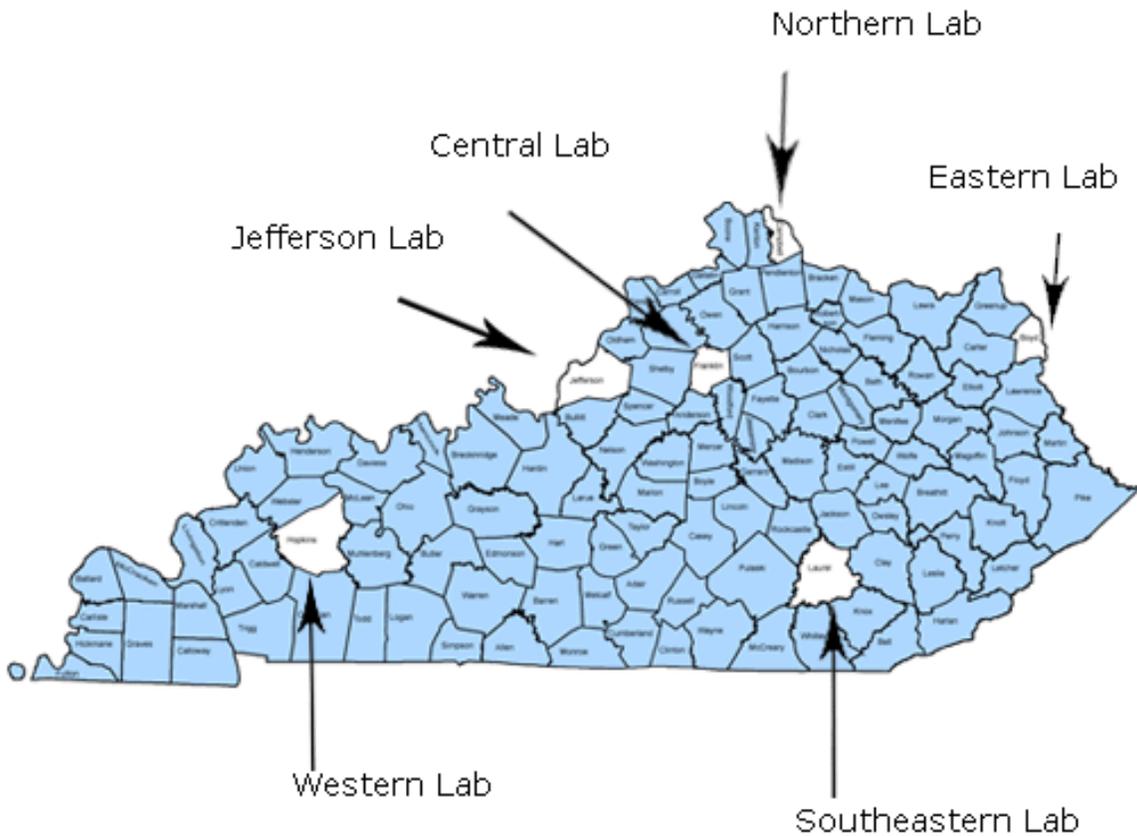


# PHYSICAL EVIDENCE COLLECTION GUIDE

## KENTUCKY STATE POLICE

## FORENSIC LABORATORY



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**PREFACE**

This manual has been prepared as an aid in the collection and preservation of evidence prior to its submission to a laboratory for analysis. Nothing printed in this manual is meant to preempt using common sense in applying this information to field applications. All other previous versions of this document are now considered null and void.

This manual is divided into sections concerning different types of evidence. Each type is discussed in terms of its value as evidence, the information that can be determined from it, the collection of the evidence and how to ship the evidence. It is important to note that the section concerning collection is a “how to” section and can be used as a field guide.

Even though the Kentucky State Police Forensic Laboratory does not have evidence collection personnel who are sent to crime scenes, technical assistance and advice to any agency is always available. If you need this assistance, please call 502-564-5230 between the hours of 8 AM and 4:30 PM Monday through Friday at Frankfort. You will be directed to the appropriate individual for information.

**Laboratory reports containing results and/or conclusions of examination are available on the world-wide-web (the internet) through a secured portal with a username and password available to requesting agencies from the Laboratory System Director. Reports are not mailed on a regular basis. Faxed reports can be sent upon request if you do not have access to the internet at the time of request, or have not set up your username and password for report retrieval. Reports will only be distributed to authorized individuals.**

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## INTRODUCTION

The Kentucky State Police Forensic Laboratory has been established to serve a vital need in the criminal justice system. Their purpose is to scientifically analyze physical evidence from criminal activities and to deliver that information to the submitting agency to aid in its investigation and to the judicial system in the event of a trial.

In order to handle the thousands of cases involving physical evidence, the Kentucky State Police has developed a forensic laboratory system that has six (6) locations in Frankfort, Madisonville, Ashland, Louisville, London, and Cold Springs, Kentucky. Please review Appendix A for addresses, phone numbers, and a list of services offered at each location.

In addition to laboratory analysis, technical assistance at crime scenes is also available through advice over the telephone.

Expert testimony by the examiner, who performs the analysis and whose opinions and/or results are stated on the report, is also available when the case goes to trial; however, in order to maximize the amount of time an examiner has for analysis, the following are requested when expert testimony is required:

1. That it is ascertained whether or not the expert is a necessary witness.
2. That the analyst be advised when and where the trial is to be held as far in advance as possible in order to avoid conflicts with other commitments.
3. That the analyst be advised regarding the expected duration of the trial and the exact date on which the expert will be needed.

All of these services are available, free of charge, to all state, federal, county, and municipal law enforcement agencies and to the Public Defender's Office in connection with official investigations in criminal cases. Normally, no examination will be made if the same or similar evidence in an individual case has been subjected previously to a technical examination in the same scientific field. This limitation is necessary in the interest of economy as well as for the proper administration of justice. Requests for re-examination decisions are at the discretion of the Laboratory Director or the Court System. If there is any question concerning laboratory services, please contact any of the forensic laboratory locations.

Other services are available by the Kentucky State Police, but are not a part of the Forensic Laboratory

### ***Forensic Latent Print Laboratory***

Automated Fingerprint Identification Section (AFIS)  
1266 Louisville Road  
Frankfort, KY 40601  
(502) 782-9821

### ***Electronic Crimes Branch***

1266 Louisville Road  
Frankfort, KY 40601  
(502) 782-9769

***Polygraph Office (Central)***

1250 Louisville Road  
Frankfort KY 40601  
(502) 782-2025

Polygraph offices are also located in the Western, Northern, Eastern, and Southeast Laboratories.

Other services available through organizations outside of the Kentucky State Police:

***Medical Examiners Office*** *–Executive Director*

Central Laboratory Facility  
100 Sower Blvd, Suite 202  
Frankfort, KY 40601  
Tel: (502) 564-4545  
Fax: (502) 564-1699

***Questioned Documents***

Federal Bureau of Investigation  
Federal Bureau of Investigation  
Laboratory Division  
Attention: Evidence Control Unit  
2501 Investigation Parkway  
Quantico, VA 22135  
(703) 632-8444

## NATURE AND VALUE OF PHYSICAL EVIDENCE

Evidence can be defined as something legally submitted to a court of law as a means of determining the truth. Physical evidence deals with material objects. It may be material left or taken from the scene of a crime by the suspect or victim, or it might be an impression left in some material. It includes not only fingerprints and footprints, but also hair, fibers, blood, flammable (ignitable) liquids, glass, or almost anything that can be deposited and collected. Unlike oral testimony, it is not influenced by the stress of the moment; it does not forget. Physical evidence can aid in solving the case by developing *modi operandi* (M.O.'s), by developing suspects, by proving or disproving alibis, by eliminating suspects or connecting suspects to the crime, by identifying the source of stolen materials, and by providing investigative leads. Physical evidence is often necessary to prove that a crime had been committed. For instance, the presence of ignitable liquids at a fire scene indicates arson, and the presence of heroin constitutes a crime if connected to a suspect.

The amount of consideration given to physical evidence depends on whether the evidence has individual or class characteristics. Evidence with individual characteristics can definitely be identified with a person or source if sufficient microscopic or accidental markings are present. Some examples include fingerprints, firearms, bullets, tool marks, shoe prints, and pieces of glass in cases in which broken edges can be matched.

Since all forensic laboratory locations have more case work than analytical time, the submitting officer can aid the examiner by fully relaying the facts of the case. Information given to the laboratory will establish the direction of the analysis and may help to determine the worthiness of the evidence. Many laboratory examinations are lengthy and expensive. The efficiency of the laboratory is directly related to keeping the analyst well informed as to the facts of the case, submitting relevant evidence, and not overloading the system.

## COLLECTION OF PHYSICAL EVIDENCE

While the specifics of collection of different types of evidence will be discussed later under the individual categories of evidence, certain general rules must be kept in mind.

1. All evidence must be collected legally--either with a warrant, with the consent of the owner or incidental to an arrest.
2. All evidence must be safely collected, packaged, sealed with evidence tape and initialed, stored, and transferred. This is of special concern with respect to bloodborne pathogens. Exposure to HIV (the AIDS virus) and to the hepatitis B virus is of much concern in collecting any evidence that has blood or other body fluids present in either the liquid or dry state. This includes garments, and other types of evidence involved in murders, rapes, assaults, burglaries, and drug offenses. Please consult your agency's exposure control plan for bloodborne pathogens. In general, at least disposable gloves should be used in handling such evidence, and safety glasses, surgical masks, and other safety garments should be available if necessary. A 10% solution of household bleach and water is a good disinfectant for cleaning items or areas contaminated by such materials. Do not, however, use this solution on the evidence itself unless instructed to do so by the laboratory, since it could destroy some of the evidence that should be analyzed. Do not use a bleach solution in conjunction with a clandestine laboratory. Chemicals associated with a clandestine lab can produce lethal gases upon mixture with bleach.
3. The evidence must be described in notes. Where it was located, the circumstances, and how it was obtained should be recorded along with the date.
4. The evidence must be marked for later identification. Initials and date, with proper notes, are usually sufficient. The use of a case number and exhibit number is highly recommended. Markings on the wrapping or tags need to be placed with the evidence (do not mark the evidence itself); however, in cases of liquids, powders, small fragments, etc., the containers need to be marked, sealed and initialed. The recommended places on specific types of evidence will be discussed under each particular type of evidence
5. All evidence needs to be stored in a secure place with restricted access. The chain of custody needs to be documented. Valuable evidence such as money, drugs and weapons needs to be secured separately within the storage locker.
6. All evidence needs to be properly sealed and initialed for submission to the Forensic Laboratory. An evidence package is defined as properly sealed when the contents cannot readily escape and if entering the container will result in obvious damage or alteration to the container or seal. Tape needs to be used to seal the openings of evidence containers. Initials or likewise identification of the person placing the seal should be marked across the tape so that the writing falls on both the tape and the container. Heat seals or manufactured self-sealing "evidence bags" may be used and should have the same markings placed along the seal.

Stapling is not an appropriate seal. Evidence that is improperly sealed when received at the laboratory shall be properly sealed at that time. This shall be accomplished by having the submitting officer place an appropriate seal on the evidence and initial. If the submitting officer is not present, the receiving analyst shall properly seal and initial package.

### **Packaging**

Select suitable containers such as round pillboxes, glass or plastic vials, envelopes, paper bags, strong cardboard boxes, etc., for packaging evidence. Each piece of evidence needs to be individually packaged to avoid any possibility of cross contamination. Special care must be taken not to package wet stains until they are dry. Wet items should NEVER be packaged in PLASTIC. Please see the "Blood and Other Body Fluids" section for more specifics for this type of evidence. The package needs to be sealed with evidence tape and initialed. Eliminate the use of staples since they can tear disposable gloves, skin tissue, and be a source of infection. Keep the chain of custody as small as possible. Keep the sealed evidence under lock and deliver it as soon as possible to the nearest laboratory providing the services needed.

Packages containing ANY evidence that is a possible source of infection, especially from bloodborne pathogens (e.g., HIV or Hepatitis B virus), must be packaged in a safe manner and properly marked identifying the contents as a BIOHAZARD. Such evidence includes garments with stains of blood and other body fluids, syringes, razor blades, knives, and contraband from body cavity searches. Sharps (e.g., razor blades, knives, or broken glass) must be packaged in puncture-resistant containers with biohazard labeling. Any piece of evidence that is likely to spill due to breakage, such as a tube of blood, must be double packed to prevent spillage. For instance, blood alcohol kits have zip-lock plastic bags for containing any blood spilled from broken blood sample tubes.

### **BLOODSTAIN PATTERN CASE ACCEPTANCE POLICY**

#### Service

- A. Bloodstain Pattern Analysis will only be performed for the agencies served by the Kentucky State Police Division of Forensic Services (i.e., KSP, local PD's and Sherriff's offices, prosecutors, and public defenders).
- B. Bloodstain Pattern Analysis is generally limited to murder, death investigations, or assaults. Not every case of these types is suitable for this type of analysis. Contact the Kentucky State Police Laboratory in the appropriate region prior to submission. An in-person consultation may be necessary prior to the submission of evidence, if requested by an analyst.

#### Suitability

- C. The investigating officer should contact the Kentucky State Police Laboratory prior to submitting scene photographs (i.e. scene overview, areas of staining, stains, and close-up stains with scale) and/or items that may be submitted for this type of analysis.

- D. The investigating officer should request bloodstain pattern analysis at the time of submission, prior to other analysis, if particular items (i.e., clothing) are to be considered for this type of analysis.
- E. The investigating office may request the assistance of an analyst for examination at scenes of bloodshed with approval by the Laboratory Manager or their designee(s) and through other proper channels.
- F. The investigating officer should provide witness and/or suspect statements, autopsy reports, scene diagrams, etc. as requested.

## **SEROLOGY CASE ACCEPTANCE**

- I. Service
  - A. Serology analysis will only be performed for the agencies served by the Kentucky State Police Division of Forensic Services (i.e., KSP, local PD's and Sherriff's offices, prosecutors, and public defenders).
- II. Priority
  - A. Priority will be given to current cases involving a violent crime (i.e., murder, sexual assault, assault, or robbery).
  - B. The next priority will be given to current cases involving a property crime (i.e., arson, burglary, or other property crimes).
  - C. Cold and inactive sexual assault cases will be given last priority.
  - D. Cases will typically be worked based on the case type and order in which the cases were received into the Forensic Biology Casework section of the Kentucky State Police Laboratory system.
- III. Samples
  - A. Although many items of evidence may be collected throughout an investigation, only the most probative items should be submitted to the laboratory for analysis. Information provided prior to and/or at the time of submission should be written on the KSP 26 or added to the narrative in the BEAST LIMS (i.e. specific additional case history for a relevant item, the name of the owner/wearer of an item and if the item was collected from or belonged to an individual, the collection location of an item). If additional items of evidence are available, an inventory of such may be submitted with the initial submission. Serological analysis will be conducted in the absence of reference standards; however, the case shall not be forwarded for DNA analysis until the appropriate DNA reference standards are submitted. Cases for which there is no suspect, when a suspect has fled, when an investigating officer has attempted, but cannot obtain a warrant for the collection of a suspect's standard, or inactive sexual assault cases may be exempt from this requirement. Reference standards are not included in the total item counts below.
  - B. Murder/Death Investigation Cases
    - 1. Initial submission
      - a. One (1) to ten (10) items may be submitted; the investigating officer should indicate the order of importance for the items being submitted.
      - b. With analyst discretion, additional items may be submitted on a case by case basis if specific information regarding the

circumstances for those items (i.e., multiple persons directly involved and/or bleeding) is provided by the investigating officer at the time of submission. The additional items request may also need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).

2. Subsequent submission(s)

- a. Communication between the analyst(s) working the case and the investigating officer/prosecutor should provide information as to the reason additional items may need to be submitted. The additional analysis request may need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).

C. Sexual Assault Cases

1. Initial submission

- a. Sexual Assault Evidence Collection Kit(s)
  - i. All sexual assault evidence collection kits should be submitted to the laboratory.
- b. Panties/underwear worn during/after the offense that were collected but not included in the kit should be submitted.
- c. Other clothing and/or bed linens should not normally be submitted during the initial submission.
- d. With analyst discretion, additional items may be submitted for cases involving victims who may be incapable of providing information about their assault (i.e., young children, mentally disabled, or elderly); however, the investigating officer should notify the analyst of this circumstance at the time of submission. The additional items request may also need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).
- e. Additional items may be submitted on a case by case basis if specific information regarding the circumstances for those items (i.e., multiple suspects, no kit(s) was collected, or known ejaculation on a particular item) is provided by the investigating officer at the time of submission.

2. Subsequent submission(s)

- a. Clothing and/or bed linens may be submitted after the initial analysis is completed if there is no probative evidence from the initial submission.
- b. Communication between the analyst and the investigating officer/prosecutor should provide information as to the reason any other additional items may need to be submitted. The additional analysis request may need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).

D. Assault/Robbery/Arson/Burglary Cases

1. Initial submission

- a. One (1) to five (5) items may be submitted; the investigating officer should indicate the order of importance for the items being submitted.
  - b. With analyst discretion, additional items may be submitted on a case by case basis if specific information about those items (i.e., multiple persons directly involved and/or bleeding) is provided by the investigating officer at the time of submission. The additional items request may also need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).
2. Subsequent submission(s)
    - a. Communication between the analyst and the investigating officer/prosecutor should provide information as to the reason additional items may need to be submitted. The additional analysis request may need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).
- E. Other case types
1. The investigating officer should consult with a forensic biology analyst prior to submitting items to the Kentucky State Police Laboratory. The request may also need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).
  2. If the case is considered an acceptable case, follow the above case submission guidelines as applicable.
- IV. Incomplete Submissions from Serology Cases
- A. Communication with the investigating officer to obtain the appropriate known DNA reference standards and Combined DNA Index System (CODIS) eligibility information (if not previously provided) for evidence samples shall be attempted and noted in the case file and/or narrative by the serology analyst working the case; however if the appropriate standards have not been received into the laboratory system prior to completion of the serological analysis report, the analyst should report a statement similar to the following (reasons for exemptions should be documented):
    1. Murder, Assault, Robbery, Burglary, and Other Cases - "If DNA analysis is necessary, please resubmit Items X and Y, along with a blood or buccal standard from NAME."
    2. Sexual Assault Cases – "Items X and Y are being held for DNA Analysis as an inactive case. Please submit a blood or buccal standard from NAME or contact the laboratory if this case is still active." Inactive cases should be noted as "Initiative" on the KSP 26.
  - B. Incomplete serology submissions shall not be forwarded for DNA analysis, with the exception of inactive Sexual Assault Cases.
  - C. If the appropriate known DNA reference standards are submitted to the laboratory prior to the release of the evidence to the investigating agency, those items may be forwarded for DNA analysis and should be noted in

the case file and/or narrative without the need for an additional laboratory report or corrections to the previously issued report.

### Suitability

- I. Stains which need to be determined as blood, semen, and/or saliva should be submitted to the appropriate laboratory for that region before being forwarded for DNA analysis.
- II. A hair screen, and if applicable a hair comparison, should be completed prior to DNA analysis on hair(s) and shall follow the Hair Comparison Acceptance Policy found on page 58 of this guide. Exceptions may need to be approved by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s). DNA analysis of hair may result in consumption of the item.
  - A. **Head hair, pubic hair, and/or facial hair (as applicable) standards from victims and/or suspects should be collected as close to the offense date as possible and submitted if trace analysis may be requested (recommended for autopsies).**
- III. DNA analysis will generally be limited to suitable stains, hair, and reference standards.
- IV. Touch DNA items are those where contact, which may be limited, between a person and an object could result in the transfer of cells to an object. Touch DNA samples, would primarily include objects touched by an individual's hand. "Touch" evidence does **NOT** refer to items of evidence on which biological fluids (e.g. blood or saliva) are observed or expected to be found. In addition, evidence that has allegedly come in contact with a person's mouth or items of clothing left at a scene are not considered "touch" DNA.

**Note:** Fingerprints can and should be submitted to the Automated Fingerprint Identification (AFIS) section for analysis.

1. Touch DNA will **NOT** be accepted for robberies (exceptions may apply) and the following non-violent crimes: burglary, theft, larceny, and criminal mischief,
  1. Examples of types of evidence items that **WILL** be accepted for robberies and property crimes:
    - Blood/Saliva
    - Bottles/Cans
    - Cigarette Butts
    - Clothing (to identify owner/wearer)
    - Gloves
    - Hats
    - Masks
    - Tools/objects brought to and left at scene
  2. Examples of types of evidence items that **WILL NOT** be accepted for robberies and property crimes:
    - Swabs from doorknobs/Handles (including vehicles)
    - Swabs from windows/doors (including smears)
    - Swabs from countertops
    - Swabs from cash registers/drawers
    - Swabs from safes/jewelry boxes

Cords/Cables (exception-ligatures)

Keys

Pockets

2. For other violent crimes, the suitability of touch samples for DNA analysis will be determined on an item-by-item basis, and may be analyzed **only** if deemed suitable, and other items have not provided probative information.
  1. Articles of clothing with/without other suitable stains or hair that provide an association to the offense may be submitted to determine the owner/wearer and are not considered touch DNA. Information as to the item's direct association to the scene is required when being considered for CODIS (i.e., witness statements, videotape, or photographs).
  2. Clothing worn by an individual or similar type items to determine if another individual has come in contact with the item are considered touch DNA (i.e. suspect grabbed victim's shirt), and should not be submitted for analysis at this laboratory; however, they may be received and forwarded to a vendor laboratory for analysis at the requestor's expense. If a specific area has been documented and visually exhibited contact, item will be considered for analysis on an item by item basis (i.e. turned out pockets from a victim's pants)
  3. Items utilized as a weapon in violent offense cases may be submitted and are not necessarily considered touch DNA. Suitable stains, hair, or analysis by another section in the laboratory may be required to make an association to the offense before being considered for analysis. Items collected from an individual/location to determine the owner (i.e controlled substance, manufacturing controlled substances, and possession of a firearm) are generally not accepted.
  4. Items for which fingerprinting is also requested will be considered for analysis on a case by case basis. The request for both analyses should be noted on the KSP 26. Consultation with Forensic Latent Print Laboratory may be appropriate.
  5. Items collected from common areas (i.e. door knobs/push plates/handles, and countertops) and paper items which do not have other suitable stains or hair are considered touch DNA and should not be submitted.
  6. Analysis of a sample is contingent upon the size, quality, and probative value of that sample. Samples that do not meet these criteria will be returned unexamined.

#### Reference Standards

- I. **The appropriate DNA reference standards are required prior to the starting of DNA analysis, generally from both victim(s) and suspect(s). Cases for which there is no suspect, when a suspect has fled, when an**

- investigating officer has attempted, but cannot obtain a warrant for the collection of a suspect's standard, or inactive sexual assault cases may be exempt from this requirement. This information should be provided by the investigating officer at the time of submission. If this status changes, the investigating officer should notify the laboratory and submit any attainable standards.** Known reference standards are utilized for comparison and elimination purposes. If the appropriate standards have not been submitted, an analyst or designee shall attempt to contact the submitting agency to request such. Incomplete submissions will be returned unexamined unless there was approval by the Laboratory Manager, an applicable Forensic Biology Casework Supervisor, or their designee(s).
- II. Known reference standards may be a blood standard (drawn by medical personnel) and submitted in either dried (preferred) or liquid form or a buccal standard (swabbing from the inside of the cheek) collected from an individual.
  - III. Known reference standards for additional elimination purposes (i.e., spouse, companion, owners, or relatives) may also be requested. Elimination standards are often required for cases involving Touch DNA. If not previously submitted, these samples should be requested by an analyst or designee, as appropriate, prior to being forwarded for DNA analysis.
  - IV. Cases with touch DNA samples may require the submission of a known DNA reference standards for elimination purposes from the individual(s) who collected the evidence prior to DNA analysis on touch samples. DNA profiles obtained from these standards will be maintained in the staff database for quality assurance purposes. These samples are not generally considered evidence. The collector name(s) and agency for touch samples should be provided at submission.
  - V. **Pseudo-standards may only be submitted if an agency does not have enough probable cause to obtain a known DNA reference standard.** Acceptable pseudo-standards are limited to the following: empty cup, can, or bottle, or a cigarette butt collected from a controlled environment (i.e. interview). Information pertaining to the collection of these types of samples must be provided to the laboratory when submitted. Exceptions to the aforementioned pseudo-standards must be approved in advance of submission by a DNA analyst. Pseudo-standards will not reference a named individual on the report. If probable cause is later established, a known reference standard should be collected and submitted to the laboratory for analysis and comparison to the evidence in the case for confirmation. **An unconfirmed pseudo-standard should not solely be utilized for elimination purposes of a named person.**
  - VI. Comparison to known DNA reference standards for which analysis has been completed may be requested by an agency, these are considered paper comparisons and may be submitted in person, via fax, or via email.
    - A. Paper comparisons to evidence items submitted from the same agency that requested the analysis for the reference standard should submit a KSP 26 referencing the agency case number or laboratory number for comparison.
    - B. Paper comparisons to evidence items submitted by an agency different than that which requested the analysis for the reference standard should

- submit a KSP 26 referencing the agency name/case number/item and laboratory number for the comparison of interest. In addition, the prosecuting attorney for the jurisdiction maintaining the evidence items should submit a letter authorizing the use of the reference standard maintained by the other agency for comparison and acknowledging that there are no issues with the original chain of custody for the reference standard.
- VII. An offender sample collected and submitted to the DNA Database Section of the Kentucky State Police Laboratory pursuant to (KRS 17.170) is not considered a suitable known DNA reference standard for casework purposes; therefore, direct comparison between offender samples and evidence items not submitted to CODIS is not allowed.
  - VIII. In the event that offender information is supplied as an investigative lead from a CODIS entry, a known DNA reference standard should be submitted for comparison to the evidence in the case.
  - IX. Known DNA reference standards collected for casework purposes are not eligible for entry in CODIS and no suspect database is maintained by the laboratory.
  - X. Unidentified human remains, missing person samples, or samples from relatives of missing persons may be submitted for analysis and entry into the Missing Person Index of CODIS.

### **DNA CASE ACCEPTANCE POLICY**

#### **I. Service**

- A. DNA analysis will only be performed for the agencies served by the Kentucky State Police Division of Forensic Services (i.e., KSP, local PD's and Sherriff's offices, prosecutors, and public defenders).
- B. Items submitted for DNA analyses that are not offered by the Kentucky State Police Laboratory (i.e. Mitochondrial DNA (mtDNA), touch DNA requests for robberies and property crimes, and some touch DNA requests associated with violent crimes). Costs for this analysis will generally be the responsibility of the agency and/or attorney submitting the evidence to the laboratory. A "Responsibility for Cost" form should be completed and the appropriate billing information provided to the laboratory prior to the evidence being forwarded to a vendor laboratory for analysis. Fees associated with testimony (i.e. witness and travel) from the vendor laboratory are the responsibility of the agency and/or attorney submitting the evidence to the laboratory.
- C. Cases requiring hair analysis may take an extended period of time for analysis. At the discretion of the Kentucky State Police Laboratories, these types of cases may be sent to the FBI for analysis at no cost to the submitting agency.

#### **II. Priority**

- A. Priority will be given to current cases involving a violent crime (i.e., murder, sexual assault, assault, or robbery).
- B. The next priority will be given to current cases involving a property crime (i.e., arson, burglary, or other property crimes).

- C. Touch DNA (only) cases (those not associated with robberies or property crimes), cold cases, and inactive sexual assault cases will be given last priority.
- D. DNA Cases will typically be worked based on the case type and order in which the cases were received into Forensic Biology Casework section of the Kentucky State Police Laboratory system.
- E. Y-STR (male specific) DNA Analysis cases may be submitted to the Kentucky State Police Laboratories on a case by case basis. Analysts should forward cases for Y-STR DNA Analysis, as applicable.
- F. Relationship testing (i.e. paternity, maternity, unidentified human remains, missing person) cases may be submitted to the Kentucky State Police Laboratories. Known DNA reference standards will generally be analyzed in-house, but product of conception or other unique evidence will be forwarded to a vendor laboratory for analysis. The following should be provided to the laboratory at the time of submission; however all required\* items should be received before any in-house analysis or submission to a vendor laboratory will be undertaken. Case scenarios requiring exceptions should be approved in advance.
  - 1. \*Known DNA reference standards from the mother/alleged mother
  - 2. \*Known DNA reference standards from the alleged father
  - 3. \*Product of conception or known DNA reference standard from the child
  - 4. Other family Known DNA reference standards, as applicable
  - 5. \*A letter from the prosecutor with explanation of the intent to prosecute (i.e. sexual assault, incest)
  - 6. \*The following information is necessary for relationship testing statistical analysis:
    - a. the race of each individual
    - b. if there is any known relatedness between the victim and suspect (i.e. sexual assault, incest)
    - c. the known relationship between the victim and family reference standards (i.e. unidentified human remains, missing person)
  - 7. The following information should be provided:
    - a. if any of the individuals have received a blood transfusion in the last three(3) months
    - b. if any of the individuals have had a hematopoietic progenitor cell transplant (i.e. bone marrow transplant)
- G. Post-conviction cases may be submitted to the Kentucky State Police Laboratories for analysis (KRS 422.285).

### III. Samples

- A. Although many items of evidence may be collected throughout an investigation, only the most probative items should be submitted to the laboratory for analysis. Information provided prior to and/or at the time of submission should be written on the KSP 26 or added to the narrative in the BEAST LIMS (i.e. specific additional case history for a relevant item, the name of the owner/wearer of an item and if the item was collected from or belonged to an individual, the collection location of an item). If

additional items of evidence are available, an inventory of such may be submitted with the initial submission. All appropriate reference standards should be submitted and are not included in the total item counts below. The number of samples for DNA analysis will differ depending upon serology results, previous DNA results, information provided by the investigating officer, and/or if multiple persons were directly involved and/or bleeding. **Not necessarily all samples submitted for DNA analysis will be analyzed.**

- B. Murder/Death Investigation Cases
    - 1. One (1) to ten (10) items
  - C. Sexual Assault Cases
    - 1. One (1) to three (3) items
  - D. Assault/Robbery/Arson/Burglary/Other/Touch DNA Cases
    - 1. One (1) to three (3) items
- IV. Consumption (KRS 524.140)
- A. Unknown Suspect – If consumption of an item is deemed necessary to continue its analysis, the laboratory will request in writing that the investigating officer/attorney provide, at a minimum\*, a letter advising that no suspect has been established for the associated case, and authorizing consumption of the item. Analysis will not proceed until such a letter has been received by the laboratory. \*Case specific scenarios may warrant utilizing the known suspect authorization requirements.
  - B. Known Suspect – If the consumption of an item is deemed necessary to continue its analysis, the laboratory will request in writing that both the prosecutor and defense provide a letter authorizing the consumption, or that a judge provide an order compelling the analysis to continue. Analysis will not proceed until such a letter/order has been received by the laboratory.
- V. Combined DNA Index System (CODIS)
- A. Profiles eligible for CODIS will be entered at the time of analysis based upon the information provided by the agency prior to the completion of the DNA report.
  - B. The investigating officer should contact the analyst regarding CODIS pending profiles.
  - C. An item does not have to be eligible for CODIS to be analyzed; however, if a sample is not eligible for CODIS, the required known DNA reference standards must be submitted prior to DNA analysis.
- VI. Incomplete Submissions from DNA Analysis Only Cases
- A. Cases requiring DNA analysis only should not be submitted to the laboratory without the appropriate known DNA reference standards.
  - B. If a submission is received, communication with the investigating officer to obtain the appropriate known DNA reference standards and CODIS eligibility information (if not previously provided) shall be attempted by a forensic biology analyst or their designee (at the laboratory where the evidence was received) and noted in the case file and/or narrative; however if the appropriate standards have not been received into the laboratory system the assigned analyst shall report a statement similar to

the following: "If DNA analysis is necessary, please resubmit Items X and Y, along with a blood or buccal standard from NAME."

- C. If the appropriate known DNA reference standards are submitted to the laboratory prior to the release of the evidence to the investigating agency, those items may be forwarded for DNA analysis and should be noted in the case file without the need for an additional laboratory report or corrections to the previously issued report.
- D. Incomplete DNA only submissions shall not be forwarded for DNA analysis, with the exception of inactive Sexual Assault Cases.

**Evidence should be submitted to the laboratory promptly and once adequate information has been obtained.**

**If a case no longer requires analysis (i.e. adjudicated), the submitting agency should notify the laboratory as soon as possible to ensure that cases are not unnecessarily worked.**

## Forensic Biology Case Acceptance Policies – Quick Reference Guide

### Serology

#### Murder/Death Investigation Cases

1. Initial submission  
One (1) to ten (10) items, should indicate the order of importance for the items being submitted; additional items may be submitted on a case by case basis (i.e., multiple persons directly involved and/or bleeding)
2. Subsequent submission(s)  
Additional items may be submitted after communication between the analyst and the investigating officer/prosecutor

#### Sexual Assault Cases

1. Initial submission  
Sexual Assault Evidence Collection Kit(s) along with panties/underwear worn during/after the offense that were collected but not included in the kit; other clothing and/or bed linens should not normally be submitted during the initial submission; case by case exceptions – victims who may be incapable of providing information about their assault or cases with multiple suspects, no kit(s), or specific information about the item. All sexual assault evidence collection kits should be submitted to the laboratory.
2. Subsequent submission(s)  
Clothing and/or bed linens may be submitted after the initial analysis is completed if there is no probative evidence from the initial submission; additional items may be submitted after communication between the analyst and the investigating officer/prosecutor

#### Assault/Robbery/Arson/Burglary Cases

1. Initial submission  
One (1) to five (5) items, should indicate the order of importance for the items being submitted; additional items may be submitted on a case by case basis (i.e., multiple persons directly involved and/or bleeding)
2. Subsequent submission(s)  
Additional items may be submitted after communication between the analyst and the investigating officer/prosecutor

#### Other case types

1. The investigating officer should consult with a forensic biology analyst prior to submitting items, if the case is considered an acceptable case, reference Assault/Robbery/Arson/Burglary Cases submission guidelines.

### Bloodstain Pattern Interpretation

Please contact the laboratory.

### DNA

All appropriate reference standards should be submitted and are not included in the total item counts below. The number of samples for DNA analysis will differ depending upon serology results, previous DNA results, information provided by the investigating officer, if multiple persons were directly involved and/or bleeding. **Not necessarily all samples submitted for DNA analysis will be analyzed.**

#### Murder/Death Investigation Cases

One (1) to ten (10) items

#### Sexual Assault/Assault/Robbery/Arson/Burglary/Other/Touch DNA Cases

One (1) to three (3) items

**If a case no longer requires analysis (i.e. adjudicated), the submitting agency should notify the laboratory as soon as possible to ensure that cases are not unnecessarily worked.**

## DELIVERING EVIDENCE TO THE LABORATORY

The evidence should be sent to the laboratory as soon as possible. Use Appendix A for determining the nearest laboratory providing the desired services. The analyst receiving the evidence shall begin an internal chain of custody for the case and evidence acceptance.

All evidence brought to the Forensic Laboratory by evidence contributors shall be accepted for analysis when meeting the following criteria:

1. Evidence needs to be submitted to the laboratory either in person, by the United States Postal Service, or by commercial carriers (Federal Express, United Parcel Service, etc.). Qualified Forensic Laboratory personnel shall receive the evidence or when appropriate provide secure drop boxes. Parcel post and regular mail cannot be traced and are not recommended due to chain of custody issues, which may arise in court. When evidence is mailed to the lab, mark the package to the attention of whatever section (Controlled Substances, Forensic Biology, Firearms, etc.) to which it would be assigned. Unmarked packages arriving at the lab may not be recognized as evidence, resulting in a receptionist signing for the package. Before mailing firearms and live ammunition, please refer to [page 29](#) for proper procedures.
2. Evidence requiring latent print/fingerprint analysis should only be sent to the AFIS Section which is housed within the KSP Criminal Identification & Records Section. See Appendix A for AFIS contact information and mailing address.
3. A Forensic Laboratory Request for Examination (KSP 26 or pre-log) or an Evidence Collection Kit Information Form should accompany all evidence. The form is available at all laboratory locations, KSP posts and the KSP website. Submitting officers will be asked to sign this form at the time it is received in the laboratory. If evidence received by the U.S. Postal Service or a commercial carrier does not contain a Forensic Laboratory Request for Examination (KSP 26 or pre-log) or Evidence Collection Kit Information Form, the analyst accepting the evidence will notify the submitting officer/agency and request a completed Forensic Laboratory Request for Examination (KSP 26 or pre-log). *If the form is not received within 7 calendar days, then evidence will be returned unexamined.*
4. All evidence needs to be properly sealed with evidence tape, heat sealed, or sealed using self-seal adhesive "evidence bags". Heat sealed, or self-seal "evidence bags" containing adhesive should be initialed along the seal. All other packages should be initialed across package and tape so that the writing falls on both the tape and the container. All initials should be legible. If evidence has been received at the laboratory that is not properly sealed and the submitting/property officer is not present, then it shall be sealed and documented by the receiving analyst.
5. The receiving analyst shall legibly sign the Forensic Laboratory Request for Examination (KSP-26 or pre-log) or Evidence Collection Kit Information Form with their name (or initials), date, time, what items/packages were received, how the items/packages were received, from whom they were received, and condition of the evidence (i.e. improperly sealed).

6. The information from the Forensic Laboratory Request for Examination (KSP-26 or pre-log) or Evidence Collection Kit Information Form shall be used to log into the Forensic Laboratory Information System and obtain a unique laboratory number. This number will be used to track the evidence from receipt to release.
7. An identifying mark, such as the case number, submitting officer or victim/suspect name, must be present on both the evidence and the KSP Forensic Laboratory Examination Request Form (KSP-26 or pre-log).
8. Trained Forensic Laboratory personnel may forward evidence for further testing when the Forensic Laboratory does not provide necessary services requested.

**BEAST LIMS (Laboratory Information Management Systems)**

The Kentucky State Police Forensic Laboratory utilizes the laboratory information system called "Beast" to maintain chain of custody, maintain electronic case records, generate laboratory reports and provide authorized individuals remote access to completed laboratory reports, case status, and pre-log capabilities.

Permission to access the secured website must be made by a law enforcement agency or authorizing individual within the judicial system for a username, password, and internet address. Inquiries can be sent to:

Laboratory System Director  
Kentucky State Police-Central Forensic Laboratory  
100 Sower Blvd., Suite 102  
Frankfort, KY 40601  
Attn: Beast Access Request  
502-564-5230

Laboratory reports will not be mailed on a regular basis to reduce paper and postage usage. Contact the laboratory in your region if you have a question about the progress of a case.

## PHOTOGRAPHY

The law enforcement community must constantly review its mission to determine the appropriate use of the photographic medium. This review necessarily demands that a variety of possible areas be explored, because photographic duties and goals will differ in given instances.

### **Value**

An extremely important application of photography in law enforcement involves the pictorial documentation of crime scene locations. Because a complete visual recording of the scene is needed to insure a thorough investigation and subsequent prosecution, there are theoretical, legal and technical problems, which are to be studied prior to the on-site photography. A series of poorly planned, executed, and displayed photographs have the potential to adversely affect the success of other efforts of the crime scene investigation. Therefore, crime scene photography is an integral facet of the entire investigation process.

### **Information Determined**

The obvious purpose of crime scene photography is to set forth a visual record of the crime scene and all its pertinent features. However, the best example of the role of photography is the presentation of a logical “story” as told by the scene in visual form.

### **Collection**

Before a systematic depiction of the scene can be made with photography, the purpose and basic initial rules are to be discussed as background for a comprehensive approach. The first idea to be considered is that the scene must be undisturbed, to the extent reasonably possible, prior to the taking of photographs. This will assist in the establishment that the conditions as portrayed in the pictures truly illustrate the original and uncontaminated features of the scene. Also, numerous pictures should be taken with the idea that the cost of film does not override the immense value of completeness. When in doubt, take the photograph. Hindsight will not be a comfort when a part of the scene, which appeared to have no significance, was not photographed and becomes of immense importance at a later date.

A sequence of photographs showing all pertinent locations in an organized manner must be compiled. As a basic guideline, the subject matter should be represented by a progression of “general to specific,” in essence, from three major vantage points: 1) long-range, 2) mid-range, and 3) close-up. In addition, each state of the commission of the crime must be treated and photographed separately. A jury in the courtroom could be logically presented, for example, with a compilation of pictures illustrating the subject's approach to the scene, entrance into the scene, commission of the crime, and departure from the scene.

A measurement scale must be used when photographing elements of the crime scene for size and distance relationships. Whenever practical, measuring devices should appear in the photographs. However, the subject matter should first be photographed in an “as is” condition prior to added markers.

Follow-up photographs represent an outgrowth of the crime scene investigation. Autopsy photographs and photographs of a live victim or suspect to show bruises or wounds are prime examples of this category. An integration of the information recorded at the actual scene and in follow-up areas will reveal a greater depth of understanding of the realities of the crime scene. Most importantly, photographing the physical evidence at the scene will be a major component in establishing the chain of custody of items introduced in the courtroom.

Because of the number and types of photographs, which are normally taken at a thorough crime scene search, a photographic log should be kept. The following information should be included:

1. Identity of photographer
2. Date and time
3. Specific location of crime
4. Orientation and description of photographic scene
5. Type of camera
6. Type of film (or digital image)
7. Light source
8. Distance from camera to subject
9. Environmental conditions
10. Focal length of lens
11. Shutter speed
12. Lens aperture

This information will assist the photographer in establishing the details of the crime scene in a detailed and professional manner in the courtroom. Additionally, the log will assist in the chemical development of the negatives (or archiving the electronic file) and photographs. Added to the log at a later date should be information concerning where the film was processed and printed. Security of the negatives (or electronic file) should also be established.

No matter how extensive the photographic efforts at the crime scene, photographs must stand the test of legal admissibility. The general standards used to review the credibility of the photographs are:

1. Accurate representations
2. Free of distortion
3. Material and relevant
4. Unbiased

If a photograph is deemed to depict only the gruesome nature of the scene to excite the emotions of the viewer, then its potential to prejudice the viewer may outweigh its value as a purveyor of truth. Additionally, the distortion represented in the photograph may be so prominent that the accuracy and reliability of the photograph is severely questioned. To contend with the issue of distortion in photographs, the best situation is to have the person who actually took the photograph testify concerning the inherent accuracy of the photographs.

Even a person who possesses a detailed level of photographic expertise is not necessarily qualified to be a crime scene photographer. Photographing a scene involves an understanding of all aspects of difficulties which can exist. If these aspects are not thoroughly examined and understood, the photographic product of a crime scene can actually harm the prosecution of a case. The person holding the camera must be aware of the theory of crime scene photography, which will then be combined with the practical and equipment operation segments of the task.

## **FIREARM IDENTIFICATION**

The Firearms Identification Section, often mistakenly referred to as “Ballistics”, is responsible for the examination of firearms, bullets, fired cartridge cases, ammunition components, victim clothing (powder patterns) and any other firearm related item. Associations between some of these items as well as other determinations can be made based on microscopic comparisons and analytical observations. The Central, Eastern and Jefferson Laboratory locations currently have firearms sections.

Examinations for biological evidence or latent fingerprints **MUST** be done prior to submission to the Firearms Identification Section. Biological and latent fingerprint evidence **WILL BE DESTROYED** during the examinations conducted by the Firearms Identification Section. Firearms identification concerns itself primarily with the comparison of bullets and cartridge cases in an attempt to identify the individual firearm from which they were fired. Other examinations conducted under the discipline of firearms identification include muzzle to target distance tests, functional tests to determine if a firearm functions properly and comparisons of bullets and cartridge cases from unsolved murders.

### **Value**

The examination of evidence collected from shooting scenes can assist the investigation by providing conclusive information as to the source or potential source of fired components and to support or contradict statements made by witnesses and suspects. Trajectory analysis and muzzle to target determinations can assist with the crime scene reconstruction. Some examples of information that can be provided by Firearm Section examinations include some of the following:

### **Information Determined**

#### **Firearms**

- Determine if the item is a functional firearm.
- Determine if all safety aspects of the item are operating properly.
- Documentation of the condition of the item as received for future reference as the investigation progresses or during court proceedings.
- Measure the force needed to operate the trigger.
- Other appropriate miscellaneous examinations that may be necessary.

#### **Bullets**

- Through microscopic comparisons of the markings engraved on the item during the firing process, positive identifications can be made to a particular suspect firearm.

- If no firearm has been recovered, multiple bullets can be associated as having been fired from a single source and a list of possible firearms can be generated based on the rifling characteristics.
- The manufacturer, caliber and likely source cartridge designation of the item can be determined.
- Detailed documentation of the item's condition as received as well as other aspects for future reference as the investigation progresses or during court proceedings.
- Any other miscellaneous requested examination.
- Bullets typically cannot be conclusively associated with fired cartridge cases.

### **Cartridges and Cartridge Cases (including Shot shells)**

- Through microscopic comparisons of the markings impressed or engraved into the items during the cycling and/or firing process, positive identifications can be made to a particular suspect firearm.
- If no suspect firearm has been recovered, expended cartridge cases can be identified as having been fired in the same firearm and a possible make of that firearm may be determined.
- Markings made during the manufacturing process can be used to associate unfired cartridges or fired cases with each other. These types of associations are of varying significance depending on cartridge type and brand.
- Cartridge cases typically cannot be conclusively associated with the bullets once fired.

### **Shot and, Wadding**

- The size and type of shot recovered can be determined.
- The manufacture and gauge of the wadding can be determined.
- Associations of recovered components to evidence ammunition can be made based on similarities in manufacture, size, materials and configuration. These are class associations only and are not individual identifications.
- In some instances plastic wad components can be associated to a firearm based on microscopic comparison of the markings left by the barrel of a shotgun. Typically these types of comparisons are possible whenever the barrel has been shortened using crude techniques.

### **Shot Patterns**

The distance from which a shotgun was fired can be determined by comparing the pellet pattern on an evidence item to test patterns made at known distances using the suspect shotgun and evidence or similar ammunition. These examinations require submission of recovered ammunition and a complete evidence pellet pattern along with the suspect firearm.

### **Muzzle to Target Distance Determinations Gunpowder Patterns**

These types of examinations are typically performed on victim's clothing; often mistakenly referred to as "Gunshot Residue Exam" and thus confused with the

Gunshot Residue Analysis conducted by the Trace Evidence Section. The primary difference is the goal of this examination is not to conclusively detect the presence of gunshot residues but to visually examine and chemically treat the area around a bullet hole to develop a pattern that can be compared or interpreted.

Whenever a firearm is discharged, material including lead, copper, burned and unburned gunpowder is expelled from the muzzle along with the bullet. This material can be deposited on articles, depending on the range from the muzzle, forming a pattern. Discharges from contact range will exhibit certain characteristic physical effects in addition to possible material from the muzzle. Once examined and visualized through chemical development, the evidence pattern can be compared to test patterns made at known distances. Test patterns must be made using the suspect firearm and evidence or similar ammunition. If a comparable evidence pattern is developed, a bracketed distance estimate may be reported.

The following circumstances may prevent a pattern from being observed:

- The discharge occurred beyond the maximum distance that residues would be deposited by a particular firearm/ammunition combination.
- Atmospheric conditions may wash away or dissolve any muzzle residue present.
- Excessive bleeding could dissolve and/or wash away any muzzle residue present.
- Excessive or rough handling of the garment could dislodge many of the particles making up the pattern.
- An intervening object such as a pillow or car window may have been present and blocked the particles from reaching the victim's clothing.

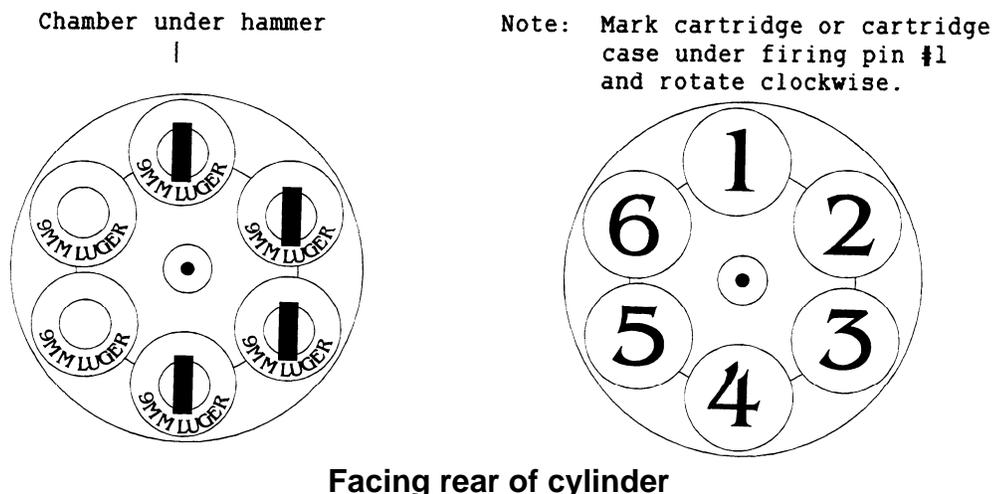
### **Collection and packaging**

When handling and packaging firearms, extreme caution should be observed following standard firearm safety practices. As with any submission to the Laboratory all evidence items must be inside a properly sealed container. Use the following steps as a guide when submitting firearms evidence.

#### **Firearms**

- Loaded firearms should **NEVER** be routinely submitted to the Forensic Laboratory. There are certain circumstances which require submission of a loaded firearm; **ALWAYS** speak with a Firearms Examiner to receive approval and arrange for them to be present before bringing a loaded evidence firearm to the Laboratory.
- When submitting revolvers, if possible, indicate the position of the cylinder as well as the chamber from which each cartridge or cartridge case was unloaded. This can be done by marking the cylinder on each side of the top strap (that part of the frame directly above the cylinder) and numbering each cartridge or cartridge case as it is removed. A diagram indicating cartridge/cartridge case positions can be made and submitted with the firearm.

Diagram to be made by officer recovering revolver:



- Mark the containers for all cartridges and cases with initials, date and exhibit / item numbers to correspond with the numbered chambers in the diagram.
- The same procedure should be followed with ammunition recovered from auto loading firearms, indicating on the container which cartridge was recovered from the chamber and the position of each cartridge in the magazine. Place live ammunition in a container separating it from the firearm.
- Mark on the outside of the container appropriate information regarding the firearm; if necessary attach any evidence tags to the trigger guard.
- If it is desired to place an object within the action for visual unloaded verification, it is strongly recommended to use a non-metallic object which should never be placed in or through the barrel. Attach an evidence tag to the trigger guard of each firearm and mark with appropriate information.
- If mailing the firearm, package it in a rigid container and realize that FEDERAL LAW PROHIBITS SENDING LIVE AMMUNITION THROUGH THE U.S. MAIL.
- When DNA, trace or latent fingerprint analysis is requested, these should be conducted PRIOR to the item being submitted to the Firearms Identification Section.

### Bullets

The portion of the cartridge that is propelled down range, sometimes referred to as projectiles or more correctly as bullets; they may be fragmented upon recovery.

- During collection no metal tools should be used to extract the bullets as these could disturb the rifling markings that will be used for comparison.
- After collection it is recommended that bullets be dry before packaging.
- Once dry, wrap each in an individual package; the outer package should be a rigid container of some type.
- Appropriate identifying markings should be placed on each individual package.
- It is not absolutely necessary to mark an evidence bullet but, if desired, mark the bullet on the nose or the base, NEVER on the cylindrical portion or sides.

- When DNA, trace or latent fingerprint analysis is requested, these should be conducted PRIOR to the item being submitted to the Firearms Identification Section.

### **Cartridges and Cartridge Cases (including Shotshells)**

Cartridges are unfired rounds of ammunition, which contain components including a bullet, primer, powder, and cartridge case. A cartridge casing is the remaining component either in the firearm or at the shooter's general location after the cartridge is fired.

- After collection it is recommended that each cartridge or cartridge case is dry before being packaged.
- Once dry, an unfired cartridge case should be wrapped in clean tissue paper and placed in a suitable container.
- Appropriate identifying markings should be placed on each container.
- When applicable, any unfired ammunition recovered at a scene should be submitted to the laboratory.
- It is not absolutely necessary to mark an evidence cartridge or casing but, if desired, DO NOT mark the item on the head, primer or near the rim; instead mark near the mouth of the casing taking care not to disturb any other markings present.
- When DNA, trace or latent fingerprint analysis is requested, these should be conducted PRIOR to the item being submitted to the Firearms Identification Section.

### **Shot and Wadding**

- Recover as much of the shot material as possible.
- Do not damage the shot when recovering.
- Recover all wadding.
- It is recommended items be dry before being packaged.
- Once dry, place pellets and wads from different locations in separate containers.
- Appropriate identifying marks should be placed on the containers. DO NOT mark pellets or wads.

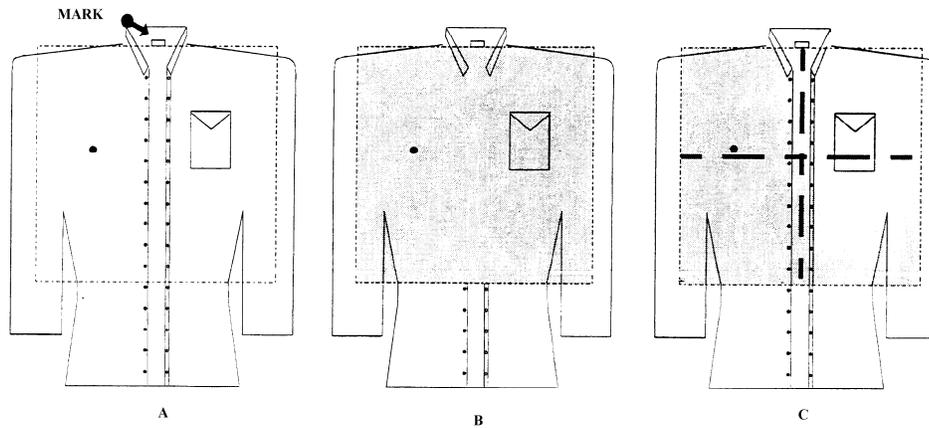
### **Shot Patterns**

- If a shot pattern is present at the crime scene which cannot be submitted to the laboratory, such as a wall, car, house, etc., scaled photographs should be taken before removal of the shot material.

### **Muzzle to Target Distance Determinations**

- If articles of clothing are to be forwarded to the laboratory for a muzzle to target distance determination, make sure it has been air dried before packaging.

- Place cardboard or paper inside the garment (see diagram A below) and when applicable, close the front of the garment.
- Position the garment inside two pieces of cardboard so as to fix the position of the garment inside (B).
- If the item must be folded, fold only twice as shown by broken line (C). Fold arms over outside of cardboard or paper; one in front and one in back.
- Package each article individually in paper. DO NOT use plastic bags.



### **Shipment**

Live ammunition CANNOT be sent by U.S. mail. Firearms, and then only if unloaded (i.e. with no live ammunition) can be sent only via U.S. registered mail. Live ammunition should be hand-carried to laboratory. In special circumstances, UPS may be the only legal way to ship ammunition when other means are not possible. For UPS shipments the package must be marked "ORM-D" and "CARTRIDGES, SMALL ARMS" on all sides. If any clothing is to be sent that is stained with blood or other body fluids, the package must be marked "BIOHAZARD" or possess a biohazard label. Bloody clothing must be dried prior to shipment.

## **GUNSHOT RESIDUE ANALYSIS-by ICP-MS**

As of June 1, 2013, the Kentucky State Police Central Forensic Laboratory no longer conducts gunshot residue analysis on hand swab kits (white envelopes). Please use the new GSR-SEM kits (white boxes) for the collection of gunshot residue. See information in the Gunshot Residue Analysis – by SEM/EDS section below.

## **GUNSHOT RESIDUE ANALYSIS-by SEM/EDS**

Gunshot residue is formed by the ignition of the primer mixture when a firearm is discharged. This results in the formation of microscopic particles that are blown out of various openings in the firearm.

Gunshot residue particles usually have a spheroidal and noncrystalline morphology. Particles characteristic of gunshot residue are typically composed of antimony, barium, and lead. Particles consistent with gunshot residue can have a combination of two of the three elements listed above. These particles are consistent with gunshot residue, but may also originate from other sources. The composition of gunshot residue can have other elemental compositions not listed here depending on the type of ammunition and firearm involved.

Gunshot residue can be deposited on the hands by: firing a weapon, handling a weapon, being in the proximity of a discharging weapon or coming into contact with an object with gunshot residue on it. The examination itself cannot determine the relative likelihood of these listed actions.

The morphology and elemental composition of particles on the adhesive lifts are determined by scanning electron microscopy/energy-dispersive x-ray spectrometry (SEM/EDS) at the Central Forensic Laboratory.

The Kentucky State Police Forensic Laboratory provides Gunshot Residue Adhesive Lifter Kits (GSR-SEM/KY [Q]) consisting of the following:

1. Instruction sheet
2. Gunshot Residue Analysis Information Form
3. One pair of gloves
4. Two (2) adhesive lifters (right hand and left hand)
5. Police Evidence seal

## **Collection of Sample Guidelines**

### **Gunshot Residue from the Hands:**

Follow the specific instructions included in the KSP (adhesive lift) GSR-SEM kits. Always sample the hands of a suspect as soon as possible. Collect gunshot residue samples at the scene whenever possible. If collection at the scene is not possible, then bag the hands of the suspect before transporting in a police vehicle.

If possible, always wash your hands before collecting the samples. Always wear the gloves included in the kit. Do not substitute with other gloves.

Avoid touching the surface to be sampled. Avoid wet or bloody areas.

Gunshot residue particles are continually lost from the hands due to normal activity. The optimal window of opportunity for sampling the hands of a living individual is up to 4 hours after the shooting incident. The Kentucky State Police will not analyze gunshot residue adhesive lifts collected from the hands of a living individual if 4 hours have passed since the shooting incident. Please refer to the case acceptance policy section.

### **Gunshot Residue from Clothing:**

Sample collection depends on the item(s) to be sampled such as: size, condition, and prior handling. Additional factors can influence the number of samples collected and where to sample, such as: preservation of other evidence (DNA, other trace evidence), known case circumstances, requirements of the investigation, and retention of GSR.

The most likely areas to sample include, but are not limited to:

- Right and left cuffs and wrists of long sleeved shirts or jackets
- Right and left shoulders if a long gun is used
- Pockets – if it is known the subject placed his or her hands in pockets
- Back waistband – if it is believed that is where the gun was carried
- Gloves (sample like hands)

It is preferred that clothing be sent to the laboratory for the collection of possible gunshot residue. However, if clothing cannot be removed immediately from the subject (before placing in a police vehicle), then the clothing should be sampled at the scene to minimize contamination and the loss of GSR.

If clothing is removed from the subject for submission to the laboratory, it is recommended that the subject remove the item himself/herself and place it into a large paper evidence bag. Properly seal the paper evidence bag for submission to the Central Forensic

Laboratory. Never store any GSR evidence near a firearm, firearm components or any surface that may have been exposed to firearms.

Use the Gunshot Residue Adhesive Lifter Kit (GSR-SEM/KY [Q]) to sample the area(s) of interest. Simply strike out "right hand" and/or "left hand" and write in the area being sampled.

Collection:

1. If possible, wash your hands before collecting sample(s). Put on the gloves included in the kit. Do not substitute with other gloves.
2. Carefully remove the cap from the vial labeled with the area to be sampled.
3. Depending on the type of firearm used by the subject, while holding the vial cap, press the adhesive lifter to the appropriate area(s) of the clothing. This is repeated until the adhesive lifter is no longer sticky.
4. Put the cap back on the labeled vial after sampling the area. These steps can be repeated, as needed, with a new adhesive lifter for other areas of the same piece of clothing. Make sure each adhesive lifter is labeled with the area that was sampled.
5. A new GSR-SEM adhesive lifter kit is used for each piece of clothing.
6. After each area of the item is sampled, the adhesive lifter is sealed. Place lift(s) back into the GSR-SEM kit. Fill out the Gunshot Residue Analysis Information form and return to the kit box. Place the Police Evidence seal on the box, then initial seal. Mail or hand deliver the sealed kit, along with a KSP 26, to the Central Forensic Laboratory.

Do not submit clothing from any subject that has sustained a gunshot wound. Only submit clothing (outer garments) that may have been exposed to gunshot residue. Please refer to the case acceptance policy section.

Analysis of gunshot residue particles collected from clothing can be problematic. There is no way to determine how long gunshot residue may remain on clothing. Studies have shown that clothing may retain some gunshot residue particles after washing.

NOTE: Clothing from any subject that has a bullet hole may be submitted to the Firearms section for distance determination. Please refer to the Firearm Identification section of this guide. The GSR-SEM kits cannot be used for muzzle-to-target distance determination.

**Gunshot Residue from Vehicles:**

If a vehicle is suspected to have been used in a drive-by shooting, used by the shooter to leave the scene of a crime, or shots were fired inside a vehicle, samples can be collected for gunshot residue analysis.

If a vehicle is suspected to have been used in a drive-by shooting, samples can be taken from the exterior and interior surfaces around the window. However, smooth surfaces and areas exposed to the wind from an open window are less likely to retain gunshot residue particles.

If the shooter uses a vehicle to leave the scene of a crime, contact areas within the vehicle, such as the steering wheel, gearshift lever, and door handles are good areas to sample.

If the weapon is discharged inside a vehicle, GSR is usually found on most surfaces inside the vehicle. However, areas exposed to the wind from an open window are less likely to retain gunshot residue particles.

Precautions should be taken before collecting samples from vehicles. If the vehicle is also to be sampled for other evidence (fingerprints, DNA, other trace) a strategy of sampling for each type of evidence has to be established to prevent possible contamination and loss of ALL evidence.

If samples from exterior surfaces of the vehicle are required, they should be sampled as soon as possible at the scene.

Use the Gunshot Residue Adhesive Lifter Kit (GSR-SEM/KY [Q]) to sample the area(s) of interest. Simply strike out "right hand" and/or "left hand" and write in the area being sampled.

Collection:

1. If possible, wash your hands before collecting sample(s). Put on the gloves included in the kit. Do not substitute with other gloves.
2. Carefully remove the cap from the vial labeled with the area to be sampled.
3. Depending on the circumstances, while holding the vial cap, press the adhesive lifter to the appropriate area(s) of the vehicle. This is repeated until the adhesive lifter is no longer sticky.
4. Put the cap back on the labeled vial after sampling the area. These steps can be repeated, as needed, with a new adhesive lifter for other areas of the vehicle. Make sure each adhesive lifter is labeled with the area that was sampled.
6. After each area of the vehicle is sampled, the adhesive lifter is sealed. Place lift(s) back into the GSR-SEM kit. Fill out the Gunshot Residue Analysis Information form and return to the kit box. Place the Police Evidence seal on the box, then initial seal. Mail or hand deliver the sealed kit, along with a KSP 26, to the Central Forensic Laboratory.

It is not necessary to submit multiple kits from a single vehicle since it is not possible to determine the position where the shooter was firing from by gunshot residue analysis.

**Submission Reminders:**

Fill out the Gunshot Residue Analysis Information form as completely as possible and return with the kit.

Fill out a KSP 26 when submitting the evidence to the laboratory. It should be noted on the KSP 26 if DNA analysis is also needed on clothing submitted for GSR analysis.

The kits may be mailed or hand delivered to the Central Forensic Laboratory.

When submitting clothing for GSR analysis, ONLY the outermost garments (i.e. jacket, shirt, pants) from the suspected shooter(s) should be submitted to the Central Laboratory for analysis.

There should be a direct association between the shooting incident and the clothing being submitted. If the clothing is taken directly off the subject, it should be the same clothing worn at the time of the shooting incident. If the clothing is not taken directly from the subject upon detainment, it needs to be associated with the shooting incident and the suspected shooter (i.e. surveillance video, eyewitness statements) to be suitable for analysis.

If rush results are needed, please contact the Central Forensic Laboratory in Frankfort. Reports will be available on the BEAST website when completed.

NOTE: GSR-SEM adhesive lifter kits should be taken on victims of shootings. However, they should not be submitted to the laboratory for analysis. Please see the case acceptance policy below.

**CASE ACCEPTANCE POLICY: GSR-SEM**

The information below is the case acceptance policy for the GSR-SEM adhesive lift kits for gunshot residue analysis. This information is to assist an agency in the submission of evidence for gunshot residue analysis.

In some circumstances, the analysis of samples for GSR will provide NO additional investigative information. The following evidence will NOT routinely be analyzed for GSR.

1. GSR kits collected from ALL victims (including suicides).\*
2. GSR kits collected from live subjects after 4 hours have passed since the shooting incident.
3. GSR kits collected from subjects that are known to have washed their hands prior to samples being taken.
4. GSR kits collected from subjects apprehended in the possession of a firearm.
5. Clothing worn at the time a subject is shot.
6. GSR kits collected from clothing of subjects that have sustained a gunshot wound.
7. Shoes collected from a subject (i.e. suspected shooter).\*\*

8. Clothing collected from a subject (suspected shooter) that is not the outermost garment.\*\*
9. Clothing collected from a subject (suspected shooter) that does not have a direct association with the shooting incident.\*\*
10. Clothing collected from a subject (suspected shooter) that is known to have been washed prior to collection.

NOTE: When adhesive lifts from the hands and clothing from the same subject are submitted for gunshot residue analysis, the clothing will only be analyzed if the adhesive lifts from the hands test negative for GSR.

\*Written or electronic communication between the analyst and the prosecutor should provide information as to the reason any victim kits should be submitted. A victim kit may be analyzed if the case information indicates the victim was shot through a barrier (i.e. door, wall, car door) or if the distance between the victim and the shooter was sixty (60) feet or greater. These are instances when a victim's hands may be relatively free of gunshot residue if they have not recently discharged a firearm or handled an object with gunshot residue on it.

\*\*Such items will be considered on a case-by-case basis. Written or electronic communication between the analyst and the investigating officer should provide information as to why these articles of clothing should be submitted for GSR analysis.

GSR analysis may be completed if the detailed case information presented explains the investigative value gained from GSR analysis.

Evidence that is received and not analyzed for any of the above reasons will be reported as not analyzed.

## TOOLMARK IDENTIFICATION

Toolmark examinations are forensic comparisons to determine whether or not a particular tool can be associated with a mark left at a scene. Generally, when any two objects come in contact with sufficient force, the softer of the two will be characteristically marked, i.e., damaged, by the harder. These markings may be class in nature or individualized enough for an examiner to identify a suspect tool to a toolmark found at a scene of a crime.

The Firearm Identification Section conducts Toolmark Identification Analysis.

If submitted, tools are to be processed for biological or trace evidence or latent fingerprints, these examinations MUST be done PRIOR to submission to the Firearms Section.

### Value

Toolmark evidence can possibly link the suspect in possession of a tool to the scene of a crime. Assuming the conditions for collection and preservation have been met, an examiner can possibly identify a particular tool as having made the evidence mark. Do not submit tools found at the scene of a crime if you cannot associate a suspect to the evidence tool.

### Information Determined

An examination of a toolmark can possibly determine the type of tool used and if the mark is of value for comparative purposes. Most tools become individualized through use and or abuse and have the potential to leave marks of comparative value. Common toolmarks found at scenes include:

- Impressions produced by a perpendicular force acting against an object. Examples of tools that can make impressions include punches, hammers, and some gripping tools.
- Scrape marks that are made by moving the tool laterally across the object. Examples of such tools include flat bladed tools such as crowbars, pry bars and screwdrivers.
- Shearing or pinching marks that occur when the object is caught between opposing blades. Examples include bolt cutters, wire cutters, scissors and tin snips.

Generally, multi-toothed cutting blades such as saws, when used to completely cut through an object do not leave comparable marks; however, circumstances in which an incomplete cut is present may be of value.

### Collection of Evidence

Whenever possible, the actual evidence toolmark should be submitted to the lab. This may mean having to cut part of a doorway or window sill. Photographs depicting the mark as found are often helpful for the examination as this allows the examiner to orient the action of the tool.

When collecting cut wire ends or other material that must be removed, ALWAYS indicate which end is the evidence cut and which was cut by the investigator.

If collection of the evidence bearing the actual mark is not practical, please perform the following steps:

- Photograph overall and close ups using oblique lighting
- Make moulage casts of each mark using forensic casting material such as Mikrosil or Forensic-Sil. These materials are non-destructive, providing the opportunity for multiple casting attempts. Do not use modeling clay or other materials that will not retain the necessary detail for comparison.
- Ensure no air bubbles are in the cast once removed; repeat the process if air bubbles are present.
- Do not package in plastic as the casts tend to sweat and degrade when sealed in plastic. Use small boxes or paper envelopes. Mark the packaging for later identification.

When collecting the suspect tool, make sure to wrap or package the working end of the tool to protect and retain any trace evidence that may be present. This could further link the tool to the toolmark. Always package the tool and the toolmark separately and never touch the suspect tool to the evidence.

### **Shipment**

Toolmark evidence can be mailed to the laboratory by registered mail if rigid containers are used. Please mark the evidence "Attention Firearms" and include the proper submission paperwork. In situations where large items of evidence are to be submitted, it may be necessary to hand carry them to the laboratory.

## **SERIAL NUMBER RESTORATION**

The serial numbers on firearms are often removed or altered in an attempt to prevent the identification of the original owner. The serial number can sometimes be restored depending on the degree of obliteration or alteration.

All modern firearms manufactured post 1968 are required by federal law to be stamped with a unique serial number. Many firearms, particularly shotguns and rifles made prior to the Gun Control Act of 1968 are not serialized so the absence of a serial number does not necessarily indicate an altered firearm.

When a number is stamped into a metal object, the properties of the metal are changed. Although the visible number may have been removed, often the altered metal has not. Several techniques exist that react with this altered metal revealing the original stamped number. This is commonly referred to as "raising the serial number", but the restored visible digits are not always permanent.

### **Value**

Restoration of an obliterated or altered serial number can possibly provide the information needed to trace the item back to its original owner or link a suspect to a crime scene.

### **Submission**

Many restoration kits are available for purchase; however, the process is destructive and not repeatable. If a restoration attempt has been made before submission to the laboratory, no further restoration can be done.

Forward any object to the laboratory properly marked and packaged for later identification. Contact the lab in your area if the evidence is too large to transport to the lab. Arrangements can possibly be made for an examiner to come to the evidence.

The laboratory does not routinely trace firearms through the Bureau of Alcohol, Tobacco, Firearms and Explosives using the restored serial number; this is the responsibility of the investigating officer once the restored number has been reported.

## **SHOE PRINT and TIRE TREAD EVIDENCE**

Shoeprint or tire tread impressions are routinely left at crime scenes. These impressions can be found on various surfaces in two-dimensional and three-dimensional forms. Almost all impressions, including partial impressions, have potential value for forensic comparisons. The examination of detailed shoeprint and tire tread impressions can possibly result in the identification of the suspect's shoes or tires from the suspect's vehicle.

Shoeprint and tire tread comparisons are conducted by the Firearm Identification Section.

## **Photography and Collection of Evidence**

Whenever possible, the item bearing the original print should be submitted for comparison; however, proper documentation of the print should always be conducted prior to collection. Most collection techniques are destructive in nature so it is critical photographs be taken prior to any collection attempt.

### **Photography**

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

- **General crime scene photographs** of shoeprint or tire tread impressions should include close-range and long-range photographs. These photographs should show the relationship of the impressions to the surrounding area.
- **Examination-quality photographs** should be taken using a tripod and oblique lighting. A scale must be in every photograph. The purpose of these photographs is to produce a natural size enlargement that can be used for forensic examination. The following steps should be followed to produce examination-quality photographs:
  - Place a linear scale next to and on the same plane as the impression.
  - Place a label in the picture to correlate the impression within the crime scene.
  - The camera should be mounted on a tripod and positioned 90 degrees to the impression.
  - Adjust the height of the camera or the zoom lens to fill the frame with the impression and scale.
  - The camera back must always be in the same plane as the impression.
  - A detachable flash with extension cable should be used, if available, to flash across the print at a very low angle. A bright flashlight may be used as well. Block out bright ambient light to increase the contrast from the flash or flash light.
  - Focus on the bottom of the impression not on the scale.
  - Take several images with lighting from various angles and bracket the exposure. For low light conditions, exposure times may be long, so care should be taken to not shake or jar the camera during the exposure.
- Photographs of impressions in snow are difficult to take due to the lack of contrast. Snow print wax can be used to lightly coat the impression to provide contrast. When applying the wax, the can must be held far enough away and sprayed at an angle so as not to disturb the print. Light should be directed toward the print or impression from the side to prevent the detail from being washed out.

### **Collection of Evidence**

Submit the evidence bearing the original impression if possible. If the evidence cannot be submitted, use one of the following appropriate techniques to recover the impression after taking photographs.

- **Casting three-dimensional impressions** should be done using a hard dental stone material rather than the relatively soft plaster of paris or other modeling

plasters. Mix the material according to the included instructions, typically to the consistency of pancake batter. Begin pouring the mixture just outside of the actual impression and allow the material to flow down into the impression. Continue pouring onto the accumulating casting material, moving across the impression evenly. Never pour directly onto the impression as this will cause damage. Allow the cast to harden before removing and then allow to dry for an additional 48 hours to cure; do not package in plastic. A shallow box such as a pizza box can be used as packaging to protect the cast.

- **Lifting three-dimensional impressions** transfers a residue or dust impression to a lifting film, allowing the impression to be transported for photography and examination. Several techniques are readily available. Some of the more common are listed here:
  - **Electrostatic lifts** are made using a Mylar film and a power source to lift dry dust or residue prints from porous and non-porous surfaces. This technique can only be used on dry origin prints and will not work if the impression were made when wet or were to become wet. Once lifted, the print on the film is fragile and easily damaged. The film itself contains a residual static-electrical charge and should be properly stored as soon as practical. The film should not be rolled or folded; it can be taped inside a new clean file folder. Used or old file folders or other low grade materials such as cardboard boxes should not be used as the charged film will pull the dust from these materials, contaminating the print.
  - **Gelatin lifters** can be used to lift impressions from porous and non-porous surfaces. Black gelatin lifters work well for lifting light-colored dry or wet impressions. White gelatin lifters can be used to lift impressions developed with fingerprint powders or impressions dark enough to contrast with the white background. Transparent gelatin lifters can be used to lift impressions developed with fluorescent powders and should not be used on original non-enhanced prints.
  - **Adhesive lifters** can only be used to lift impressions from smooth surfaces. Transparent tapes, palm print lifters or specific shoe print lifters can be used to lift powdered impressions, provided they are transferred to a contrasting colored card.

### **Chemical Enhancement of Prints**

Numerous techniques for the enhancement of shoeprints are available, particularly those made in blood. These techniques are analogous to those used for fingerprint enhancement/development. The impressions should always be documented with photographs first before utilizing any enhancement techniques. ALWAYS collect any blood evidence prior to any enhancement attempts.

### **Shoeprint and Tire Tread Database**

The laboratory does not maintain a searchable database of shoe sole pattern designs and is typically limited to comparisons of suspect footwear to recovered impressions.

Published references, although not inclusive, are available for possible determination of tire tread patterns.

**Shipment**

Due to the general fragile nature of shoeprint / tire tread evidence, shipping is not recommended.

## **BIOLOGICAL EVIDENCE: BLOOD AND OTHER BODY FLUIDS**

Evidence in this category includes blood of human or animal origin, semen, and saliva submitted for body fluid identification. It does not include samples of blood or urine submitted for the determination of the presence of drugs, alcohol, or poisons. See the section on Toxicology for such evidence.

When blood or other body fluid stains have been identified, further characterization can be performed through DNA analysis. DNA analysis is based on the understanding that no two persons, except identical siblings, have the same DNA. DNA profiles from forensic case samples are routinely entered into a computer database. These profiles are routinely searched at our state and/or national level against other forensic case and offender samples.

### **Blood Evidence**

#### **Value**

Blood evidence can be of value in crimes such as murder, rape, assault, robbery, burglary, hit-and-run accidents, and game law violations. Blood evidence may aid an investigation by locating the crime scene, by identifying the weapon used, by proving or disproving a suspect's alibi, or by eliminating suspects. It can also be used for the identification of bodies when samples specified as being from relatives of the missing person are available for comparison.

#### **Information Determined**

1. Analysis must be performed on a stain to determine that it is blood, since the appearance of blood varies greatly depending on the age and condition of the stain.
2. If the sample is blood, the species origin may then be determined. Usually, it is necessary to determine if the blood is presumptive for human. In certain cases, however, it may be necessary to determine from what animal a bloodstain originated. This can be done, but in most cases, only to the level of the taxonomic family used in animal classification.
3. Blood may be further characterized through DNA analysis. Different individuals have a different type due to the genes they received from their parents. The Central Forensic Laboratory uses current technology to examine numerous sites within an individual's DNA. At each site there are several different types. Each of these types has a certain frequency of occurrence in the population. By multiplying together this frequency of occurrence at each site, a statistical estimation can be made as to how often a particular profile would be observed in the general population.
4. The sex of the person from whom the sample originated can be determined by DNA analysis.

5. DNA analysis of blood and other body fluids is regularly performed when necessary.
6. Private laboratories perform other types of DNA analyses not offered by the KSP lab. These services may require an additional cost, and will be addressed at the time of request.
7. Generally, DNA analysis will be limited; see [case acceptance policy and quick reference guide](#).
8. Additional information may be obtained from the size, shape, and distribution of bloodstains at the scene. This information may be used to reconstruct the events that occurred during the bloodshed. This examination may be performed at the crime scene. Detailed photographs taken at the scene showing measurements of the bloodstains can greatly aid the analysis. Blood spattered clothing and other items can be evaluated at the laboratory. Contact the nearest laboratory when this type of analysis is desired.

### **Other Body Fluids of Significant Value**

#### **Value**

Depending on circumstances of the case, it is sometimes helpful to identify seminal stains, or saliva. DNA analysis is performed on seminal stains in order to determine if the unknown sample matches the DNA profile of a suspect's standard. A differential extraction technique is used on seminal stains to separate sperm cells from the cells of vaginal secretions and therefore may aid in separating DNA profiles from the male and female portions of the stain.

There are no specific tests to identify feces; therefore, it should not be submitted for identification. Some cells containing DNA may be present in human feces. However, it is very difficult to obtain a DNA profile from feces.

#### **Information Determined**

1. Seminal stains. A suspected seminal stain may be identified by testing for the presence of prostatic acid phosphatase, spermatozoa or prostate specific antigen (p30). Semen may be further characterized by DNA analysis.
2. Saliva stains. The presence of amylase is presumptive for saliva. Saliva may be further characterized by DNA analysis.
3. Urine. The laboratory no longer has a test to characterize urine. However, some cells containing DNA may be present in a urine sample/stain. Depending on the quantity of these cells, it may be possible to obtain a DNA profile.
4. Other. It is sometimes possible to perform DNA analysis on samples that cannot be identified through serological means. These include but are not limited to sweat, skin cells, muscle tissue, teeth, bone, and hair roots.

### **Collection of Sample and Standards**

Since blood and other body fluid evidence is biological and is rapidly decomposed by bacteria and mold, it is absolutely essential that such evidence is handled properly. Please follow these instructions carefully for each type of situation in which stains of blood or other body fluids are found. **IF YOU HAVE ANY QUESTIONS, PLEASE CALL THE LABORATORY.** Remember safety measures for biological hazards. Always wear disposable gloves when handling material stained with blood or other body fluids. To prevent cross contamination of samples, these gloves should be changed before collecting each exhibit. Disposable utensils would be preferred, however at a minimum, utensils used to collect evidence should be cleaned with 10% bleach between each item collected. A mask or other protective clothing may be advisable in some cases. Please check with your agency's safety protocols for biological hazards.

#### Stains on Garments or Fabrics

1. Make sure that all stains and clothing are **DRY!** If the stain is **wet**, it must be air dried **away** from heat and sunlight, preferably in a secure, ventilated room. The victim's items should be separated from those of the suspect during drying.
2. Package each item separately to avoid contamination and in paper to avoid further decomposition. Paper bags are recommended. **DO NOT USE PLASTIC** since plastic does not "breathe" and holds in moisture, permitting bacterial and fungal growth.
3. Avoid unnecessary handling of garments with blood or seminal stains.

#### Stains on Surfaces

1. If there are items that need to be examined for both body fluids and fingerprints, consult with the Forensic Biology unit before submitting for fingerprints.
2. Whenever possible, submit the bloodstained item itself for analysis. If this is impractical, photograph the stain while on the item, then detach or cut out the part with the stain for submission. Carefully package to avoid contamination or loss. Do not put any tape directly on the stain.
3. Bloodstains can be swabbed off items that are too large for submission. These blood stains should be photographed before being removed. Swab the blood generously onto a sterile cotton-tipped applicator that has been slightly dampened with distilled water. Swab in a manner which will distribute concentrated blood over the entire swab, if possible. For a control swab, moisten a separate swab with the water used for collecting the blood stain. Do not swab an unstained surface for a control. Air-dry and package the stain and control swabs separately in paper.

4. If the stain is moist, let it air dry first, or swab it onto a cotton tipped applicator and then air dry.
5. A control sample of any liquid used during the collection process should also be collected. If using distilled water, moisten a cotton tipped applicator, allow to air-dry and label as "Control."
6. Collect generous portions of the samples to be analyzed.

### **Standard samples for comparison**

If DNA analysis is necessary on evidence samples, blood or buccal standards are required from the victim, the suspect, and from anyone else who may have been a contributor to the biological stain in question. If blood standards are to be collected, they should be drawn in purple-capped tubes (i.e., tubes with EDTA as the preservative), or stained on a DNA blot card. If buccal standards are to be collected, use four sterile cotton-tipped applicators and have the individual rub the applicators firmly on the inside cheeks. Allow the swabs or DNA blot card to air-dry before packaging. The standard should then be submitted to the lab as soon as possible, along with the rest of the evidence. Blood tube samples should be stored in an evidence refrigerator until transported to the lab.

### **Shipment**

Deliver biological evidence to the laboratory as soon as possible. Check Appendix A for the closest laboratory performing serological analysis. It is best to deliver the evidence in person; however, if this is impossible the evidence should be kept as cool and dry as possible; then forwarded by way of registered mail or commercial carrier to the appropriate laboratory. Do not use staples to seal packaging since they easily puncture disposable gloves and skin and are a possible source of infection. The outer package should be marked to the attention of the *Forensic Biology Section*. An envelope containing the laboratory request form (KSP 26 or pre-log form) needs to be taped to the outside of the package. When submitting evidence, it is important that the request for analysis form (KSP 26 or pre-log form) be included. Please provide all information requested, as this will expedite the process of analysis. Each item submitted should be listed along with the specific examinations desired. The package should be marked with a biohazard label.

### **Rape Evidence**

Evidence collected in rape or sodomy cases includes a variety of unknown and known samples, which are relatively constant from case to case. This hair, fiber, and biological evidence is covered in separate sections in this manual, but a separate section was considered necessary to explain rape evidence.

### **Value**

Evidence in rape cases is likely to link the suspect to the victim or the individuals to some location. Body fluids, hair or foreign fibers may be transferred during a sexual assault.

While the specifics of each type of evidence are discussed in the sections on serology and hairs and fibers, this section will deal with these types of evidence as they relate to rape cases. The Kentucky State Police Forensic Laboratory has sexual assault evidence collection kits available free of charge. One is for the victim (female or male) and one for the suspect. This evidence is essential for effective forensic analysis.

### **The Sexual Assault Evidence Collection Kit for Female or Male Victim**

This victim's kit consists of labeled packages for properly collecting and storing evidence, a set of instructions, and a Victim's Medical History and Assault Information Form. Although trained medical personnel collect these items, each item is discussed below so the investigator can understand why this sample is requested. All envelopes should be sealed with tape, initialed over the tape, and properly labeled.

1. Pubic hair combings. A paper towel, a comb, and an envelope are provided to collect any loose hair and fibers from the pubic region. This sample will be used to determine if any foreign hair similar to the suspect is present, or if any fibers are present that may be used to link the suspect or the scene to the victim. This process should be gentle so that attached hairs are not unnecessarily pulled from the subject.
2. Pulled pubic hairs. An envelope for at least 30 pubic hairs pulled from various pubic locations is provided. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled, but pain can be reduced by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.
3. Pulled head hairs. An envelope for at least 30 head hairs pulled from various locations from the head is also provided. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled, but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.
4. Blood sample. Blood should be drawn into an EDTA tube, then placed on the filter paper cards provided. This is used as a standard.
5. Buccal sample. Four cheek swabs are requested. These are sometimes used as a back-up DNA standard.
6. Vaginal or Penile swabs. Four vaginal or penile swabs are requested. These are necessary to detect semen and to determine the DNA profiles present. These must be air dried and placed in the provided white envelope.
7. Other evidence swabs. There are three envelopes containing four swabs each to be used for other specimens relevant to the case. There is a check off area on the envelope for marking whether the swabs are anal swabs (for cases involving

anal sodomy), oral swabs (for cases involving oral sodomy), external genital swabs, or dried secretion swabs. If more than one sample is required, please be sure the samples are separated from each other and properly marked as to the type of sample and/or where it was collected.

8. Underpants. Collect any underwear worn by the victim after the assault.

It is recommended that you contact your forensic biology unit before submitting any clothing (besides underwear) or bedding material to the laboratory. If clothing items or bedding are submitted, package them individually in paper bags.

### **The Suspect Sexual Assault Evidence or Biological Reference Collection Kit**

The kit for suspects consists of labeled packages for evidence, instructions, and a Request for Examination form. Although these items are usually collected by trained medical personnel, each item is discussed so the investigator can understand why this sample is requested. All envelopes should be sealed with tape, initialed over the tape, and properly labeled.

1. Penile swabs. This sample consists of four swabs dampened with water and then used to swab the outer surface of the penis. This sample may contain vaginal secretions from the victim. These must be air dried and placed in the provided envelope.
2. Pubic hair combing. A paper towel, comb, and envelope are provided to collect any loose hair and fibers in the pubic region. This sample is used to determine if any foreign hairs similar to the victim are present, or if any fibers are present that may be used to link the victim or the scene to the suspect. This process should be gentle so that attached hairs are not unnecessarily pulled from the subject.
3. Pulled pubic hairs. This sample consists of at least 30 pulled pubic hairs from various pubic locations. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled, but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.
4. Pulled head hairs. This sample consists of at least 30 pulled head hairs from various regions of the scalp. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.
5. Blood sample. Blood should be drawn into an EDTA tube, then placed on the filter paper cards provided. This is used as a standard.

6. Buccal sample. Four cheek swabs are requested. These are sometimes used as a back-up DNA standard.
7. Control swabs. If swabs were moistened with water or saline in any step, moisten the two control swabs with the same fluid, and then allow them to air dry and place in the provided white envelope.
8. Other evidence swabs. There is an envelope containing four swabs to be used for other specimens relevant to the case. There is a check off area on the envelope for listing whether the swabs are dried secretion swabs or other swabs. If more than one sample is required, please be sure to separate each type of swab from the other and to properly mark the samples as to what type of sample and/or where they are collected from.

It is sometimes appropriate for the suspect's underwear or other clothing to be submitted. Each item of clothing should be packaged separately in a paper bag.

Please note that swabs are provided in the kits. If there are no medical personnel available, suspect samples, except the blood sample, can be collected by an investigator or by the suspect himself under supervision.

### **General Collection Information**

1. Blood or buccal standards are necessary from any individual who may have contributed to a stain in order for complete analysis to be performed.
2. Hair analysis cannot be performed without an adequate standard sample for comparison.
3. NEVER lick the seal of the envelopes containing biological samples. Use tape and not staples to seal packages. The collector's initials should be written across the tape in indelible ink.
4. Try to minimize the amount of bulk evidence that is submitted. This particularly applies to clothing and bedding.
5. Be sure all envelopes and bags are properly identified with the description of the item, where and/or from whom the item was collected, the collector of the evidence, and the date and time of collection.
6. Do not cross contaminate evidence by packaging two items in the same package.
7. Provide detailed facts to the analyst. The request form should bear the names of all victims and suspects, sex, age, case history, and types of analysis requested.

8. Remember to use disposable powderless gloves in handling evidence and use any other protective equipment as directed by your agency. All packaged evidence containing blood or other body fluids should also be marked as "BIOHAZARD."
9. All items should be packaged in paper.
10. Please contact the Forensic Biology Unit if there are questions regarding the collection, preservation, and submission of biological evidence.
11. For shipping information, see shipment paragraph under Biological Evidence (this section).

## DNA DATABASE

All forensic unknowns collected from crime scenes will be considered for entry into the DNA database; therefore, an independent request for database entry is not required. It is required that the location where an item was located be provided to the laboratory. This information is vital for determining eligibility for database entry. The DNA database, which houses DNA profiles, has two major indices used in forensic cases:

- Forensic Unknown- contains crime scene sample profiles believed to be from the alleged suspect.
- Convicted Offender- contains profiles from certain offenders, or those adjudicated delinquent, who are required by law to provide a sample.

The DNA database also has the capacity to store profiles from unidentified human remains and profiles involved in missing person investigations. Information on submitting samples involved in a missing persons investigation follows in the next section. If you have questions, please contact the laboratory about submission of such samples.

The KSP laboratory participates in the Combined DNA Index System (CODIS) which is maintained by the FBI. This allows for searching of qualifying samples within the State DNA Index System (SDIS), as well as across the nation via the National DNA Index System (NDIS). These databases allow the searching of forensic samples against each other in an attempt to link cases. Forensic samples are also searched against offender's samples in an attempt to link an offender to a crime. When cases are linked to each other or to an offender, this is termed a "hit". Hits will be reported to the investigating officer(s) as an investigative lead.

In the event of an offender hit the submitting agency will be contacted to determine if the case is unsolved. A prompt reply to this inquiry will facilitate rapid verification of the offender information. Once an offender hit is verified the officer will be notified via a hit notification letter. If the officer determines that the individual is a viable suspect in the crime, the officer should obtain a blood or buccal standard from the suspect and submit it to the Forensic Biology unit at the Central Laboratory for analysis. A KSP-26 or pre-log form referencing the DNA database hit should accompany the submission of the suspect's standard. Offender samples maintained in the database are not intended for court purposes but only for searching and supplying investigative leads; therefore, a confirmation sample from the suspect is always required in the event of a hit that will be pursued legally. The suspect's standard will be compared to the crime scene evidence and a statistical evaluation will be reported to the officer in a KSP-35.

When submitting a case with a known suspect, who is in the offender database, it is still required that a blood or buccal standard is obtained. It is preferable that the standard be submitted with the evidence. Since offender samples are not intended for court there is no advantage to submitting a case with a known suspect simply for comparison to the offender database.

Our participation in NDIS requires that we follow stringent guidelines in determining sample eligibility for entry into the databases. A sample from a victim, even if left at a crime scene, is not allowed in the forensic unknown database. Also, if state statute does not allow the databasing of suspect's standards (blood or buccal sample) submitted for comparison in an

investigation, then those samples are not allowed in the database. At this time Kentucky law does not allow the maintenance of these samples for purposes of searching. Mixtures are extremely problematic for database searches and some mixtures are of no value for searching and cannot be entered into the database. DNA analysts are trained in the interpretation of DNA profiles for entry into the database and will make the determination on allowable samples. If a sample is deemed allowable for database entry, this may be reported in the KSP 35.

Qualifying forensic unknowns collected from crime scenes that are believed to be from an alleged suspect may be entered into the database(s). This includes both cases with unknown suspects (unsolved) and cases where a matching suspect's standard (solved) was provided. The presence of a DNA match to a suspect does not prevent the sample from being added to the database, as this sample may prove useful in the investigation of other unsolved cases.

Name searches may be requested to determine if a sample is present in the DNA database. The search should be requested only if the individual in question is a person of interest in an active investigation, and there is no probable cause or the person cannot be located to obtain a standard. Requests must be in writing on forms which can be obtained by contacting the DNA Database Section. Information provided will be for informational purposes only and is not intended for use in criminal proceedings.

### **Missing Persons Investigations**

The Missing Persons Database is a central repository for all information pertaining to missing persons. It is part of the DNA Database Section housed in the Central Forensic Laboratory in Frankfort, KY. The database personnel will provide assistance in filing a missing person's report, advise on collecting family reference sample(s) as well as provide DNA sample collection kits and profile entry into NamUS. NamUS is a federally funded website that has been created to help solve missing person and unidentified human remains cases. The testing and collection kits are offered at no cost to the agency or the reporting party.

The collection of all missing person's data is important in the creation of a missing person's file. A complete file is essential to solving a missing persons case. Often, files are incomplete and are not useful to medical examiners, DNA personnel, and law enforcement. The following procedures will help streamline the data collection and make the creation of a missing persons file easier and more useful to all agencies involved.

### **Filing a Missing Persons Report**

**\*\*It is essential to gather all data pertaining to a missing person as soon as possible after the person is reported missing. \*\***

#### **A. Personal Identifiers:**

- Name and aliases (also the reporting party's relationship to missing person)
- Address (from missing person and from the reporting party)

- Date of birth
- Social security number
- Date of last contact
- Potential whereabouts
- Clothing/jewelry worn when last seen

**B. Biological Identifiers:**

- sex
- race
- height
- weight
- hair color
- tattoos
- DNA sample from personal belongings and family members
- Eye color

**C. Medical Identifiers:**

- Dental records
- X-rays from any physical injury
- List of broken bones
- List of physical abnormalities (one foot shorter than the other, amputations, etc.)
- Scars

**Submission of Information:**

Information can be submitted via a copy of the KSP-26 or pre-log form or by utilizing the missing persons report form provided by the DNA Database Section.

All information needs to be sent to the Missing Persons Database at the **Kentucky State Police Central Forensic Laboratory, 100 Sower Blvd. Suite 102, Frankfort, KY 40601**. The information can be submitted electronically via email to database personnel. Information will be entered into the missing person's database of NamUs. After 30 days, the reporting agency will be notified that a DNA sample(s) should be submitted and the missing persons report needs to be completed, if not done previously. A kit will be provided for the collection of DNA samples from family members who are willing to submit. The kit and testing are provided free of charge. The sample will be entered into the DNA database and used for missing person purposes only.

Once uploaded to NamUs, the missing person file will be monitored and updated as new information is made available. This website will be viewed by both the public and law enforcement. Case sensitive information will only be viewable by law enforcement. Because NamUs houses information from both missing person and unidentified human remains, it will be easier to cross reference remains with those reported missing.

The missing person's information should also be submitted and entered into NCIC. The reporting agency will be responsible for both submission into NCIC and NamUs. The missing persons database will work with NCIC to make sure that all information is in both systems.

Please keep in mind that it is crucial that medical records, dental records and DNA samples are collected in the early stages of the missing person report. **Please contact the laboratory, if you have questions.**

## TRACE EVIDENCE

Trace analysis is only conducted at the Central Forensic Laboratory. The trace analysis section is that section of the laboratory that examines evidence that does not conveniently fit into the other classifications. Paint, glass, tape, hair, and fibers are the most common types of trace evidence. If you have any questions about the types of analysis the Trace Section can do in an investigation, please contact the Central Forensic Laboratory at (502) 564-5230. As can be concluded from the title, trace evidence refers to the size and quantities of evidence that can be collected. Paint chips, a few bits of glass, and single fibers are examples. Because of the small size and quantity of many types of trace evidence, it is important to completely seal each item's packaging in order to prevent the loss or cross-contamination of evidence. Many times, trace evidence that is too small to be seen without the aid of a microscope can be transferred. For this reason, submission of items that may have transferred material is encouraged.

The Kentucky State Police Laboratory has Trace Evidence Kits available to help in the collection and preservation of trace evidence. These kits contain zip-lock plastic bags for samples like soil, round metal "pillboxes" for small particles such as paint and glass, paper envelopes with folded paper packets for hairs, a scalpel, and evidence seals.

The Laboratory also has Trace Evidence Tape Kits available to help in the collection and preservation of certain types of trace evidence, especially hairs and fibers. Once any visible hairs and fibers are collected using the Trace Evidence Kit, the Tape Kit can be used to collect hard-to-see hairs and fibers and other very small pieces of evidence. The Tape Kits contain tape pads and plastic sheets to put the tape on. DO NOT use the Tape Kits to collect paint evidence, as the adhesive on the tape may interfere with analysis of the paint. DO NOT use the Tape Kits to collect hair and fiber evidence from accident reconstruction scenes, as loose hairs and fibers from the scene may be difficult to differentiate from impacted hairs and fibers from the accident.

### Hair

Hair is a common type of evidence found in a variety of different types of criminal cases. The identification, examination, and comparison of hair evidence is performed in the Trace analysis section.

### Value

Hair evidence can be of particular value in the investigation and prosecution of a variety of criminal cases. These commonly include crimes such as accident investigations, homicide, rapes, assaults, robberies, and game law violations. Hair identifications and examinations provide important information in an investigation. Microscopic comparisons cannot limit the source to a single individual, but with DNA analysis, further testing and additional results are now available.

### Information determined

1. The analyst can determine whether the sample is of human or animal origin.

2. If the hair is of animal origin, microscopic examinations may allow the analyst to identify the species from which it came, if required by the investigation.
3. If the hair is human, the possible race of the person, as well as the area of the body from which it originated, may be determined.
4. Hair damage or treatment can also be determined. Indications of hair being burned, crushed, cut, bleached, dyed, or artificially waved are often exhibited on individual hairs. Examination of the root may show whether the hair has been pulled out (forcibly removed) or has fallen out naturally.
5. Hair comparisons with a hair standard can be made. Such comparisons can yield the following results: (a) that the hairs are different, (b) that the hairs are similar with respect to microscopic characteristics and originated either from the same person or from another whose hairs exhibit the same microscopic characteristics, or (c) that no conclusion can be reached.
6. If a microscopic comparison has been done, additional DNA analysis may be performed.
7. In a homicide or rape in which the suspect is unknown and no probative DNA results identifying the suspect have been obtained, the examination of hairs on a victim's clothing (and/or bedding, if applicable) may be used as an investigative tool in conjunction with DNA and the CODIS system. The victim's hair standards need to be submitted for this type of analysis.

### **Evidence Collection**

1. Since hair evidence is generally small in nature, care should be taken to protect evidence from loss or contamination. Unknown hair(s) should be placed in a piece of paper which is folded up before being placed in an envelope.
2. Visual searches and searches with additional magnification can be used in the detection of hair evidence.
3. Recovery of evidence should be the most direct but least intrusive technique practical. For hair evidence, this could include picking or taping. If the item of interest is something that can be packaged, i.e., bedding or clothing, package the item for analysis and allow the analyst to collect the hairs.
4. If the location of a foreign hair is important, it should be collected and packaged separately.
5. Package clothing or evidence items separately. Before submitting clothing that is wet or bloody, air-dry over a clean sheet of paper, and then place each garment in a separate bag. Include the paper with the evidence to preserve any trace evidence that may have fallen off during drying.
6. If a hair comparison is requested, it is absolutely necessary that an adequate known sample be submitted. This consists of at least thirty (30) pulled hairs from the head and/or pubic region of the body. Collect the hairs from all areas of the region: for head hair standards, for example, collect from the front, back, top, and both sides of the head. Because of their limited features, microscopic comparisons cannot be performed on arm, leg, chest, or underarm hair. Do not collect known samples from these parts of the body.
7. In some circumstances, facial hair comparisons can be performed. If the suspect and/or victim have facial hairs of at least one-half inch long, collect a standard of thirty (30) hairs for comparison.

8. A minimum of 30 hairs is necessary because of the range and variability of hair.
9. Several hairs must be forcibly pulled, but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.
10. **In homicide cases, the head and pubic hair standards of the victim need to be collected at autopsy.**
11. Known DNA samples will also be necessary if DNA analysis is to be performed on a hair sample. Written authorization to consume the hair root may be necessary.
12. Label the sample containers with the case number, exhibit number, and exhibit description. Seal the containers with evidence tape and initial over the tape.

### **Hair Comparison Acceptance Policy**

A hair comparison will only be performed when known standards are provided. If a hair comparison is requested, a known standard of at least thirty head and/or pubic hairs from the victim must be submitted for the comparison to be performed. Facial hair comparisons, using a standard of at least thirty hairs, may be performed in appropriate cases.

Exceptions are:

- The item to be examined has been established as not belonging to the victim (e.g., clothing discarded at a burglary scene)
- The victim is missing. A hairbrush may be used as a standard if deemed suitable by the hair analyst.
- The victim has decomposed to the point that no hair standard can be collected. A hairbrush may be used as a standard if deemed suitable by the hair analyst.
- The victim was bald at the time of the offense. This does not include a “buzz cut.”
- The victim was cremated/burned prior to a standard being collected.

The interment of a victim does not constitute an exception.

If a hair comparison is requested, and a suspect has been developed, a known standard of at least thirty head and/or pubic hairs from the suspect should be submitted for the comparison to be performed. Facial hair comparisons, using a standard of at least thirty hairs, may be performed in appropriate cases.

Exceptions are:

- The suspect is missing.
- The suspect has been developed a long time after the date of offense.
- Insufficient probable cause exists to obtain a suspect standard.
- The suspect was bald at the time of the offense. This does not include a “buzz cut.”

Hair comparisons shall be performed prior to DNA analysis of a hair. Exceptions may be made on a case-by-case basis.

### **Fibers and Fabric**

Fiber and fabric comparisons and identifications can be encountered in a variety of criminal cases. A trace analyst performs this analysis.

### **Value**

Fiber identification can be of great value in many types of investigations. Cases involving rape, homicide, accident investigation, robbery, kidnapping, and assault can have fiber evidence. A fiber or fabric comparison can tell us if an unknown fiber could have come from a known piece of fabric.

### **Information Determined**

1. The fiber type can be determined by microscopic or instrumental examination when found individually or as part of a fabric. Polyester, nylon, acrylic and spandex are examples of synthetic fibers. Wool, mink, and silk are examples of fibers from animal sources. Cotton, linen, hemp fibers, and jute are examples of plant fibers. The fibers in paper are generally woody in origin. Asbestos is a mineral fiber.
2. Comparisons of fibers include the analysis and comparison of fiber type, color, dyes, optical properties, fiber diameter, cross-sectional shape, and if a piece of fabric, its weave or knit pattern. Unknown fibers can be compared to a known fabric. Unknown fabric can be compared to a known fabric.
3. Sometimes a physical match can be made between two fabrics. A physical match means that two pieces that are now separate were one piece at an earlier time.
4. Ropes and cords can be analyzed.
5. Fabric impressions may be found in a number of situations. The impression of a suspect's or victim's garment may remain on a surface of a vehicle in an accident investigation. Often, fibers will be impacted into the impression.
6. A fabric can be examined to determine if it was cut or torn.

### **Collection of Evidence**

1. Since fiber evidence is generally small in nature, care should be taken to prevent loss or contamination. Small samples should be placed into one of the metal pillboxes provided in the Trace Evidence Kits.
2. Visual searches and searches with additional magnification can be used for the location of fiber evidence.
3. Recovery of evidence should be the most direct but least intrusive technique that is practical. This could include picking up with forceps or tape lifts. Individual fibers usually cannot be seen with the naked eye. Tape lifts are therefore recommended on areas where contact might have occurred.
4. If the item of interest is something that can be packaged, i.e., bedding or clothing, package the items for analysis separately and allow the analyst to collect the fibers. Before submitting clothing that is wet or bloody, air-dry over a clean sheet of paper, and then place each garment in a separate bag. Include the paper with the evidence to preserve any trace evidence that may have fallen off during drying.

5. If fabric or fiber impressions are desired from an accident reconstruction scene, do not use tape to collect the evidence. It is best to collect the entire item (i.e., visor, glove compartment) and allow the analyst to collect the impacted fibers.
6. Known samples need to be submitted for comparison purposes.
7. Label the sample containers with the case number, and exhibit number. Seal the containers with evidence tape and initial over the tape.

## **Paint**

### **Value**

Paint chips and paint smears can be transferred from one automobile to another in a car crash. They may also be left on the clothing of a pedestrian who has been the victim of a hit-and-run. Paint from a house or business may be on the tools of a burglar. Criminal mischief cases can include paint evidence.

### **Information Determined**

Two types of analysis are available: comparison and identification. A comparison is between a known sample and an unknown sample. A paint comparison can tell us if an unknown paint could have come from a known paint. Identification can give the make, model, and approximate year of manufacture of original-finish paint using the Paint Data Query.

### **Collection of Paint Evidence**

1. All samples from painted surfaces should be collected so that all the layers of paint are present. In other words, the paint should be sampled down into the unpainted surface. Put the chips into one of the metal "pillboxes" provided in the Trace Evidence Kits. Do not use envelopes to package paint chips. Do not use tape to transfer or pick up paint samples.
2. When a foreign smear is collected, the underlying paint should also be collected, down to the unpainted surface.
3. Known samples (including all paint layers) need to be submitted when a paint comparison is requested. Known samples should be taken as close to the damaged area as possible
4. Sometimes it is better to submit a small or easily removed item (trim or molding from a vehicle) as-is and let the laboratory remove any foreign paint.
5. Before submitting clothing for trace paint analysis, air-dry over a clean sheet of paper and then place each garment in a separate bag. Include the paper with the evidence to preserve any trace evidence that may have fallen off during drying.
6. If submitting a tool such as a crowbar for paint analysis, wrap the tool in plastic or place it in one of the plastic bags in the Trace Evidence Kit.
6. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape

## **Glass**

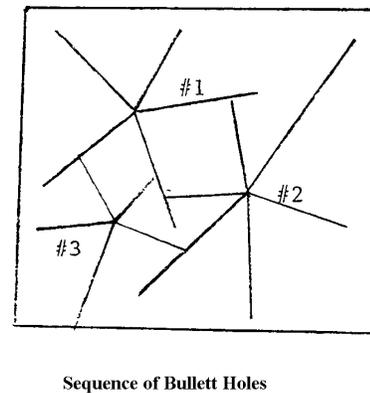
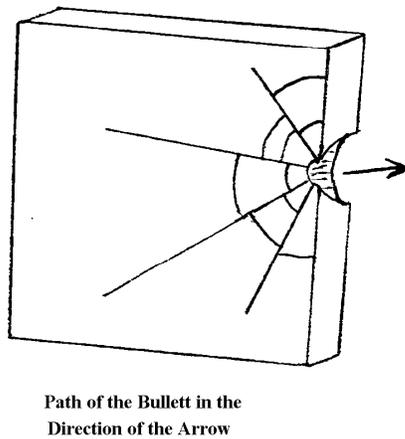
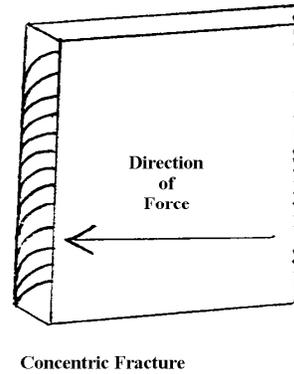
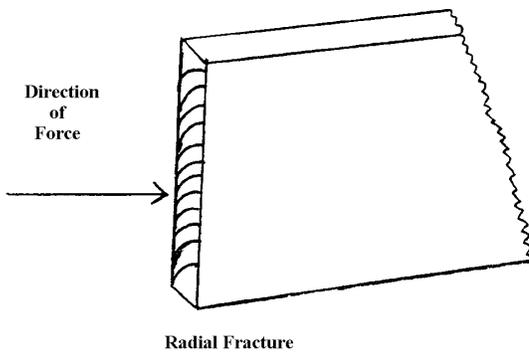
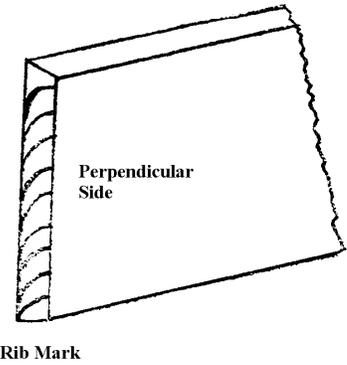
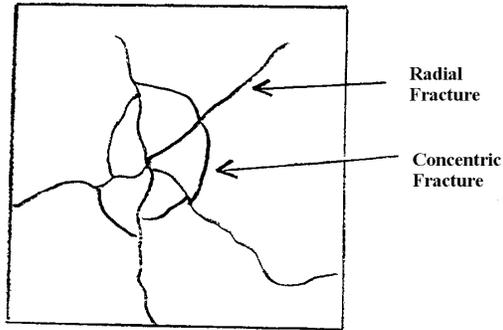
### **Value**

Glass is found in many types of cases including burglaries and homicides. Glass fragments can be found on shoes, clothing, in hair, on a baseball bat and many other places. A glass comparison can tell us if an unknown piece of glass could have come from a known piece of glass. Physical matches can be made with glass. A physical match means that two pieces that are now separate were one piece at an earlier time.

### **Information Determined**

1. Most glass analysis consists of comparing the morphological characteristics, refractive indices, elemental compositions, and densities of two or more samples.
2. Sometimes a fractured glass object, such as a headlight lens, can be reconstructed. Reconstruction can be used to find the direction of breakage, to determine the original shape and size of the object, and to make a physical match.
3. The direction of force used in breaking certain types of window panes can be determined by characteristics left on the glass due to the breakage. (See figures on page 61).
4. When a window is broken by a bullet firing through it, it is possible to determine the bullet's direction due to the characteristics left on the glass by the bullet. This applies to specific types of window glass. (See figures on next page.)
5. A determination of the sequence of bullet holes can be made by examination of the characteristics left on the glass due to the bullets passing through. This applies to specific types of window glass. (See figures on next page.)

GLASS BREAKAGE



## **Collection of glass evidence**

1. When collecting glass samples, it is best to make sure that a representative sample of known glass is collected. Collecting the four corners of a broken window does this best. When this is not the case or when the glass broken is not a window, collect all the glass that is available.
2. If more than one type of glass is broken, collect representative samples of each different type and package separately.
3. The round pillboxes are the best containers for small glass samples. If the glass pieces are extremely small, use the Tape Kit to collect the glass.
4. Breaking glass can fly back and lodge in the hair and clothing. If clothing is to be submitted, allow it to air-dry over a clean sheet of paper and then place each garment in a separate bag. Include the paper with the evidence to preserve any trace evidence that may have fallen off during drying.
5. The soles of shoes frequently pick up glass fragments, as do the cuffs of jeans. If the item of interest is something that can be packaged (i.e., clothing, shoes, or a tool), package each item separately and allow the analyst to collect the glass.
6. For the reconstruction of glass, lenses, or panes, collect all the glass possible and carefully package to prevent further breakage.
7. Direction of force is best determined at the scene from pieces of glass still in the frame. The lab cannot make such a determination from one isolated piece. If such material is to be submitted, be sure to remove as much glass as possible from the frame and mark the pieces to indicate the inside or outside.
8. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

## ***Physical Matches***

### **Value**

Physical matches can be made with most hard and some soft items. Examples of “hard” items would include glass, ceramic, hard plastic, brick, large paint chips, wood, and metal. Examples of “soft” items include cloth, matches from a matchbook, and paper. A physical match means that two pieces that are now separate were one piece at an earlier time. Some “soft” items such as cloth can stretch and a physical match between two soft items would be less specific.

### **Information Determined**

Physical matches are made based upon the visible characteristics of the pieces, their unique points of weakness, and the unique force applied that created the pieces. Plastic

vehicle pieces from a hit-and-run would be one example. The stereomicroscope is usually used to examine each piece for common features.

### **Collection of evidence for physical matches**

1. Collect all the material possible and carefully package to prevent loss and further breakage.
2. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

### ***Lamp Filament Examination for On/Off Determination***

#### **Value**

Lamp filaments can be used to determine whether or not a lamp was incandescent (on) at a time of impact. This is usually performed on automobile lamps. Any lamp on the outside of a vehicle can be examined. This includes the headlamps, tail lamps, brake lights, turn signal lights, and running lights.

#### **Information Determined**

Light is generated when a filament is very hot (4000 degrees F). This also causes the filament to be ductile (soft). When a great force is applied to a soft filament it will deform. If the glass bulb around the filament is broken when the filament is very hot, oxidation will occur. Oxidation colors are then created.

Filaments are examined using a stereomicroscope. We look at the color, shape and broken/melted ends. We look for glass that may be fused to the filament. We may also examine the glass bulb that contains the filament.

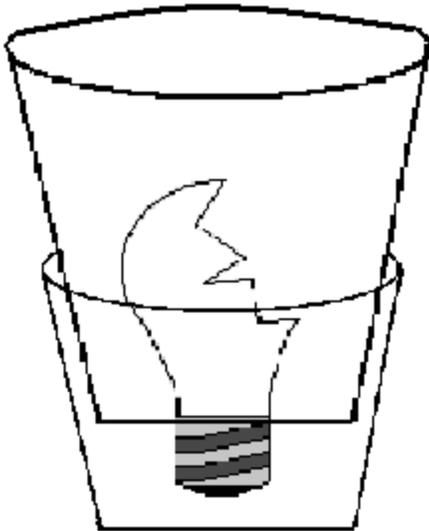
Sometimes an analyst cannot determine whether a filament was incandescent or not at a time of impact. The filament may not have the features needed to make a determination. This may mean that the filament was off or that the force applied was not great enough to cause damage to the filament. Another reason for an inconclusive result is that most of the filament may have been lost in the crash and there is not enough left to observe the necessary features.

#### **Collection of filaments**

1. At the scene the officer should NOT test the filaments by turning the lights on or off. Once the bulbs are removed, the officer may check the position of the switches.
2. It is best to remove the entire fixture, or as much as possible, all in one piece.
3. Any loose pieces of filament should be collected.

4. The Styrofoam cup method for packaging glass is diagramed below.
5. The packaging should be such that the filaments and bulbs are protected from further breakage and loss.
6. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

- Cut a small hole in the bottom of the cup
- Place the bulb-end inside the cup and secure
- Use tissues or other soft material to pack around the bulb
- Place another cup under the first cup
- Cover the cup top to retain any pieces that may become loose
- Secure with tape to prevent any loss or contamination



### **Unknown Substance and Product Tampering**

#### **Value**

This topic encompasses a wide variety of substances.

Some examples include:

- acid thrown on clothing
- pepper spray
- furniture polish in a beverage
- unknown powders
- antifreeze

- rat poison

Submission of possible standards is very valuable in determining the source of product contamination. If ingesting a substance has physically harmed a victim, they should be taken to a hospital. Any information that the doctor can provide indicating the source of harm would be very helpful.

### **Information Determined**

A wide variety of tests and instrumentation is available to identify an unknown substance or contaminant. Sometimes we cannot determine the identity of a substance; this may be due to sample size or the fact that some analyses are not within our testing abilities. In product tampering cases, it is highly recommended that the officer get a toxicology/poison screening for the victim done at a medical facility to help ascertain what the material may be. Biological materials such as mold or anthrax are not tested at the Forensic Lab.

### **Collection of evidence**

1. Obtain as much sample as practical.
2. Package the sample to reduce the possibility of contamination or loss. For example, meat tainted with antifreeze should be placed in a zip-lock bag or airtight container and placed in the freezer. **Any non-liquid food product with suspected contamination should be immediately frozen in an air-tight container to preserve the evidence. Any liquid food product with suspected contamination should be immediately refrigerated in an air-tight container to preserve the evidence.**
3. If you are not sure how to package the evidence, call the Trace section at 502-564-5230 to find out the proper packaging.
4. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

## **Soil**

### **Value**

Soil is frequently found on clothing, shoes, tools, and on vehicles.

### **Information Determined**

Most soil analysis consists of comparing two or more samples by their color, mineral content, and density. The presence of pesticides and herbicides has also been used in soil comparison.

**Collection of soil evidence**

1. Clothing or shoes should be dried over a clean sheet of paper and then placed in individual paper bags with the paper.
2. Known soil samples should be collected as follows:
  - a. one sample at the point of suspected origin;
  - b. three samples (in a triangle pattern) approximately ten feet away from the point of suspected origin
3. These samples should be taken from approximately the same depth as the questioned sample. If a shoe print is one quarter of an inch deep, do not sample an inch or more in depth.
4. The zip-lock plastic bags in the trace kit are convenient for such samples. One bag about half-full (1/4 of a cup) of soil would provide an adequate sample
5. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

**Tapes and Adhesives****Value**

Tape, such as duct or electrical, may be found in cases involving homicide, robbery, kidnapping, and assault. Adhesives by themselves, such as glues, may be found in a variety of cases as well.

**Information Determined**

A comparison between a known sample and an unknown sample may be made. This can tell us if a piece of tape could have come from a certain roll, or an adhesive could have come from a certain container. Sometimes, a physical match can be made between the ends of a known and unknown tape. A physical match means that two pieces that are now separate were one piece at an earlier time. Tape can also be examined for other trace evidence, such as hairs and fibers, and torn ends may have DNA from saliva on them. In some circumstances, the originating source of an unusual tape may be determined because of its unique characteristics.

**Collection of tape and adhesive evidence**

1. Use non-stick aluminum foil to package the tape. Plastic may interfere with DNA analysis and will stick to the tape.
2. Avoid wadding or balling the tape up.
3. Known samples should be submitted for comparison purposes.

4. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

### **Miscellaneous Trace Evidence**

#### **Value**

Trace evidence also includes a "Miscellaneous" section. This would include safe insulation, plastics (including garbage bags), cosmetics, lubricants, rubber, ink, dyes, wood, herbicides, pesticides, plaster, concrete, building materials, petroleum products, acids, alkalis, other corrosive materials, etc.

#### **Information Determined**

The information determined is dependent upon the substance to be analyzed. Often a comparison is performed and a known sample would be submitted.

#### **Collection of miscellaneous evidence**

1. In collecting such evidence, use a container that will protect the items from breakage and loss. If you are not sure how to package the evidence, call the Trace section at 502-564-5230 to find out the proper packaging.
2. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.
3. If you have any questions about whether the Trace Evidence Section can do a certain type of analysis, contact the lab at 502-564-5230.

### **Fire Debris**

Fire Debris analysis is a difficult field, both for the investigator and the chemist analyzing the material. During a fire involving an ignitable liquid, the ignitable liquid (e.g., gasoline, kerosene, mineral spirits, etc.) will undergo change. The more volatile components will be lost to a much greater extent than the components of lower volatility, and that which remains has been absorbed into wood and carpeting of the structure or soil underneath. There are situations in which one sample will show ignitable liquids and another will not, even though the samples were taken from areas quite close together.

#### **Value**

The presence of an ignitable liquid, i.e., a material used to spread or increase the rate of burning, will be indicative of arson if there is no good, legitimate reason for its presence.

#### **Information Determined**

Laboratory analysis can determine if an ignitable liquid is present in the sample. The volatility range and general chemical composition can also be determined. If an alcohol or other highly volatile product is suspected, please let the analyst know by putting the information on the KSP-26 or pre-log (lab request form) or by letting the analyst know when the evidence is brought into the lab.

### **Collection of Samples and Standards**

1. An ignitable fluid can be a liquid or a gas. Normally, liquids are used. If a suspected flammable liquid is found near the site or in the possession of a suspect, estimate its volume and pour a sample into a jar for submission to the lab. The forensic laboratory provides such jars and one is provided in the standard issue Arson Evidence Collection Kit.
2. For evidence at the fire scene, collect samples with a porous nature near the point or points of the suspected origin. In some instances, the most useful evidence will consist of material that has been relatively protected from intense heat, such as from beneath furniture or in a crawl space. Examples of materials commonly submitted are charred wood, rags, paper, insulation, soil and clothing.
3. Since ignitable liquids are volatile, evidence must be stored in air-tight containers. The laboratory provides "paint" cans for this purpose. One can should be used for each suspicious location or object. **Do not use plastic bags since ignitable liquids will pass out through the plastic, and never use paper bags or envelopes.**
4. The evidence should be of sufficient quantity. In most cases, the one-gallon cans should be one-half to three-quarters full or have an air space of two (2) inches at the top of the can.
5. After placing the evidence in the can, the lid should be secured in place by hammering or by stepping on and around the lid. If the object is too large for the one gallon can, it is perfectly acceptable to chop, cut or saw the evidence to make it fit inside of the air-tight container. (DO NOT USE GASOLINE POWERED TOOLS).
6. Fill in the information requested on the label on the lid. Do not forget to seal with evidence tape, and put your initials and date on the tape.
7. Store the evidence at as low a temperature as possible until it can be brought to the lab. If the fire debris consists of soil and/or dirt, put the evidence in the paint can(s) and freeze the can(s) as soon as possible. If the can(s) cannot be placed in the freezer before submitting to the Central Laboratory, submit the evidence as soon as possible.
8. List all evidence to be submitted on a laboratory Request for Examination form (KSP-26 or pre-log) and fill in all other information requested.

9. If DNA is requested for bloody clothing from an arson/homicide scene as well as ignitable liquid analysis, please put the evidence in the paint cans and **FREEZE THE CAN AS SOON AS POSSIBLE.** If the can(s) cannot be placed in the freezer before submitting to the Central Laboratory, submit the evidence as soon as possible.

For advice and/or assistance, contact a Kentucky State Police Arson Investigator through a nearby State Police post or contact the Central Forensic Laboratory (502-564-5230).

### **Shipment**

Currently, only the Central Forensic Laboratory provides Fire Debris Analysis. Postal regulations prohibit the mailing of flammable liquids. This does not include fire debris, which can be mailed. (Via certified mail). If flammable liquids are requested for analysis, please use Federal Express or United Parcel Service and clearly mark the container as evidence with flammable contents.

Please arrange for pickup of evidence as soon as possible after receiving the laboratory reports.

### **Explosives**

#### **Shipment**

For explosive devices, follow the instructions of the explosive expert for disposal and evidence collection. For blast scenes, package debris in plastic bags or arson cans if possible. Call the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) lab for advice on exploded material, blasting caps, and other detonating material. Analysis of explosives is currently being handled by the ATF.

## DRUG CHEMISTRY

The drug chemistry section is responsible for the analysis of exhibits suspected of containing controlled substances. This evidence includes plant material, pharmaceutical preparations, illicit tablets/capsules, powder/solid substances, possible drug paraphernalia, liquids, residues, and clandestine laboratory evidence. The drug chemistry section does not provide analysis that identifies controlled substances in biological specimens such as blood or urine (for this type of analysis, please refer to the Toxicology Section). Drug identification is available at all six (6) laboratory locations in the state and this service is provided for local, state, and federal law enforcement agencies.

The primary information provided by drug chemistry analysis is:

- Identification of controlled substances present in an exhibit
- Identification of methamphetamine precursors in a clandestine laboratory
- A net weight, volume, or count of the material tested (if the exhibit's weight includes the packaging it will be noted on the report as a gross weight)

### ***Submission Requirements***

1. Evidence submitted to the laboratory must be accompanied by a legible request for examination form (Form KSP-26). The request for examination form is available on the Kentucky State Police website at <http://kentuckystatepolice.org/labs.html>. This form should, ideally, be completed before arriving at the laboratory. It should include exhibit number designation along with a brief description of the item being submitted for testing.
2. Evidence can be submitted in a plastic evidence bag, envelope, brown paper bag, and/or cardboard box. Evidence should not be submitted with zip-lock bags, zipper plastic bags, or sandwich plastic bags as the outermost packaging. (These bags may be used as interior packaging.)
3. All evidence should be brought to the laboratory in a properly sealed package. A properly sealed package contains a complete closure whereby the contents of the package cannot readily escape and entrance to the package will result in obvious damage to the package or seal. The individual creating the seal should place their initials across it. The agency's name and a unique identifier (case number, citation number and/or suspect's name) should be visible on the outside package. Inner packages should indicate the appropriate item (exhibit) number and, if applicable, the associated subject's name.

### ***Case Acceptance and Item Prioritization***

Drug evidence is the most commonly submitted evidence to the Kentucky State Police Forensic Laboratory. In order to return analytical results as efficiently as possible, the KSP Laboratory has implemented the following case acceptance policy. This policy ensures that sufficient evidence is tested to support the maximum criminal charge

possible according to state or federal law, while managing requests in such a way to provide test reports within a target timeframe of 30 days from submission.

**The laboratory only accepts items that are intended for testing. Items such as rolling papers, lighters, paraphernalia (zip-lock bags, prescription bottles, twist ties, etc.) not containing controlled substances, field test kits, and/or personal belongings of the defendant(s) will not be accepted. Additionally, items that exceed the testing limits described below will not be accepted.**

1. Service

- a. Drug Chemistry analysis will only be performed for agencies serviced by the Kentucky State Police Division of Forensic Services (e.g. Kentucky State Police, local police departments and sheriff’s offices, prosecutors, and public defenders).
- b. Drug Chemistry analyses that are not offered by the Kentucky State Police Laboratory (e.g. quantitations and hemp vs. marijuana testing) may be forwarded to a vendor laboratory for analysis, as appropriate. Costs for this analysis will be the responsibility of the agency and/or attorney requesting the analysis. A Responsibility for Cost form must be completed and the appropriate billing information provided to the laboratory before the evidence will be forwarded to the vendor laboratory for analysis. Fees associated with testimony (e.g. witness and travel) from the vendor laboratory are the responsibility of the agency and/or attorney requesting the analysis.

2. Item Testing Priority

- a. Although many items of evidence may be collected during an investigation, only the items supporting the highest charge should be submitted to the laboratory. Testing items in excess of the maximum possible charge is an inefficient use of resources and creates further delays in testing of other pending drug chemistry cases.
- b. The Kentucky State Police Laboratory will perform chemical analysis on sufficient material to meet the single highest charge in each case. The following table can be used to assist in determining which items will be tested:

<b>Table 1 – Item Acceptance Priority by Substance</b>	
Tier 1	<ul style="list-style-type: none"> <li>≥ 100 grams heroin</li> <li>≥ 28 grams fentanyl</li> <li>≥ 10 grams carfentanil</li> <li>≥ 10 grams fentanyl derivatives</li> <li>Manufacturing methamphetamine evidence</li> </ul>
Tier 2	<ul style="list-style-type: none"> <li>Any quantity of heroin, fentanyl, carfentanil, or fentanyl derivatives in amounts less than Tier 1</li> <li>Any amount of LSD, PCP, GHB, or flunitrazepam</li> <li>≥ 2 grams methamphetamine</li> <li>≥ 4 grams cocaine</li> </ul>

	<p>≥ 10 dosage units of CI or CII narcotic          ≥ 5 pounds marijuana</p>
Tier 3	<p>&lt; 2 grams methamphetamine          &lt; 4 grams cocaine          &lt; 10 dosage units of CI or CII narcotic          ≥ 10 dosage units of CI or CII non-narcotic          ≥ 20 dosage units of CIII          &gt; 120 dosage units of CIV or CV          ≥ 5 plants of marijuana          8 ounces to 5 pounds of marijuana          Any quantity of synthetic drugs</p>
Tier 4	<p>&lt;10 dosage units of CI or CII non-narcotic          &lt;20 dosage units of CIII          20 to 120 dosage units of CIV or V          &lt; 8 ounces of marijuana          &lt; 5 plants of marijuana</p>
Tier 5	<20 dosage units of CIV or V
Tier 6	Paraphernalia / residues

- c. When determining item acceptance priority, consideration will be given to gross and net weight differences in order to ensure enough items are accepted to meet any existing weight thresholds.
- d. If no controlled substance is identified in the initial case submission, additional items may be submitted for analysis. Further testing will be conducted until a controlled substance is identified or all potential drug items are tested.
- e. FEDERAL PROSECUTION: Item acceptance priority for cases undergoing Federal prosecution will be determined on a case-by-case basis in consultation with the appropriate attorney.
- f. MULTIPLE DEFENDANTS: In cases involving multiple defendants and multiple items of evidence, items will be tested to meet the highest charge for each defendant. When this situation applies to a case, the submitting officer(s) must communicate clearly with the laboratory which items pertain to which defendant(s).
- g. CLANDESTINE LABORATORIES: In cases involving the charge of “manufacturing methamphetamine,” all items in the case will be tested up to a maximum of five (5) items. Officers are encouraged to submit a variety of items that represent final product, precursors, and intermediate steps (in that order of priority).
- h. Additional considerations:

- i. In circumstances where multiple items are present which represent equivalent “highest charges” (multiple items in the same Tier), the item weighing more will be tested.
- ii. Syringes will not be tested unless they are the only item in the case *and* submitted in an appropriate “sharps” container. Exposure to HIV (the AIDS virus) and to Hepatitis C is of serious concern when collecting, handling, and examining any evidence that has blood or bodily fluids present in either liquid or dry state.
- iii. Currency will not be tested for drug residue, unless it is the only evidence in the case *and* obvious, visible residue is present on the surface of the currency.
- iv. Quantitations (sometimes referred to as “purity tests”) will not be performed.

### ***Item Packaging Guidelines***

#### **1. General Considerations**

- a. Do not place suspected drug evidence directly into a manila envelope, brown paper bag (exception: wet marijuana), or any package that has seams or holes in which the evidence can readily escape.
- b. Place all items in a secure package (e.g. taped plastic bag, ziplock bag, closed knotted plastic bag) prior to placement in an outer package to prevent loss or cross-contamination.
- c. The outer packaging must be free of perforations, staple holes, or any other damage that could cause evidence to easily escape. If the outer packaging is damaged in any fashion, it may be returned unexamined.
- d. Label all inner bags with a minimum of a case number and an item number. Additional information associated with that item may be included (e.g. location found, suspect’s name).
- e. The inner package may be the original packaging and need not be sealed with evidence tape, but should be securely closed to prevent loss or cross-contamination of between items.
- f. In cases with unusually large quantities of evidence, the officer is encouraged to call the laboratory for assistance in packaging and receiving. By calling ahead, the officer allows the laboratory to prepare for the evidence arrival and the officer can be advised if he/she is needed to stay until the evidence is weighed and sampled.

#### **2. Powders and Solids**

- a. Powder and solid samples should be packaged in a manner that prevents leakage and cross-contamination between exhibits. If the original container has holes of any sort, the officer should place this bag inside of another secure package.

- b. Some controlled substances are extremely potent and present a hazard to officers and laboratory personnel (e.g. carfentanil). The use of gloves is highly encouraged when handling any unknown powder/solid samples.
  - c. Powder/solid samples will not be accepted for weighing purposes only.
3. Tablets and Capsules
- a. Generally speaking, it is best to submit the entire exhibit (all tablets or capsules of a single type in a single exhibit), as more than one tablet or capsule may be needed for testing and identification of the active ingredient. In cases where there are extremely large amounts of tablet or capsules, however, a representative sample may be submitted.
  - b. Tablet/capsules exhibits will not be accepted for counting purposes only.
4. Liquids (non clandestine laboratory related)
- a. Liquids should be placed in a secure container to prevent spillage. It is encouraged that this container be placed inside a ziplock or zippered plastic bag inside of another outer container in the event that the innermost container ruptures during transportation.
5. Plant Material (marijuana, peyote cactus, opium poppy, various species of psilocyn/psilocybin mushrooms, khat, kratom, synthetic cannabinoids, etc.)
- a. Fresh/wet plant material SHOULD NOT be placed in a plastic bag. This will lead to degradation of the sample from mold and mildew which will, at minimum, render the sample unable to be analyzed and, at worst, cause fungal growth that can lead to serious respiratory complications in individuals that contact the substance.
  - b. In cases involving the cultivation of marijuana where there are five (5) or more plants, it is recommended that a sample be taken from five to ten plants and placed in individual envelopes.
    - i. A good sample would consist of a handful of leaves.
    - ii. Submissions containing only plant roots are discouraged.
    - iii. If the plants are mature, some of the flowering top should be included in the sample.
    - iv. A note should be made on the request for examination form that the material submitted is from a cultivation case.
    - v. In large cultivation cases, the investigating officer is encouraged to consult with the laboratory for the most appropriate sampling techniques due to the varying sizes of cultivation cases and pertinent sentencing guidelines.
  - c. In cultivation of marijuana cases where the plants measure less than approximately 1 foot tall, the officer may submit the entire plant provided that each plant is properly packaged separately in paper bags.
  - d. General notes on marijuana plant items:
    - i. Immature plants often do not have the chemical constituents present for the identification of marijuana. As a general rule, a plant must have more than the first two seed leaves to produce enough THC to be identified.

- ii. Officers should try to remove as much soil and debris from the root system as possible without destroying it.
  - e. In cultivation cases involving mushroom spores, please call the laboratory for assistance in evidence retrieval and submission. These cases vary in size and growth apparatuses.
  - f. If a plant is suspected as being khat, the officer should store the plant material in a cold storage unit such as a freezer until it is submitted to the laboratory. Khat is heat sensitive and the active controlled substance breaks down quickly over time.
  - g. Peyote cactus should be submitted in a rigid container such as a bucket to preserve the plant material
6. Residues
- a. Generally speaking if a residue cannot be seen, there is not enough material present to chemically identify it.
  - b. Officers are discouraged from performing field tests on items with residue, as a field test may consume what evidence is present.
  - c. Syringes
    - i. Syringes present a serious hazard due to the possibility of transmission of diseases such as hepatitis, HIV, and AIDS.
    - ii. If a syringe is accepted for testing, it must be packaged properly by placing the syringe in a sharps container or some other puncture resistant container.
    - iii. Submitting officers must label syringe packaging *and* the Request for Examination as a BIOHAZARD when submitting syringes.
  - d. Sharp Objects (broken glass, razors, knives, etc.)
    - i. These items should be placed in a sharps container or some other puncture resistant container. Glass items are easily broken during transit and storage, so even if the item is not broken at the time of submission (e.g. glass smoking pipes, mirrors), it should still be packaged in an appropriate container to prevent damage.
    - ii. Sharp objects should not be wrapped with tape in order to preserve the sample, as it is hazardous for examiners to remove the tape and it may destroy the evidence.
7. Clandestine Laboratories
- a. Officers are strongly encouraged to submit clandestine laboratory evidence in the "Methamphetamine Clandestine Laboratory Collection Kits," if available. These kits can be obtained from any state police post or DESI branch. These kits contain instructions on how to collect evidence, vials for collecting liquids, smaller vials for collecting residual evidence, zip-lock bags, and swabs. Before submitting the kit to the laboratory, the officer should discard any container from the kit that is not used in collecting evidence. Note: These

kits are not routinely stocked or available for distribution at the forensic laboratory locations.

#### 8. Biohazards

- a. Occasionally, drugs are hidden by suspects in their body cavities (vagina, mouth, anus, etc.). For the safety of the officer, laboratory personnel, and court personnel, any evidence submitted that is known to have been placed in a body cavity **must** be labeled with a BIOHAZARD sticker and the Request for Examination form must be marked BIOHAZARD.
- b. This evidence should be placed inside of a package within the outermost package (two layers of packaging). This will prevent contamination of the packaging and will ensure the safety of the individuals handling the evidence.
- c. When possible, it is important to note where the item was found in the “Case History” part of the Request for Examination form.

#### ***Evidence Warning Label***

Drugs are sometimes submitted to the laboratories that contain highly toxic substances that are capable of causing overdose simply by touching or inhaling a very small quantity of the drug. When the laboratory identifies these substances during analysis, a warning label will be affixed to the outermost evidence package to alert the submitting agency that a dangerous substance is present and extreme caution should be exercised when handling or disposing of the evidence. Such substances that may cause overdose if touched or inhaled include but are not limited to fentanyl and carfentanyl. The warning label affixed to the evidence will read as follows:

**DANGER: Portions or all of the contents may contain a highly toxic chemical which can cause death if inhaled or comes in contact with skin.**

*Label affixed by the Kentucky State Police Forensic Laboratories after analysis.*

#### **Evidence Shipment**

If evidence is to be shipped to the KSP Laboratory instead of in-person delivery, the following guidelines should be followed:

1. Officers should determine which of the six laboratory branches the evidence should be submitted to, by either contacting the laboratory, the evidence custodian within the officer’s agency, or the closest KSP Post in the local area.
2. If the evidence is to be mailed, laboratory policy *requires* that the evidence to be sent via Registered Mail for best chain-of-custody tracking. Registered Mail requires a signature upon receipt and this receipt is returned to the sender via the Post Office. *Evidence shipped to the KSP Laboratory via methods other than U.S. Registered Mail may be returned unexamined.*
3. It is crucial to the integrity of the evidence and the safety of the laboratory personnel that the package being sent is sealed. It is recommended that the

evidence be placed inside of a sealed package within the outer mailing envelope or box.

4. On the outside of the mailing envelope, officers should put "ATTENTION: CS" or "IDCS." This indicates to the laboratory that the evidence is intended for the controlled substances section, but does not conspicuously identify the package contents during transit.
5. Syringes, sharp objects, and clandestine laboratory evidence should ***never*** be sent via mail. These types of evidence must be hand-delivered to the laboratory.
6. Mailing liquid items to the laboratory is strongly discouraged.

## **BLOOD ALCOHOLS & TOXICOLOGY**

Blood and urine can be analyzed to determine alcohol and drug concentrations (not syringes). Urine samples will not be examined for drugs if a suitable blood sample is received, unless the case type is a sexual assault, murder, or homicide. Each Kentucky State Police Forensic Laboratory location has the ability to determine the alcohol content of blood and provide expert testimony as to these findings. The Central Laboratory in Frankfort also has the capability to do toxicological analysis of biological specimens for the presence of drugs.

### **Blood Alcohol and Intoxicants**

#### **Value**

The alcohol, inhaled solvents, and drug levels of samples (blood, urine, and suspected volatiles only), can assist in the determination of the level of intoxication of a person while operating a motor vehicle.

#### **Information Determined**

Toxicological evidence submitted from subjects for screening will usually be limited to blood and urine. Blood and urine specimens are sufficient to screen for drugs of abuse and are generally adequate in all DUI cases. Each of these specimens can be the evidence of choice, depending upon the request.

The submission of whole blood specimens in a Blood/Urine Collection Kit is sufficient for the determination of alcohol content. Blood alcohol or other volatile analysis will be performed as requested.

**Drug analysis will follow standard operating procedures for the Toxicology section. Drugs of interest should be specifically requested.**

#### **Collection and Shipment**

The Forensic Laboratory makes available kits for the collection of blood for DUI cases. These kits are obtainable free of charge from each of the laboratory location. These kits have a pre-paid mailer attached and can be forwarded to the laboratory servicing your area for blood alcohol by placing the sealed kit in the mail. Following the blood alcohol determination, the sample will be forwarded by the laboratory system to the Central Forensic Laboratory for the drug screen, if required.

Even though the sample containers have preservatives, be sure to avoid extreme heat, such as a car dash or a trunk in summer.

If a kit has expired, replace the blood tubes provided with gray/lavender vacutainer hospital tubes.

A copy of the Investigating Officer's Report, listed below, can be found on the Styrofoam container of each kit. Instructions for use of the KSP Blood/Urine Collection Kit are included on the following pages. These instructions are included with each kit.

INVESTIGATING OFFICER'S REPORT	
NAME OF SUBJECT:	_____
OFFENSE:	_____
DATE OF INCIDENT:	_____ TIME: _____ AM-PM
COUNTY:	_____
INVESTIGATING OFFICER:	_____
DEPARTMENT:	_____
DATE BLOOD DRAWN:	_____ TIME: _____ AM-PM
FACILITY WHERE DRAWN:	_____
BLOOD DRAWN BY:	_____
CASE OR CITATION NO.:	_____
LAB NO.:	_____
WAS SUBJECT GIVEN BREATH ALCOHOL	<input type="checkbox"/> YES <input type="checkbox"/> NO
IF YES, RESULTS:	_____
<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center; margin: 0;">CHECK APPROPRIATE BLOCKS</p> <p style="margin: 5px 0;"><input type="checkbox"/> ALCOHOL</p> <p style="margin: 5px 0;"><input type="checkbox"/> DRUG SCREEN (SPECIFY) _____</p> </div>	
<p style="margin: 0;">CHAIN OF POSSESSION</p>	
RECEIVED FROM:	_____
BY:	_____
DATE:	_____ TIME: _____ AM-PM

**Forensic Laboratories  
Kentucky State Police  
Blood Collection Kit**  
For Alcohol and or Drug Determination

**PURPOSE:** This kit is designed to contain blood specimens obtained from DUI, criminal and death investigations in which only an alcohol and/or general drug screen is needed. This kit is not sufficient for a full toxicological study.

**CONTENTS OF KIT**

- 2 ea. 10mL blood tubes containing sodium fluoride and potassium oxalate.
- 1 ea. 7mL blood tube containing EDTA
- 1 ea. Styrofoam blood tube holder
- 1 ea. Direction sheet
- 2 ea. Police evidence seals for resealing kit box after collection of evidence
- 1 ea. Ziplock bag with liquid absorbing sheet

**DIRECTIONS FOR HANDLING SPECIMENS**

**Instructions to the investigating officer:**

1. Fill in the "Investigating Officer's Report" completely and legibly.
1. Witness the collection of samples.
2. Fill containers in accordance with Administrative Regulations (500 KAR-Chapter 8).
3. Return filled blood tube(s) to styrofoam holder.
4. Place styrofoam holder in ziplock bag and return ziplock bag to kit box (do not remove the liquid absorbing sheet from bag).
5. Reassemble kit box and affix red evidence seals where indicated on box top.
6. Submit to forensic laboratory or refrigerate until sample can be transported (do not freeze).

**Instructions to physician or technician drawing sample:**

1. Clean skin with non-alcohol disinfectant.

2. Draw blood with a clean (alcohol-free) needle or syringe.
3. Add samples to blood tube via needle (do not remove stopper).
4. "Facility where drawn" refers to the hospital, office etc.

## **BREATH ALCOHOL MAINTENANCE PROGRAM**

The Breath Alcohol Maintenance Program is established by the Kentucky State Police to ensure proper calibration and maintenance for evidential breath alcohol measuring devices located throughout the state. Field service technicians for this program are assigned to the Central, Western, Northern, Eastern and Southeastern Laboratory Branches, and the program is administered through an office located at the Central Laboratory Branch.

### **Value**

All state evidential breath alcohol measuring devices are assigned to the Breath Alcohol Maintenance Program. Field technicians maintain and ensure proper calibration of instrumentation and provide expert testimony in court regarding service activities and maintenance documentation.

Evidentiary breath alcohol instruments used in the Commonwealth includes the Kentucky Model Intoxilyzer ® 5000EN, the Kentucky Model Intoxilyzer ®8000. The Breath Alcohol Maintenance Program also provides calibration services for portable breath testing devices for any law enforcement agency within the commonwealth.

## APPENDIX A: LABORATORY CONTACT INFORMATION

The following is a list of the laboratories, and a list of services offered at each laboratory. Submissions may be made in person or by registered or certified mail to the nearest regional laboratory or to the Central Laboratory.

### **CENTRAL FORENSIC LABORATORY BRANCH**

Phone: (502) 564-5230

FAX: (502) 564-4821

Kentucky State Police  
Central Forensic Laboratory  
100 Sower Blvd., Suite 102  
Frankfort, Kentucky 40601-8272

#### **Services offered:**

##### *Toxicology and Drug Analysis*

Blood Alcohol/Toxicology

Drug and Other Unknown Controlled Substance Identification

##### *Trace Analysis*

Paint, Plastics, and Tape

Glass and Headlamps

Soil

Arson

Hair Identification and Comparisons

Fiber Comparisons and Fabric Impressions

Gunshot Residue

Oils and Lubricants

Physical Match Comparisons

Pesticides and Herbicides

Unknown Substances (other than Controlled Substances)

Product Tampering and Lachrymators (Pepper Sprays)

Miscellaneous Analyses

##### *Forensic Biology*

Body fluid Identification

Bloodstain Pattern Analysis

DNA Analysis

##### *DNA Database*

##### *Firearms Identification*

Identification of Firearms, Bullets, and Cartridge Case

Determination of Muzzle-to-Target Distance

Identification and Comparison of Inked Impressions

Identification and Comparison of Plaster Casts

Tool Mark Identification  
Related Firearms and Comparative Microscopy  
Open Case Search  
Serial Number Restoration

**Breath Alcohol Maintenance Program**

Phone: (502) 782-0232  
1025 Capital Center Dr.  
Suite 103  
Frankfort, KY 40601

Maintaining breath alcohol measuring device  
Ensuring calibration of such devices

**Forensic Latent Print Laboratory**

Phone: (502) 782-9821  
1266 Louisville Rd.  
Frankfort, KY 40601

**WESTERN FORENSIC LABORATORY BRANCH**

Phone: (270) 824-7540  
FAX: (270) 824-7029

Kentucky State Police  
Western Forensic Laboratory  
4415 Hanson Road  
Madisonville, KY 42431

**Services offered:**

*Blood Alcohol*

Blood Alcohol

*Drug Analysis*

Drug and Other Unknown Controlled Substance Identification

*Forensic Biology*

Body fluid Identification

*Breath Alcohol Maintenance Program*

Maintaining breath alcohol measuring devices  
Ensuring calibration of such devices

**JEFFERSON FORENSIC LABORATORY BRANCH**

Phone: (502) 426-8240

Fax: (502) 426-4531

Kentucky State Police  
Jefferson Forensic Laboratory  
3600 Chamberlain Lane, Suite 410  
Louisville, Kentucky 40241

**Services offered:***Blood Alcohol*

Blood Alcohol

*Drug Analysis*

Drug and Other Unknown Controlled Substance Identification

*Forensic Biology*

Body fluid Identification

Bloodstain Pattern Analysis

*Firearms Identification*

Identification of Firearms, Bullets, and Cartridge Case

Determination of Muzzle-to-Target Distance

Identification and Comparison of Inked Impressions

Identification and Comparison of Plaster Casts

Tool Mark Identification

Related Firearms and Comparative Microscopy

Open Case Search

Serial Number Restoration

**NORTHERN FORENSIC LABORATORY BRANCH**

Phone (859) 441-2220

FAX: (859) 441-0848

Kentucky State Police  
Northern Forensic Laboratory  
5690 East Alexandria Pike  
Cold Spring, KY 41076

**Services offered:***Drug Analysis*

Drug and Other Unknown Controlled Substance Identification

*Blood Alcohol*

Blood Alcohol

*Forensic Biology*

Body fluid Identification  
Bloodstain Pattern Analysis

*Breath Alcohol Maintenance Program*

Maintaining breath alcohol measuring device  
Ensuring calibration of such devices

**EASTERN FORENSIC LABORATORY BRANCH**

Phone: (606) 929-9142

FAX: (606) 929-9364

Kentucky State Police  
Eastern Forensic Laboratory  
1550 Wolohan Drive Suite 2  
Ashland, Kentucky 41102

**Services offered:**

*Blood Alcohol*

Blood Alcohol

*Drug Analysis*

Drug and Other Unknown Controlled Substance Identification

*Firearms Identification*

Identification of Firearms, Bullets, and Cartridge Case  
Determination of Muzzle-to-Target Distance  
Identification and Comparison of Inked Impressions  
Identification and Comparison of Plaster Casts  
Tool Mark Identification  
Related Firearms and Comparative Microscopy  
Open Case Search  
Serial Number Restoration

*Breath Alcohol Maintenance Program*

Maintaining breath alcohol measuring device  
Ensuring calibration of such devices

**SOUTHEASTERN FORENSIC LABORATORY BRANCH**

Phone: (606) 877-1464

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**Services offered:**

*Blood Alcohol*

Blood Alcohol/Toxicology

*Drug Analysis*

Drug and Other Unknown Controlled Substance Identification

*Breath Alcohol Maintenance Program*

Maintaining breath alcohol measuring device

Ensuring calibration of such devices

**APPENDIX B: THE FOLDED PAPER PACKET**

1. Obtain a square piece of paper or cut one in a square of the approximate size needed to hold the material in question.
2. Make a diagonal fold (A).
3. Then fold B and C together.
4. Then fold at D
5. Open and place the sample in the center of the square and refold in the same manner.
6. Tuck triangle E into the slot formed by the folds of B and C.
7. Initial and date the packet formed.

