure and format for taking major case prints are significantly different than recording standard inked fingerprints. There are also alternative methods (modified major case format) in how to take major case prints depending on what the latent examiner needs to conduct a comparison.

When major case prints are required for comparison, the investigator will be notified in the case report issued by the latent print examiner. The examiner will specify what type of major case exemplars are needed, and if necessary, provide a brief description on how to take the needed prints.

Any questions concerning major case prints can be directed to the Latent Print Section.

6.8 DIGITAL MEDIA

Any digital media (smartphone photos, photos from social media, etc.) that contains the underside of fingers and hands can potentially be used for identification of a person of interest. This may be important in photos involving the exploitation of children, individuals



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prohibited from possessing firearms, etc. The photos should be submitted to us on a disk, thumb drive, or in urgent situations, via electronic mail. Submission of digital media evidence must comply with the laboratory policies governing evidence submission.

6.9 THE LATENT PRINT SECTION REPORTS

Upon the conclusion of a latent examination, a report explaining the results of the examination will be issued to the investigator. There is a limited range of interpretation used in latent print examinations. Pieces of evidence (objects, lifts, or photographs/images) either contain latent prints of comparison value or they do not. If there are latent prints of comparison value contained on/in the objects, lifts, or photographs/images, the latent prints will be compared to known finger or palm print exemplars (suspect or elimination) either supplied by the investigator or that are on file in CIB Records or at the FBI. The results of the comparison will be an identification to the exemplar, an exclusion, or the result will be inconclusive.

Identification

Identification is the strongest degree of association between two friction ridge impressions. Identification is the examiner's opinion that based on the observed data the friction ridge impressions have corresponding ridge detail and the examiner would not expect to see the same arrangement of details repeated in an impression that came from a different source. The phrase *was (or were) made by* is also acceptable for latent print cases.



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The phrase *were made by* (or *was made by*, if applicable) is used in reporting the results of a positive non-latent print comparison (standard fingerprint comparison).

Exclusion

Exclusion is the conclusion that two friction ridge impressions did not originate from the same source. Exclusion is reached when in the examiner's opinion, considering the observed data, the probability that the two impressions came from the same source is considered negligible. When the result of a latent print comparison is exclusion, the Latent Print Section will report this conclusion using the phrase *not made by* or a close approximation, such as *did not make* or any variation that will fit the sentence being constructed. The alternate phrasing is synonymous with exclusion, but was chosen as being less confusing to the reader of the report.

The phrase *were not made by* (or *was not made by*, if applicable) is used in documenting the results of a negative non-latent print comparison (standard fingerprint comparison).

Inconclusive

The term *inconclusive* is defined as "the determination by an examiner that there is neither sufficient agreement to individualize, nor sufficient disagreement to exclude." The Latent Print Section only issues an inconclusive result when the available known exemplars are incomplete or unclear and would not allow for a definitive conclusion to be reached. A request for appropriate clear and complete exemplars will be made in the issued report.

6.10 DISPOSITION OF EVIDENCE



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Once the latent print examination has been completed, the evidence, report, and accompanying paperwork will be returned to the Central Evidence Receiving Section for return to the investigator by certified mail or by pick up. Due to space limitations, evidence that the investigator must pick up should be retrieved as soon as possible upon notification.

7- TOXICOLOGY

The **Toxicology Section** primarily performs qualitative and/or quantitative analysis of blood and urine for the presence of ethanol/ other volatiles and drugs of abuse. The section also performs alcohol/volatile and drug analysis on specimens taken from victims of sexual assault, as well as, other crimes where alcohol or drug consumption and/or impairment might be a factor. Another area of analysis performed in the section includes testing of beverages for ethyl alcohol percentage, i.e. moonshine.

EXPEDITED REQUESTS ARE NOT ACCEPTED BY THE TOXICOLOGY SECTION. Please submit your evidence in a timely fashion. Cases are worked in the order they are received, NOT by crime date.

Samples submitted to the lab are analyzed using Headspace Gas Chromatography with a Flame Ionization Detector and Mass Spectrometer for alcohol/volatiles and Liquid Chromatography-Tandem Mass Spectrometry for drug analysis. The Toxicology Section will perform drug testing on blood specimens at the officer's request provided the Blood Alcohol Level is below 0.08% Blood Alcohol by Weight. Special circumstances will be considered for drug testing requests made on samples with a Blood Alcohol Level equal to or greater than 0.08% Blood Alcohol by Weight. For cases requesting drug analysis, cocaine and cocaine metabolite examination will



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only be performed on gray top tubes. No analysis will be performed on specimens submitted in red top tubes.

Please remember that the State Police Toxicology Laboratory will only perform analysis on samples submitted from subjects that are living. All samples from deceased persons should be sent to the Office of the Chief Medical Examiner at the following address:

**Office of the Chief Medical Examiner
619 Virginia St. W
Charleston, WV 25302
ATTN: Toxicology
(304) 558-6920**

7.1 GLOSSARY

- **Alcohol** – The unique chemical compound, ethyl alcohol/ethanol, commonly found in consumable beverages.
- **BAC** – Blood Alcohol Content
- **Forensic Scientist** – A person employed by the Toxicology Section who performs the technical procedures of Forensic Alcohol/Volatiles Analysis and Forensic Drug Toxicology.
- **“Sample” or “Specimen”** – A representative portion of breath, blood, urine, or other biological material taken for the purpose of measuring the alcohol and/or drug concentration.



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- **Gas Chromatograph with Flame Ionization Detection/ Mass Spectrometer** – Instrument used in identifying and quantitating ethanol and identifying other volatiles.
- **Serum** – The liquid portion of a whole blood sample with the red and white blood cells removed. The Toxicology Section divides the serum alcohol result by 1.16 to determine the quantity of alcohol in the blood. (See Hospital BAC Result Conversion Section below.)
- **%** - Grams of alcohol per volume of sample as defined in the WV State Code 17C-5-8(3)(b).
- **dl** - Deciliter – 1 deciliter is equivalent to 100 milliliters.
- **Liquid Chromatography-Tandem Mass Spectrometry (LC/MS/MS)** Instrument used in identifying the type/amount of drugs and/or their metabolites in biological samples.
- **Metabolite** – By-products created by the body's metabolism of the parent drug that was ingested.
- **Concentration** – The weight amount of alcohol contained in a unit volume of liquid or a unit volume of gas under specified conditions of temperature and pressure.
- **Proof** – Twice the alcohol content by volume percent: 20%=40 proof

7.2 CHEMICAL TESTS FOR INTOXICATION

7.2.1 Blood Alcohol Tests



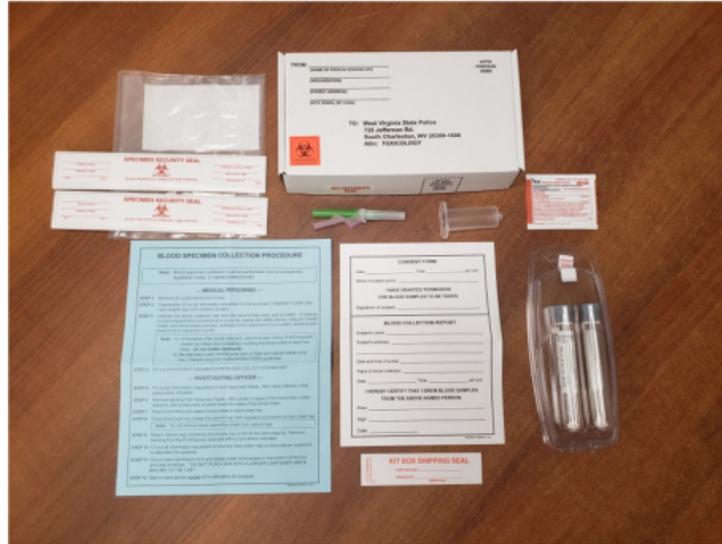
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Blood must be collected in accordance with West Virginia Department of Health Rules and Regulations Section 8.2 (see below). Biological Specimen Kits **should be used**, if available. The Commission on Drunk Driving Prevention provides these kits to local hospitals. Use of the Biological Specimen Collection Kit assures complete compliance with the West Virginia Department of Health Rules and Regulations. These kits contain labels, seals, vacuum tubes, alcohol free swabs, instructions for the phlebotomist, and consent forms. The kit also contains a pre-addressed mailing label and serves as a mailing carton. **IF A KIT IS NOT AVAILABLE, REQUEST THAT THE BLOOD SAMPLE BE DRAWN IN A GRAY TOP BLOOD COLLECTION TUBE.** If the provided blood collection vials have expired, replace them with similar unexpired vials from the hospital stock (Gray Tubes).

Kits do not have to be refrigerated prior to submission, however, if a refrigerator is available, please utilize it for storage until the evidence is sent to the laboratory and after the evidence is returned from the laboratory.



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Blood Collection Kit

7.2.2 Collecting and Handling of Samples

7.2.2.1. Blood Samples

Blood samples are collected by venipuncture from living individuals as soon as feasible after the alleged offense. These samples should only be taken by persons authorized by the West Virginia Department of Health Rules and Regulations: Title 64 Series 10.

Section 8.2: The methods of extracting blood for alcohol analysis shall be as follows:

- a. The blood shall be drawn only by a licensed doctor of medicine or osteopathy, or by a registered professional nurse, or by a trained medical technician at their place of employment.
- b. Sterile hypodermic needles and syringes shall be used. Sterile disposable units are recommended.



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- c. The skin shall not be disinfected with ethyl alcohol. The use of non-alcoholic antiseptics, those that do not contain ethyl alcohol including 1-1000 aqueous solution of mercuric chloride, aqueous benzalkonium chloride (zephiran), aqueous merthiolate, or other suitable aqueous disinfectant is acceptable.
- d. The container (tube or vial) must be clean and dry, and have an inert, airtight stopper.

Please have medical personnel discard the needle used for the drawing of the blood sample.

7.2.2.2 Collection Procedures (Blood)

a. Medical Personnel

Step 1. Remove all components from Kit box.

Step 2. If applicable, fill out all information requested on consent form. Then have subject sign where indicated.



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CONSENT FORM	
Date: _____	Time: _____ am/pm
Name of subject (print): _____	
I HAVE GRANTED PERMISSION FOR BLOOD SAMPLES TO BE TAKEN.	
Signature of subject: _____	
BLOOD COLLECTION REPORT	
Subject's name: _____	
Subject's address: _____	
Date and time of arrest: _____	
Place of blood collection: _____	
Date: _____	Time: _____ am/pm
I HEREBY CERTIFY THAT I DREW BLOOD SAMPLES FROM THE ABOVE-NAMED PERSON.	
Print: _____	
Sign: _____	
Date: _____	

Step 3. Cleanse the site with alcohol free prep pad provided. Following normal hospital/clinic procedure and using the needle with safety device, tube and needle holder, and blood tubes provided, withdraw blood specimens from subject, **allowing both tubes to fill to maximum volume.**

Note: Immediately after blood collection, assure proper mixing of anticoagulant powder by slowly and completely inverting the blood tubes.

****DO NOT RETURN USED NEEDLE, PREP PAD, OR TUBE AND NEEDLE HOLDER TO KIT BOX.****

b. Investigating Officer

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Step 4. Fill out information requested on Blood Collection Report.

Step 5. Fill out any information requested on specimen seal and have collector initial seal where indicated.

Step 6. Remove backing from specimen seal. Place the **center of the specimen seal to the blood tube rubber stoppers**, and then press the ends of the seal down the sides of the blood tube.

Step 7. Return both blood tubes filled, sealed, and initialed back to the holder.



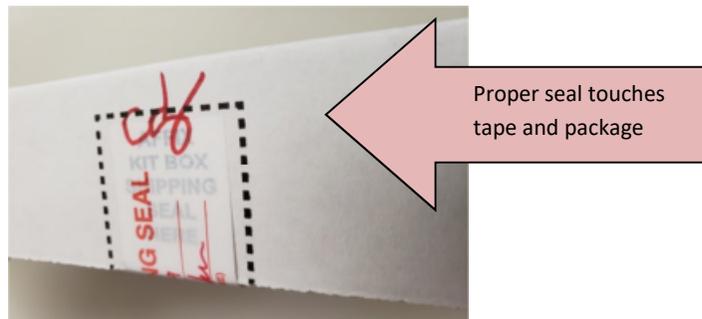
Step 8.

Place blood tube tray inside the ziplock bag, then squeeze out excess air and close bag. * **Note: Do not remove liquid absorbing sheet from ziplock bag.**



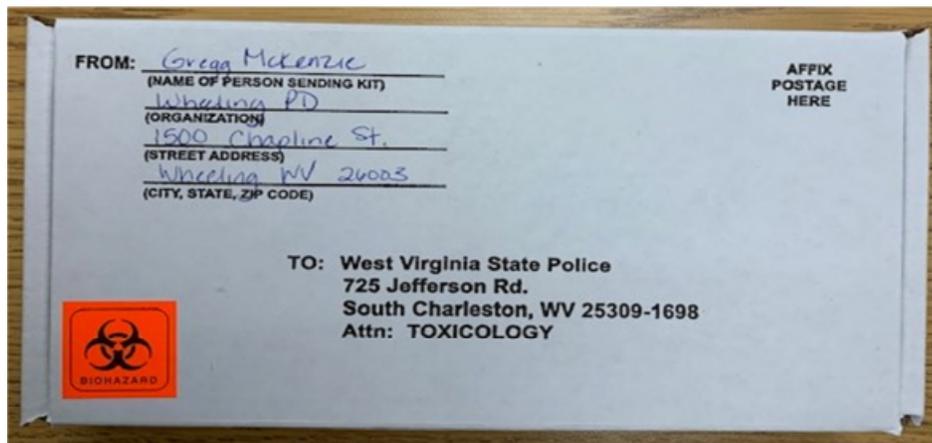
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Step 9. Return consent form and ziplock bag containing blood tube tray to the kit box and close lid. Remove backing from the kit shipping seal and affix to box where indicated.



NOTE: DO NOT REMOVE LIQUID ABSORBING SHEET FROM ZIPLOCK BAG

Step 10. Fill out all information requested on box top.

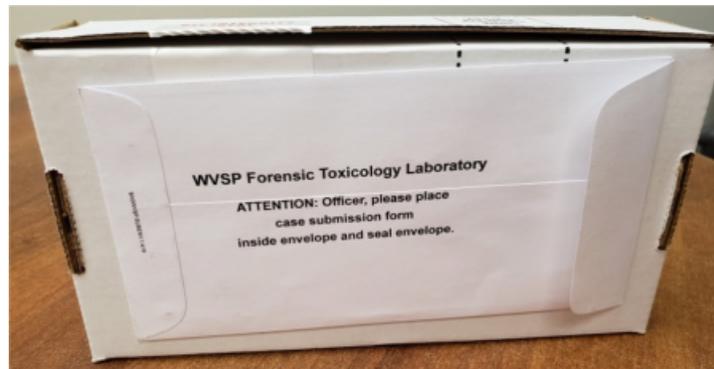




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Step 11. Fill out case submission form (WVSP form 53) and place inside of envelope on the bottom of the box and seal envelope.

DO NOT PLACE BOX INTO A LARGER CONTAINER WHEN MAILING TO THE LAB.



Step 12. Mail or hand-deliver sealed kit to the laboratory for analysis.

Any sample submitted to the laboratory not suitable for analysis (i.e. improper tube, insufficient sample, broken vial or sample completely clotted) will not be analyzed.

DO NOT LIST TOXICOLOGY AS THE REQUEST. One of the following specific requests should be listed on the case submission form:

- Alcohol (BAC)
- Drug Testing
- Alcohol/Volatile Analysis (“huffing”)
- Alcohol and Drug testing



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- Remember a 0.000 reading on the PBT/Intoximeter limits you from listing this request unless volatile (“huffing”) abuse is suspected.

7.3 TOXICOLOGY SPECIMEN COLLECTION KITS (INCLUDED WITH SEX CRIMES KITS)

If alcohol and drug determinations are requested, always submit both blood and urine specimens.

1. Blood collection steps should be performed only by a physician, registered nurse or trained phlebotomist. Sterile hypodermic needles and syringes shall be used. Sterile disposable units are recommended. **The skin shall not be disinfected with ethyl alcohol.** Non-alcoholic antiseptics should be used.
2. In a drug facilitated assault, the likelihood of detecting the drug used to commit the assault diminishes each time the victim urinates; therefore, it is imperative that immediate action be taken to preserve the evidence.
3. **96-Hour Rule.** In a suspected drug facilitated assault, if the drug was ingested within the last 96-hours (4 days), collect the urine and blood specimens.
4. If the provided blood collection vials have expired, replace them with similar unexpired vials from the hospital stock (Gray Tubes).
5. **If the victim arrives with a urine specimen,** label the specimen, seal the specimen, and include the specimen in the Toxicology kit with the one collected by the hospital.
6. **Procedure:**



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Remove all of the components from the box. Complete the appropriate fields regarding the role of drugs and/or alcohol in the sexual assault on the Sexual Assault Kit paperwork.

If **collecting blood** for either alcohol or drug analysis, collect two vials of blood following standard clinical procedures in “gray top” (potassium oxalate/sodium fluoride) 10 ml tubes. Place the blood tubes in the pouch provided and seal. Return the blood sample to the **Toxicology Collection Kit**.

If **collecting urine for drug analysis**, collect 30 ml to 90 ml of urine using standard clinical procedures in the urine specimen container (max capacity 90 ml). Place the urine specimen container in the Ziploc bag provided and seal. Return the urine sample to the **Toxicology Collection Kit**. Seal the kit and affix the Biohazard label to the front of the kit. Fill out a Case Submission form (WVSP Form53) and submit the evidence to the laboratory, if analysis is desired. **DO NOT LIST TOXICOLOGY AS THE REQUEST.**

One of the following specific requests should be listed on the case submission form:

- Alcohol (BAC)
- Drug Testing
- Alcohol/Volatile Analysis (“huffing”)
- Alcohol and Drug testing

7.4 SAMPLE RETURN

Blood and urine samples will be returned to the submitting officer along with a report of results. The submitting officer is responsible for proper storage of evidence until a court order for destruction can be



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obtained.

7.5 ILLEGAL LIQUOR

The alcohol content of “moonshine” liquors, wines and beers can be determined by the Lab.

1. Submit approximately **4 oz.** of the sample to the Toxicology Section. It is not necessary to bring in large quantities of the sample. A representative sample will suffice. Submit the sample in a sealed, leak proof container.
2. Initial all seals.
3. Hand deliver any items that contain a high alcohol content and are flammable.
4. The report will be forwarded upon completion of analysis. Due to U.S. Postal Regulation, we cannot mail back evidence that is flammable; therefore, it **must** be picked up in person.

7.6 HOSPITAL ALCOHOL RESULTS CONVERSION

Blood Alcohol results can be determined from Serum Alcohol results that are obtained from the hospital using the guidelines provided in TITLE 64, SERIES 10, METHODS AND STANDARDS FOR CHEMICAL TESTS FOR INTOXICATION which is set forth by the Bureau for Public Health.

Before performing the following calculations, one must:

- Ensure that the value was determined from Serum
- Ensure that the units of measurement are listed as mg/dL



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COMPREHENSIVE METABOLIC PROF					
GLUCOSE	125		N	70-110 mg/dL	ML
BLOOD UREA NITROGEN	8			6-22 mg/dL	ML
CREATININE	0.97			0.72-1.30 mg/dL	ML
GFR ESTIMATED	> 60			>60 ml/min	ML
SODIUM	135		L	136-145 mmol/L	ML
POTASSIUM	3.5			3.5-5.0 mmol/L	ML
CHLORIDE	99		L	101-111 mmol/L	ML
CARBON DIOXIDE	22			22-32 mmol/L	ML
CALCIUM	9.8			8.8-10.3 mg/dL	ML
TOTAL PROTEIN	7.6			6.0-8.0 g/dL	ML
ALBUMIN	4.4			3.2-5.0 g/dL	ML
BILIRUBIN, TOTAL	0.5			0.0-1.3 mg/dL	ML
AST	29			0-45 IU/L	ML
ALT	23			0-63 IU/L	ML
ALK PHOSPHATASE	72			35-120 IU/L	ML
ALCOHOL SERUM	256		H	<10 mg/dL	ML

ML - CITY HOSPITAL 2500 HOSPITAL DRIVE
MARTINSBURG, WV 25402

1. Take the value 256.0 and move the decimal point 3 places to the left (0.256) to convert the units from mg to g.
2. Take this value 0.256 and divide by a factor of 1.16 as prescribed in §64-10-8 section 8.2 (d)

$$0.256/1.16= 0.22 \% \text{ Blood Alcohol by Weight}$$

PLEASE NOTE: REPORTS ISSUED BY THE WVSP TOXICOLOGY SECTION DO NOT NEED THIS CALCULATION PERFORMED

8 - TRACE EVIDENCE

8.1 EXAMINATIONS PERFORMED

The Trace Evidence Section of the Laboratory is composed of several different categories of testing. The section currently performs analysis in the areas of Primer Gunshot Residue (pGSR) and Fire Debris. Collection, packaging, and submission instructions for these types of analyses are included in this manual. In addition to these major categories, Trace Evidence may perform some miscellaneous examinations, such as material identification. Please contact the laboratory for these types of requests and for specific instructions on collection, packaging, and submission procedures.



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SAFETY CONSIDERATIONS

Trace Evidence may often be associated with biological fluids and biohazard materials. Universal Bloodborne Pathogen Precautions should be observed. Personal protective equipment such as eye protection and gloves is recommended.

Razor blades, scalpels, knives, broken glass, and other sharp objects may be encountered during trace evidence collection. Personal protective equipment such as eye protection and protective clothing is recommended.

8.2 CASE SUBMISSION AND ACCEPTANCE

All submissions to the Trace Evidence Section must meet general laboratory guidelines. Please review laboratory criteria before submitting evidence. Also be aware of any guidelines required by the U.S. Postal Service and private carriers concerning submission of an item considered to be a biohazard, a flammable, and/or a combustible.

Turnaround time for evidence submitted to the Trace Evidence Section will vary depending on the type of analysis requested, the number of items submitted, the number of other sections that will be analyzing the evidence, and the existing backlog at the time of submission.

In general, for cases consisting of three or less items, allow at least two weeks for a response. For larger cases, allow at least three weeks. Cases where the evidence must be analyzed by multiple sections will require a longer time for completion.

Always notify the supervisor of the Trace Evidence Section when there are specific deadlines that must be met.

8.3 GLOSSARY OF TERMS



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Data Sheet: The data sheet contains questions about the incident and the ammunition involved.

GSR: Gunshot Residue is the common term used to refer to primer residue particles that are created during a firearm discharge.

Primer: The ignition component of a cartridge consisting of a friction sensitive compound.

SEM: Scanning Electron Microscope is the instrument used to locate and identify particles that have been collected on adhesive lifters.

Stubs/lifters: Stubs/lifters are the devices used to collect and recover GSR particles. They are circular discs covered with an adhesive.

Accelerant: A substance that is used to accelerate the spread of a fire.

Ignitable Liquid: A fuel (usually a flammable or combustible liquid) that, if present in the fuel load, increases the intensity or progression of a fire.

8.4 PRIMER GUNSHOT RESIDUE

Primer Gunshot Residue (pGSR) is generated from the primer mixture of a cartridge case and consists typically of Lead, Barium, and Antimony. This residue may be deposited on a shooter's hands, face, or nearby surfaces, depending on the conditions at the time of discharge. Gunshot Residue kits are analyzed in the laboratory using a Scanning Electron Microscope equipped with an Energy Dispersive X-ray Detector (SEM-EDS). This allows Primer Gunshot Residue to be identified based on the composition and morphology of the particles present on the samples submitted to the laboratory.



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8.4.1 Instructions for the Collection, Packaging and Submission of Primer Gunshot Residue (pGSR) Samples

The collection of pGSR from persons suspected of firing a gun should be performed with a commercially available GSR collection kit. The collection kit should be designed to be analyzed by Scanning Electron Microscopy. It is necessary to use this type of kit because they employ adhesive lifters for collecting residue. The laboratory cannot examine kits designed for Atomic Absorption (swabs) or Instant Shooter Identification kits.

*These kits can be obtained from *CSI Forensic Supply, Inc., 1-800-227-6020 (part #40316) or other crime scene supply vendors.*





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There is an instruction sheet inside each kit. Be sure to follow the instructions carefully. Support the hand to be sampled by holding the arm above the wrist. Have the subject relax and flex the hand during collection to allow the adhesive access over the wrinkled areas around the knuckles and palm. **Do not peel off or touch the sticky surface.** Use the gloves provided or a pair available to you. Do not include gloves with the samples.

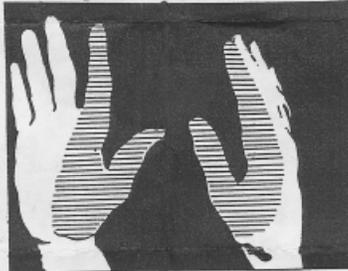
Fill out the Data Sheet (See Sample Form that follows) and submit to the laboratory with the evidence.



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INSTRUCTION FOR COLLECTION OF GUNSHOT RESIDUE

1. WASH your hands.
2. Open GSR kit.
3. Put on gloves.
4. Remove cap from vial marked right hand and press the sticky disc repeatedly on the back of the subject's right hand, concentrating on the thumb, web area, and index finger extending to the index fingertip. Continue to daub the thumb, fingers, and palm until stickiness is gone. Have subject flex open creases in the knuckles and palm to allow sampling in these areas.



5. Place cap with collected residue back in the original vial tightly, and seal with tape if possible.
 6. Repeat items #4 and #5 with the vial marked left hand on the left hand.
 7. Remove the cap from the vial marked "Face" and collect from skin areas of the face. Return to vial and seal.
 8. Label the vials with subject's name and officer's identification. Place vials back into box.
 9. Throw gloves away, seal box, and place identification on the kit.
 10. Prepare a DPS Form 53 and fill out the DATA SHEET on the reverse side of this sheet and submit to Trace Evidence Section of the WV State Police Laboratory.
- ** Do Not remove sticky tape from disc. AVOID collections from wet or bloody areas.
Clothing and Objects may be sampled with these.
- DO NOT SEND IN CLOTHING OR OBJECTS - Sample these in the field as you encounter them.



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GUNSHOT RESIDUE DATA SHEET

Agency _____ Case Number _____

Collecting Officer _____ Date _____

Adhesive lifts were taken: Date: _____ Time: _____

Guns was fired: Date: _____ Time: _____

Type of gun: _____ Caliber: _____

Manufacturer of ammunition: _____

*Please advise for .22 caliber ammunition. Check if brand is unknown:

WINCHESTER

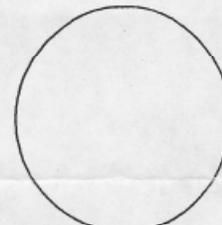
REMINGTON

CCI

FEDERAL



or



Cartridge Base
Sketch

REMINGTON
Yellow Jacket



SQUIRES BINGHAM



PMC



SEARS-FEDERAL



Subject's Name _____ Dead or Alive? _____

Did the subject wash up since the shooting? _____

Does the subject have any debris on the hands or face:
(Dirt, blood, cosmetics, sweat etc.) _____

Subject's occupation and hobbies _____

Discharge Location? (Indoors, Outdoors, Vehicle, etc) _____

Number of Shots and description of activity between the discharge
and sample acquisition _____

Has this subject been in around or in contact with
sparklers, fountains, or any other firework devices? Yes No

**If YES list kinds, types, times and collect dry spent & unspent
device(s) in separate bags and retain for future reference.

Collecting Officer _____



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A manufacture date “MFG” may appear on the kit. This is not an expiration date. There is not an expiration time limit but common inventory practices dictate the use of old kits before new ones.

The kit typically contains three vials with an adhesive layer on the stopper specifically designed for particle analysis using SEM-EDS. One vial is for the right hand, one for the left hand, and the third for the face. Other commercially available kits may contain four vials, labeled as right back, right palm, left back, and left palm. Sample accordingly.



Use a dabbing, up and down motion during collection. Do not rub or streak over the surface. Label the vials with the subject’s name and your initials. Seal the kit and label it with the same information. When you list a GSR kit on the case submission form, include the subject/object sampled in its description.

Primer residue (pGSR) quantities diminish with time and activity. Collect the residue as soon as possible. It is best to collect the samples at the scene before transporting the subjects.



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Surfaces other than skin may be sampled using the typical procedure but the vial needs to be labeled to reflect the respective object. Clothing/objects are to be sampled at the scene when possible. They should not be packaged and transported to the laboratory for sampling unless it also requires attention by other sections of the forensic laboratory (Biology Unit, Latent Prints, Firearms).

Note: Sample clothing being worn by a person while they are dressed. Do not remove the garments since this may contribute to the loss of pGSR particles.

Gunshot residue kits taken from shooting victims will not be analyzed by the laboratory. Analyzing a GSR kit taken from the victim of a shooting cannot answer the question of homicide versus suicide. A shooting victim has clearly been associated with a firearm discharge as a result of their injuries, and analysis of a kit from this subject does not typically provide any more definitive information. It is recommended, however, to collect samples from shooting victims in case of future developments in the case. **Please contact the Trace Evidence Section prior to submitting shooting victim kits.**

If multiple items are submitted from the same subject (GSR kit and clothing from the same individual) the GSR kit will be analyzed first. If pGSR particles are identified on the kit, then the clothing worn by the subject will not be analyzed. If pGSR particles are not identified on the kit, then analysis will be performed on the clothing or other items submitted.

8.4.2 Primer Gunshot Residue Results

Locating and identifying pGSR means that particles that are created during a firearm discharge have come in contact with the surface or surfaces that were sampled. The quantity and location



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of the particles cannot be used to predict the circumstances that occurred during the incident. The presence of primer gunshot residue may be the result of discharging a firearm, having been in the environment where primer gunshot residue was present, or having come in contact with a surface with primer gunshot residue on it.

The lack of pGSR on a sample does not exonerate a person as it can be readily removed from surfaces through washing and normal activity.

Primer gunshot residue analysis **does not** give an indication of the distance from which a firearm is discharged. Please refer to the Firearm/Toolmark section of this manual for Distance Determination information.

8.5 FIRE DEBRIS ANALYSIS

8.5.1 Collection

Collect the fire debris evidence as soon as possible. *Use clean gloves and tools when collecting evidence.* Change gloves for each collection, i.e., change gloves when sampling debris from the kitchen, bedroom, stairs, etc. Do **NOT** include gloves used for collection in the can with the evidence. Clean tools in between each collection.

Take samples from an area where ignitable liquid residues may remain. Attempt to recover debris at the area of the suspected origin or along unusual fire / pour patterns. Porous materials that have not been burned are good samples, as they tend to hold ignitable liquids. Soil samples that may have been saturated by ignitable liquids provide good evidence, however **they need to be refrigerated immediately to help prevent bacterial degradation.**

Place the debris in an airtight, clean metal paint can.

It is very important to use clean containers so the
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Approved By: WVSP Quality Assurance Board

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samples do not become contaminated. Seal the can using a mallet or hammer. Place evidence tape over the top of the can extending over onto its sides. Place your initials on the tape overlapping on each side of the can.

Note: Only fill cans 2/3 of the way full.

Note: Do not place gloves in the can.

Small amounts of liquid may be submitted by placing sterile gauze, cotton, or tissues in a can and adding a few drops of the liquid to be tested. A comparison sample of any absorbent used should be submitted to the laboratory in a separate can.

If you are in doubt about the sample collection, handling or the capabilities of the laboratory in regard to ignitable liquids, please do not hesitate to contact the laboratory.

8.5.2 Results

Any ignitable liquids detected will be reported according to a classification scheme that includes:

Gasoline

Petroleum distillates

Isoparaffinic products

Aromatic products

Naphthenic Paraffinic products

Normal Alkane products

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Oxygenated Solvents

Miscellaneous products

They will be further classified as light, medium, or heavy, when appropriate, and examples of products that fall into this category will be given.

If there are no ignitable liquids identified in the evidence it does not necessarily mean that the fire was not incendiary. Ignitable liquids may have evaporated, washed away during fire suppression, or not used at all.

8.6 MISCELLANEOUS

Any time you are submitting items to that are miscellaneous in nature, you should first contact the Trace Evidence Section Supervisor to ensure that this type of analysis can be performed.

Plastic or tape samples can be examined for physical matches. Please refer to the Firearm/Toolmark Section of this manual for information on physical matches.

8.7 QUALITY CONTROL

The laboratory will examine collection items (metal cans, GSR kits) prior to use by your agency. If quality checks are desired, contact the supervisor of the Trace Evidence Section for more information.

8.8 ANALYSES *NOT* PERFORMED IN TRACE EVIDENCE

Bones or Skeletal Material

Paint Comparison/Analysis

Glass Comparison/Analysis

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Live Improvised Explosive Devices /Explosive Residues

Fiber Analysis

Lamp Examinations (On/Off Determinations)

Hair Comparisons

Soil Examinations/Comparisons

Poisons

You may refer to another laboratory, such as the FBI Laboratory or the Office of the Chief Medical Examiner, or a private forensic laboratory for the types of analyses not performed by the WVSP Forensic Laboratory. You may contact the laboratory for proper collection of these types of materials if needed.