

WEST VIRGINIA STATE POLICE FORENSIC LABORATORY



Revision 1/22/14

FIELD MANUAL

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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.

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 current and 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 growing at a rapid rate. Law enforcement agencies are encouraged to keep regular contact with the West Virginia State Police Forensic Laboratory to keep abreast of any such changes.

1.1 MISSION STATEMENT



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

1.2 INTRODUCTION

The West Virginia State Police Forensic Laboratory 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 West Virginia State Police Forensic Laboratory has been accredited since 1994 by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB). The purpose of the accreditation process is an ongoing monitoring of laboratory operations to assure efficiency and proficiency in laboratory functions.



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The forensic laboratory is composed of several analytical sections and an evidence receiving section. The analytical sections are comprised of trained analysts and examiners with each section managed by a supervisor that reports directly to the director of the forensic laboratory. Analysts and examiners conduct examinations on criminal evidence and prepare reports of their findings for the investigator. If subpoenaed, the analysts 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.

Biochemistry 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 the DNA Database (NDIS). This Section also manages and administers the State's CODIS database.

Central Evidence Processing Section

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

Drug ID Section



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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 will not be performed by the Drug ID Section.

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. Physical matches of any type of evidence except for paper are performed in this section.

Questioned Documents Section

This section performs examinations and comparisons of questioned handwriting, hand printing, and numerals to identify or eliminate known writers. Additional examinations conducted in this section include alterations, obliterations and substitutions to documents, chemical and physical erasures, indented impressions on paper, rubber stamp impressions, ink examinations, printed or typed documents and photocopier comparisons. This section also conducts physical matches of paper.



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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 IAFIS databases which are composed of known fingerprint standards are used for searching unknown latent prints.

Toxicology Section

This Section performs qualitative analysis of blood and urine for the presence of volatiles and drugs of abuse. Quantitative analysis is performed on blood alcohol cases.

Trace Evidence Section

The section performs analysis in the areas of Gunshot Primer Residue (GSR), Fire Debris, Glass, and Paint. In addition, Trace Evidence may perform some miscellaneous examinations, such as speed at time of impact from speedometers and material identification.

For all types of examinations not offered by the WVSP Laboratory such as hair, fiber, poisons, soil, explosive residues etc... The WVSP recommends the submission of evidence to an accredited laboratory.



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The WVSP provides examination of digital and multimedia evidence however such examination is not performed by the Laboratory.

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	WV Office of Laboratory Services



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(anthrax, ricin)	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) Kelly Beatty – Tel: (304) 691-8953
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

Normal work hours of the forensic laboratory are 8:30 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.

Vehicles involved in crimes that are to be submitted for processing must be coordinated with Central Evidence Receiving before transporting.



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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.
3. Evidence or material that was *not* previously examined by another analyst 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



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response has been obtained. Additional information, if necessary, is available in the appropriate discipline section, such as Biochemistry.

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 rush 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 rush situations are discouraged as it will inevitably impact completion of other cases.

1.4 CONTACT INFORMATION

<u>Section</u>	<u>Contact Number</u>	<u>Email</u>
Laboratory Director	746-2132	lab.director@wvsp.gov
Biochemistry	746-2270	biochemistry@wvsp.gov
Central Evidence Processing	746-2412	cep@wvsp.gov
Central Evidence Receiving	746-2472	cer@wvsp.gov



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Drug Identification	746-2142	drugs@wvsp.gov
Firearms/Toolmarks	746-2167	firearms@wvsp.gov
Latent Prints	746-2185	latentprints@wvsp.gov
Questioned Documents	746-2175	documents@wvsp.gov
Toxicology	746-2288	toxicology@wvsp.gov
Trace Evidence	746-2468	traceevidence@wvsp.gov

1.5 EVIDENCE SUBMISSION

1.5.1 General Guidelines

The forensic laboratory has a Central Evidence Receiving Section. This section is comprised of evidence technicians 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.

Laboratory personnel will evaluate the evidence, the 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 report can assist in evaluating the requested services.



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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.

Prepare the Case Submission Form (WVSP-53) *legibly*. A completed WVSP-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 *any* and *all* examinations 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. If the number of items submitted does not fit on one Case Submission Form, *use 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.



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By submitting this form, 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.

Review the *Forensic Laboratory Field Manual* when submitting evidence for specific sections. Each section has packaging requirements and the guidelines from the *Forensic Laboratory Field Manual* should be followed. Please refer to the quick reference guide provided below. All biological evidence **must** be pre-dried prior to packaging and submitting.

Evidence from a case requiring analysis in more than one section can be submitted together, ***but it is imperative that each item of evidence be placed into separate evidence containers and properly sealed.*** A description of the evidence must be placed on the outside of each evidence container (i.e., gun, knife, paint samples,



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questioned checks, etc.). For consistency, the description used on the evidence container should be used on the Case Submission Form. ***The list of items on the Case Submission Form must be an accurate inventory of evidence being submitted.*** Evidence from multiple cases should be submitted in separate packaging and/or separate case submission forms.

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.***



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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 (marihuana, 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, syringe contents, samples



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	from clandestine laboratories etc...
Paper folds and Post-It notes placed into a larger envelope	Small pieces of trace evidence such as glass particles, paint chips, residue amount of powder drugs. Use a Post-It note by placing the trace evidence on the adhesive and folding the Post-It in half to cover the adhesive
Cardboard boxes	Firearms, knives, large pieces of plate glass, surfaces with shoe prints etc....

1.5.2 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



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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 would be:

1. Paper bags not closed or closed with staples (*Note: Do not use staples*).
2. Evidence tape on a container without identifying initials.
3. Bags or envelopes that are sealed, but intrusion can be made easily without detection.



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4. Bags or envelopes improperly sealed and containing evidence such as loose powder, paint chips, 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
	Paper clips, binder clips, etc...

1.5.3 Safety



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Investigators must always be aware of the potential dangers attributed to the 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.

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/Toolmark 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.



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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.

1.5.4 Labeling of Packaging Containers

Proper labeling of evidence containers will warn laboratory personnel of the potential hazard of the items enclosed. Be aware of the federal laws governing submissions through the US Mail, regulations for sending packages by private carrier, and laboratory policies for proper submission. Always keep in mind the individual who will be 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.



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Sharps Evidence such as knives, blades, hypodermic needles, broken glass, 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**.

1.6 SUBMISSION OF EVIDENCE

Case Submission Form (WVSP-53)

Authorized individuals will prepare the Case Submission Form (WVSP-53) when submitting items of evidence to the forensic laboratory for analysis.

The Case Submission Form is a self-carbon form that will be prepared by the investigator by typing or *legibly* writing the information. The original (white) and two copies (pink and canary) will be placed in the mailing envelope. The submitting officer



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will retain a copy (goldenrod). The forensic laboratory will return a receipt copy to the submitting officer at the time a report is issued.

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

Items of evidence received at the Laboratory for examination purposes without a properly completed Case Submission Form **will not be accepted until the form is submitted.**

Other police agencies may obtain the Case Submission Form from local State Police detachments or by preparing a written request on agency letterhead. Send the request to the State Police Procurement Division, 4124 Kanawha Turnpike, South Charleston, WV 25309-1698 or fax it to 746-2239.



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Additional Forms

Special forms may be required for specific types of evidence. See individual section entries in this manual for complete instructions.

1.7 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 in court proceedings 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 most 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 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.

Remember that the shortest chain-of-custody is usually the strongest chain.



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1.8 METHODS OF SUBMITTING EVIDENCE

1.8.1 US Mail, Private Carrier or Personal Delivery

Evidence can be submitted by the use of US Mail, private carrier or personal delivery. Whatever method is used, proper documentation must be recorded for chain-of-custody purposes.

Evidence can be sent either regular US Mail or by Certified US Mail. Since certified mail requires a return receipt to be signed by the individual receiving the evidence, this is the recommended method for mailing evidence (provided there are no restrictions on the type of evidence being sent). Not only does the receipt provide a permanent record of the transaction, certified 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.

Personal delivery of evidence to the laboratory can be accepted by evidence technicians during regular working hours (8:30 a.m. to 4:30 p.m.). Personal delivery is advisable on



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large items of evidence or 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.

1.8.2 Vehicle Processing Garage

The State Police Forensic Laboratory has a facility to process vehicles that are seized as evidence in criminal investigations. Some of the types of examinations that are performed on vehicles include latent prints, biological material, trace evidence, and bullet recovery. The forensic laboratory will process vehicles regardless of the agency investigating a case. The following is the protocol for submitting a vehicle to the laboratory:

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. Arrange to have the vehicle transported to the laboratory. Take into account the weather conditions.



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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. Inventory the vehicle prior to submitting it to the laboratory.
5. A Case Submission Form ***must*** accompany the vehicle with pertinent information and type of analysis desired on the vehicle.
6. Upon receiving the vehicle at the laboratory, an analyst or examiner will fill out a Vehicle Processing Receipt form and provide it to the officer accompanying the vehicle. The actual transfer of the vehicle will be made to a member of the Central Evidence Receiving Section.
7. 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.



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8. The laboratory will not release the vehicle to anyone other than an authorized representative of the submitting agency.

1.9 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:

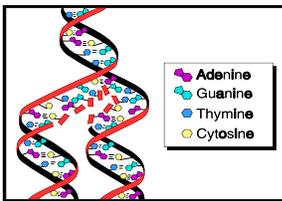
<http://www.nfstc.org/bja-programs/crime-scene-investigation-guide/>

Forensic training specifically designed for law enforcement is periodically provided by the National Institute of Justice. For further information, go to <http://www.nij.gov/training/Pages/law-enforcement>



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2- BIOCHEMISTRY



Biochemistry is the section of the laboratory that performs DNA analysis from evidentiary items. 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 Central Evidence Processing (CEP) section. CEP will issue a report detailing the results of their testing and if DNA analysis is needed, CEP will retain cuttings and/or swabs from the bulk evidence. DNA analysis will be conducted on the retained material and a DNA report will be issued detailing the results of the testing.

2.1 GLOSSARY OF TERMS

Biological Material: any material that may contain human DNA: blood, semen, saliva, skin, sweat, hair, etc.



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- PCR:** Polymerase Chain Reaction; a method of cloning small amounts of DNA to produce large amounts of the same DNA.
- STR:** Short Tandem Repeat; DNA regions with repeat units that are 3 to 7 base pairs in length; highly variable among individuals
- Locus:** A unique location on the DNA molecule possessed by every individual. Examples would be D3S1358 or D21S11
- Allele:** the generic term describing the different versions of DNA that may occur at a locus. Each person possesses two alleles at each locus. These alleles may be the same or different and will have a numerical designation.
- Genotypes/DNA Profile/DNA Results:** The collection of allele values for each locus obtained from a sample.

2.2 CASE ACCEPTANCE POLICY

To maximize use of the resources available, the following case acceptance policy has been adopted.

1. Only cases that are of criminal nature will be examined. Civil cases will not be examined. All paternity cases are considered civil cases.



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2. 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.
3. Only "open" cases that are being actively investigated will be tested. Closed or adjudicated cases will not be examined. Cases submitted under the post-conviction DNA analysis law will be examined upon proof that all preconditions have been met.
4. When a case is received into the Biochemistry section and additional information is needed, a letter detailing the information is sent to the investigator. The investigator is given 90 days to complete this request and if necessary after the 90 day window has expired, the laboratory reserves the right to return the case unexamined.
5. All reference specimens of identified individuals should be collected and submitted prior to DNA analysis.
6. Due to the expense of doing DNA analysis, the lab will be limited as to the number of samples that can be examined per case. The following are general guidelines for the maximum sample selection per type of case involving one suspect and one victim.
 - a. Homicide: 8 samples
 - b. Sexual Assault cases: the most intimate samples first, then one or two additional samples if needed.
 - c. Other case types including property crimes: 4 samples
7. 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



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- safety is a concern will be examined upon proof that all preconditions have been met. An expedited request should be made in writing.
8. The laboratory requires **at least 10 business days to complete a DNA analysis case**, once all required items are submitted that are necessary to generate results and render an opinion (i.e. reference samples, consumption order, etc.).
 9. A consumption letter from the prosecutor giving the laboratory permission to consume a sample is required before testing can begin.

2.3 EVIDENCE

2.3.1 Collection

The sensitivity of DNA analysis allows a large variety of samples to be tested. Generally, any cellular material can be used as a source of DNA. The following is a list of potential sources of DNA.

Sources of DNA: blood, semen, saliva, skin, sweat, hair roots, bone, tooth pulp, etc.

Potential Evidence: weapons, clothing, sex crime kits, pop cans/bottles, chewing gum, hairs, cigarette filters, masks, envelopes/stamps, fingernail scrapings, etc.

DNA recovery can be unpredictable. Many factors influence the recovery of DNA from a stain including age, exposure to light, moisture, heat and other environmental insults. With the increased sensitivity of DNA analysis, there is a greater chance that accidental contamination can be detected. Contamination can occur by introducing foreign DNA



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into a stain while collecting or securing it; or contamination can be a transfer of DNA from one piece of evidence to another within a crime scene. Therefore, every precaution should be taken to reduce possible sources of contamination when evidence is collected.

These include the following:

- Wear protective equipment (i.e. gloves, masks, booties, and gowns) when collecting biological evidence.
- Change gloves frequently and between samples.
- Sterile collecting material such as swabs or gauze should be used to collect evidence. Swabs should be lightly moistened with **distilled** water prior to collecting dried stains.
- Use clean tools with each sample being collected (razors, forceps, swabs, etc.). Alcohol or bleach solution should be used for cleaning.

When collecting evidence for DNA analysis the following measures should be taken.

- Collect the entire item or take a cutting of the item.
- Collect sufficient material for testing and preservation. When possible, **collect at least 2 swabs** of a suspected biological material.
- Document how the swabs were collected, simultaneously (at the same time) or consecutively (one after the other).
- When collecting a small stain, attempt to concentrate the stain on the tip of one swab.

2.3.2 Reference Samples

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A package containing known specimens must be labeled with the name 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 named source of the known specimens.

2.3.2.1 Known Reference Samples

Must be submitted from individuals involved in the incident under investigation or who may have deposited biological material that has been collected as part of the investigation. **A sample will be needed even if the individual is believed to be in CODIS.** The reference sample may be a blood sample or buccal (mouth) swabs.

- Blood Sample
 - The liquid blood sample needs to be collected by qualified medical personnel in a purple top vial (EDTA).
 - Collected blood samples should be refrigerated, if possible.



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- Blood samples submitted for *DNA analysis* should be labeled *BIOCHEMISTRY*. A blood sample submitted for *alcohol or drug analysis* should be labeled *TOXICOLOGY*.
- A sample of blood taken from a wound is not an acceptable known sample.
- Buccal Swab
 - A minimum of four sterile swabs should each be swabbed against the inside of the individual's cheek.
 - The swabs should then be air dried, if possible, and returned to their original packaging.

2.3.2.2 Elimination Reference Samples

Elimination references are individuals who are not suspected of being a victim or suspect in a criminal investigation but may still have deposited biological material that could be collected as part of the investigation. These are used to eliminate DNA profiles that could not have originated from the victim or other identified individuals. The investigator can assure the individuals that the



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sample **will not be entered into any database** and will only be compared to the samples collected from the associated case.

- Property Crimes –If the possibility exists that the DNA could have been deposited by individuals not involved in the crime such as the occupants of the building, then the investigator should collect reference samples from all possible contributors for elimination purposes.
- Sex Crimes – if the victim of a sex crime indicates that consensual sex has occurred prior to the assault or if there is a reasonable possibility that another individual’s DNA may be present on the clothing, bedding or other submitted evidence then elimination reference samples should be submitted from these individuals.

2.3.2.3 Convenience Samples

Collected when there is a lack of sufficient probable cause to obtain reference samples from suspected individuals. Investigator should be able to document that an individual used the item submitted (cigarette filter, cup, straw, bottle, etc.) and it is reasonably expected to contain DNA from only the user. Upon



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collection of the item it should be treated as evidence with a documented chain of custody.

The DNA profile obtained from the convenience item can be compared to the DNA results from the evidence. **The conclusion in the report will compare the questioned sample(s) to the item submitted as a convenience known and not to the individual in question.** If the profile appears to match the report confirming the match can be used as probable cause to obtain a reference sample from the suspect. **A known sample will need to be obtained and submitted to the laboratory for comparison purposes.**

2.3.3 Packaging

- Allow all wet samples to dry thoroughly before packaging.
- Package items individually into some type of paper container. **Do not package items in plastic.**
- If biological materials are packaged wet or in plastic (both encourage the growth of bacteria and mold), the materials may be deemed unsuitable for analysis by the laboratory and returned unexamined.
- Seal and label all packages thoroughly.

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



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regulations and guidelines for packaging biological specimens in the Domestic Mail Manual, Section 601: Mailability.

- Liquid biological material 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.

- Use the following guidelines to package and preserve samples for storage and transport to the laboratory:
 - Package all dried biological samples individually in sealed paper containers.
 - Package all sharp objects in a manner that prevents the possibility of puncture.
 - All packages should be labeled for content and marked with a biohazard label.
 - Package clothing individually in paper bags or in paper wrap 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”.



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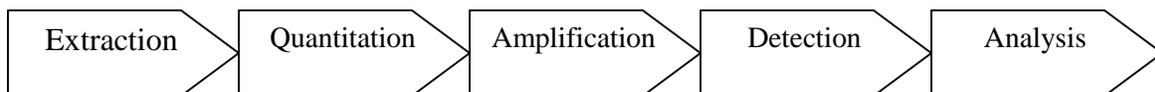
2.3.4 Submission

While it is recommended that all possible items of evidence be collected, it is practically impossible for the laboratory to analyze every item of evidence or stain collected.

- Rank evidence based on relative probative value.
- Avoid submitting samples that may provide duplicate information.
- Clearly identify the forensic examination requested for each item on the Case Submission Form (WVSP Form 53) i.e. gunshot residue, latent prints, DNA.

Initially, Biochemistry will only test a limited number of samples in any given case. If the originally tested items do not prove to be of probative value then additional items can be tested. If the probative value of evidence cannot be established, the laboratory reserves the right to deny analysis.

2.4 DNA TESTING METHODS



2.4.1 Extraction



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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 Biochemistry section uses silica-based DNA binding chemistries. This process can be performed either manually or using a liquid handling robot.

In sexual assault cases where spermatozoa have been identified, a differential extraction technique is utilized. This is a multi-step process where the epithelial cells or non-sperm cells are separated from the sperm cells. The result is two samples or fractions: the e-cell fraction and the sperm fraction.

2.4.2 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 Biochemistry 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.

2.4.3 Amplification

The purpose of PCR amplification is to make many copies of particular regions of the DNA molecule through a series of heating and cooling cycles. The Biochemistry section performs autosomal STR testing using a kit that targets 16 loci or locations on the DNA molecule, which include the 13 CODIS core loci and a sex-determining region.

The Biochemistry section also performs Y-STR testing. Y-STR testing is useful in cases such as digital penetration sexual assaults, fingernail scrapings, contact body swabs, etc.



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These cases would have high levels of female DNA in the presence of minor amounts of male DNA. 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 from generation to generation without changing. Therefore, all patrilineal related male 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.

2.4.4 Detection

The Biochemistry section uses a genetic analyzer to perform capillary electrophoresis (CE). CE separates the amplified DNA product based on size to permit subsequent identification.

2.4.5 Analysis

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.

2.5 BIOCHEMISTRY SECTION REPORTS

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



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- 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.
 - Exclusion – The DNA profile of the reference donor is **not** consistent with the DNA profile of the evidentiary sample or the reference donor could **not** have contributed to the mixture of DNA obtained from the evidentiary sample.
 - Inclusion – The DNA profile of the reference donor is consistent with the DNA profile of the evidentiary sample or the reference donor could have contributed to the mixture of DNA obtained from the evidentiary sample. If an inclusive statement is made, then a statistical calculation will be generated for the sample.
 - Inconclusive or No Conclusions – The reference donor could neither be included nor excluded as a contributor to the DNA result obtained from the evidentiary sample. Some examples would include low-level results, partial results, too many contributors, etc.
 - No Results – No interpretable results were obtained from the evidentiary sample.



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- DNA Results Chart – a chart provided as an attachment to the report detailing the results of the evidentiary and reference samples.

2.6 CODIS

The CODIS (*CO*mbined *DNA* *I*ndex *S*ystem) program is a national database of offender, forensic unknown (casework) and missing person DNA profiles. Each state collects and types blood specimens from all individuals convicted and/or arrested of crimes that have been designated as qualifying offenses for that state's CODIS program. The offender DNA profiles are compared to casework profiles in the WV database and are then sent to the national database to be compared against the forensic unknown (casework) profiles submitted by participating states. The offender database is compared to the forensic unknown database to identify possible suspects in crimes where DNA has excluded a suspect or where a suspect was never developed. The forensic unknown database can also be compared to itself to connect crime scenes together based on the presence of a particular DNA profile(s).

The missing persons and unidentified human remains database can be used to identify bodies by comparing the DNA profiles to both the convicted offender and forensic unknown databases. Individuals related to a missing person may have their profiles entered into CODIS to produce a database for search purposes or "known samples" like toothbrushes from the missing person may be submitted to produce a searchable profile. Reference samples submitted by relatives of missing persons are **not** searched against the offender or forensic databases.



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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. The CODIS Administrator can confirm if an individual has had a sample collected and whether that sample has been uploaded to the database. Submit the request 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 and fax to 304-746-2409. If a name provided to an investigator proves to be probative then the lab will require a known blood specimen from that individual to confirm the CODIS match.

Kits to collect convicted offender blood samples are provided by the Biochemistry Section. *The Database and Databank Act of 1995* (WV Code 15-2B) allows the WV State Police to collect samples from individuals convicted of all felonies and other specified crimes. The CODIS (*CO*mbined *DNA* *I*ndex *S*ystem) blood kits are used to collect these samples. The kits can be used to collect **ONLY** this type of sample. The Biochemistry Section distributes collection kits free of charge to corrections facilities and other collection sites. Collection sites can receive kits by contacting the Section at laboratory.kits@wvsp.gov

The Biochemistry Section also distributes buccal collection kits to Sheriff's Offices and other agencies charged with collecting DNA samples from the following:

- Individuals convicted of a qualifying offense but not incarcerated



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- Individuals who are required to register as a sex offender but did not give a sample under another provision of the law
- Individuals who are convicted of a qualifying offense (felony in West Virginia), move to West Virginia and are required to be under state supervision, if they have not given a DNA sample in the state where the conviction occurred.

These kits are to be used only for CODIS related collections since they will not be treated as evidence.

3 - CENTRAL EVIDENCE PROCESSING

Evidence 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



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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 Biochemistry Section of the Laboratory.

The Evidence Processing Section of the Laboratory will issue a preliminary 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.

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.

3.1 GLOSSARY OF TERMS

Biological Material: Any material that may contain DNA: blood, semen, saliva, skin, sweat, hair, etc.



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- 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. “Seminal fluid 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.
- Known Reference Specimen:** A biological material (usually 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



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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.

3.2 CLEAN TECHNIQUE:



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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.

Use clean tools with each sample being collected (razors, forceps, swabs, etc.).

3.3 SAFETY

Use universal safety precautions when processing evidence. ***Remember, you are responsible for your own safety.*** All investigators need to be familiar with all the



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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 is needed for specific jobs.

Practice good hygiene.

Take responsibility for yourself and co-workers.

3.3.1 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.

3.3.2 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



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certain work tasks. Investigators must realize that one accidental exposure to blood borne pathogens can result in serious health effects.

3.3.3 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.

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.



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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.

3.3.4 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, 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.



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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.

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



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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).

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.

First aid on victims of accidents, violence, or those experiencing medical emergencies.



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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.

3.3.5 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).

3.4 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 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. Therefore, every

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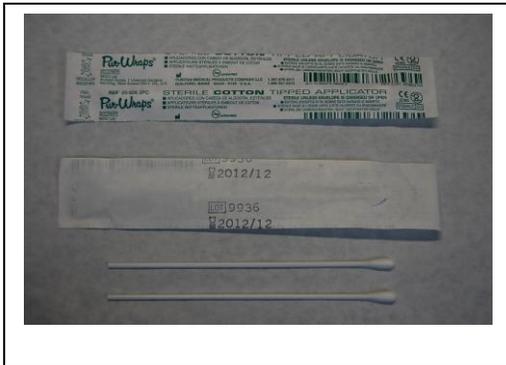


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precaution should be taken to minimize possible sources of contamination.

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.

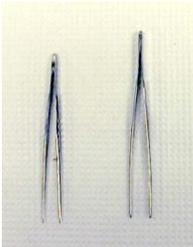


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Do NOT collect samples using culture swabs, which promote bacterial growth.

Culture swabs have a hard plastic tube with liquid and are designed to keep the swab wet.



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.



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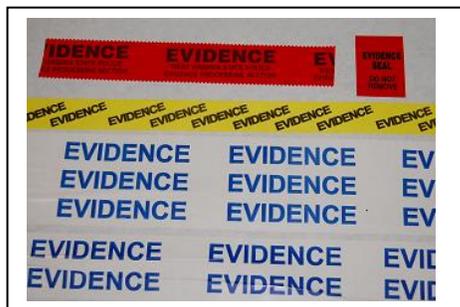
Clean and dry them thoroughly with soapy water or with 10% bleach after each use. Replace disposable blades after each use.



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

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.



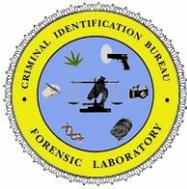
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3.5 SEX CRIME KITS

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 Biochemistry Section. Hospitals can receive kits by contacting the section at the following number: 304 746-2412 or sending a request via email to laboratory.kits@wvsp.gov

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



West Virginia State Police Forensic Laboratory Field Manual

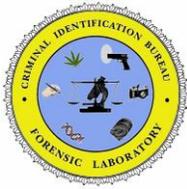
3.6 COLLECTION OF EVIDENCE

DNA recovery can be unpredictable. Many factors influence the recovery of DNA from a stain including age, exposure to light, moisture, heat and other environmental insults. Collect a sufficient amount of material for testing and preservation.

Evidence should be collected and dried as soon as possible to avoid degradation and bacterial contamination. DNA evidence can be adversely affected by heat, humidity, sunlight, and bacterial contamination, and steps must be taken to minimize these conditions.

Possible contamination can be reduced with the use of clean tools and sterile material to collect evidence. Instruments such as scissors or knives should be thoroughly cleaned with soapy water or 10% bleach and dried thoroughly before and between each use. Sterile collecting material such as swabs and gauze should be used to collect evidence. The most important safeguard to contamination is the wearing of gloves during the collection process. Gloves not only protect the evidence, but they also protect the collector of the evidence from potential biohazards. Likewise, the proper packaging of evidence can prevent contamination.

3.6.1 Collection Methods



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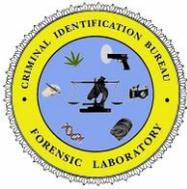
Since the advent of DNA testing on forensic samples, emphasis has been placed on the collection of biological material in a proper manner, to minimize the chances of contamination.

Investigators of a crime scene should develop a strategy for collecting evidence. This section will provide suggestions for collecting biological material.

Collect the entire object - Examples include clothing, knives, guns, and pieces of glass. This method is recommended unless the potential exists for losing the evidence or a portion of the evidence during packaging or transport.

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.

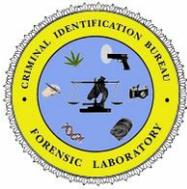


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4. **Make sure the stain cutting is completely *air-dried* prior to packaging.**
5. Package the cutting into some type of paper container and seal.

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 a sterile swab or gauze pad (approximately the size of the stain) with distilled water. **Use distilled water only.**
4. Place the swab or gauze onto the stained area and absorb as much of the stain as possible by moving the collection material gently back and forth across the stain.



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Note: if there is sufficient amount of sample present, multiple swabs should be taken. If the stain is very small, then it is better to concentrate the stain onto the swab tip, rather than to have the sample diffused over the entire swab.

5. Label the swab with some type of identifier noting from where it was collected.
6. **Make sure the swab is completely *air-dried* prior to packaging.**
7. Package the sample in some type of paper container and seal.

3.6.2 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 West Virginia State Police Forensic Laboratory. 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



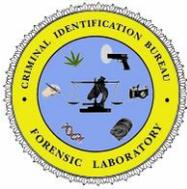
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surroundings.

2. Photograph or sketch the location of the hairs that are collected.
3. Use a clean a 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.

3.6.3 Known Reference Samples

Reference samples must be submitted from individuals involved in the incident under investigation. The preferred reference sample is two swabs of known saliva. When collecting known saliva swabs, at least two swabs (but not more than six) should be collected by rubbing the inner surface of the cheeks for 10 to 15 seconds. The swabs should be air-dried and placed in a clearly labeled envelope for submission to the laboratory.



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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.

Blood samples submitted for *DNA analysis* should be labeled **BIOCHEMISTRY**. 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 name 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 named source of the known specimens.

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

3.6.4 Packaging of Biological Material

All 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



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growth of bacteria and mold), the materials may be judged unsuitable for analysis by the laboratory and returned unexamined.

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: Mailability. Liquid samples submitted to the laboratory must comply with this section of the manual.

Liquid samples, urine samples, or any other liquid biological material 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.

Biological samples collected for possible testing must be air-dried before packaging. Packages used for biological materials must maintain the samples in a dried state. Use the following guidelines to package and preserve samples for storage and transport to the laboratory:

Package all dried biological samples individually in sealed paper containers. The paper



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containers allow the samples to breathe and encourages dryness.

Package all sharp objects in a manner that prevents the possibility of puncture.

All packages should be labeled for content and marked with a biohazard label.

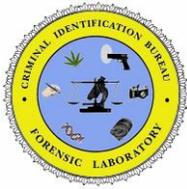
Package clothing individually in paper bags or in paper wrap and seal with tape.

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".

3.7 SUBMISSION OF BIOLOGICAL EVIDENCE

While it is recommended that all possible items of evidence be collected, it is practically impossible 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

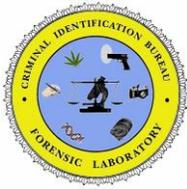


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values and submitted accordingly. For example, in cases with numerous pieces of evidence, avoid submitting samples that theoretically will provide duplicate information. Initially, Central Evidence Processing will only accept a limited number of samples 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.

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 Central Evidence 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 Biochemistry, it is very important that the Case Submission Form clearly identifies which items are to be examined for gunshot residue.

3.8 PROCESSING SECTION REPORTS



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Preliminary 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:

Preliminary Reports

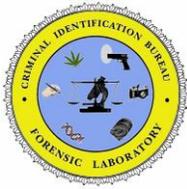
“Biological samples were collected and are being transferred to the Biochemistry Section. The remaining items are to be returned.”

Samples have been retained by the laboratory for PCR-based DNA analysis. The remaining items, which are sometimes packaging only, are being returned to you for safekeeping, later additional analysis, or until it is needed at trial.

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

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.



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“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 identified 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.

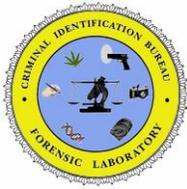
“Based on the test performed, no seminal fluid was identified from the item.”

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.



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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 Biochemistry 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 Processing Section will request the needed known specimens in their report.

“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. However, if a suspect is developed during the course of the investigation, please submit known specimens from that individual for comparison purposes.



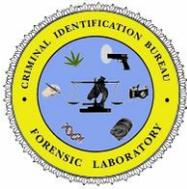
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4 - DRUG IDENTIFICATION

Drug evidence includes powders, liquids, tablets, capsules, and plant material samples suspected of being or containing controlled substances. The Drug Identification 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 drug analyst is what controlled substance(s) and/or regulated chemical(s) are present, if any.

All cases submitted to the Drug Identification Section require an agency case number, officer contact information, suspect name, signature of the prosecuting attorney or task force supervisor, and a court date provided by the prosecuting attorney. 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



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maximum of three attempts will be made with each attempt being approximately a week apart. Upon the second attempt, the analyst will notify the agency that the evidence will be returned unanalyzed if a response is not received. If a third attempt is necessary, the analyst 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 analyst, a detailed message will be left and the officer can leave a voice mail with his/her response during his/her working hours.

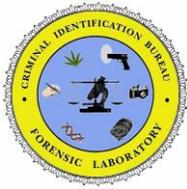
If a case requiring drug analysis needs to be completed by a specified date, a written request from the prosecuting attorney must be submitted to the Drug Identification Section Supervisor. A minimum of one week for single exhibit cases and two weeks for multiple exhibit cases, including clandestine laboratory cases, is required for expedited analysis. 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.

Requests for expedited analysis can be mailed or faxed to:

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WVSP Forensic Laboratory Field Manual
Approval Date: 1/8/14
Approved By: WVSP Quality Assurance Board

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Effective Date: 1/22/14
Revision: 1/22/14



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Drug Identification 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.

4.1.1 Vegetation

Plant material, which is controlled, includes items such as marihuana, the peyote cactus, the opium poppy, and 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.
2. Samples from separate locations should be individually packaged.

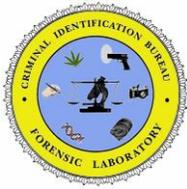


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3. Do not submit potted or large, whole marihuana plants to the laboratory. Take only a sample as described in the next paragraph and place in an envelope.
4. In those cases involving the cultivation of marihuana in which the quantity of five (5) or 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 marihuana 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.).



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4.1.3 Powders

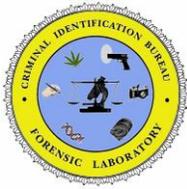
1. Powders are best collected using vials or plastic bags (without holes!). If the items are pre-packaged (ex. small plastic bags of Cocaine or Methamphetamine ready for distribution), then the small plastic bags should be placed in a larger plastic bag or other sealable container.
2. Each container should be marked for identification (i.e. initials, date, etc.).

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 used syringes be accepted. They pose a health hazard to all personnel handling such items. Only in cases of tampering where hospital personnel are



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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.

4.2 DRUG IDENTIFICATION REPORTS

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

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.

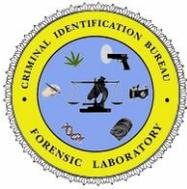
4.3 CLANDESTINE LABS

Clandestine laboratories are on the rise in West Virginia. So this section needs to be taken into consideration by the field personnel. There are different methods being utilized in the



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



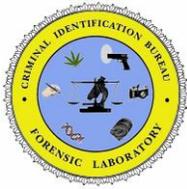
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The case submission form should be accompanied with the officer's notes, clean up sheets, sampling form etc. in order to give the analyst an idea as to the potential hazards associated with each sample. Upon completion of "clan lab" evidence the central evidence receiving section of the laboratory will 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.

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.



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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

Cpl. 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.



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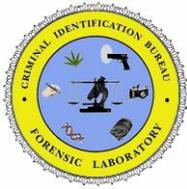
2. Label any biohazard samples as such.
3. The following fields on the Case Submission Form must be completed: Agency Case No., Crime Date, Suspect, Prosecuting Attorney's Signature, and Projected Court Date.

5 – FIREARMS/TOOLMARKS

The Firearm/Toolmark Section of the laboratory receives multiple case submissions throughout the year. Typically, these cases will be worked in the order in which they were received.

However, a case will be given priority when a letter has been submitted by the prosecuting attorney's office with upcoming court dates. Also, if the submitting officer feels there is special need for expedited testing he may speak with the Firearm/Toolmark Section Supervisor who may give priority to these cases. Cases with upcoming court dates will be given higher priority than officer requests.

An average case in the Firearm/Toolmark Section will need a **minimum** of three days from the time a case is begun until results will be ready to be released. This **does not** mean that results can be expected three days after every rush request is made since more complicated cases may take



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significantly more time. Also, there are typically multiple rush requests in the section at any given time. 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 **two weeks** before rush results are needed.

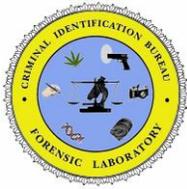
Also, any evidence that is being examined by another section/s (Processing, Latent Prints) **cannot** be examined by the Firearm/Toolmark Section until **all** other sections have completed their examinations. Any rush request for a case needing examination by multiple sections will require appropriate 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.

5.1 EXAMINATIONS AND POSSIBLE DETERMINATIONS

5.1.1 Firearms

1. Given a fired bullet: Determine the make, model, caliber, and chambering of the firearm from which it was fired.



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2. Given a fired cartridge case: Determine the make, model, caliber, and chambering of the firearm it could have been fired in.

3. Given a fired bullet and a firearm(s): Identify if bullet was fired in/which firearm.

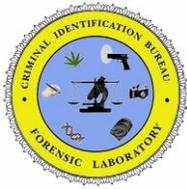
4. Given a fired cartridge case and a firearm(s): Identify which firearm the fired cartridge case was fired in.

5. Given two or more fired bullets: Identify if bullets were fired from the same firearm.

6. Given two or more fired cartridge cases: Identify if fired cartridge cases were fired in the same firearm.

7. Firearm Function Test: Does firearm work properly. (Safeties functioning, internal adjustment/modification, etc.)

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



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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 Toolmarks

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

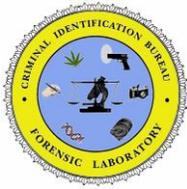
5.1.3 Vehicles

Determine possible bullet paths; recover fired bullets and other firearm related evidence found in the vehicle.

5.1.4 Restoration of Serial Numbers

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



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serial number restoration will be considered authorization by the submitting agency to alter the evidence.

5.1.5 Distance Determinations

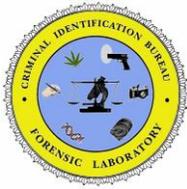
Determine approximate distance of the muzzle to the victim or object based on the microscopic and/or chemical examination of the gunpowder pattern around the bullet hole.

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.

5.1.6 Physical Matches

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

Note: Paper physical matches are performed by the Documents Section



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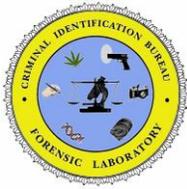
Note: The above are the basic examinations performed by the Firearm/Toolmark Section. This does not limit the section to perform other examinations not listed.

5.2 GLOSSARY OF TERMS

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





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



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



6. **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)



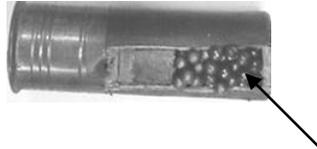
7. **Loaded Shotshell:** A cartridge containing projectile(s) designed to be fired in a shotgun. The cartridge body may be metal, plastic, or paper.





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



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

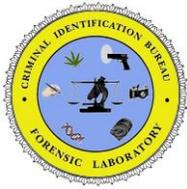


10. **Revolver:** A firearm, usually a handgun, with a cylinder having several chambers so arranged as to rotate around an axis and be discharged successively by the same firing mechanism.



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





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

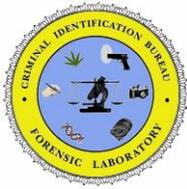


13. **Short Barreled Rifle:** A “sawed-off” rifle that has a barrel length of less than 16 inches or its overall length is less than 26 inches.
14. **Short Barreled Shotgun:** A “sawed-off” shotgun that has a barrel of less than 18 inches or its overall length is less than 26 inches.

5.3 RECOGNITION, COLLECTION, AND PACKAGING OF EVIDENCE

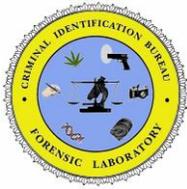
5.3.1 General Guidelines

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.



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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.**
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.



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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. There are many other cases in the laboratory, and cases are, for the most part, worked in order of arrival. The examiners must have the evidence before they can complete their testing.

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:

Biochemistry → Latent Prints → Firearm/Toolmark.

5.3.2 Safety

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.



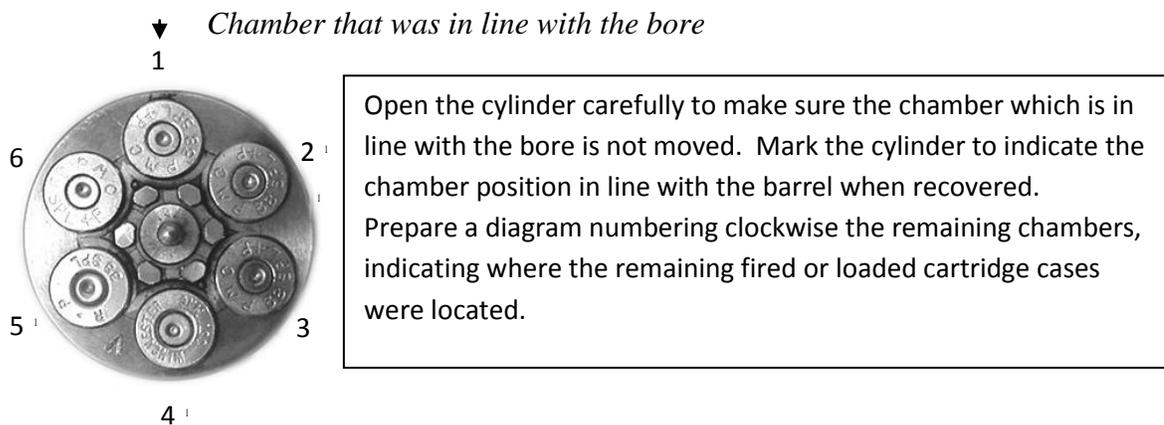
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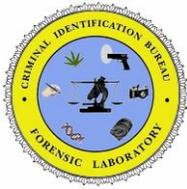
5.3.3 Handling of Firearm(s)

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

The above procedures for handling and documentation of evidence should also be followed 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.





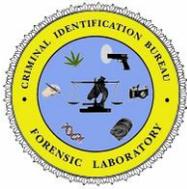
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Identification Number	Condition	Chamber Position	Manufacturer or Headstamp
EV 1	Fired	In line with bore	PMC
EV 2	Fired	#2 position	PMC
EV 3	Fired	#3 position	PMC
EV 4	Fired	#4 position	Winchester
EV 5	Fired	#5 position	Remington Peters
EV 6	Fired	#6 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. Never wipe the firearm off or clean the bore. Any blood or foreign material should be left attached to the firearm.

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.

A firearm recovered under water should be packaged in water in a water-tight container.



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

5.3.4 Fired Bullet(s) Recovery

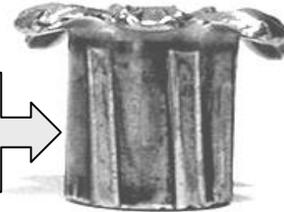
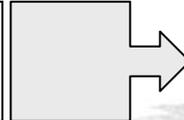
The recovery of fired bullets and shot pellets from the ceiling, walls, floor, furniture, body of victim, etc. should be performed with the greatest of caution so as not to alter them in any way. When bullets are embedded in wood or some other substance it is recommended, if possible, to secure that 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.



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

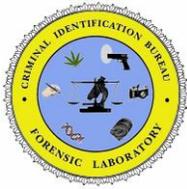


It is possible to determine the caliber of gun, number of lands and grooves (called rifling), direction of twist, and brand of ammunition from the fired bullet. Often the investigating officer can determine the direction of twist of the firearm and eliminate certain firearms at the scene.

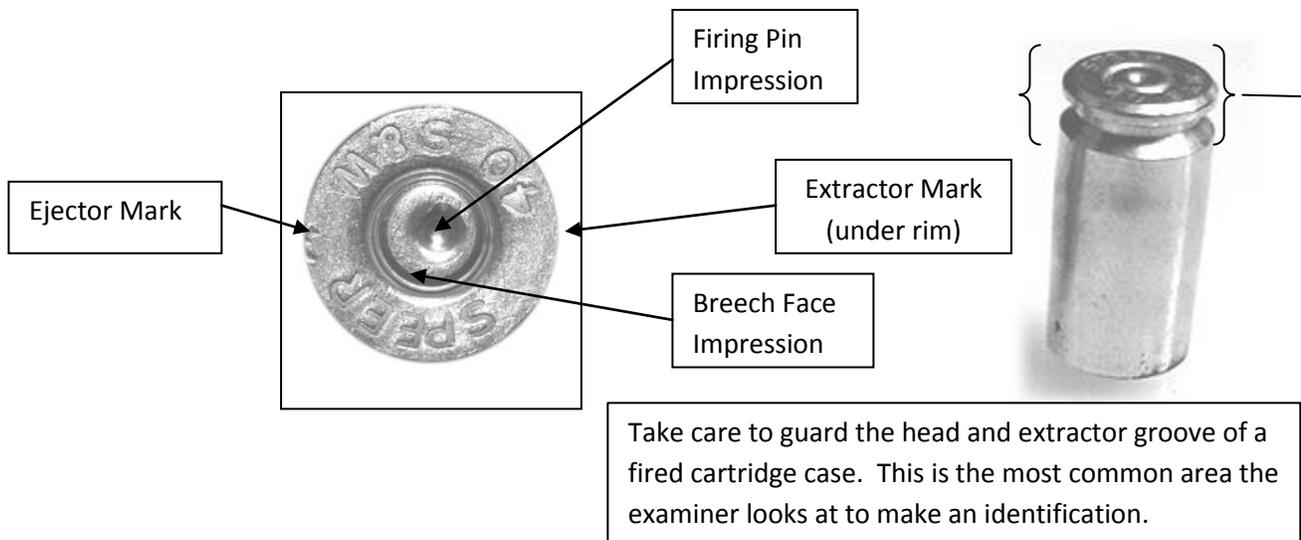
This bullet has a left hand twist.

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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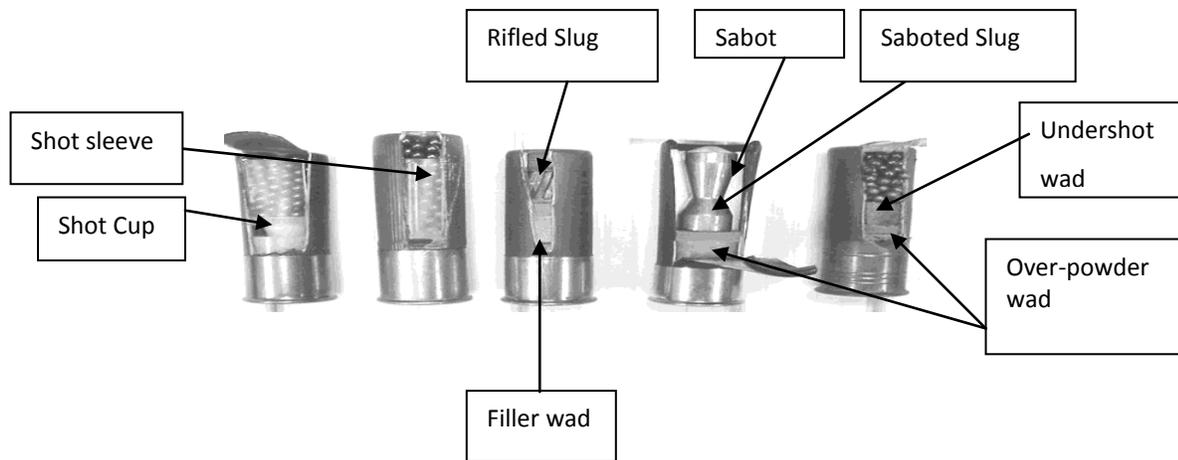


In cases where a shotgun is used, it is possible that more than one shot was fired and more than one size pellet could be present at the scene. Therefore, care should be exercised to keep the recovery of the pellets from each shot separated (within reason). Like the brass cartridge case, the brass portion of the fired shotshell case may display identifying markings. In some instances, the wadding from a shotgun shell could be in the victim, provided the weapon was held close enough (usually within 10 feet). 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.



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One can expect to find the wadding 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.

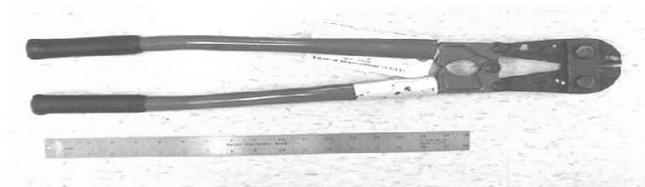
5.3.6 Tools and Toolmarks

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.



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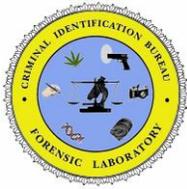
Toolmark evidence should be handled and marked in much the same way as firearm evidence. The tool in question should never be placed directly in contact with the toolmark in question. Contact between the two items could alter the evidence.



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. Any 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,



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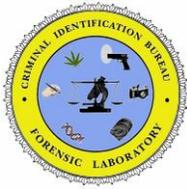
which may result in bacteria developing and hindering the examination of potential evidence. If the clothing is wet with body fluids, it should be *air dried* **prior** to submission. If DNA analysis of the item is required, it should be sent to the Biochemistry Section first, with instructions to forward 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 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.



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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 Molding and Castings of Evidence

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



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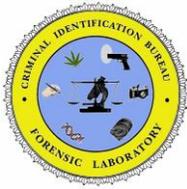
be cut away and preserved. If this is not feasible due to possible destruction of an object or possible deformation of the depression, then a cast is necessary. Before any cast is made the impression should first be photographed. Be sure to include a scale in your photograph.

There are several forensic casting materials on the market today. Micro-Sil and Forensic Sil 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. Dental stone is a good alternative for casting larger, three-dimensional impressions on relatively flat surfaces.

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



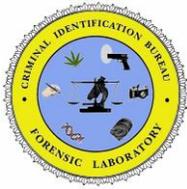
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container should be tape sealed, initialed by the officer, labeled with date, what it contains, and any other pertinent information the officer deems necessary that could aid the examiner. Empty film canisters work well for securing this type of evidence. 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.



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.



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5.4.2 Firearms Evidence

Firearms should be unloaded prior to submission to the laboratory, however, before unloading 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)

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 pistol:

7. Remove and document loaded ammunition in the magazine.
8. **After unloading, place firearms in a sturdy sealed cardboard box.**



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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.

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



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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.

5.4.5 Vehicle Evidence

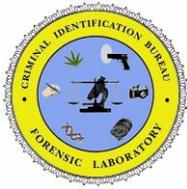
Vehicles that are to be sent to the laboratory should be examined for loose evidence prior to loading and transport. All efforts should be made to ensure that evidence will not be lost during transport to the lab. It is a good idea to tape cardboard over any windows containing bullet holes.

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:

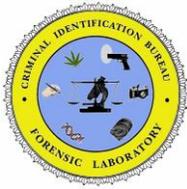
5.5.1 Firearm Reports



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- 1. Inconclusive** – The evidence submitted was in such a condition that no conclusions could be made as to the origin of the fired bullet/cartridge case.
- 2. Class Characteristics** – The evidence submitted could not be narrowed down to a specific firearm. Characteristics found on the submitted fired bullets/cartridge cases were similar to those on test fired bullets/cartridge cases from the submitted firearm. However, matching individual characteristics were not present to positively identify the submitted firearm.
- 3. Individual Characteristics** – The submitted fired bullets/cartridge cases exhibited unique characteristics that, in the examiner's opinion, could have only come from the submitted firearm.
- 4. Elimination** – Class and or individual characteristics present on the submitted fired bullets/cartridge cases were different than those found on test fired bullets/cartridge cases from the submitted firearm.

5.5.2 Toolmark Reports

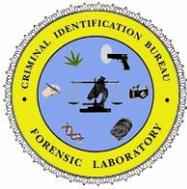


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- 1. Inconclusive** – The evidence submitted was in such a condition that no conclusions could be made as to the type of tool that made the damage.
- 2. Class Characteristics** – The evidence submitted has toolmarks/damage consistent with the type of tool submitted. However, matching individual characteristics were not present to positively identify the tool.
- 3. Individual Characteristics** – The evidence submitted had unique toolmarks/damage that, in the examiner's opinion, could have only come from the tool submitted.
- 4. Elimination** – The evidence submitted had toolmarks/damage inconsistent with the submitted tool. This tool could not have made the toolmarks/damage observed on the submitted evidence.

5.6 IMPRESSION 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



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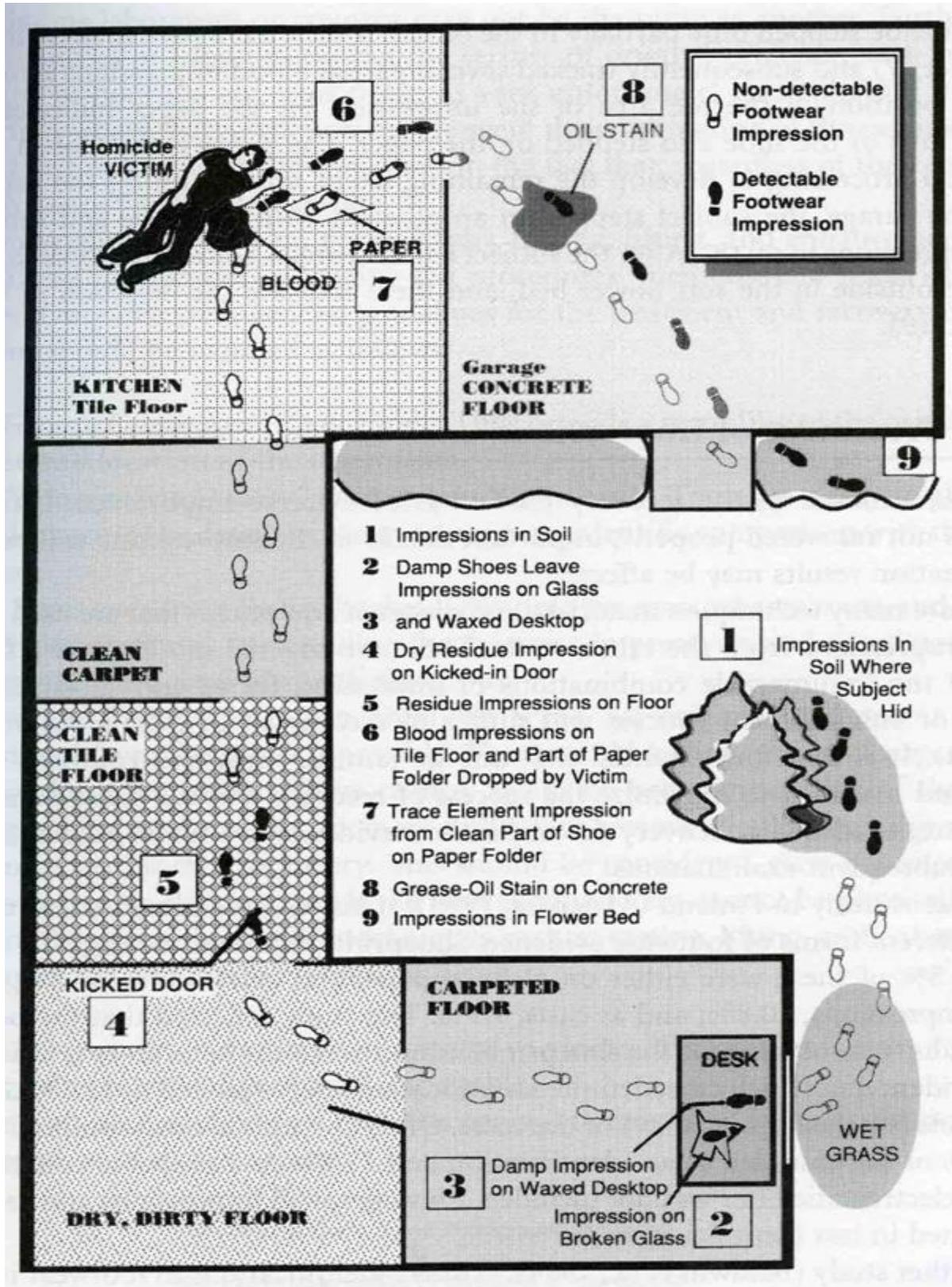
processing and evidence collection techniques are imperative to a successful examination and comparison of these impressions.

5.6.1 Impression Evidence at the Crime Scene

1. Secure and preserve the crime scene
2. Impression evidence, such as footwear and tire track, 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 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



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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

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

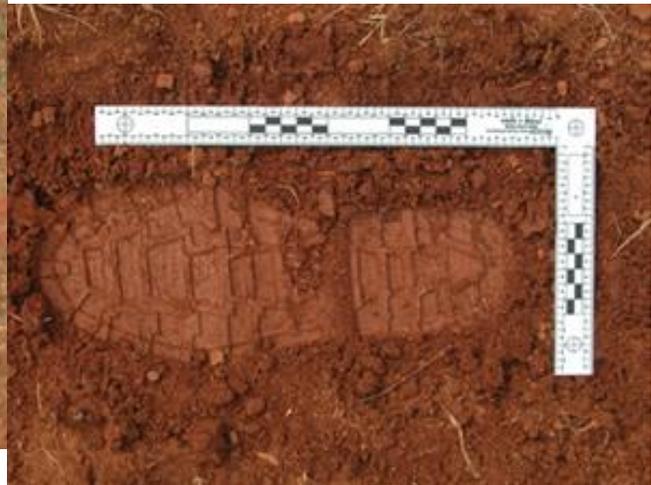
Long range photographs that show the overall scene

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



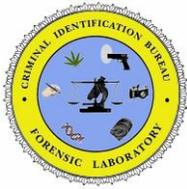
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Examination-Quality Photographs: taken from directly over the top of and sufficiently close to the object, to fill the frame with the area or object being photographed and to capture the maximum amount of detail. This method allows for use of the photographs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



Comparison quality photographs should be taken as follows:

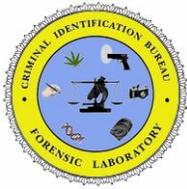
- Identify the impression you wish to photograph and place a good linear scale next to



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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.
- 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



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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.



Existing Light

Oblique Light

Oblique Light
(ambient light blocked)



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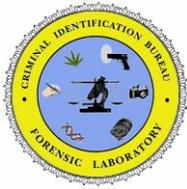
2. Lifting Techniques for various two-dimensional surfaces

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

3. Casting Techniques to Recover Three Dimensional Impressions

Importance of casing

- 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



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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 begin mixing at once

Reclosable 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 minutes; make sure all the material in the bag (corners) is mixed
- Viscosity should be that of pancake batter

Pouring

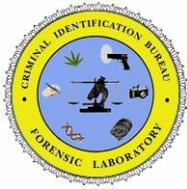
- Pour the material outside the impression on the high ground and let it flow into the impression; never pour directly into the impression which can damage it
- Always pour into the dental stone about an inch or two behind the flowing portion

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.



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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 space minimum from the impression
 - Lightly sift the dental stone powder over the areas of the impression that are underwater until 1 in 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).

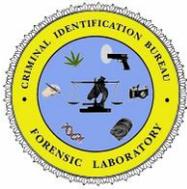
Avoid pouring the mixture directly into the impression. At a low height, pour the dental stone material onto a small piece of cardboard, directing the flow to the impression. Allow the material to pour to the side of the impression, letting the casting material flow into the impression. Once material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



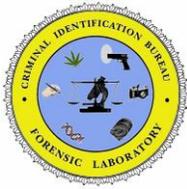
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of the vehicle (if this can be determined). Also include the date of the cast and your initials. Pry the cast carefully to avoid breaking and defacing, and allow to air dry for 48 hours.

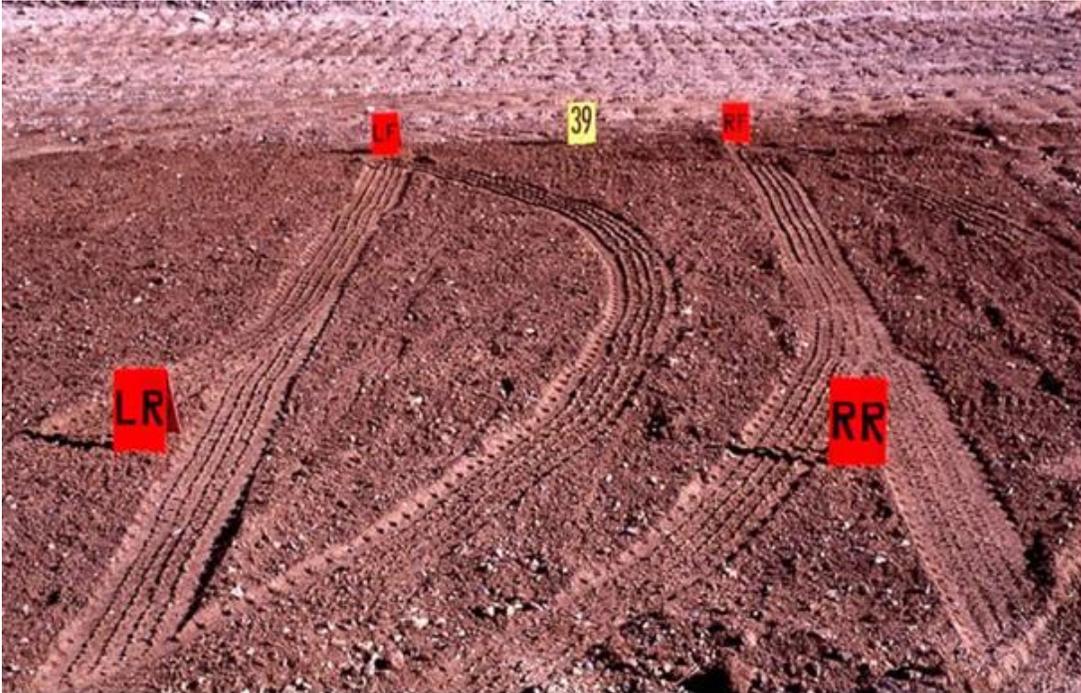
Do not package the cast **in plastic!**

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

- 3.3 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.
4. **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.
 5. **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
 6. **Submit any and all original evidence:** such as shoes, tires, photos, photographic negatives and lifts.
 7. **Basic Tire Measurements at Crime Scene** —Wheelbase, Front and Rear Track Width, Turning Diameter



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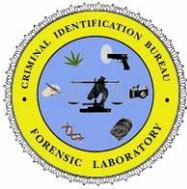


Vehicle Turning Sequence Showing Tire Tracks

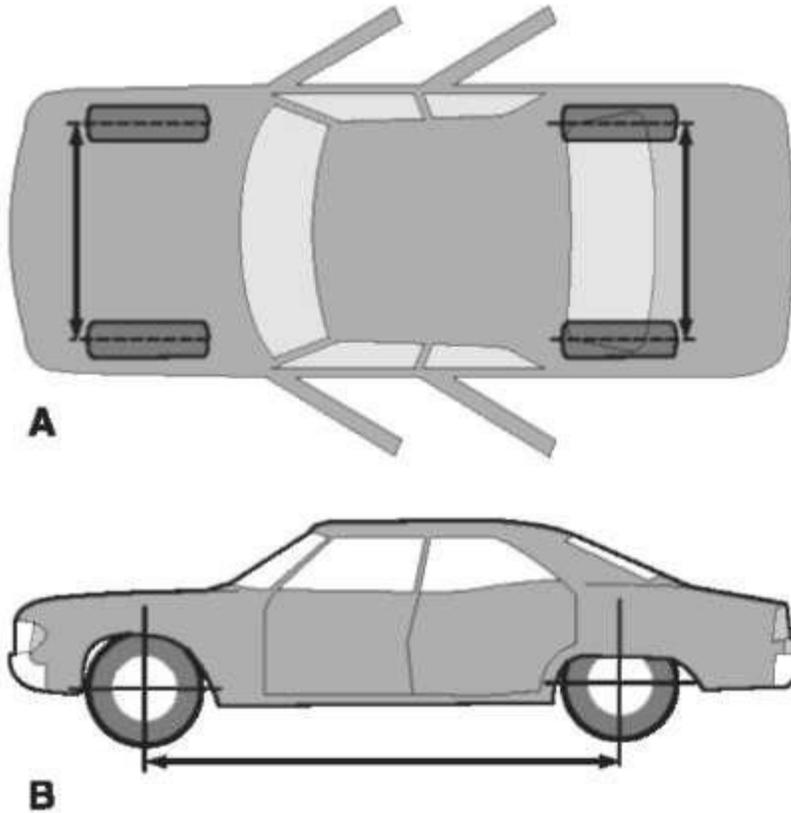
8.1 Track Measurement

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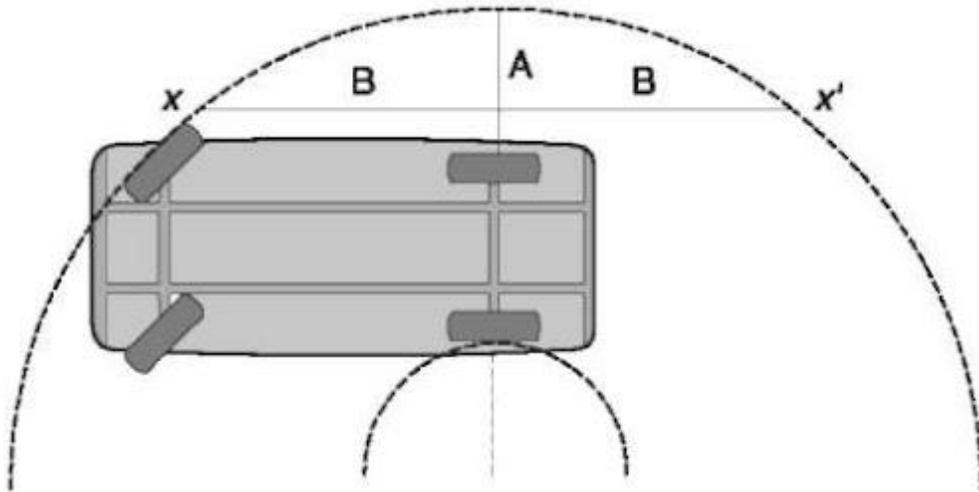
B – WHEELBASE: Should be measured from the suspect vehicle.

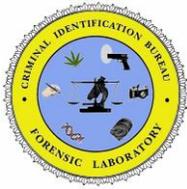
Turning Diameter

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 capable of leaving the impressions at the crime scene.



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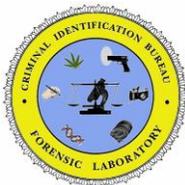




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5.6.3 Impression Evidence Reports

- 1. Inconclusive** – The evidence submitted was in such a condition that no conclusions could be made.
- 2. Class Characteristics** – The evidence impression has design features consistent with the footwear or tires submitted. The impression may also be similar in physical size or dimension. However, matching individual characteristics were not present to positively identify the footwear or tires.
- 3. Individual Characteristics** – The evidence impression displays unique damage or defects that, in the examiner's opinion, could have only come from the footwear or tire submitted.
- 4. 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.



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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**

17
14
14

PHONE: 703-632-7314/7315/7288

FAX: 703-632-7316



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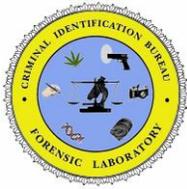
5.7 DISPOSITION OF EVIDENCE

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.)



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4. Automated Fingerprint Identification System (AFIS) searches through the WV and FBI databases

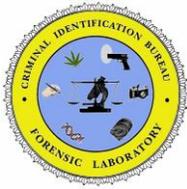
6.2 GLOSSARY OF TERMS

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 fingerprint database in a relatively 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.



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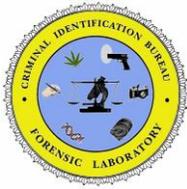
Elimination prints – Known finger, palm, or major case prints taken of individuals having legitimate access to an area that has become a crime scene or to an object collected from a crime scene. These are usually victims, residents of a home, or employees of a business.

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 – 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.

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



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from a suspect or victim for comparison as known prints in a criminal investigation. Inked prints can also refer to major case prints.

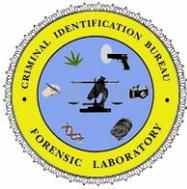
Known prints – Most commonly digital or inked finger, palm, or major case prints taken of individuals and submitted for comparison to developed latent prints. Known prints can be of suspects or submitted for elimination purposes.

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.

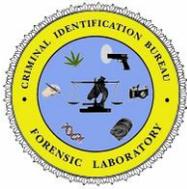
Postmortem prints – Known prints of the dead. Postmortem prints are most often used as elimination prints in homicide investigations or to re-establish the identity of an unknown deceased individual.

6.3 COLLECTION OF EVIDENCE

6.3.1 Safety

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Approved By: WVSP Quality Assurance Board

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Revision: 1/22/14

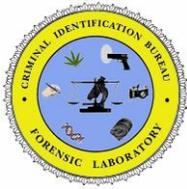


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In addition to having equipment for developing and preserving latent prints, your crime scene kit should include several items of safety gear. Latex gloves, dust masks, eye protection, and shoe covers are an inexpensive way to provide yourself with 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 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.*



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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.*

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)



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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.

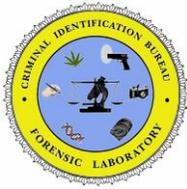
Magnetic powder (black, white, gray, or silver) is a suitable alternative for standard and fluorescent powders.

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.

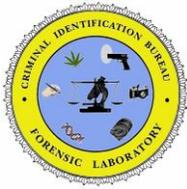
Rubber lifters are opaque rubber squares and rectangles containing a lifting adhesive on one side. Because of their flexibility, rubber lifters are often used on round, cylindrical, or oddly shaped surfaces. Since the lifted print is reversed and requires correction through digital imaging or photography, 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



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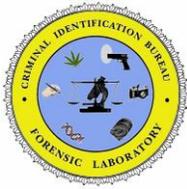
sheet protector. **Remember to place the lifts on the outside of the plastic and not on the insert.**

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 35mm or high-end digital camera with a tripod is recommended first. If this is not possible, satisfactory photographs can still be taken with a simple 35mm or digital camera.

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.



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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.

6.3.2.5 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.

6.3.2.6 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.



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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 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**



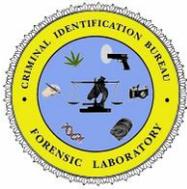
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powder impressions made in dust or other substances such as blood, grease, putty, etc.

Impressions such as these should be carefully photographed.

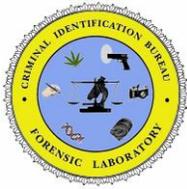
6.3.3.1 Powder Processing

- 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.**
- 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).



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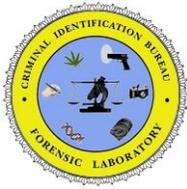
- If working above a horizontal surface, lightly sprinkle the powder from the brush over the area to be processed. If working below a horizontal surface, or on a vertical surface, gently apply the powder directly to the surface.
- After applying the powder, begin brushing lightly in a circular motion. 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 the print. A second



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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.



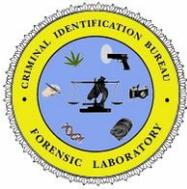
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Evidence processed in the field should be retained and stored in a secure area. Though the lifts will be what are analyzed in the laboratory, the actual pieces of evidence will have to be produced as the source of the lifts should the case go to trial.

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 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***



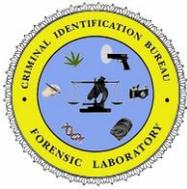
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- *Note: Superglue fuming should never be attempted without proper training. Anyone interested in learning this development and preservation method should seek a qualified instructor. Please contact the Latent Print Section before attempting this process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



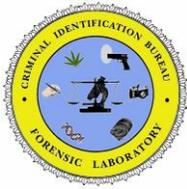
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on nonporous surfaces). Do not handle items of evidence excessively.

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.).



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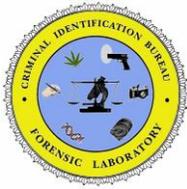
- Multiple items such as lifts and photographs of latent prints can be placed in a single container.
- All evidentiary containers should be sealed according to laboratory guidelines.

6.4 SUBMISSION OF EVIDENCE

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



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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.

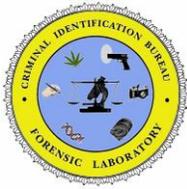
Cases in which the evidence must be analyzed by another section (Drug Identification, Biochemistry, et al.), will add additional weeks to the above time frame.

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 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 analysts of the Latent Print Section are



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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.



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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, 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 West Virginia State Police Forensic Laboratory.

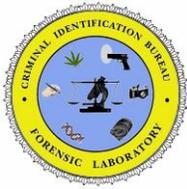
Responsibilities of the Investigator:

- 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.



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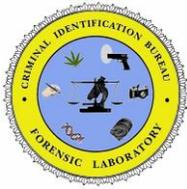
- Photographs of latent prints should include a scale. The scale can be standard or metric, but the designation must be clearly visible in the photograph. It is recommended that the scale type be listed on the Case Submission Form. If using a digital camera, include on the Case Submission Form the resolution 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.
- Elimination fingerprints should 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 **Integrated Automated Fingerprint Identification System**, or **IAFIS**, can be sent from the West Virginia AFIS.



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Additional Information:

- Currently, the databases of the West Virginia State Police AFIS and the FBI IAFIS 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 will also have the ability to search latent palm prints. A palm print database in West Virginia now exists and will become larger as more palm print images are entered.
- Latent prints developed in the laboratory on submitted evidence and which meet AFIS and IAFIS 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 IAFIS 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 occur.

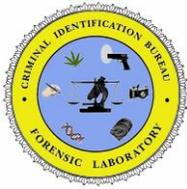


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- Negative results of the AFIS and IAFIS searches may be an indication that the contributor of the latent print does not have known finger or palm prints in the West Virginia database or fingerprints in the FBI database. Additionally, the AFIS may 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 IAFIS search is dependent upon the quality of the finger and palm prints placed in the database, the taking 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 centimeters. 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.



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

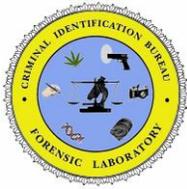
6.8 THE LATENT PRINT SECTION REPORTS

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) either contain latent prints of comparison value or they do not. If there are latent prints of comparison value contained on the evidence, the latent prints will either be identified to the submitted known prints or they will not.

The following is an explanation of terms and phrases commonly used in the latent report:

- 1. There were no latent prints developed on the submitted evidence.**
- 2. There were no latent prints contained in the submitted lifts/photographs.**

These phrases refer to the absence of latent prints on items of evidence processed in the laboratory or lifts/photographs taken at the scene by the investigator. This does not necessarily mean that the items were never touched, only that if they were touched, there was not a detectable transfer of latent print residue. This could be due to a barrier between the friction ridge skin and the surface (gloves); a barrier on the surface, which repelled the latent print residue (oil or another rust inhibitor); the intentional or accidental destruction of latent print residue (wiping the object), or the natural deterioration of the latent print residue (evaporation).



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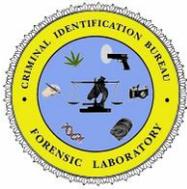
3. **There were no latent prints of comparison value developed on the submitted evidence.**
4. **There were no latent prints of comparison value contained in the submitted lifts.**

Alternate wording:

- **The latent prints developed on the submitted evidence lacked sufficient clarity and content of ridge detail and were not of comparison value.**
- **The latent prints contained in the submitted lifts lacked sufficient clarity and content of ridge detail and were not of comparison value.**

These phrases refer to the quality of latent prints that were developed on items of evidence processed in the laboratory or lifts taken at the scene by the investigator. Though latent prints were developed, the fragments did not contain enough clarity or information in the ridge detail to be considered sufficient for comparison with a set of known prints.

5. **The latent fingerprint developed on the submitted piece of glass was identified to the right index finger contained on the exemplar bearing the name John Q. Public.**



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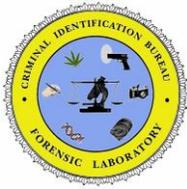
- 6. The latent print contained in the submitted lift was identified to the left palm print exemplar bearing the name Jane Q. Public.**

These phrases refer to an identification of a latent print developed on an item of evidence processed in the laboratory or one that was submitted on a lift taken at the scene by the investigator. In addition to informing the investigator which individual made the latent print, the specific finger or palm will also be listed.

- 7. The latent fingerprint developed on the piece of notebook paper was compared to the fingerprint exemplar bearing the name John Doe. This individual did not make the latent fingerprint.**

- 8. The latent palm print contained in the submitted lift was compared to the palm print exemplars bearing the name Jane Doe. This individual did not make the latent palm print.**

These phrases refer to latent prints that did not match the submitted known prints. If only suspect prints were submitted, elimination prints should be forwarded. Since the latent prints may have been made by the victim or by someone else having legitimate access to the scene,



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every effort should be made to account for all unidentified latent prints of comparison value.

Any questions pertaining to a latent print report should be directed to the latent examiner whose name appears on the report.

6.9 DISPOSITION OF EVIDENCE

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 alcohol and drug analysis on blood samples taken from subjects believed to be driving under the influence. The section also performs alcohol and drug analysis on samples taken from victims of sexual assault. The samples



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submitted to the lab are analyzed using Headspace Gas Chromatography for alcohol and Liquid Chromatography Tandem Mass Spectrometry for drug analysis. The West Virginia Department of Health has approved Gas Chromatography as the method for secondary chemical testing for alcohol in blood.

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 only be performed on gray 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



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7.1 GLOSSARY

Alcohol – The unique chemical compound, ethyl alcohol/ethanol, commonly found in consumable beverages.

Forensic Alcohol Analysis – The practical application of specialized devices, instruments and methods by trained laboratory personnel to measure the concentration of Ethyl Alcohol in samples of blood, breath, and urine of persons involved in traffic accidents and violations.

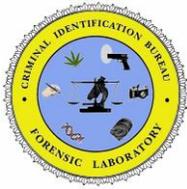
Forensic Analyst – A person employed by the Forensic Toxicology Section who performs the technical procedures of Forensic Alcohol Analysis and Forensic Drug Toxicology.

“Sample” or “Specimen” – A representative portion of breath, blood, urine, or other material taken for the purpose of measuring the alcohol and/or drug concentration.

Gas Chromatograph – 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)

Drug Screen – A preliminary test that indicates a class of drugs present in a sample.



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% - 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.

LC/MS/MS – (Liquid Chromatography/Tandem Mass Spectrometry) Instrument used in identifying the amount of drugs 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.

11-nor-delta 9 tetra hydro cannabinol-9-carboxylic acid – Metabolite of THC; an active ingredient in marihuana.

Proof – Twice the alcohol content by volume percent: 20%=40 proof

7.2 CHEMICAL TESTS FOR INTOXICATION

7.2.1 Blood Alcohol Tests

Blood must be collected in accordance with West Virginia Department of Health Rules and Regulations Section 8.2 (see below).



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Blood Alcohol Collection Kits **should be used**, if available. The Commission on Drunk Driving Prevention provides these kits to local hospitals. Use of the Blood Alcohol 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

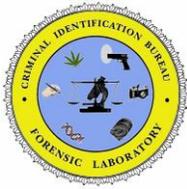
7.2.2 Collecting and Handling of Samples

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.

Step 3. Cleanse the site with alcohol free prep pad provided. Using needle, needle holder and tubes provided, withdraw Blood Specimens from subject, **allowing both tubes to fill to maximum volume.**

If Applicable

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



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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			
BSC101			

BLOOD COLLECTION REPORT			
Subject's Name and 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.			
Signed	Date		
I hereby certify that I have witnessed the actual withdrawal of blood from the above subject by the person whose signature appears above.			
Signed	Date		
Date and Time of Delivery to Lab and to Whom			
How Delivered and by Whom			
Date Test Made	Result	Remarks	BSC102

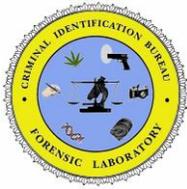
Note: Immediately after blood collection, assure proper mixing of anticoagulant powder by slowly and completely turning the blood tube several times.

****DO NOT RETURN USED NEEDLE AND/OR PREP PAD TO KIT BOX****

b. Investigating Officer

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.



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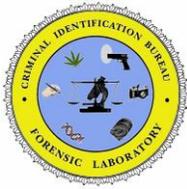
Step 7. Return both blood tubes filled, sealed, and initialed back to the holder.



Step 8. Fill out any information requested on the investigating officer's report on the holder. Affix the evidence seal where indicated on the inside box/container.

INVESTIGATING OFFICER'S REPORT	
NAME OF SUBJECT	JOHN DOE
OFFENSE	DUI
CASE NO.	1234
DATE OF INCIDENT	7-2-01
TIME	1600 AM
COUNTY	Kanawha
INVESTIGATING OFFICER	J.D. WATTS
DEPARTMENT	WVSP
DATE BLOOD DRAWN	7-2-01
TIME	1700 AM
LOCATION OF DRAWING	Charleston Sewer
BLOOD DRAWN BY	ERIN FEZELL RN Eun Seayle
CHAIN OF POSSESSION	
RECEIVED FROM	ERIN FEZELL
BY	TPR J.D. WATTS
DATE	7-2-01
TIME	1705 AM
RECEIVED FROM	
BY	
DATE	
TIME	
AM-PM	
RECEIVED FROM	
BY	
DATE	
TIME	
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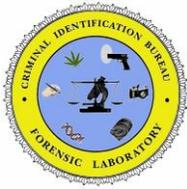


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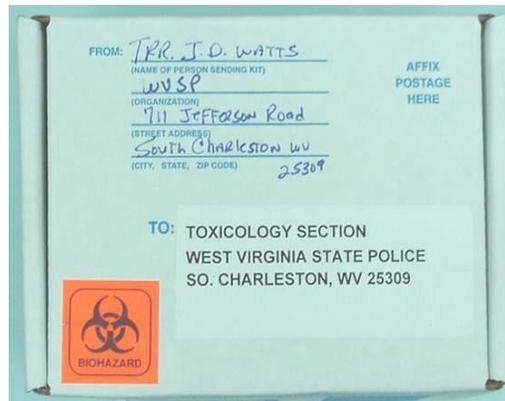
Step 9. Place the sealed specimen holder inside a ziplock bag. Squeeze out excess air and close the bag.

NOTE: DO NOT REMOVE LIQUID ABSORBING SHEET FROM ZIPLOCK BAG

Step 10. Return the ziplock bag containing the sealed specimen holder to the kit box and close lid. Remove the backing from the kit box shipping seal and affix it to the box where indicated.

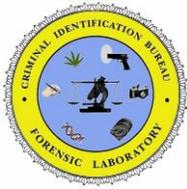


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Step 11. Fill out any information requested on the box top.

Step 12. Fill out a Case Submission form WVSP Form53. (If a specific drug is suspected, note this on your case submission.) **Please note on the form whether you are requesting Blood Alcohol Analysis, Drug Analysis, or both.**



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Step 13. Place the Case Submission form into a business size envelope on the **OUTSIDE** of the mailing container and address it to the Toxicology Section.

Step 14. Mail or personally deliver the kit in a **SEALED** condition to the laboratory for analysis as soon as possible. Any sample submitted to the laboratory not suitable for analysis (i.e. improper tube, broken vial or sample completely clotted) will not be analyzed.

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.



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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 to be taken to preserve the evidence.

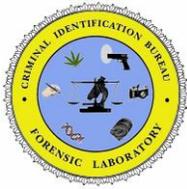
3. **96-Hour Rule.** In a suspected drug facilitated assault, if the drug was ingested within the last 96-hours (4 days), collect the urine and blood specimens.

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 presents 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:**

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.



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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 ziplock 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.

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 obtained.

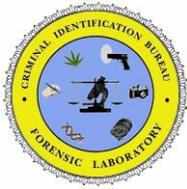
7.5 ILLEGAL LIQUOR

Alcohol Analysis

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

WVSP Forensic Laboratory Field Manual
Approval Date: 1/8/14
Approved By: WVSP Quality Assurance Board

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Effective Date: 1/22/14
Revision: 1/22/14



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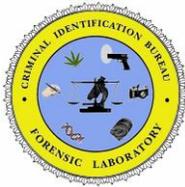
1. Submit approximately **4 oz.** of the sample to the Toxicology Section. It is not necessary to bring in large quantities of the sample. A representative sample will suffice. Submit the sample in a sealed, leak proof container.
2. Initial all seals.
3. Hand deliver any items that contain a high alcohol content and are flammable.

The report will be forwarded upon completion of analysis. Due to U.S. Postal Regulations, we cannot mail back evidence that is flammable; therefore, it must be picked up in person.

Note: Items that are flammable MUST BE hand delivered to the Laboratory.

7.6 HOSPITAL ALCOHOL RESULT CONVERSIONS

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.



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Before performing the following calculations, one must:

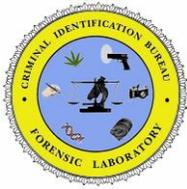
- Ensure that the value was determined from Serum
- Ensure that the units of measurement are listed as mg/dL

COMPREHENSIVE METABOLIC PROF					
GLUCOSE	125		H	70-110 mg/dL	ML
BLOOD UREA NITROGEN	8			6-22 mg/dL	ML
CREATININE	0.87			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			8.5-10.5 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)

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



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8 - TRACE EVIDENCE

8.1 EXAMINATIONS PERFORMED

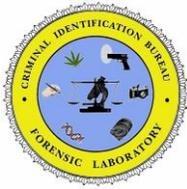
The Trace Evidence Section of the Laboratory is composed of several different sub-disciplines. The section currently performs analysis in the areas of Gunshot Primer Residue (GSR), Fire Debris, Glass, and Paint. Collection, packaging, and submission instructions for these types of analyses are included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

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 in Trace evidence collection. Personal protective equipment such as eye protection and protective clothing is recommended.



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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.

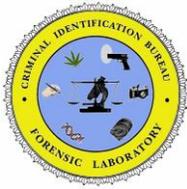
Turnaround time for evidence submitted to the Trace Evidence Section will vary depending on the type of analysis requested, the number of items submitted, the number of other disciplines that will be analyzing the evidence, and the existing backlog at the time of submission.

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

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



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involved.

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

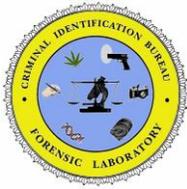
Primer: The ignition component of a cartridge consisting of a friction sensitive compound.

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

Stubs: 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.



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8.4 GUNSHOT RESIDUE

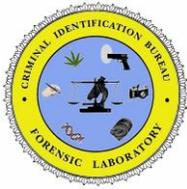
Gunshot Residue (GSR) is generated from the primer mixture of a cartridge case and consists typically of Lead, Barium, and Antimony. This residue may be deposited on a shooter's hands, face, or nearby surfaces, depending on the conditions at the time of firing. Gunshot Residue kits are analyzed in the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

8.4.1 Instructions for the Collection, Packaging and Submission of Gunshot

Residue (GSR) Samples

The collection of GSR 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 tape lifts 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.

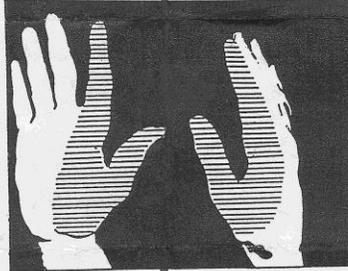
Fill out the Data Sheet (See Sample Form that follows) and submit to the laboratory with the evidence.



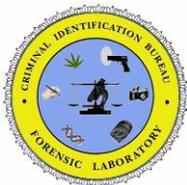
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INSTRUCTION FOR COLLECTION OF GUNSHOT RESIDUE

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 _____

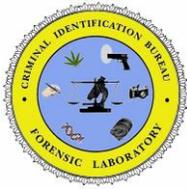
Discharge Location? (Indoors, Outdoors, Vehicle, etc) _____

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” appears on the kit. This is not an expiration date. There is not an expiration time limit but common stocking and inventory practices dictate the use of old kits before newer ones.

The kit typically contains three vials with an adhesive layer on the stopper specifically for particle analysis using SEM-EDS. One vial is for the right hand, one for the left hand, and the third is to be used on 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.



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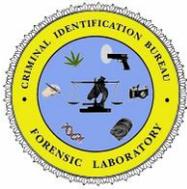
Primer residue (GSR) quantities diminish with time and activity. Collect the residue as soon as possible. It is best to collect the samples at the scene before transporting the subjects.

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 (Biochemistry, 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 GSR 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.**



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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 GSR is identified on the kit, then the clothing worn by the subject will not be analyzed. If GSR is not identified on the kit, then analysis will be performed on the clothing or other items submitted.

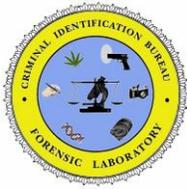
8.4.2 Gunshot Residue Results

Locating and identifying GSR 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 of the particles cannot be used to predict the circumstances that occurred during the incident.

The presence of gunshot residue may be the result of firing a weapon, having been in the environment where gunshot residue was present, or handling an item with gunshot residue on it.

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

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

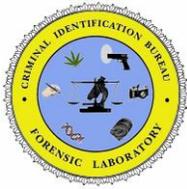


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Scanning Electron Microscope (SEM)

8.5 PAINT COMPARISON



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Paint evidence may be encountered in burglary, breaking and entering, and hit and run cases.

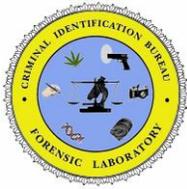
Paint chips, fragments and smears may originate from protective and/or decorative coatings such as varnishes, lacquers, sealers, enamels and plastics.

Common origin can definitely be stated when the detached fragment can be physically joined to the suspected source. This demonstrates the fact that these pieces were once whole and continuous. This usually occurs with large fragments that can be manually manipulated.

Therefore, before removing any paint from an item, consider the possibility of common origin.

Physical matches are performed by the Firearm/Toolmark section of the laboratory. Please refer to that section of this manual for more information on physical matches.

When a physical match cannot be obtained, comparison of the paint samples with respect to their color, texture, layer structure, chemical solubilities, organic and inorganic compositions is attempted. With all these characteristics being alike, the samples could have originated from the known source. The more layers a sample has, the more unique it becomes. Therefore, a paint chip with seven layers has more forensic value than a chip of one layer.



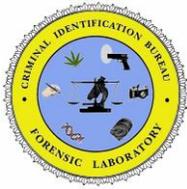
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With multi-layered chips, it may be stated that the questioned sample (Q) originated from the known samples (K) or from a surface painted in the same exact manner with the same exact paints. This latter possibility is considered extremely remote.

The evidentiary value of paint samples increases with different kinds of paint. For example, a black car with three layers of paint is suspected in a hit and run involving a white car with two layers. If the three layers from the black car are transferred to the white car as well as the two layers from the white car to the black vehicle, then the possibility that these surfaces have been in contact is very likely. A double comparison is always desirable.

Always attempt to obtain a physical match where there is no disputing the possibility of common origin. When this is not possible, secure samples to include all layers down to the substrate, i.e., wood or metal. A known sample from each damaged area of a vehicle or object should be obtained. For example, a victim's vehicle has damage on the driver's door, front bumper, and hood. Three known samples should be collected. Even though the vehicle or object has the same color paint, it may have different formulations depending on the location.

Caution: Observe procedures relating to evidence collection. Remove samples from the immediate areas of all damage. Wipe clean the razor, knife or instrument before obtaining



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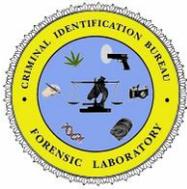
samples from different items or each area of damage. Prevent and be conscious of cross-contamination.

Paint evidence can be in the form of liquid, chips, or smears. These samples can be compared with known samples to determine if they have similar characteristics.

8.5.1 COLLECTION OF PAINT SAMPLES

8.5.1.1 On Small Portable Objects and Clothing Containing Paint Chips and Smears

1. Mark with your initials in an inconspicuous place.
2. Place each item in a separate paper bag, making sure that the area containing the paint transfer is protected from any abrasion or destruction. Cover these areas with paper.
3. Collect loose chips with forceps or tweezers or by scooping them up with a piece of paper, fold and tape securely. Be sure to clean forceps or tweezers before use.
4. Initial each separate container and identify its origin.

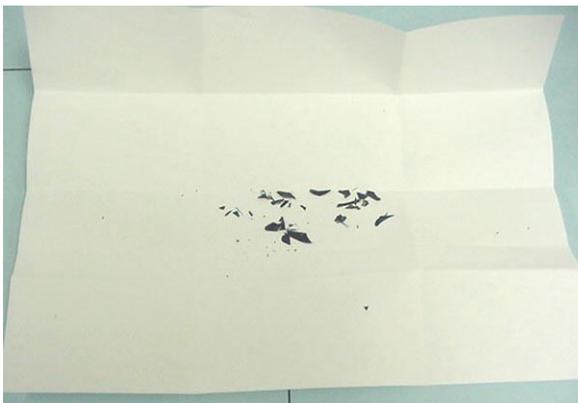


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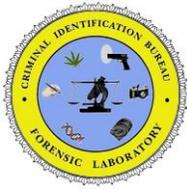
1. *Always collect a standard (known sample) for comparison.*

8.5.1.2 On Large Non-Portable Objects

1. Remove the paint fragments off of the area of concern using a sharp instrument such as a razor blade, trying to remove the entire sample. Wipe the blade clean after each item.
2. Remove the entire sample, getting down to bare metal or wood.
3. Catch the loose fragments on a sheet of paper and simply fold the piece of paper into a packet in such a manner as to trap the particles inside. Seal the seams with tape and place into an envelope. Initial and identify its source, i.e. year, make and model.



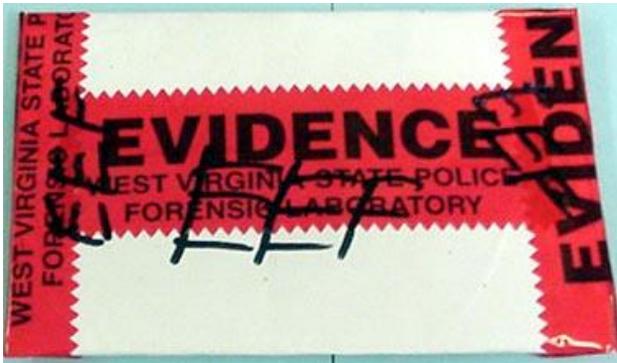
*Paint chips scraped into the middle of a
sheet of paper*



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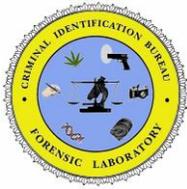


Fold the paper so you trap the paint chips in the middle of the sheet of paper.



Seal all seams with tape and initial each seam

4. Do not pack chips in cotton and do not collect paint with adhesives (such as tape) as this may interfere with analysis.
5. Do not pack chips loose in envelopes.
6. Always collect a standard (known sample) for comparison.
7. Toolmarks transferred to wooden or metal objects may exist at scenes of forced entries.



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Caution should be used to preserve these marks (see Firearm/Toolmark Section). Do not disturb toolmarks while securing paint samples for use in comparisons with questioned paint samples on suspected tools (tire tools, crow bars, screwdrivers, etc.).

8.5.1.3 Wet Paint Smears on Cloth, Wood, Metal or Glass

1. Let paint dry completely before placing smeared item in protective container.
2. Mark item with your initials and identify its source.

3. Collect a standard for comparison.

8.5.1.4 Liquid Samples

Submit liquid samples in a sealed metal container if possible. If the sample is to be compared to a dry one, you may wish to spread some of the liquid onto a similar substrate as the sample in question and allow it to dry before submission. Check with the laboratory before sending in gallon size cans of paint.

8.5.1.5 Comparison Standards



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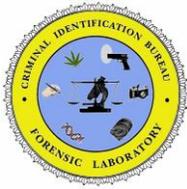
Collect the sample from the object with a sharp instrument such as a clean scalpel or razor blade in a manner that the entire layer structure may be preserved intact. Try to obtain at least a ½ inch square of the surface near the area of damage. Submit all available chips or scrapings and package in a packet as described above. If the object is small, send the entire object. Initial and identify its source, i.e., year, make, and model of the vehicle.

8.5.1.6 Unknown Suspect Vehicles

In some instances when the suspect vehicle leaves the scene, a list of its possible year, make, and model can be developed. The physical and chemical characteristics of the paint samples left behind at the scene can be cross-referenced in an international automotive paint database , depending on the amount and condition of the sample(s) recovered.

8.5.2 PAINT COMPARISON RESULTS

When known and questioned samples are found to be alike, the possibility exists that they originated from the same object. If differences are found between known and questioned samples, then they did not share a common origin.



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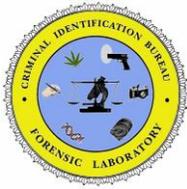
8.6 GLASS COMPARISON

Glass fragments may be encountered in many types of cases, including burglary and hit and run cases. Glass is impervious to chemical attack and may remain on items for long periods of time. Glass fragments may be recovered from clothing, shoes, tools, etc. Glass fragments recovered from these items may be compared to glass from known sources. Examination and comparison of known glass with questioned samples may disclose that they are alike or different with respect to their physical, optical and chemical properties. The only instance in which a questioned sample can be identified positively as originating from the known source is when a physical fracture match is established. The Firearm/Toolmark section of the laboratory conducts physical matches. Please refer to the Firearm/Toolmark section of this manual for more information on physical matches.

8.6.1 Collection

8.6.1.1 Known samples

- a. Package in heavy zip bags or other containers that will not tear or leak.



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- b. Collect from all separate areas of damage; i.e., each broken pane, the inside and outside of double pane windows.

- c. Initial and identify its origin.

- d. If there is more than one known sample (multiple broken panes or bottles), package glass fragments from each separately.

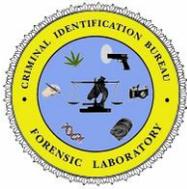
8.6.1.2 Questioned samples

- a. Place clothing and shoes of victims and suspects in separate paper bags.

- b. Submit the sheet which a hit and run pedestrian was placed upon.

- c. Check suspect driver's shoes for broken glass.

- d. Any large obvious fragments should be removed from the clothing, packaged in a paper packet, and identified.



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- e. Allow physicians to remove glass from any wounds and package it for submission.
- f. Wrap objects (i.e. clubs or bats) to protect embedded glass.

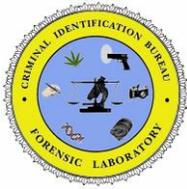
Caution: *Take care in packaging to avoid contamination. Contamination nullifies any comparison efforts.*

8.6.1.3 Glass Breakage

It may be necessary to determine the direction of force, or order of impact, on glass surfaces. If this is required, it is necessary to photograph the glass before removal or transport. The inside and outside of the glass must be marked on the glass as well. The glass must be packaged to prevent further breakage or damage. If possible place cardboard on either side of the glass to help secure it.

7.6.2 Glass Examination and Comparison Results

Comparison examinations of known and questioned samples disclose whether they are alike or different.



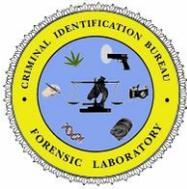
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8.7 FIRE DEBRIS ANALYSIS

8.7.1 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 the samples from an area where ignitable liquids may remain. Attempt to recover debris at the area of the suspected area of origin or along pour patterns. Porous materials that have not been burned are good samples, as they tend to hold ignitable liquids. Also, take samples from areas where more intense burn has occurred. 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.**



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

It is very important to use clean containers so the samples do not become contaminated. 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.

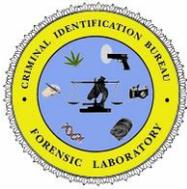
Note: Only fill cans 2/3 of the way full.

Note: Do not place gloves in the can.



When two or more ignitable liquids are submitted for comparison, they must be in separate, sealed containers. Liquid samples are not normally accepted. 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.

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.



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8.7.2 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

Oxygenated Solvents

Miscellaneous products

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



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If there are not any 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.

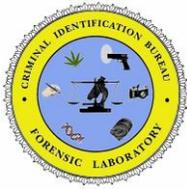
8.8 MISCELLANEOUS

Anytime 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.

Clothing from a hit and run victim can be examined for paint, glass, or other substances and compared with similar substances from a suspect automobile.

Contaminants (Sugars, etc. in gasoline or motor oil.) Try to obtain sample from bottom of gas tank. Check fill-neck area also for any powders or residues.



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Clothing and other objects can be analyzed for the presence of **caustic substances**. These may include battery acid, lye, or muriatic acid. The item should be placed in a chemical resistant container such as a clean paint can or heat sealed bag. Attempt to secure a standard of the suspect liquid for comparison.

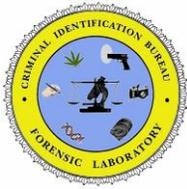
Some speedometers removed from vehicles involved in collisions can be examined for the reading that was registered at the time of impact.

Collection

- a. Take picture at scene if possible to try and illustrate needle position.
- b. Check if a mechanic can remove it for you. If possible, be present to observe.
- c. If removed by yourself, be careful and do not jar.

Submission

- a. Cover faceplate with cardboard and tape to unit if lens is broken.



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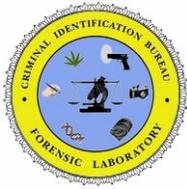
- b. Place in box and package in styrofoam or other jar-proof type packaging and transport carefully if bringing to the laboratory in person (best and recommended method).
- c. If mailing, use certified mail, mark “fragile” and pack as secure and careful as possible.

Results

- a. This examination serves as an investigative aid.
- b. Cannot certify that unit was registering properly or was calibrated correctly at time of wreck.
- c. Positive results mean the slapmark could have come from the wreck, but also could have occurred from other types of impacts, secondary impacts, or possibly previous wrecks.
- d. Negative results – possibly plastic needle, indirect collision, or insufficient force to provide an indication.

8.9 QUALITY CONTROL

The laboratory will examine collection items (metal cans, GSR kits) prior to use by your agency.



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If quality checks are desired, contact the supervisor of the Trace Evidence Section for more information.

8.10 ANALYSES *NOT* PERFORMED IN TRACE EVIDENCE

Bones or Skeletal Material

Live Improvised Explosive Devices /Explosive Residues

Fiber Analysis

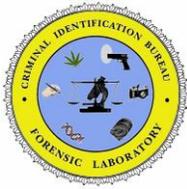
Lamp Examinations (On/Off Determinations)

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.



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9- QUESTIONED DOCUMENTS

The Questioned Document Section of the West Virginia State Police Forensic Laboratory is responsible for the examination of document evidence related to criminal investigations.

These documents may include, but are not limited to checks, withdrawal forms, credit card receipts, demand notes, suicide notes, anonymous letters, firearm transaction reports, insurance claim forms, and prescriptions.

If a case requiring an examination in the Questioned Document Section needs to be completed by a specified date, the Document Section will require a minimum of three weeks from the time that the Document Section has received all required evidence, documents and communications and the Document Section has been notified that the case requires an expedited examination. The Document Section will also expedite cases based on danger to the public. Requests to expedite cases that do not meet this requirement will be considered on a case by case basis.

9.1 EXAMINATIONS PERFORMED

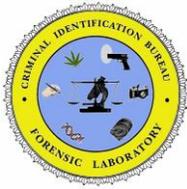
Handwriting

Hand Printing

Numerals

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Typewriting (carbon ribbons and correctable ribbons in addition to typed documents)

Check writers

Rubber Stamps

Paper (physical matches of torn, cut, and perforated paper)

Watermarks (used to identify manufacturer or date of manufacture of paper)

Indented Writing

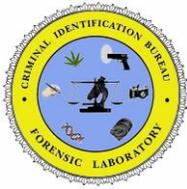
Photocopies (examined to identify the photocopier from which the document was produced)

Inks (additions, deletions, alterations, and/or obliteration)

Printing Processes (i.e. commercial printing, dot matrix, ink jet or laser)

Counterfeiting (contact the laboratory prior to submitting this type of evidence)

It should be noted that the Questioned Document Section does *not* perform computer examinations related to the retrieval of information from the hard drive or software files. Examinations of this nature should be referred to the WVSP Digital Forensics Laboratory at (304) 691-8973 (Huntington) or (304) 293-6400 (Morgantown).

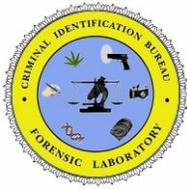


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Questioned documents will be compared to known standards to identify or to eliminate a writer by evaluating handwriting or hand printing, including letters and numerals. However, the scope of analysis is not limited to handwriting exclusively. Other examinations can identify or eliminate suspect typewriters, check writers and rubber stamps.

Many additional exams can be performed to give the investigator an important lead. For example, physical matches between torn papers can be made (this includes notebooks, paper labels, or matchbooks). Watermarks can be examined to determine the date and or manufacturer of the questioned paper. Indented writings can be visualized with a piece of equipment called the Electrostatic Detection Apparatus (ESDA) resulting in an ESDA lift. Questioned photocopies can be examined and linked back to a photocopier provided there are enough identifying features on the questioned copies and known samples are taken a short time after the questioned documents were made. Inks can be evaluated with differing wavelengths of light to determine if writing was added, or to visualize obliterated writing on questioned documents. Documents from computer printers can be classified as being produced from a dot matrix, ink jet or laser printer. If at all possible, the *original document* should be submitted for comparison. If an original document is not available, the best copy should be submitted.

Paper is an excellent source of latent prints, so when submitting items for examination, one can also request a latent print examination. However, because the latent examination procedure can



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prevent certain questioned document examinations from being conducted resulting in lost evidence, **do not process the document for latent prints prior to submitting it to the laboratory.** The evidence will be forwarded to the Latent Print Section for processing and examination upon completion of the document examination. Refer to the Latent Prints section of this manual for further instructions on submittal of Latent Print evidence.

9.2 COLLECTION OF EVIDENCE

9.2.1 Safety

Documents that are believed to contain biological fluids should only be handled while wearing latex or other suitable gloves. Documents of this type can be found at the scene of a homicide, a sexual or other type of assault, a breaking and entering, or may be found on the suspect when he or she is arrested. If documents are known to be blood-soaked, then safety glasses, gloves and protective clothing should be worn. Documents like this should be submitted indicating the biohazard potential. The laboratory can provide biohazard stickers for this type of evidence. Body fluids, wet or dry, may cause diseases, so proper safety precautions must be observed. Dry stains may flake when disturbed or collected, sending minute particles airborne. These may be absorbed through mucus membranes (eyes, nose, mouth), through open cuts or through chapped skin.



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9.2.2 Protection of Evidence

When an investigator collects documentary evidence, it will be his/her responsibility to preserve the document in its original condition and to avoid any contamination that would have an adverse effect on potential laboratory examinations. Care should be used to avoid placing extraneous folds, notations (other than inconspicuous initials or dates), indented writings, and latent prints on the document evidence. If possible, gloves should be used if the evidence will later be processed for latent prints. Documents should be placed in separate paper or plastic envelopes, so the evidence can be preserved without further handling. Do not underscore, circle, or highlight words or letters on the questioned document.

9.2.3 Desirable Known Standards

Examination of many thousands of known handwriting standards has revealed that the most suitable standards for comparison are those written in the exact wording of the questioned writing and prepared on forms similar to that of the questioned items. Samples such as these provide an excellent basis for comparison and also present readily recognized reference points for demonstration before a court or jury. The following procedure is recommended when obtaining handwriting or hand printing samples from a suspect or victim in either a voluntary or court ordered sample-taking situation.



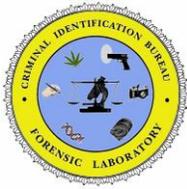
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1. Obtain samples from dictation *until it is believed normal writing has been produced*. The number of samples necessary cannot be determined in advance, although 12-15 samples is generally regarded as the rule of thumb. If disguised writing is suspected it may be necessary to ask the writer to supply a handwritten statement explaining the instructions he/she was given. This may provide the document examiner with normal writing for use as a comparison. The writer should sign, initial, and date each page containing his/her handwriting samples.
2. Do not allow the suspect to see either the original document in question or a photograph thereof.
3. Remove each sample from the sight of the writer as soon as it is completed.
4. Witness each sample on the back, never on the front. Number the order in which the samples were obtained, numbering each sample in the order taken.
5. Initially, do not give instructions on spelling, punctuation, arrangement, etc. However, later in the process, this may be done to ensure the samples are comparable.
6. Use the same writing media, such as type and size of paper, writing instruments, printed forms (such as checks, notes, etc.).



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7. If possible, obtain the full text of the questioned writing in word-for-word order at least once. Signatures and less extensive writing should be prepared several times, each time on a different piece of paper.
8. In suspected forgery cases the Questioned Document Section should also be furnished genuine signatures of the person whose name is allegedly forged. This is to ensure that the “victim” is not also the “suspect”, as well as to evaluate the signatures for signs of simulation by the alleged forger.
9. Obtain samples with both the left and the right hands if the off-hand is suspected in the preparation of the questioned document.
10. Obtain samples written rapidly, slowly, at varied slants and size, noting these requests on the back of each sample.
11. Obtain samples of supplementary writing such as sketches, drawings, manner of addressing an envelope, etc.
13. If readily available, samples of undictated writing should be obtained, such as applications for employment, social or business correspondence, school papers, etc. (See list at the end of this section)
14. The investigator should advise the document examiner concerning the suspect’s manner of writing; i.e. whether he/she was relaxed, writing slowly or rapidly, or apparently attempting to disguise all or a portion of the handwriting samples.



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9.2.4 Additional Information About Taking Known Standards

In order to be accepted in court, known writing must be authenticated in one of three ways:

1. Testimony from someone who personally witnessed the samples;
2. The sample is admitted to by its preparer or;
3. A close personal friend, family member, or co-worker that is familiar with the writer's handwriting can recognize the sample.

9.2.5 The London Business Letter

If disguise is suspected or if the questioned writing includes extended writing, investigator may want to dictate the content of the following paragraph, known as the London Business Letter, which conveniently incorporates all twenty-six letters of the alphabet (upper and lower case) and numerals 0 through 9. The paragraph should be written two to three times.

“Our London business is good, but Vienna and Berlin are quiet. Mr. D. Lloyd has gone to Switzerland and I hope for good news. He will be there for a week at 1496 Zermott St. and then goes to Turin and Rome and will join Col. Parry and arrive at Athens, Greece, Nov. 27th or Dec. 2nd. Letters there should be addressed: King James Blvd. 3580. We expect Chas. E. Fuller Tuesday. Dr. L. McQuaid and Robt. Unger, Esq., left on the “Y.X.” Express tonight.”



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SOURCES OF UNDICTATED WRITING*

Bank Records:

Canceled Checks
Deposit Slips
Promissory Notes
Signature Cards
Withdrawal Slips

City Records:

Licenses

County Records:

Licenses
Applications

Employment records:

Applications

Federal Records:

Fingerprint Cards
Military Records

Home:

Canceled Checks
Correspondence
Diaries
Insurance Policies
Military Discharge Papers
Notebooks
Passports
Receipts
Wills

Hospital Records:

Admission/Releases

Insurance Records:

Applications for Insurance

On the person:

Signed ID Cards (all types)
Letters, Post Cards
Notebooks
Passports

Police and Sheriffs' Department Records:

Complaints
Fingerprint Cards
Receipts for Property Written
Statements

Public Utility Records:

Application for Services:
Electricity
Gas
Telephone
Water

Real Estate Records:

Property Listing Agreements
Rental Contracts

Relatives:

Letters and Other
Correspondence

School and College Records:

Applications for Entrance and
Graduation

Daily Assignments

Registration Cards

Parking Applications

State Records:

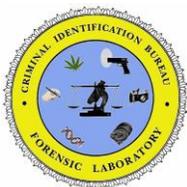
Boat, Fishing and Hunting
Licenses
State Income Tax Return
Unemployment Compensation
Driver's Files

State Records:

Titles
Probation and Parole
Reports
Application for Notary
Public
Civil Service Examination and
Exams

Miscellaneous:

After-Hour Building
Registers
Express Delivery Service
Registers



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*This information was adapted from the *Physical Evidence Handbook, 5th Edition*, Wisconsin Department of Justice, State Crime Laboratories.

9.3 SUBMISSION OF EVIDENCE

All submissions to the Questioned Document Section **must be sealed** for proper security of the evidence. The evidence should be placed into the main container and sealed, with initials across the seal and onto the main container. The case submission form should be placed into a regular envelope and attached to the outside of the main evidence container. The case submission form should include a detailed listing of the evidence submitted, and a description of the examinations to be performed (see general guidelines for evidence submission).

In specialized areas of questioned document examination such as typewriters, printers, photocopiers, rubber stamps, check protectors, altered and obliterated documents, counterfeiting, etc., it is suggested to consult the Questioned Document Section of the laboratory for appropriate evidence handling and collection.

Evidence should be addressed to:

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Attn: CER
725 Jefferson Road
South Charleston, WV 25309-1698

If the evidence submitted is supplemental to a previously submitted case, be sure to refer to and include the original Laboratory Case Number to alert the examiner that it is a supplemental case.

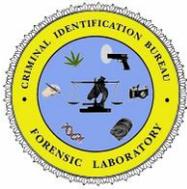
If you should have any questions regarding a case or questions prior to taking known samples, feel free to call the section at (304) 746-2175 or (304) 746-2176.

9.4 EXPLANATION OF OPINIONS EXPRESSED IN A HANDWRITING CASE

Identification (definite conclusion of identity): The examiner is certain, based on evidence contained in the handwriting, that the writer of the known material wrote the writing in question.

Qualified opinions: Limiting factors, such as unexplained letter formations or sample quality and/or quantity, preclude the examiner from rendering an opinion of certainty. These opinions may be expressed with lesser degrees of certainty using terms such as highly probable, probable and indications that they may have or may not have.

No conclusion (totally inconclusive, indeterminable): Significantly limiting factors, such as disguise in the questioned and/or known writing, lack of comparable writing, or poor quality



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samples, preclude the examiner from rendering an opinion towards either identification or elimination.

Elimination: The examiner is certain, based on evidence contained in the handwriting, that the writer of the known material did not write the writing in question.

9.5 GLOSSARY OF TERMS

Base Line: The ruled or imaginary line on which all writing sits.

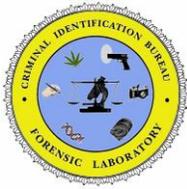
Characteristics: The overall quality and features exhibited in a body of writing.

Class Characteristics: (general features) These characteristics which approximate “copy book” forms and contain little individuality, thus have very limited significance in handwriting examinations.

Conclusion: (determination) The opinion the examiner arrives at based on his examination of the evidence.

Connecting Strokes: Strokes that join one letter to another in handwriting or hand printing.

Deliberation: A slow drawn characteristic of one’s writing, although sometimes indicative of disguise or simulation, some people normally write in a deliberate manner.



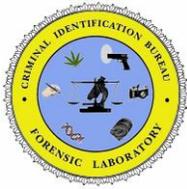
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Differences: Characteristics in one body of writing that have no counterparts in another body of writing. The nature and extent of these differences may be indicative of another writer, and they are termed significant differences, or the evidence may indicate that they could be due to disguise, variation, inadequate specimens, or other factors; and they are termed unaccountable, unexplained or irreconcilable differences.

Disguise: A conscious attempt to change the characteristics of one's handwriting.

Distorted Writing: Writing which does not appear to reflect normal writing habits, either from a deliberate attempt to disguise or from unusual writing conditions.

Forgery: Forged signatures can be classified into four types: simulated (with and without a model signature), traced, auto and freehand or simple. Simulated forgeries are where the perpetrator simulates the signature of the victim using an example of their signature as a model or by memory. While they can be pictorially similar, individual characteristics of the forger may be found. Traced forgeries are where the suspect has traced the victim's signature and are usually characterized by heavy, shaky line quality. Freehand or simple forgeries are when the perpetrator has no prior knowledge of the suspects writing and the forger may produce normally prepared writing. Auto forgeries, usually seen with bad check writers, are prepared when the "victim" uses disguise, and later claims that a check was forged.



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Handwriting: The combination of the body and mind in expressing thought.

Individuality: (peculiarities) Characteristics of writing which are unusual or rare and have great significance in determining whether the same person prepared two bodies of writing.

Known Standards: (specimen) Handwriting used as a known standard for comparison with another body of writing. These Specimens fall into two categories:

Dictated or requested known standards: those that are written solely for comparison purposes, usually on standard forms at the request of an investigator.

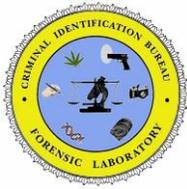
Undictated or collected known standards: handwriting prepared during the normal course of business or social activities, such as that found on canceled checks, letters and applications.

Limited Writing: Writing which is too brief to permit a meaningful comparison.

Line Quality: The characteristics of writing that are a combination of a person's writing skill, speed, pressure, etc.

Natural Writing: Writing which is executed with little attention to the act of writing.

Similarities: Characteristics in one body of writing that have counterparts in another body of writing. The nature and extent of these similarities may be indicative of common authorship, and



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they are termed significant similarities. Or they may exhibit a general overall appearance of agreement but lack individuality and significance, and they are then termed general or pictorial similarities.

Simulation: An attempt to copy or imitate another person's handwriting characteristics, either by observing the writing being copied or from memory.

Slant: The angle of the individual letters in a body or writing in relation to the baseline.

Style: The general appearance of a body of writing. Some people have more than one style of writing.

Tracing: The copying of a genuine signature or other writing by tracing from a model.

Variation: The lack of rigid duplication of writing characteristics (letterforms, speed and spacing) throughout a body of writing. Each person had a certain range of normal variation in habit when writing under essentially the same conditions. External conditions surrounding the execution of writing may produce greater variations.