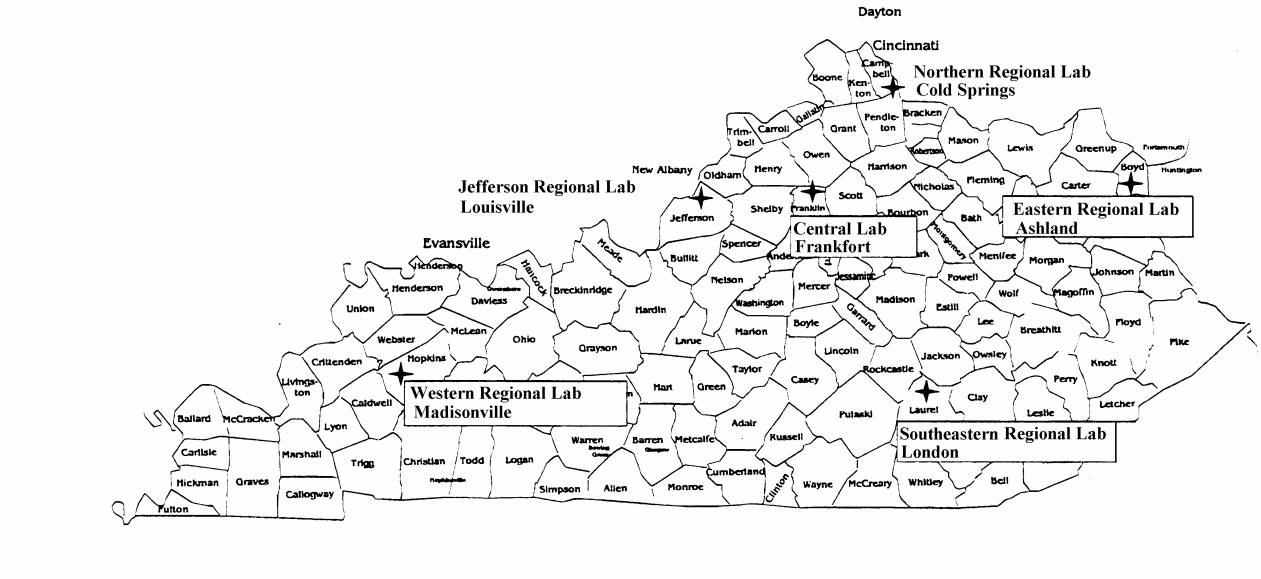
PHYSICAL EVIDENCE HANDBOOK

KENTUCKY STATE POLICE

FORENSIC LABORATORIES SECTION
(Revised 6/01)



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.

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 Laboratories Section does not have evidence collection personnel who we are able to send to crime scenes. We are always ready to render technical assistance and advice to any agency. If you need this advice, please call 502-564-5230 between the hours of 8 AM and 4:30 PM Monday through Friday at Frankfort. The Commander or one of the Assistant Commanders will assist you if it is within their power to do so.

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INTRODUCTION

The forensic laboratories of the Kentucky State Police have 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 network of forensic laboratories located in Frankfort, Madisonville, Louisville, Northern Kentucky, Ashland, and London. The Central Laboratory in Frankfort is a full-service forensic lab offering a full range of such services. The five regional laboratories offer a more limited range of services. For a listing of each laboratory's services, please consult Appendix A. Latent print capabilities are offered by the Kentucky State Police Automated Fingerprint Identification Section (AFIS), which is located at 1250 Louisville Road, Frankfort, KY 40601. Its telephone number is (502) 227-8700.

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 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.

Remember, no analysis can be performed by examiners in courthouse halls waiting to testify.

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. 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. The exception to this rule is requests for searches of the Firearms Open Case file.

If there is any question concerning laboratory services, please contact any of the forensic laboratories.

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, arson accelerants, 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 accelerants at a fire scene indicates an 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, handwriting, firearms, bullets, tool marks, shoe prints, and pieces of glass in cases in which broken edges can be matched.

Evidence with class characteristics, no matter how thoroughly examined, will only be placed in a class or group. A definite identification can never be made. There is always a possibility of more than one source for the material found. Some examples are hair, fibers, blood, soil, paint, and glass fragments. It is, of course, desirable to have evidence that can be positively identified, but cases can be made on evidence with class characteristics only. This type of evidence can help build the case of circumstantial evidence or prove an alibi false. Just as important, this type of evidence can give a definite negative, i.e., proving positively that a particular piece of evidence did not come from a particular source. A bloodstain can be proved not to be from an individual.

A better case can be made with class evidence when the evidence has either a greater number of identifying features or a greater number of different types of evidence. Identifying features include layered paint or soil with foreign matter. A greater number of different types of evidence is exemplified by rape evidence which may include hair, fibers, blood, and semen.

Since all forensic laboratories 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 you use is directly related to keeping the analyst well informed as to the facts of the case.

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, 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, syringes, 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; however, do not 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.

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 is highly recommended. Markings should be placed on the evidence itself; however, in cases of liquids, powders, small fragments, etc., the containers should be marked and sealed. The recommended places on specific types of evidence will be discussed under each particular type of evidence

5. All evidence should be stored in a secure place with restricted access. The chain of custody should be documented. The laboratory report will include the information concerning from whom the evidence was received at the laboratory and how it was returned or if it was kept at the lab for pickup by the investigating department. Valuable evidence such as money, drugs and weapons shall be secured separately within the storage locker.

6. All evidence must be properly sealed for submission to the Forensic Laboratories Section. 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 may be used to seal the openings of evidence containers. Initials or likewise identification of the person placing the seal shall be marked across the tape so that the writing falls on both the tape and the container. If the tape is such that the removal or breakage of the tape will leave obvious marks on the container, the identification need not be across both the tape and the container. Heat seals may be used as long as the same markings are placed along the seal. Stapling is not considered 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. If the submitting officer is not present, the receiving analyst shall place tape across the seal perpendicular to the original seal and then mark appropriately.

Packaging. Select suitable containers such as round pillboxes, glass or plastic vials, or a folded paper packet (see Appendix B), paper bags, strong cardboard boxes, etc., for packaging evidence. Each piece of evidence should be individually packaged to avoid any possibility of cross contamination. Special care must be taken not to package samples with wet stains until they are dry and then NEVER IN PLASTIC. Please see the "Blood and Other Body Fluids" section for more specifics for this type of evidence. The package should be sealed, preferably with evidence tape, and initialed. Please minimize or eliminate the use of staples since they can tear disposable gloves and 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.

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 and sexual assault evidence collection kits have ziplock plastic bags for containing any blood spilled from broken blood sample tubes.

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 services desired or call the closest laboratory and ask for that information. If the evidence cannot be delivered in person, the evidence should be sent by registered mail or certified mail.

Parcel post and regular mail cannot be traced and are not recommended. When evidence is mailed to the lab, mark the package to the attention of whatever section (Chemistry, Forensic Biology, Firearms, etc.,) to which it would be assigned. Again, please check the section in the manual covering the particular type of evidence in question. It should be noted that evidence requiring latent print work only should be sent to the AFIS Section and not the Crime Laboratory (see Appendix A). An envelope containing the KSP laboratory request form should be taped to the outside of the package used for mailing.

The Laboratory Request Form: The completed KSP Laboratory Request Form should accompany all evidence submitted to the laboratory. The form is available at all laboratories and at the various State Police posts throughout the state. A copy of this form is in the back of this manual.

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, poorly executed and poorly 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 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 a 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
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 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 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.

FIREARMS IDENTIFICATION

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.

Note: Ballistics is the study of a projectile in motion and is often confused with firearms identification.

Value

The value of firearms identification is that it allows the investigator, with the aid of the firearms examiner, to reconstruct the events of a shooting. With information gathered from the various tests performed by the firearms examiner, details such as what kind of gun was fired, at what distance and angle, and possibly the exact sequence of events can be determined. Even more important, a bullet or cartridge case can be positively associated with a particular firearm to the exclusion of all others, a claim most other areas of forensic science cannot make.

Information Determined.

Firearms.

A firearm can be tested to determine if it functions properly. The safety mechanisms will be checked to see if the firearm will discharge in an unsafe manner. The amount of pressure necessary to discharge the firearm (trigger pull) will also be measured. Test bullets will be fired and held on file at the laboratory for future comparisons.

Bullets.

Marks produced by tools used in the manufacture of a bullet make possible the identification of bullet brand, caliber, and type. Rifling impressions on the surface of a fired bullet enable a firearms examiner to determine the possible manufacture of firearm from which the bullet was fired. A list of possible makes of firearms will be included on the laboratory report.

A bullet may also be examined to determine whether the bullet was fired from a specific firearm by comparing striated marks visible with the aid of a comparison microscope. The condition of the bullet and/or the firearm may prevent a positive conclusion.

Cartridges and Cartridge Cases.

Cartridges and cartridge cases can be marked by a firearm during loading, firing, or extracting in a manner which allows the firearm examiner to make a positive association between the cartridge or cartridge case and firearm. These marks are produced by the firing pin, breechface, extractor, ejector, chamber and magazines, depending on the type of firearm. Firing pin and breechface markings can positively identify a

cartridge case as having been "fired" in a particular firearm. Extractor, ejector, and chamber marks can be used to associate a cartridge or cartridge case to a particular firearm.

Shot, Wadding.

Recovered shot material normally from a shotshell can be identified as size of lead, steel , copper, nickel or bismuth shot. Wadding material can be examined to determine type of wad, gauge and manufacture.

Shot Patterns.

The distance from which a firearm was fired can be determined by comparing the pattern made by the pellets to test patterns made at various distances by the suspect firearm using ammunition similar to that found in the weapon or at the scene.

Gunpowder Patterns.

The distance from the end of a firearm (muzzle) to a shooting victim or an object can be determined by examining the area around any bullet entrance holes found in the victim's clothing for the presence of a pattern of gunshot muzzle residues. Gunshot residues are projected out of the muzzle of a firearm, at a high velocity and may embed, pass through, or adhere themselves around the bullet hole. By comparing the patterns found on evidence to test patterns produced by the suspected firearm using ammunition similar to that found in the weapon or at the scene, an approximate firing distance (muzzle to garment) can be established.

The absence of powder residues may be due to one of the following:

1. a shot fired beyond the maximum distance that residues would be deposited by that firearm.
2. excessive bleeding may wash away any gunshot muzzle residue originally present.
3. there may have been an intervening object such as a pillow, etc., between the gun and the victim's clothing.
4. in handling the garment, residues may have been dislodged.
5. in the case of a contact shot, the powder residues may have been projected into the wound, whereby physical characteristics will be indicative of the range of fire.

Open Case File and the Drug Fire System.

Bullets and cartridge cases recovered in unsolved murder cases are retained in each firearms unit of the Forensic Lab. Firearms which are recovered and thought to have some relationship to a particular “open case” can be routinely submitted for comparison. Contact the firearms examiner in your area prior to submitting firearms which are to be compared to the open case file Drug Fire System or the open case file.

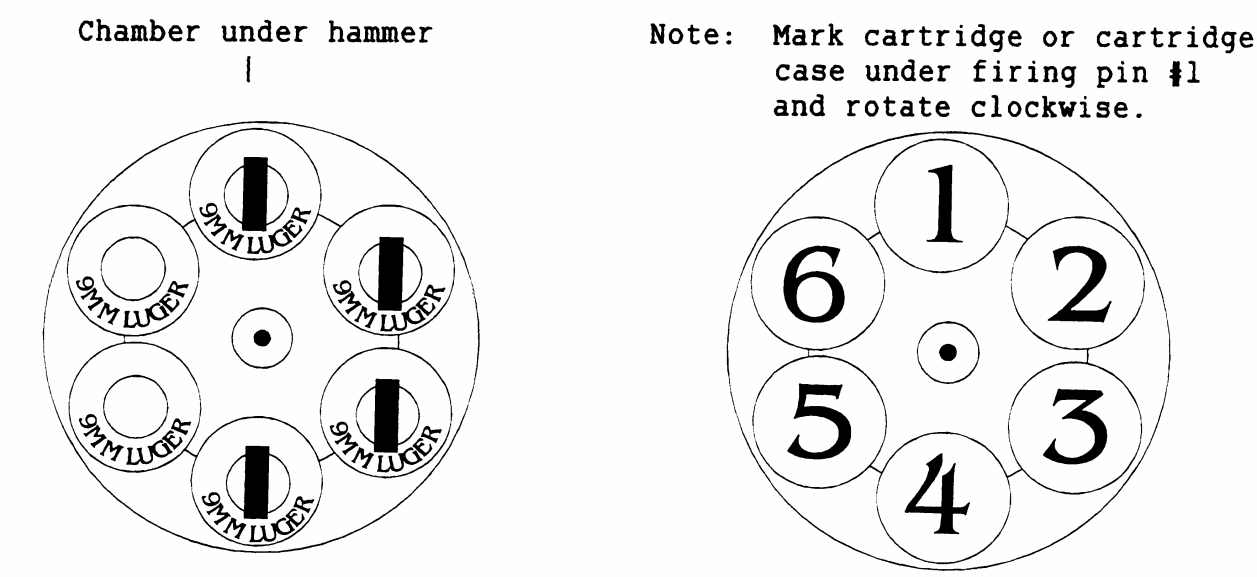
Collection.

Firearms evidence carried or sent to the laboratory should be properly recorded, diagrammed (crime scene sketch), marked and packaged. Use the following steps as a guide when submitting firearms evidence.

Firearms.

Do not bring a loaded weapon to the Forensic Lab. **Always** unload the firearm before submitting it to the laboratory. If the firearm is a revolver, 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 etching the cylinder on each side of the topstrap (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 should be made and submitted with the firearm.

Diagram to be made by officer recovering revolver:



Facing rear of cylinder

Mark all cartridges and cases with initials, date and numbers to correspond with the numbered chambers in the diagram. The same procedure should be followed with ammunition recovered from autoloading firearms, indicating which cartridge was recovered from the chamber and the position of each cartridge in the magazine. 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. FEDERAL LAW PROHIBITS MAILING OF LIVE AMMUNITION

Bullets.

A bullet or bullet fragment may be classified as projectiles or components from a live cartridge. Wrap each one in clean tissue paper or cotton and place in a rigid container. Mark on the container the source of each. It is not absolute that you mark an evidence bullet. Putting your marks on a container will suffice.

When marking bullets, DO **NOT** disturb the sides or cylindrical portion of the bullet. Mark bullets on the nose or base.

Cartridges and Cartridge Cases.

Cartridges are live rounds of ammunition, which contain components to include a bullet, primer, powder, and cartridge casing. A cartridge casing is a component of a live cartridge or live round of ammunition.

Wrap each cartridge or cartridge casing individually in clean tissue paper or cotton and place in a container. Mark on the container the source of each. When marking cartridges or cartridge cases, DO NOT mark near the rim, head, or primer. Mark cartridges and cartridge cases near the mouth of the casing. (Note: All live rounds of ammunition recovered at a crime scene should be submitted to the laboratory when applicable.

Shot, Wadding.

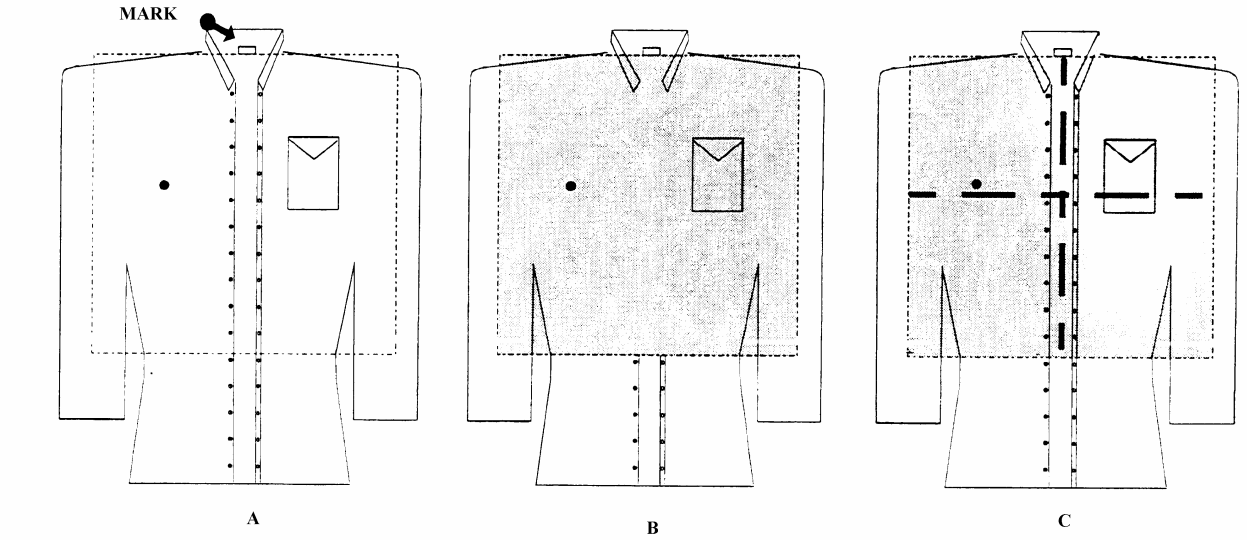
Recover as much of the shot material as possible. Do not damage the shot when recovering. Recover all wading. Place in a container. Package pellets and wads from different locations in separate containers. Mark on the container the source of each. DO NOT mark pellets or wads.

Shot Patterns.

If a shot pattern is present at the crime scene, on an object, or on a victim which cannot be submitted to the laboratory such as a wall, car, house, etc., a scaled photograph should be taken first. Then shot material should be removed from the item.

Powder Patterns.

If articles of clothing are to be forwarded to the laboratory to determine the presence of gunpowder residue, make sure it has been air dried before packaging. Then place cardboard or paper inside the garment (see diagram A below) and button the garment. Cover in a manner that will put the bullet hole and the surrounding area between the two pieces of cardboard or paper and staple or slip into a fixed position (B). A piece of cardboard or paper should also be placed in back of the shirt. 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 of clothing to be submitted to the laboratory individually in a paper sack. 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 mailed only 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. You must have package marked "Ordnance." 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

Many cartridges, when fired, produce a residue from the primer containing barium, antimony, and lead. This residue can escape from the cylinder gap, the ejection port or the muzzle of a weapon and can adhere to the hands, which fired the weapon or were in close proximity to the discharging weapon.

Value .

Finding gunshot residue on an individual's hand(s) is indicative of that person having discharged or handled or being in close proximity to a discharging weapon. The absence of gunshot residue on an individual's hand(s) does not eliminate the possibility that he or she handled, discharged or was in close proximity of a discharging weapon.

Information Determined

The amounts of antimony, barium, and lead are determined by graphite furnace atomic absorption spectroscopy at the Central Forensic Laboratory. These elements are components of most primers of ammunition larger than .22 caliber. The manufacturers of .22 caliber ammunition maintain that only Federal ammunition contains antimony.

Collection of sample.

The Kentucky State Police Forensic Laboratories provide Gunshot Residue Kits consisting of five (5) swabs in a zip-lock plastic bag, five (5) zip-lock plastic bags labeled for the samples needed, and one (1) small, disposable vial containing a 5% solution of nitric acid one, and (1) pair of plastic gloves. These are in an envelope pre-labeled for the Central Forensic Laboratory. A set of instructions and a copy of the laboratory Request for Examination form are also enclosed.

The procedure for taking the samples properly is as follows:

1. The officer performing the swabbing should thoroughly wash his hands with soap and water and dry them with a clean towel immediately prior to swabbing the subject's hands. If at any time during the swabbing procedure the hand of the wiper (collecting officer) should come in contact with the moistened cotton end of the swab or the suspect's hands, the wiper's hands should be thoroughly washed in soap and water before the next swab is used. In cases in which the same person is wiping the hands of more than one suspect, it is necessary for the collector to wash his hands between working with each subject.

2. After drying hands, the officer should put on the gloves supplied with this kit to prevent contamination.

3. Remove one of the cotton swabs from the unmarked plastic bag (the one with no label) and moisten it with four (4) drops of the 5% nitric acid solution (the dilute acid). Immediately place this swab in the plastic bag labeled "control" and fill in the information requested. NOTE: USE ONLY THOSE SWABS PROVIDED IN THE KITS. Swabs with wooden shafts will be returned unexamined.

4. Remove another swab and moisten it with the acid solution. Use this swab to thoroughly wipe the back of the right hand, including the back of the thumb, index finger, and the connecting web area. For best results, the officer should hold the suspect's arm above the wrist with one hand and swab with the other hand using pressure to remove as much residue as possible. Place the used swab in the plastic bag labeled "right back" and fill in the information requested.

5. Remove another swab, moisten as in step 3, and thoroughly wipe the suspect's right palm and finger area. Place this swab in the plastic bag labeled "right palm" and fill in the information requested.

6. Repeat steps 3**,** 4, and 5 in the same manner using the left hand of the suspect.

7. It is not recommended that the officer collect GSR swabs from living subjects if a four (4) hour period has elapsed since the shooting has occurred. Studies have shown that reliable results generally will not be obtained from live subjects more than four hours after handling or discharging a firearm.

8. The officer should now have one control swab and four hand swabs collected and ready for transport to the laboratory. Fill out the attached information sheet and place each set of swabs in the envelope provided, place evidence seal over the envelope flap, and bring or mail used kit to the laboratory. NOTE: DO NOT RETURN ACID BOTTLE.

9. When the suspect firearm is obtained but is not submitted for firearms examination, it still should be submitted to the lab for test firing**.**

10. Submit any unfired ammunition so test firing can be done with the same brand of ammunition. NOTE: Live ammunition cannot be sent through the US mail but may be shipped by other carriers such as United Parcel Service (UPS) or Federal Express if delivery in person is not possible.

11. An official report will be mailed to the requesting officer. If rush results are needed, please contact the Central Forensic Laboratory in Frankfort.

TOOL MARKS

The Firearms unit of the Forensic Laboratories system does Toolmark Identification Analysis.

Tool mark examinations are studies to determine whether or not a particular tool can be identified as having produced a particular mark. In general, when any two objects come in contact, 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 say a suspected tool was used to make a toolmark found at a scene of a crime.

Value.

The value of tool mark evidence is to link the suspected tool to the mark left at the scene of a crime. Assuming the conditions for collection and preservation have been met, an examiner can identify a particular tool as having made the mark to the exclusion of all other tools. If the possession of the tool can be established, a suspect can be associated with the crime. 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 tool mark can determine the type of tool used and if the tool is of value for comparative purposes. Most tools that leave marks have the potential for comparison. Types of marks left by tools include the following:

1. Impressions that are produced by a perpendicular force acting against an object. Examples of tools that can make impressions include punches, hammers, and some gripping tools.
2. 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.
3. Shearing or pinching marks that occur when the object is caught between opposing forces of two cutting actions. Scissors and tin snips cause shearing and wire cutting pliers cause pinching .

Collection of Evidence.

The tool mark should be brought to the lab whenever possible. This may mean having to cut part of a door way or window sill. If this is not possible, photograph with a grazing light, and then take a moulage cast of the affected area. A moulage cast is a mold that is capable of producing the tool mark when applied to the damaged area. Chances are greater for a positive identification to be made when comparing the actual tool mark rather than the moulage cast.

Submit the evidence as you find it or contact the Firearms Toolmark unit.

1. Observe the tool mark and try to eliminate a tool that could not have made the mark. Do not actually touch the tool to the mark.
2. Photograph the tool and the mark as they are found.
3. Properly mark and package the tool and mark if possible, remembering to place some lubricant on the cutting surface.

Shipment.

Tool mark evidence can be mailed to the laboratory by registered or certified mail if rigid containers are used. Please mark the evidence "Attention Firearms." 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 number on items such as motor vehicles, firearms, bicycles, and motorcycles are commonly removed or altered in an attempt to prevent the identification of the original owner of the item. The serial number can sometimes be restored depending on the degree of obliteration or alteration.

When a number is stamped into a metal object, the metal underneath the number is compressed and hardened. If the number is ground off, this hardened area may still be present. By using an acid solution the metal can be slowly eaten away. In this process the softer metal will be eaten away first and the number may reappear. This is commonly referred to as "raising the serial number".

Value.

By restoring an obliterated or altered serial number, an object can possibly be traced and returned to its original owner or link a suspect to a crime scene.

Submission.

Do not attempt to restore the number yourself. The restoration process is not repeatable. 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.

SHOE PRINT and TIRE TREAD EVIDENCE

Evidence which falls within this category includes shoes, tires, plaster casts, prints, and photographs of shoe or tire prints and impressions. As shoes and tires are used, individual characteristics such as nicks, cuts, and wear patterns develop. These characteristics may show up in prints and impressions and can be compared to a suspect's shoes or tires. Shoe and tire evidence is submitted to the laboratory's Firearms unit and is examined for like individual and class characteristics.

Shoe or tire "prints" are of a two-dimensional nature, having length and width. These are commonly found on pieces of paper as dust prints or can be made by tracking through mediums such as blood, water, oil, and dirt.

Shoe or tire "impressions" are three-dimensional in nature, having length, width, and height. This type of evidence is usually found in soil and is collected and reserved by the use of a plaster cast.

Value .

One of the most commonly overlooked types of physical evidence is the perpetrator's "tracks". Evidence of this type, whether made by shoes or tires, can link a suspect directly to the crime scene, and can be used to rule out a suspect or can be used to identify a victim.

Shoes and/or tires, when compared to a print or impression can be identified to the exclusion of all others if like individual and class characteristics are found.

Collection of Evidence.

These techniques are brief and should be practiced before any attempt is made at actually collecting the physical evidence.

Photography.

1. Any prints or impressions found should be photographed prior to any collection attempts. The camera should be perpendicular to and directly over the print or impression. One photograph should be taken of the evidence as it is, one should be taken with a ruler laid to the side so the photograph can be enlarged to a one-to-one scale, and one additional photo should be taken showing the evidence's relationship to its surroundings.
2. Light should be directed toward the print or impression from the side to prevent the detail from being washed out.
3. **All** negatives should be submitted in addition to photographs.
4. Photographs should **always** be used as a backup and not a substitute for the collection of the actual evidence.

Prints.

1. It is preferred that the original print be collected if at all possible. If it is not practical to collect the object that the print is on, then a lift can possibly be made. **Always** photograph the print prior to an attempt to lift the print. Then take wide fingerprint tape and cover the entire print. Overlap several pieces of tape as necessary to cover the entire print. The lifted tape then can be placed onto a piece of white paper.
2. Submit any partial prints found. An identification can possibly be made on a very small portion of a whole print.

Impressions.

1. Make a test cast!
2. After photographing the impression, remove any loose debris that may have fallen or was blown into the impression and photograph again. Always take a photograph with a ruler next to the impression.
3. Use a cardboard box to protect the impression if a cast cannot be made immediately.
4. Make a dam around the impression to hold the plaster. Garden edging makes an excellent dam.
5. If the soil is of a loose sandy type, use shellac or hair spray to firm the soil prior to pouring in the cast. Be careful in directing the spray of the "fixer" so that it does not blow away the impression. Spray in a way that will let the "fixer" gently floats down into the impression.
6. Dental Stone or Diestone is commonly used as a casting medium. Die Stone or Dental Stone is preferred over Plaster of Paris due to its hardness and faster setting time.
7. Mix the casting medium according to the instructions provided with the material being used. Dental stone is usually prepared by mixing two (2) pounds of powder with 12 ounces of water in a large ziplock plastic bag. The ideal mixture should be pancake batter consistency, not thick nor watery.
8. Break the mixture's fall by pouring onto a spatula. Allow the plaster to fill the entire impression. No reinforcing support is needed if Dental Stone is used.
9. Make several casts of a long tire impression.
10. The cast should be allowed to set for at least an hour before attempting removal. After the cast has partially set, scratch the exhibit number, case number, and your initials into the back of the cast.
11. Do not clean the cast yourself. The lab examiner will clean it.

<u>Shipment</u>

Prints

All original prints should be placed in a shallow box or brown paper sack and secured. Do not place anything on top of the print. Seal the box to prevent anything from falling onto the exhibit.

Always mark the box or sack with all pertinent information.

Casts.

Place each cast individually in a box and cushion with newspapers or place in brown paper sack. Seal the box and mark with all pertinent information

Shoes.

Attach an evidence tag to each shoe and place each shoe in a separate paper bag. Also mark the bag.

Do not remove any dirt or foreign material from the shoe prior to packaging.

Tires.

Attach an evidence tag to each tire and transport

BIOLOGICAL EVIDENCE: BLOOD AND OTHER BODY FLUIDS

Evidence in this category includes blood of human or animal origin, semen, saliva, urine, and skin tissue submitted for the purpose of identification and characterization according to genetic factors such as isoenzymes and DNA profiles. This evidence is called biological evidence. 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.

DNA typing is based on the understanding that no two persons, except identical twins, have the same DNA. Conventional serological techniques may still be employed to eliminate suspects. If the suspect cannot be eliminated by conventional techniques, the samples will then be forwarded for DNA analysis. DNA analysis gives an extremely high power of discrimination. DNA profiles from semen stains in sexual assault cases are maintained in a computer database. This database is routinely searched against itself and also a separate database containing DNA profiles from persons convicted of specific felony offenses.

Blood Evidence

Value.

Blood evidence is of value in such crimes 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, and by eliminating suspects. DNA profiling can be performed on any biological substance. It can also be used for the identification of bodies when samples from parents and/or children of the missing person are available.

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, weather, and other factors.

2. If the sample is blood, the species origin must then be determined. Usually, it is necessary to determine if the blood is human; in certain cases, however, it must be determined from what animal non-human blood stain originated. This can be done, but, in most cases, only to the level of the taxonomic family used in animal classification.

3. If the blood is human, further classification will be achieved by isoenzyme and DNA analysis. Different individuals have different types due to the genes they received from their parents. Each type has a certain percentage of occurrence in the population. By multiplying together the frequency of occurrence of each type found, the number of people who could have been the source of that bloodstain can be determined. If one blood type is different, a person is eliminated as the possible source.

4. DNA profiling of bloodstains is now regularly performed when necessary.

5. Additional information can be obtained from the size, shape**,** and distribution of blood spatters at the scene. This information can be used to reconstruct the events that occurred during the commission of the crime. This examination sometimes needs to be performed at the crime

scene. Blood spattered clothing and other items can be evaluated at the laboratory. Detailed photographs taken at the scene showing measurements of the bloodstains can greatly aid the analysis. Contact the nearest laboratory for further information.

6. The sex of the person from whom the sample originated can be determined by DNA typing.

7. Private laboratories are used to do DNA analysis in cases requiring paternity determination.

8. Generally, DNA analysis will be limited to three or four samples per case, the victim's blood, suspect's blood, and one or two questioned samples.

Other Body Fluids of Significance Value

Value.

Depending on circumstances of the case, it is sometimes helpful to identify seminal stains, saliva, or urine. DNA profiling is performed on seminal stains in order to determine if the unknown sample matches the DNA profile of the standard blood sample or not. A differential extraction technique is used on seminal stains that will separate sperm cells from the cells from the vaginal secretions allowing the generation of separate 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.

Information Determined.

1. Seminal stains. A suspected seminal stain may be identified by testing for the presence of prostatic acid phosphatase, spermatozoa or P-30 protein. Semen may be further identified by DNA typing.

2. Saliva stains. The presence of amylase is indicative of saliva. Saliva may be further identified by DNA typing.

3. Urine. The presence of creatinine and urea is indicative of urine; however, urine cannot be typed.

4. Skin tissue. It is sometimes possible to DNA type body tissues such as skin, muscle, etc.

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 often if they should become soiled with a biological substance. 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.

4. Each item should be initialed and dated in an area away from the stain.

Stains on Surfaces.

1. Items to be checked for blood should not be dusted for prints. Consult with the laboratory first.

2. Whenever possible, submit the bloodstained item itself for analysis. If this is impractical, 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, which cannot be submitted. Swab the blood onto a cotton-tipped applicator that has been slightly dampened with distilled water, in a manner which concentrates the sample. Swab an unstained area of the same surface in the same manner for a control. Air dry and package the stain and control swabs separately in paper.

4. Concentrated stains on walls**,** floors, etc. (i.e., items that cannot be cut out and submitted), can be scraped off into a piece of paper which is the carefully folded (See Appendix B.) and then placed in a pillbox or other suitable container. This container and the paper should be initialed and dated or otherwise identified.

5. If the stain is moist, let it air dry first, or swab it onto a cotton tipped applicator then air dry.

6. A control sample of the reagents used during the collection process should be submitted to the laboratory. Moisten a cotton tipped applicator with the distilled water. Allow to air dry and submitted to the laboratory labeled as "Reagent Control".

7. Collect generous portions of the samples to be analyzed.

Standard samples for comparison.

If blood, semen, or saliva groupings are requested, blood samples are required from the victim, the suspect, and from anyone else who may have contributed blood, semen, saliva, or any other body secretion to the stain in question. Blood samples should be drawn in purple-capped tubes (i.e., tubes with EDTA as the preservative). The sample should then be submitted to the lab as soon as possible, along with the rest of the evidence. In the period between obtaining the blood sample and transporting it to the lab, keep it refrigerated, not frozen.

Shipment.

Deliver biological evidence to the laboratory as rapidly as possible, since certain blood group factors decompose within a few days. 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 sent in a styrofoam cooler containing a freezer brick, not ice, by certified mail to that laboratory. Please avoid using staples 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 should be taped to the outside of the package. Liquid blood samples should not be mailed because heat may cause deterioration. Blood stained items should also be kept away from heat. Even an hour in a car trunk in hot weather is destructive to grouping factors. The request form should have listed the names of the victim(s) and suspect(s), and their age, race, and sex. Each item submitted should be listed along with the specific examinations desired. The package should be marked with a biohazard label.

Rape Evidence

Evidence normally collected in rape or sodomy cases includes a variety of samples, which are relatively constant from case to case. This hair, fiber, and biological evidence is covered in separate sections in this manual, but, because of the relatively constant type of evidence required, 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. Semen, blood, 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 Laboratories have 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 kit for victims consists of labeled packages for properly collecting and storing evidence, a set of instructions, a Victims Medical History and Assault Information Form, and a Request for Examination form. Each item will be discussed in order so that the investigator can understand why such a sample is requested. All envelopes should be sealed with 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 matching that of the suspect is present or if any fibers that might be a link to the suspect or a scene might be present.

2. Pulled pubic hairs. An envelope for at least 15 pubic hairs pulled from various pubic locations is provided. This sample is necessary for any hair comparison to give a determination of the range and variability of hair known to have come from the victim.

3. Pulled head hairs. An envelope for at least 15 head hairs pulled from various locations from the head is also provided. This sample is necessary for any head hair comparison to give a determination of the range and variability of head hair known to have come from the victim.

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. Two 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. Control swabs. If swabs were moistened with water or saline in any step, moisten the two control swabs with the same fluid, then allow them to air dry and place in the provided white envelope.

8. Vaginal smear sample. One cardboard microscope slide mailer is provided for a vaginal smear preparation for the determination of the presence of sperm cells.

9. Other evidence swabs. There are two envelopes containing four swabs each for use for other specimens to be taken as the case indicates. 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 case 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 type of sample.

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

It is not recommended that bedding be routinely submitted to the lab. Screening of bulky evidence by the investigator greatly expedites the analysis. Clothing items submitted should be individually packaged in paper bags.

The Suspect Sexual Assault Evidence or Biological Reference Collection Kit.

This kit for suspects consists of labeled packages for evidence, instructions, and a Request for Examination form. Each item will be discussed in order so that the investigator can understand why such a sample is requested. All envelopes should be sealed with 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 include 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 hair or fibers are resent.

3. Pulled pubic hairs. This sample consists of at least 15 pulled pubic hairs from various pubic locations. This sample is necessary for any hair comparisons.

4. Pulled head hairs. This sample consists of at least 15 pulled head hairs from various regions of the scalp. Like all pulled hair samples, it is used as a standard necessary for hair comparisons.

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. Two 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, then allow them to air dry and place in the provided white envelope.

8. Other evidence swabs. There is an envelope containing four swabs for use for other specimens to be collected as the case indicates. 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.

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. The suspect's samples, except the blood sample, can be collected by an investigator or by the suspect himself under supervision.

General Collection Information.

1. Blood 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.

4. Try to minimize the amount of the bulk evidence that is submitted. This particularly applies to bedding.

5. Be sure all envelopes and bags are properly identified as to subject, 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. Be especially thorough in relating the facts of the case to the analyst. The request form should bear the race, age, and sex of all victims and suspects.

8. Remember to use disposable gloves in handling items with stains or blood and other body fluids and use any other protective equipment as directed by your agency. All packaged evidence containing such materials should also be marked as "BIOHAZARD".

Shipment. See the Serology Section for shipping information

HAIR

Hair is a common type of evidence found in a variety of different types of criminal cases. The identification and examination of hair evidence can be performed by either a serologist or a trace analyst.

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, murders, rapes, assaults, and game law violations. Hair identifications and examinations provide important information to an investigation. In some cases, hair comparisons can provide important class characteristics similar to known standards. Microscopic comparisons cannot usually limit the source to a single individual, but with DNA analysis, further testing and additional results are now available.

Information determined.

1. With hair, the first step is to determine whether the sample is of human or animal origin.
2. If the hair is of animal origin, microscopic examinations of the internal features and of casts made of the hair scales often allow the analyst to identify the species from which it came.
3. If the hair is human, the possible race of the person, as well as the area of the body from which it originated, can usually be determined.
4. Hair treatment can also be determined. Indications of hair being bleached, dyed, crushed, cut, burned, or artificially waved often remain on individual hairs. Examination of the root may show whether the hair has been pulled out or has fallen out naturally.
5. Hair comparisons can also be made. Such comparisons can yield the following results: (a) that the hairs are dissimilar, (b) that the hairs match in microscopic characteristics and originated either from the same person or from another whose hairs exhibit the same microscopic characteristics, or (c) that no conclusion could be reached.
6. If a microscopic comparison has been done, in some cases additional DNA analysis can be performed when necessary.

Evidence Collection.

1. Since hair evidence is generally small in nature, care should be taken to protect evidence from loss or contamination.
2. Several methods could be used in the detecting of hair evidence: visual searches, alternate light sources and searches with additional magnification.
3. Recovery of evidence should be the most direct but least intrusive technique practical. For hair evidence this could include: picking, scraping, combing, or vacuuming.
4. If the location of a foreign hair is important, they should be collected and packaged separately.

5. Wrap clothing or evidence items separately if collection is to be done by laboratory personnel.

6. If a hair comparison is requested, it is absolutely necessary that an adequate known sample be submitted. This consists of approximately thirty (30) pulled hair from the area of the body that the questioned hair is thought to have originated from. (If the foreign hair is head hair, the

known sample needs to be head hair; if the foreign hair is pubic hair, the known sample needs to be pubic hair, etc.).

7. Known blood samples may also be necessary if DNA analysis is performed on a hair sample.
8. All items should be sealed and labeled for identification.

TRACE EVIDENCE

The trace analysis section is that section of the laboratory, which examines evidence that does not conveniently fit into the other classifications. Paint, glass, soil, and fibers however, are the most common types of evidence which are included in trace evidence, and each will be discussed. 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 soil stuck to shoes are examples. Sometimes relatively large quantities are present but usually just trace amounts are available. Currently most trace cases are worked by chemists in the Central Lab, but some regional labs perform limited services in this area.

The Kentucky State Police Laboratory System has available Trace Evidence Kits 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, paper envelopes with folded paper packets, a scalpel for collecting evidence, and evidence seals.

Fibers and Fabric

Fiber examination and fabric comparisons can be encountered in a variety of types of criminal cases. This analysis is performed by a trace analyst.

Value.

Fiber identification can be a great value in most types of investigations and prosecutions. Crimes such as murder, rape, accident investigation, robbery and assault can have fiber evidence. Fiber identification can sometimes give important investigation leads as well as good evidence for the prosecution purposes after further analysis is concluded.

Information Determined.

1. The type of fiber can be determined by microscopic, chemical, or instrumental tests either when found individually or as part of a fabric. Synthetics, like polyester, nylon, etc., constitute the majority of fibers used in the U.S. today. Wools, camel hair, and silk are examples of fibers from animal sources. Cotton, linen, hemp fibers, and jute are examples of plant fibers. The wood fibers in paper are also fibers of vegetable origin. Asbestos is a mineral fiber.
2. Comparisons of fibers of the same type of material include the presence of dyes and a number of microscopic features. Comparisons can be made with fibers from a fabric to individual fibers or from fibers removed from another piece of fabric. A fiber match, however, constitutes only class evidence.
3. The weave pattern of fabrics can also be compared, and sometimes, when a piece has been torn from a fabric, that piece can be matched up with weave pattern and irregularities of a mutual tear edge. This is a example of individual characteristics.

4. Similarly, cordage (ropes, string, etc.) tears and cuts can be matched if the ends are not too frayed or distorted.
5. Fabric impressions may be found in a number of situations. The impression of a victim's garment may remain on the oil pan or on another flat surface of a vehicle in an accident investigation.

Collection of Evidence

1. Since fiber evidence is generally small in nature, care should be taken to prevent loss or contamination.
2. Several methods could be used in the collecting of fiber evidence: visual searches, alternate light sources and searches with additional magnification.
3. Recovery of evidence should be the most direct but least intrusive technique practical. This could include picking, scraping, or vacuuming.
4. Wrap clothing or items to protect adhering fibers if collection is to be done by laboratory personnel.
5. Known samples should also be submitted for comparison purposes.
6. All items should be sealed and labeled for identification.

Paint

Value.

Paint chips and paint scrapings can be left in the clothing of a hit-and-run victim or transferred to or from a car that has been hit by the hit-and-run vehicle. Paint chips or scrapings from a house or business can also be in the clothing or on the tools of a burglar. Criminal mischief cases frequently include paint evidence.

Information Determined.

Depending on the amount of sample, paints can be analyzed to determine their pigments and the specific type of paint. The make, model, and year of a vehicle sometimes can be determined from paint samples of the original finish. Most important, however, is the comparison of the chip or scraping to a known sample coming from the suspected source vehicle or building.

Collection of Paint Evidence.

1. All samples from painted surfaces should be collected in such manner as to obtain a paint sample with all the layers of paint present. In other words, the sample should be chipped off down to the unpainted surface. Chips are then to be put in one of the metal “pillboxes” provided in Trace Evidence Kits. Do not use tape to transfer or pick up paint samples.

2. It is sometimes more desirable to submit an easily removed item (trim or molding from a vehicle) as is and let the laboratory remove any foreign paint.

3. If submitting clothing for trace paint analysis, air dry and the place each garment in a separate bag.

4. If submitting a tool for paint analysis, wrap the ends in plastic or place it in one of the plastic bags in the Trace Evidence Kit.

5. Identifying marks should be placed on the sample containers.

Glass

Value.

Glass is found in many types of cases. Glass, like paint, is often involved in burglaries and hit-and-runs. Glass fragments easily embed in shoes and clothing of people involved in the breakage of glass. Glass can give both class characteristics and, in the case of a reconstructed piece of glass that was broken, it can provide individual characteristics when the fractured pieces fit to either.

Information Determined.

1. Most glass analysis consists of comparing the refractive indices, elemental compositions, and densities of two or more samples. These are class characteristics of glass.

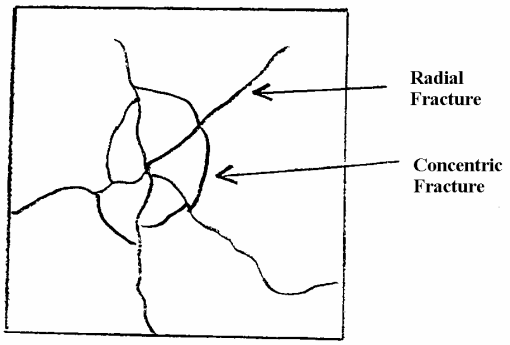
2. Sometimes a fractured glass object, such as a headlight lens, can be reconstructed. Due to the vast number of ways such a lens could break, a piece of glass fitting into such a reconstruction perfectly would constitute an actual identification.

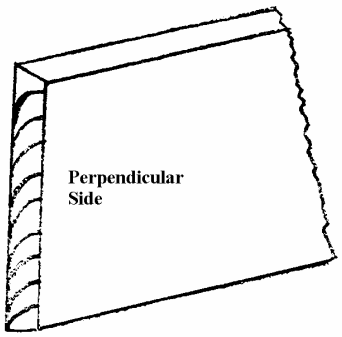
3. A determination of the direction of force in breaking a window pane can be determined by the direction of the rib marks--stress marks left on broken edges of glass that are perpendicular to one side and that curve tangentially (run almost parallel) to the other side. On radial fractures (those radiating from the center) the direction of the force used to break the window is on the same side as the tangential (almost parallel) parts of the rib marks. On concentric fractures, the relationship of the force to the rib marks reverse, for the side of the perpendicular part of the rib mark is the side from which the breaking force came. (See figures on the next page).

4. In the case in which a window is broken by a bullet being fired through it, it is possible to determine the bullet's direction by noting the side of the cone-shaped hole left by the bullet. The small opening is on the entrance side and the large opening is on the exit side.

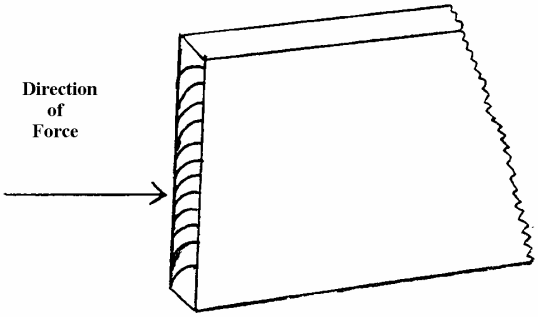
5. A determination of the sequence of bullet holes can be made by noting the radial fractures. Radial fractures caused by the passage of a bullet will stop at any pre-existing fracture. See figure.

GLASS BREAKAGE

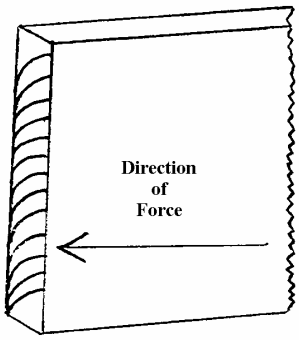




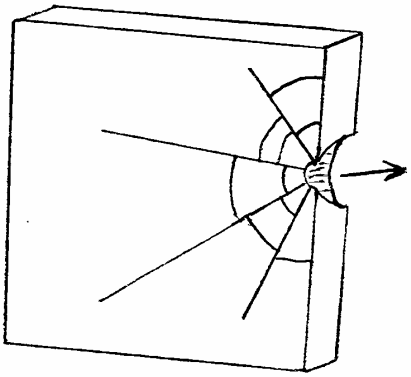
Rib Mark



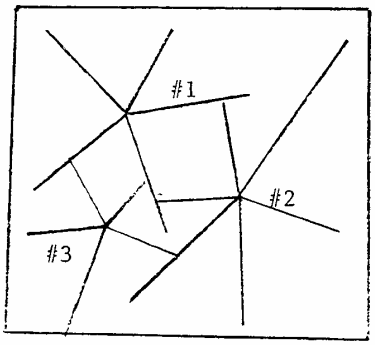
Radial Fracture



Concentric Fracture



Path of the Bullett in the
Direction of the Arrow



Sequence of Bullett Holes

Collection of glass evidence.

1. In collecting glass samples, it is best to make sure that representative sample of known glass is collected. This is best done by collecting the four corners of a broken window. 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.

3. The round pillboxes are the best containers for small glass samples.

4. Glass, when broken, flies back and lodges in the hair and clothing. If clothing is to be submitted, allow it to dry first and then package in individual paper bags. The soles of shoes frequently pick up glass fragments.

5. For the reconstructing of glass, lenses, or panes, collect all the glass possible and carefully package to prevent further breakage.

6. 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.

Soil

Value.

Soil is frequently found on clothing, shoes, or tools and in the wheel wells of vehicles.

Information Determined.

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

Collection of soil evidence.

1. Clothing or shoes should be dried and then placed in individual paper bags.

2. Known soil samples should be collected as follows
   a. one sample at the point of suspected origin;
   b. one sample on each side about one foot away
   c. one sample on each side about ten feet away .

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. The zip-lock plastic bags in the trace kit are convenient for such a sample. A bag about half-full of soil would provide an adequate sample.

Miscellaneous

Trace evidence also includes a "Miscellaneous" section. This would include safe insulation, plastics, rubber, ink, dyes**,** wood, herbicides, pesticides, plaster, concrete, building materials, petroleum products, tape, adhesives, acids, alkalis, other corrosive materials, etc., etc. Physical matches of plastic parts of vehicles or equipment, tape ends, and broken tools are performed both by trace and by firearms analysts.

In collecting such evidence, use a container appropriate for similar evidence listed under paints, glass, and soil. BE SURE THAT EACH ITEM IS PROPERLY IDENTIFIED WITH INITIALS.

Shipment.

The Central Forensic Laboratory provides the full service of trace analysis. Any mailed shipments should be sent there marked "Attention: Trace". Some regional laboratories will be able to perform certain analysis, depending upon the equipment and time available, but it would be impractical to give a list of each lab's capabilities when a telephone call would answer a specific question.

ARSON

Arson analysis is a difficult field, both for the investigator and the chemist analyzing the material. During a fire involving an accelerant, the accelerant (e.g., gasoline, 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 or carpeting of the structure. There are those situations in which one sample will show accelerants and another will not, even though the samples were taken from areas quite close together.

Value.

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

Information Determined.

Laboratory analysis can determine if an accelerant is present in the sample. The volatility range and general chemical composition can also be determined.

Collection of Samples and Standards.

1. An accelerant can be solid, 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. Such jars are provided by the forensic laboratories.

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 protected, relatively, 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 accelerants are volatile, evidence must be stored in air-tight containers. The laboratory provides one-gallon "paint" cans for this purpose. One can should be used for each suspicious location or object. Do not use plastic bags since accelerants 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 put your initials and date on the label.

7. Store the evidence at as low a temperature as possible until it can be brought to the lab.

8. List all evidence to be submitted on a laboratory Request for Examination form and fill in all other information requested.

For advice and/or assistance, contact a Kentucky State Police arson investigator through a nearby State Police post or contact one of the laboratories.

Shipment. Currently, only the Central Forensic Laboratory provides arson analysis. Postal regulations prohibit the mailing of flammable liquids. This does not include fire debris, which can be mailed. (via certified mail)

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

EXPLOSIVES

An explosive is a substance which, through chemical reaction, violently changes into a gas, creating much pressure and liberating much heat. Explosives are divided into two classes: low-order and high-order explosives.

With low-order explosives, the rate of change to gaseous state is relatively slow and must be in a compressed or enclosed state to explode. Low-order explosives tend to produce large chunks of debris. Examples of low-order explosives are black powder, smokeless powders, volatile flammable liquids, and flammable gases. These explosives can also be called deflagration agents. A dust or grain explosion can also be considered a low-order explosion.

In high-order explosives, the rate of change to the gaseous state is extremely rapid. They tend to pulverize everything nearby. Compression or enclosing the explosive is not required. Such an explosion is said to detonate. High-order explosives include dynamite, military explosives, TNT, PETN, Composition C, and mixtures of ammonium nitrate and fuel oil.

Information Determined.

1. Debris and soil close to the point of detonation are likely to bear residue from the explosive. From this residue, the type of explosive used frequently can be determined.

2. An examination of blasting caps, wires, batteries, fuses, containers and boxes, etc. sometimes makes it possible to identify the manufacturer.

Collection of Evidence.

Handling Bombs.

1. DON'T, UNLESS YOU'RE QUALIFIED! Obtain the services of explosive experts. You should have available the names of the nearest qualified disposal experts in the event one must be handled.

2. Don't move or touch anything connected with it.

3. Clear the area and post guards outside the danger area.

4. Shut off fuel, electricity, and gas and remove flammable material.

5. Notify fire and rescue squads.

6. Obtain a portable X-Ray machine if the expert requests it and obtain mattresses and sandbags for use as baffles and shields if necessary.

Collecting Evidence at the Scene of an Explosion and On-Site Determination.

1. The effects of the two classes of explosives are different. Low-order explosions tend to "push" rather than shatter. Large chunks of debris result. Twisting and tearing of objects tend to occur. High-order explosives tend to shatter and fragment material near the center of detonation, and there is much evidence of impact by small, high-velocity missiles near the center of detonation. The resulting debris is in small fragments.

2. Evidence of accessories used in the explosions may be found. Some examples are fragments of blasting caps, safety fuse fragments, wire, matches, match folders, fuse lighters, batteries or other sources of electric current, fragments of a timing device, delay mechanisms, or switches. Information of these accessories assist in the investigation. Containers or material foreign to the scene should be collected.

3. Unusual odors should be noted.

4. The site should be checked for fingerprints, footprints, tire tracks and tool marks.

5. The laboratory does not accept large quantities of explosives. It does not have the facilities for storage of such material. Requests for the identification of residues of explosives from debris is the usual request; however, if an intact explosive is needed to be identified, only a small amount is needed. Just a few grams, or about the amount in level teaspoon, is needed for analysis.

Disposition of Dynamite and Black Powder.

1. Disposition is best handled by someone familiar with explosives.

Shipment.

For explosive devices, follow the instructions of the explosives expert for disposal and evidence collection. For blast scenes, package debris in plastic bags or arson cans if possible. Call the lab for advice on exploded material, blasting caps, and other detonating material. Analysis of explosives is currently limited to the Central Forensic Laboratory in Frankfort.

SOLID DOSAGE DRUG IDENTIFICATION

Solid Dosage Drug evidence includes powders, liquids, tablets, capsules, or plan samples suspected of being or containing legally controlled substances. It includes marijuana, peyote, opium, LSD, heroin, and cocaine. This evidence does not include the identification of drugs in blood, urine, or pathological specimens; these samples are categorized under Toxicology (see the Toxicology Section). Many kinds of suspected poisons and, of course, non-controlled drugs are also examined by the drug chemists. All of the forensic laboratories in this state provide this service.

Value.

Identification of a controlled substance is necessary to prove many violations of the Controlled Substances Act. Drugs have been used in a number of poisoning cases.

Information Determined.

1. The major question to be answered by drug chemists is what is the major active ingredient or ingredients present in a sample.

2. The cutting agents, or other powders added to dilute the active ingredient, can also be determined upon request as can the quantity of the active ingredient present. Quantitations, due to the fact that they are very time consuming, are only done in select cases.

Collection of Sample.

Tablets and Capsules.

1. Tablets and capsules should be counted and each type separately packaged. This prevents cross contamination in handling. If the same type of capsule or tablet is found in more than one location, separate packaging is necessary.

2. Submit an adequate sample size. Generally speaking, it is best to submit the entire sample up to one-quarter (1/4) pound. Frequently more than one tablet or capsule is needed for the extraction and identification of the active ingredient. While the chemist may be able to do this with one, it is more time-consuming.

3. Tablets and capsules are frequently broken in handling; therefore, the container should be able to prevent the powder from leaking out. For this reason, it is best to enclose the sample in a plastic bag or, if it is a small quantity, a folded paper packet (see Appendix B) before placing it in an envelope.

4. Each container should be initialed and dated.

Powders.

1. In small quantities, powders are best collected in vials, plastic bags (without holes!), or a folded paper packet (See Appendix B).

2. Each package should be initialed and dated.

3. Unless otherwise advised by the laboratory, submit all the powder up to a quarter pound in weight. If quantitation is desired, however, it is necessary to have all the powder for proper mixing.

4. In the event that submission consists of valuable material such as pounds of cocaine or a large amount of currency which is to be checked for traces of cocaine, call the laboratory for an appointment and be prepared to wait several hours for the proper sampling procedures and extraction procedures to be carried out in your presence.

Liquids.

Liquid samples are to be collected in capped vials to prevent spillage. Again, the vials are to be initialed. Sample size should be up to one pint.

Plant Material.

Plant material that is controlled includes marijuana (Cannabis sativa L.). the peyote cactus, the opium poppy, and various species of psilocybin-containing mushrooms.

1. Submit all of the plant material up to ten pounds.

2. Samples from separate locations should be individually packaged.

3. For bales of marijuana, call first for advice. Obtain a gross weight, and take samples from various areas of each bale if the lab advises it cannot sample it while the investigator waits at the lab. Package each sample separately and label as to which bale it came from.

4. Do not submit potted or large, whole marijuana plants to the laboratory. Take a sample as described in paragraph 5 and place it in a envelope. The plants must have at least the second set of leaves, not counting the seed leaves, before they are submitted to the lab. If the plants are small enough to submit the whole plant (**without the soil**), package each separately; otherwise, the plants will stick together and be difficult to separate for counting and analysis.

5. In those cases involving the cultivation of marijuana in which the quantity of five (5) or more plants is significant, it is recommended that a sample from each of five (5) to ten (10) plants be removed and placed in individual envelopes. A good sample would consist of a handful of leaves. If plants are flowering, some of the flowering tops should also be included in the sample. For your own notes, a total count of plants and a measurement of the area of cultivation should also be made and recorded. It should be noted that the precise amount to be submitted to each lab varies somewhat and that it would be a good idea to check with the lab which covers the area involved.

6. Do not put fresh samples in plastic. Use paper bags or envelopes. With fresh samples, there is a large quantity of moisture present in the leaves; therefore, it is best to package such plant samples in paper. Plastic-enclosed, wet plant material will cause condensation of moisture and fungal growth. A common fungus in such samples can cause serious respiratory diseases. Fungal and bacterial degradation can turn a leaf sample into unidentifiable mush.

Clandestine Laboratories.

Probably no other area of law enforcement requires as much chemical knowledge as does the investigation of clandestine drug laboratories— laboratories illegally making controlled substances or their analogs (similar compound that may or may not be controlled). Clandestine laboratories contain flammable, explosive, toxic, and carcinogenic chemicals, and these chemicals are most often used by inadequately trained personnel with inadequate equipment and facilities. This situation poses serious hazards. To make matters worse, some of these labs have been booby-trapped.

It is essential that the lab be notified as early as possible if it is to be of assistance in shutting down one of these labs. Inform the chemist of the types and quantities of chemicals known or suspected to be in the laboratory or ordered by it so that it can be determined what is being made. This will allow planning for the safe dismantling of the operation and for the proper sampling and disposal of the chemicals. Court orders should be obtained authorizing the disposal of the chemicals found at the site after sampling. Notification of the fire department is also recommended.

Body Cavity Searches. Periodically drugs are hidden by suspects in body cavities. For the safety of the investigator, laboratory personnel, and court personnel, air dry the evidence. Then place it in a manila envelope. The evidence package must be labeled as evidence resulting from a body cavity search. A BIOHAZARD label must be on the outer wrapper identifying the material as a hazard. The Laboratory Request Form accompanying the evidence must advise the lab from which cavity the evidence was removed.

Syringes and Other Paraphernalia.

1. Syringes are a serious hazard due to the possibility of transmission of diseases such as hepatitis-B and AIDS. At the time of printing, syringes are not accepted for analysis without a letter from the prosecuting attorney indicating the intent to prosecute if controlled substances are found. This is to insure that the analysis is really needed and to promote the safety of the chemist, investigator, and any who handle or transport the evidence. Syringes must be packaged in puncture-resistant containers, preferably with its own needle cover in place. ALWAYS mark the packaging in bold lettering, "CONTAINS SYRINGES". A BIOHAZARD label should also be on the package.

2. Puncture-resistant containers must also be used for any item that is considered a “sharp”; i.e., razor blades, broken glass, or anything that can puncture the skin. These containers must also be marked as containing sharps.

3. Generally speaking, if you cannot see a residue in a syringe or on a piece of paraphernalia, there is not enough present to identify a controlled substance.

Shipment.

Determine which laboratory covers the county in which the alleged incident occurred and either hand carry it to that lab or mail it. Please mark the package "Attention: CS" (for controlled substance) so that the contents would not be so obviously marked for others but still adequate for the laboratory to give the package directly to the analyst who will perform the examinations. Postal regulations require that controlled substances be sent by registered mail.

BLOOD ALCOHOLS & TOXICOLOGY

Blood and urine can be analyzed to determine alcohol and drug concentrations. Each of the Kentucky State Police Forensic Laboratories, except the Northern Regional Laboratory at the time of printing, has the ability to determine the alcohol content of blood and to 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 and drug levels of blood and urine 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. However, an additional urine sample will allow for the screening for the presence of many more drugs. **The most complete and meaningful drug analysis can be performed when both blood and urine are submitted.** The following protocol will be followed in DUI cases requesting drug screens:

Blood Only	Blood and Urine
alcohol	alcohol
amphetamines	amphetamines
barbiturates	barbiturates
tricyclic antidepressants	cannabinoid metabolites
phenytoin	cocaine and metabolites
propoxyphene	propoxyphene
opiates	opiates
benzodiazepines	benzodiazepines

Drugs not on this list will not be screened for in DUI cases unless specifically requested.

Collection and Shipment:

The Forensic Laboratories Section makes available kits for the collection of blood and urine for DUI cases. These kits are obtainable free of charge from each of the laboratories. 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.

On this page below is a copy of the Investigating Officer's Report that can be found on the Styrofoam container of each kit. On the following page is the instructions for use of the KSP Blood/Urine Collection Kit that is included in 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. _____

CHECK APPROPRIATE BLOCKS

☐ ALCOHOL

☐ DRUG SCREEN IF BAC IS BELOW .10% (in **DUI cases)**

☐ DRUG SCREEN (SPECIFY) _____

CHAIN OF POSSESSION

RECEIVED FROM _____

BY _____

DATE _____ TIME_____AM-PM

RECEIVED FROM _____

BY _____

DATE _____TIME _____AM-PM

FORENSIC LABORATORIES
KENTUCKY STATE POLICE
BLOOD/URINE COLLECTION KIT
For Alcohol and or Drug Determination

Purpose:

This kit is designed to contain blood and urine specimen 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

One (1) 10-mL blood tube containing sodium fluoride and potassium oxalate.
Two (2) 7-mL blood tubes containing EDTA.
Two (2) 40-mL plastic screw-cap containers.
One (1) direction sheet
Two (2) police evidence seals for resealing kit box after collection of evidence.
One (1) ziplock bag

DIRECTIONS FOR HANDLING SPECIMENS

Instructions to the investigating officer:

1. Fill in the "Investigating Officer's Report" completely and legibly.
2. Witness the collection of samples.
   a. For blood alcohol only: Fill only the gray stoppered tube with blood.
   b. For general drug screen: Fill both lavender stoppered tubes with blood and the plastic screw-cap containers with urine, pursuant to administrative regulation.
3. Return filled blood tubes to Styrofoam holder.
4. Place Styrofoam holder and filled plastic urine bottles in ziplock bag and return ziplock bag to kit box.
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 stoppers**.
4. To insure proper mixing of the anticoagulants, slowly invert the tubes completely at least five times. (Do not shake vigorously.)
5. "Facility where drawn" refers to the hospital, office etc.

Toxicology in Death Investigations

Collection:

In general death investigations, where samples are only submitted in the Blood/Urine Collection Kit, the same drugs listed in the previous section will be screened for unless other analysis is requested. In this type case, an autopsy will usually be performed and these samples will be collected by the forensic pathologist.

Value:

Toxicology evidence is of value in determining a cause of death in either the event of acute alcohol levels and/or drug overdose. This evidence is also useful in determining contributing factors to the cause of death.

Information determined:

Biological evidence is examined to determine alcohol and drug levels.

Shipments:

All non-preserved specimens should be refrigerated until submitted to the laboratory. Pack and label each specimen in a separate container. Forward to the Central Crime Laboratory in Frankfort. A biohazard label must be on the outside of the package.

DOCUMENTS

Document examination consists mainly of side-by-side comparisons of questioned handwritten or typewritten materials with appropriate standard materials. Various types of examinations are undertaken, including microscopic, visual, photographic, chemical, ultraviolet, and infrared.

Value.

The value of document examination is that a definite conclusion can often be reached. A competent examiner has the ability to state that particular person or instrument produced the document in question, provided certain conditions for evidence collection and standard collection are met. This type of testimony has been accepted by the courts in this country for many years.

Information determined.

While handwriting and typewriting comparisons are the most common types of examinations performed by the document examiner, his expertise spans a wide variety of related examinations. Some examples follow: examinations of forgeries involving checkwriting machines or notary seals; identification of inks and writing instruments; determination of the true age of a document; and examinations involving printing and other duplication processes, indented writing, obliterated or eradicated writing, used carbon paper, and burned or charred paper. Comparisons of paper are possible, but a positive identification is seldom obtained. New typewriters are also difficult to identify. The document examiner is also trained in the use of special photographic techniques when needed.

Information that cannot be determined with certainty by handwriting examination are the age and sex of the writer.

Collection.

As in other areas, the proper collection and preservation of the evidence and the submission of adequate and suitable standards are of the utmost importance in obtaining the best results possible from the laboratory.

The questioned document must be adequately identified with initials, dates, and other pertinent data. This can be accomplished by either writing on the back of the document itself, or, if legal aspects or good judgment indicate otherwise, by placing it in a clear plastic envelope with a slip of paper inside showing the pertinent data. Other types of envelopes may also be used. Each piece of evidence must be placed in a separate envelope and suitably identified.

It is important to submit the original documents rather than photocopies of those documents for comparison purposes. Most photocopiers cannot satisfactorily duplicate those minute details of a questioned handwriting or typewriting sample which may allow a definite identification, particularly considering that the known sample will probably be an original document. Checkwriter impressions, notary seals, and other three-dimensional or colored documents obviously do not lend themselves to being photocopied.

In some cases a high quality photograph is satisfactory for laboratory examination in lieu of the originals. However, in no case does the inability to forward the originals constitute a valid reason for not requesting a laboratory examination. Contact the laboratory for further information.

CARE, HANDLING, AND PRESERVATION OF QUESTIONED DOCUMENTS

DO

(1) Keep documents unfolded in protective transparent plastic envelopes or evidence preservers. (As an alternative, a large, heavy manila or kraft envelope or folder can be used.)
(2) Take disputed papers to document examiner's laboratory at the first opportunity.
(3) If storage is necessary, keep in dry place away from excessive heat and strong light.

DON'T

(1) Do not handle disputed papers excessively or carry them carelessly in your wallet, notebook, or brief case on rounds of interviews.
(2) Do not mark disputed documents (either by consciously writing or by pointing at them with instruments or dividers) but do place very small inconspicuous initials and date on the reverse of the questioned document for identification in court.
(3) Do not smear documents with fingerprint powder or chemicals.
(4) Do not fold, staple, perforate, impress rubber or metal stamps upon, or attach labels or stickers.
(5) Do not damage by repeated refolding, creasing, cutting, tearing, or punching for filing purposes.

Always remember, a disputed document, which is important enough to be subjected to scientific study, certainly deserves better than average care.

Collection of known handwriting samples.

Because of the many variables involved in a handwriting comparison, the collection of adequate and suitable standards is an extensive and time-consuming process. The following steps are designed to reproduce the original conditions as nearly as possible. Do not compromise this process.

1. Obtain samples from dictation until it is believed normal writing has been produced. (The number of samples necessary cannot be determined in advance.)
2. Do not allow the suspect to see either the original document in question or a photograph thereof.
3. Remove each sample from the sight of the writer as soon as it is completed.
4. Do not give instructions on spelling, punctuation, arrangement, etc.
5. Use the same writing media, such as type and size of paper, writing instruments, printed forms (checks, notes, etc.).

6. Obtain the full text of the questioned writing in word-for-word order at least once, if possible. Signatures and less extensive writing should be prepared several times, each time on a different piece of paper. Obscene passages may be omitted from the dictation.
7. In forgery cases, the Laboratory should also be furnished with genuine signatures of the person whose name is forged.
8. Obtain samples with both the right and the left hands. Investigator must indicate on the sample what he told writer to do.
9. Obtain samples written rapidly, slowly, and at varied slants. Investigator must indicate on the sample what he told the writer to do.
10. Obtain samples of supplementary writings such as sketches, drawings, manner of addressing an envelope, etc.
11. Witness each sample on the back, never on the front.
12. Samples of non-dictated writing should be obtained, such as applications for employment, social or business correspondence, school papers, copies of operator's license, social security card, etc.

Collection of known typewriting samples.

1. Obtain a full word-for-word text of the message in question using as nearly as possible the same degree of touch as on the questioned sample.
2. In addition, obtain at least a partial text of the message in question in heavy, medium, and light touch.
3. Obtain carbon paper samples of every character of the keyboard (place ribbon in stencil-cutting position).
4. Pertinent information relative to the typewriter including the make and model, the serial number, when last repaired, where located, etc., should be typed at the bottom of the samples.
5. If the ribbon is obviously new, remove and forward to the laboratory. Prepare samples with a different ribbon.
6. Witness each sample.
7. If at all possible, bring typewriter to the laboratory.

In some cases special considerations apply either because of the type of evidence involved or the circumstances surrounding the case. Some of these follow:

1. Indented writing — do not fold or crease.
2. Obliterated or eradicated writing — advise whether chemical methods may be applied.
3. Used carbon paper — do not fold or crease.
4. Burned or charred papers — ship between layers of cotton in strong box. If possible, hand carry this evidence to the laboratory.
5. Latent print examination. — state clearly on the outside of the evidence if latent fingerprint examination is desired.

A laboratory report will be issued stating the results of the examinations. If "no conclusion" was reached, one or more of several factors could have contributed. Disguised handwriting, limited questioned material, inadequate known samples, or a long period of time which elapsed between commission of the crime and collection of standards will hinder examination. Finally**,** some cases are borderline cases. Even though ample quantities of questioned samples and appropriate known samples are available a conclusion sometimes cannot be reached.

Shipment.

Document evidence can be forwarded to the Federal Bureau of Investigation Laboratories. If mailing the evidence, be sure to list what items are being submitted, clearly distinguishing between the questioned and known, and state exactly what examinations are required.

BREATH ALCOHOL MAINTENANCE PROGRAM

The Breath Alcohol Maintenance Program has been established by the Kentucky State Police to provide maintenance and assure calibration for the breath alcohol measuring devices throughout the state. Field service technicians of this program have been assigned to all KSP laboratories except the Jefferson Regional Laboratory, but they are administered through an office in the Central Forensic Laboratory.

Value

All breath alcohol measuring devices in the state are assigned to this section. Its field technicians maintain and assure calibration of this equipment and provide expert testimony in court about the instruments ability and documentation on the service records.

At the time of printing, these devices include the INTOXILYZER 5000/5000EN, the portable breath testing (PBT's) devices, and related service instruments.

POLYGRAPH

The evidentiary value of polygraph is found in the statements made by the individual tested and in testimony regarding these statements that is permitted by the courts.

Polygraph offices exist in many of the regional laboratories, but they are administered from the central office in Frankfort (see Appendix A).

Value.

Polygraph assists investigators and Commonwealth Attorneys in eliminating or isolating suspects in any criminal felony case. It is also of value to the Commonwealth Attorneys in negotiating plea agreements, which in turn frees officers and analysts from time spent in court and saves the cost of a court trial.

Information Determined.

1. Polygraph is useful in determining whether a person is a viable suspect of a reported crime.

2. It eliminates possible suspects, which in turn saves investigative time and effort.

3. It is useful in determining the degree of involvement of suspect in the crime, i.e., co-conspirator, accessory before or after the fact, or the violator himself.

4. By admissions or confessions made by the individual being tested, direct involvement can be established which often leads to a plea.

5. Admissions made by the individual being tested can establish involvement in other or unreported crimes.

6. By videotaping the test and interview, the tape may become useful to the Commonwealth Attorney in developing an approach to the person during testimony in court.

7. The video tape is also useful in determining whether victims and witnesses will make good witnesses in court.

8. The interview and polygraph tests are also useful in determining the veracity of witness statements.

Polygraph examinations should be scheduled in advance at the regional labs with polygraph examiners or the Frankfort Polygraph Office by all law enforcement agencies and Commonwealth and County Attorneys. It is required that the investigator accompany the individual to be tested to the test site and provide the examiner with copies of all offense reports and related statements.

APPENDIX A

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. Latent print capabilities are provided by the KSP Automated Fingerprint Identification System (AFIS) Section located at 1250 Louisville Road, Frankfort, KY 40601. The telephone number is (502) 227-8700.

CENTRAL FORENSIC LABORATORY Phone: (502) 564-5230
FAX: (502) 564-4821

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

Toxicology and Drug Analysis
- Blood Alcohol/Toxicology
- Drug and Other Unknown Substance Identification

Trace Analysis
- Paint, Glass, Soil and Other Trace Related Analysis Explosives Analysis
- Arson
- Hair and Fiber Comparisons
- Gunshot Residue
- Related Chemical Analysis

Forensic Biology
- Blood Identification and Grouping
- Identification and Grouping of Physiological Fluid
- Identification of Related Biological Materials
- 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
- Physical Match Comparisons

Breath Alcohol Maintenance Program

Maintaining breath alcohol measuring device
Assuring calibration of such devices

CENTRAL POLYGRAPH OFFICE Phone: (502) 564-7110

Kentucky State Police
Forensic Laboratories Section
Polygraph Office
1250 Louisville Road
Frankfort KY 40601

WESTERN REGIONAL FORENSIC LABORATORY Phone: (502) 824-7540
FAX: (502) 824-7029

Kentucky State Police
Western Regional Laboratory
Martin Plaza Mall**,** 1050 Thornberry Drive
P.O. Box 1227
Madisonville, Kentucky 42431

Chemistry
Blood Alcohol
Drug and Other Unknown Substance Identification

Forensic Biology
Blood Identification and Grouping
Identification and Grouping of Physiological Fluid
Identification of Related Biological Materials
Hair Comparison

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
Physical Match Comparisons

Breath Alcohol Maintenance Program
Maintaining breath alcohol measuring devices
Assuring calibration of such devices

Polygraph

JEFFERSON REGIONAL FORENSIC LABORATORY

Phone: (502) 426-8240
595-4600
Fax : (502) 595-4601

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

Chemistry

Blood Alcohol
Drug and Other Unknown Substance Identification

Forensic Biology

Blood Identification and Grouping
Identification and Grouping of Physiological Fluid
Identification of Related Biological Materials.
Hair Comparison

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
Physical Match Comparisons

NORTHERN REGIONAL FORENSIC LABORATORY

Phone (606) 441-2220
FAX: (606) 441-0848

Kentucky State Police
Northern Regional Laboratory
116 East Alexandria Pike
P.O. Box 76130
Cold Springs, Ky 41076

Chemistry

Drug and Other Unknown Substance Identification
Related Chemical and Microscopic Analyses

Forensic Biology

Blood Identification and Grouping
Identification and Grouping of Physiological Fluid
Identification of Related Biological Materials
Hair Comparison

Breath Alcohol Maintenance Program

Maintaining breath alcohol measuring device
Assuring calibration of such devices

Polygraph

EASTERN REGIONAL FORENSIC LABORATORY

Phone: (606) 920-2053
FAX (606) 920-2054

Kentucky State Police
Eastern Regional Laboratory
3700 13th Street, P.O. Box 1507
Ashland, Kentucky 41101

Chemistry

Blood Alcohol
Drug and Other Unknown 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
Physical Match Comparisons

Breath Alcohol Maintenance Program

Maintaining breath alcohol measuring device
Assuring calibration of such devices

Polygraph

SOUTHEASTERN REGIONAL FORENSIC LABORATORY

Phone: (606) 877-1464
FAX: (606) 878-0643

Kentucky State Police
Southeastern Regional Laboratory
1001 West 5th Street
P. 0. Box 870
London, Kentucky 40741

Chemistry

Blood Alcohol/Toxicology
Drug and Other Unknown 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
Physical Match Comparisons

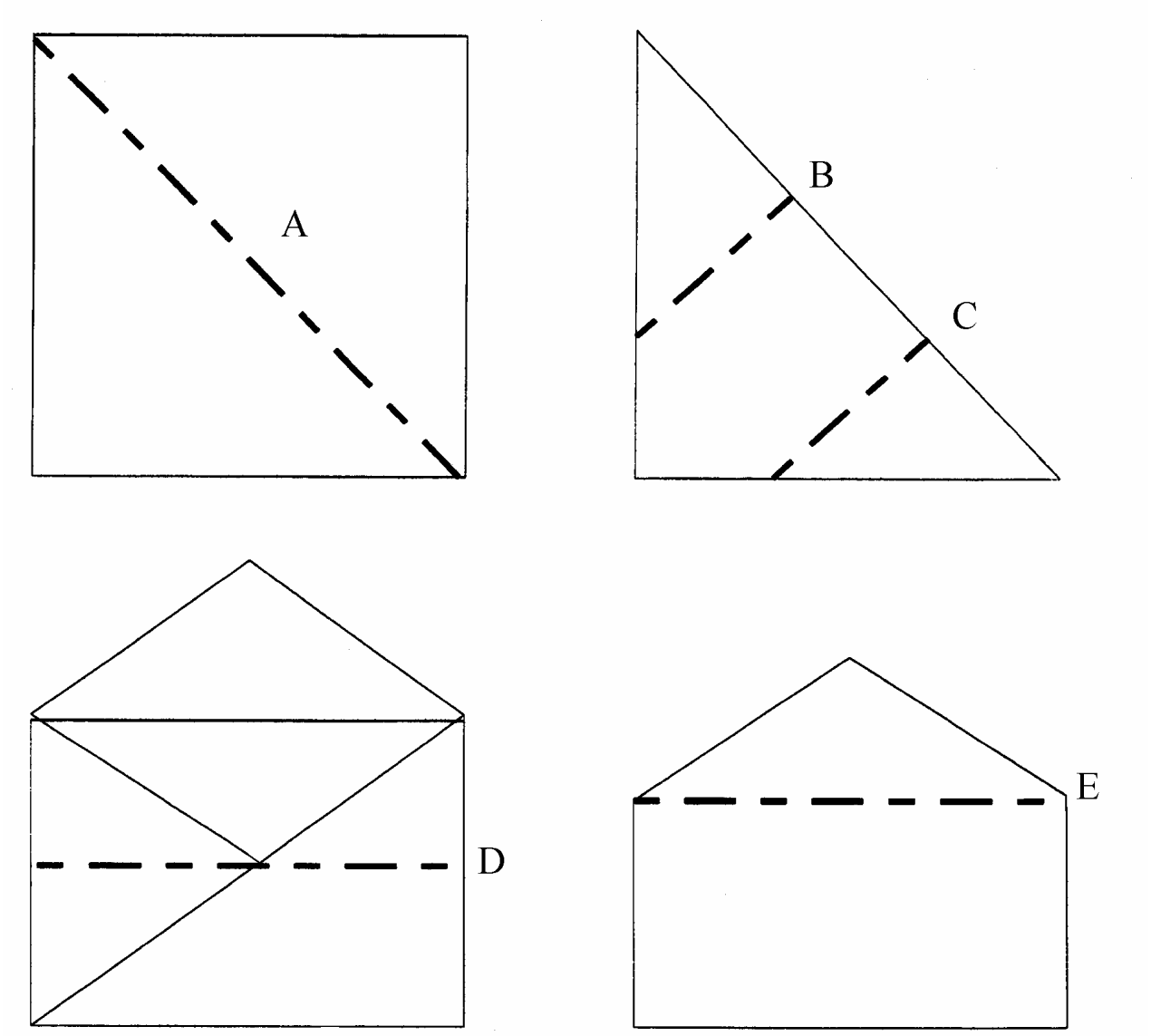
Breath Alcohol Maintenance Program

Maintaining breath alcohol measuring device
Assuring calibration of such devices

Polygraph

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. The 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.



KENTUCKY STATE POLICE
Request for Evidence Examination

(Attach additional pages as needed)

☐ BIOHAZARD

Investigating Officer: _____

Agency: _____ Laboratory # : _____

Address: _____ Case # : _____

City: _____ Zip: _____ Citation # : _____

Phone: _____ Fax: _____ ORI # : _____

Email: _____

Victim(s): _____ Offense: _____

Suspect/Accused(s): _____ Offense Date: _____

_____ Offense City/County: _____

Exhibits: (Initial exhibits received)

Case History:

_____

_____

_____

_____

Examinations Requested:

_____

_____

_____

_____

_____

☐ Forward to A.F.I.S. ☐ Forward for additional analysis (specify) _____

Submitting Officer Signature: _____ Date: _____

Print Submitting Officer _____

Received from: Received Bv: Date/Time:

_____ _____ _____

_____ _____ _____

KSP-026 3/2001