STRATFORD POLICE DEPARTMENT	Type of Directive: **Policy and Procedure**	Updated: **11/13/2023**
	Title: **Crime Scene Evidence Collection, Preservation and Examination**	No. **8.4**
	Issuing Authority: **Chief Joseph McNeil**	Issued: **10-14-2019**
	Reference: 8.2 - 05/25/22 Tier 2.2.3, 2.2.4, 2.2.5, 2.2.6	

PURPOSE:

It shall be the purpose of this policy to establish guidelines for the collection, storage and analysis of evidence from crimes in order to assist with the identification and prosecution of offenders.

POLICY:

It shall be the policy of the Stratford Police Department to follow a set of guidelines and common accepted practices for the identification, collection storage and analysis for evidence.

PROCEDURES:

Physical Evidence: Encompasses any and all objects, patterns, imprints, substances, and materials, which can be analyzed, compared, or used for reconstruction purposes. Collection of physical evidence requires careful and often painstaking efforts to be applied in a logical and systematic way.

Evidence Recovery Patterns: Includes strip search, grid search, zone search, wheel search, and spiral search.

Preliminary Evidence Collection: All evidentiary materials should be photographed in place with and without a scale. Other methods of recording the scene, such as video and audiotape, notes, and sketches.

Preservation of Physical Evidence: Different types of evidentiary materials require different methods of preservation.

Biological evidence: Clothing or other items containing apparent biological stains, i.e.: blood, semen, or body fluids, should be placed in paper bags or wrappings after air-drying. Never use plastic bags for these items. Caution should be used when handling any evidence that might have been contaminated with human waste.

Trace Evidence: Small items such as hairs, fibers, or paint chips should be folded in paper prior to placing in an envelope or bag. Do not place these items directly into plastic bags, use paper envelopes.

Chemical Evidence: Debris from a fire should be sealed in airtight, uncoated and unused paint cans to prevent evaporation of petroleum accelerants. Explosives and other chemical - materials can be similarly packaged.

Fingerprints: Items to be processed for latent fingerprints should be packaged to prevent movement and excessive friction. Avoid plastic bags and unnecessary handling.

Firearms: Make all weapons safe prior to transporting from scene. Weapons will only be unloaded after documentation of its condition when found. Placement of cartridges in the weapon is very important. Weapons and ammunition should be packaged to preserve fingerprints and in soft materials to prevent alteration of any markings.

All weapons will be unloaded and clearly marked as a firearm prior to shipping. If a loaded firearm has to be submitted to the laboratory, permission must first be obtained from laboratory staff prior to transporting it to the lab. It will be brought to the lab and presented to the firearms technician in person. The weapon should be clearly marked "Loaded Weapon Use Caution."

Documents: Preserve the document as found, folded, or unfolded and protect it from contamination.

Computer / Electronic evidence: Electronic and computer evidence will be seized in compliance with the Electronic Crime Scene Investigation: A Guide for First Responders, published by the DOJ and NIJ. (**2.2.5**)

Patterns: Patterns intended for analysis, such as imprints, impressions, blood spatters, and gunshot residues should be preserved as found. If patterns are on the clothing of the victim, after consultation with the medical examiner, these items should be taken prior to the removal of the body by the medical examiner to prevent alteration of the patterns due to handling of the body.

- Clothing items should be packaged unfolded and laid flat between layers of paper to prevent smudging and subsequent transfer.

- If a victim requires medical treatment, care should be taken to prevent destruction of the pattern evidence whenever possible.

NOTE: Lab procedures, forms and evidence storage materials and testing procedures may change, be updated or instituted. All Stratford Officers will conform to requirements for collection, storage and submission of evidence as required upon notification of the change.

The procedures set forth below are based on commonly accepted practices set by the courts and crime scene laboratory.

Submission of Evidence

It is the responsibility of the police officer requesting the examination to complete state form, SOP-ER-02:1, Request for Analysis. These forms are available online from the State Police web site under Scientific Services. Officers shall submit the form with the property to the property room officer. (**2.2.6**)

If the crime involves more than one agency, or investigator, or a team of crime scene specialists, the investigator in charge will delegate this responsibility. The proper forms required by the Forensic

Laboratory should accompany all evidence submitted to the state laboratory. The submitting officer should consult with the laboratory staff when there are large quantities of evidence or there is a question about the value of the physical evidence or what examinations should be performed prior to submitting the evidence.

Do not submit evidence to another agency or expert for a second opinion. Such actions are not only waste time and resources, but will create problems during court presentation of the evidence. If unique expertise or instrumentation is required, the laboratory will make the necessary arrangements.

When additional examinations on previously examined items are desired, the investigator shall contact the director of the Forensic Science Laboratory or his designee for assistance.

The investigator shall notify the state laboratory immediately regarding any case no longer requiring examination of evidence previously submitted.

Lab Requirements

All evidence submitted will be packaged in an envelope, paper bag, plastic bag, box or other container. Large items may be wrapped Kraft paper and sealed.

Each package or container will be labeled with the following information:

- Case Number
- Description Of the Item(s)
- Item Number
- Date and Time Seized
- Name/Initials/Badge Number of Seizing Officer

All openings will be sealed with EVIDENT TAMPER tape. Enveloped will be sealed across the entire flap. The officer will initial each seal.

If an item that is not a firearm is packaged in a firearms box, the officer must label the box “NOT A GUN.”

BUCCAL Swab envelopes must be clearly marked with the name of the person the sample was taken from.

Items of evidence to be checked for fingerprints must be fumed with superglue by an I.D. Detective before submission to the lab. In cases where this is not possible, the detective will enter the name of the lab technician, which approved acceptance without fuming on the request form.

More than ten (10) items from a single incident submitted must first be itemized and the list faxed to the lab. The lab will notify the officer on which items to submit.

Sexual Assault Evidence Collection Kits will be refrigerated prior to being sent to the lab. It is the responsibility of the officer receiving the kit from the hospital staff to ensure that the CT100 box is sealed with two (2) evident tamper seals (included in the kit), and that the hospital staff member who sealed the kit initials each seal. Any bags of clothing must also be sealed (seals included in the kit) and initialed. Any

kits not properly sealed or initialed will be returned to the officer who received the kit. That officer will be responsible for having hospital staff correct the errors.

The forensic lab may require a search and seizure (JOYCE) warrant or signed consent to search and test form from the owner of an item at the time of submission to the lab.

Physiological Evidence

Physiological evidence is usually serological evidence and pertains primarily to blood and other body fluids such as dried bloodstains, liquid blood, urine, semen, saliva, bones, and tissues.

Toxicology

Toxicology is concerned with the presence or absence of drugs and/or poisons in the body fluids and organs. The state toxicology laboratory in Hartford performs analysis for drugs and blood alcohol.

Serology

Serology is concerned with the identification of body fluids and its constituent components. Serological evidence, with the exception of liquid blood samples, should be allowed to dry thoroughly and be packaged in paper or paper bags. Plastic bags or glass jars with tight caps do not allow airflow and traps moisture, which may render serological evidence unsuitable for testing.

WARNING: Plastic gloves should be worn at all times when handling physiological evidence to avoid contamination of the evidence and to protect the investigator from disease transmission. Caution should be used when handling any evidence that might have been contaminated with human waste.

The Department Policy 7.23 on Blood Born Pathogens and Handling Infectious Evidence should be periodically reviewed.

Blood Evidence

Whenever blood is encountered at a crime scene, whether it is found on the victim, weapons, clothing, or elsewhere, and the investigator believes that the blood can be associated with the crime, the blood should be submitted for examination. When an investigator cannot determine whether a stain is actually blood, the material should be submitted for examination. Note that blood does not uniformly change appearance and may be affected by factors such as the type of stained material, elapsed time, heat, humidity, and the effect of bacteria. Frequently, stains appearing to be "rust" or other substances have been found to be blood and of major importance to a case.

It is not always necessary to submit every piece of clothing from the victim to determine blood type. Only pieces of evidence with probative value for blood grouping should be submitted. Direct these questions to the Serological Unit of the laboratory. Blood, like all physiological evidence, should be delivered to the laboratory as quickly as possible especially in warm weather; heat, humidity, sunlight, and increased exposure time are extremely destructive.

Bloodstain analysis frequently will provide answers to questions such as:

- Is the stain actually blood?
- If so, is it animal or human?
- If animal, what species?
- If human, what is the ABO group?
- What other factors and enzyme groups exist - Rh, PGM, ESD?
- What is the frequency of occurrence of such factors in the population?

Collection of Blood Evidence

The investigator may recover evidence in the form of clotted blood, smears, crusts and, more rarely, in fresh liquid form.

Photograph the stains prior to collection. This records original condition and pattern. Include a linear scale in at least one of the photographs.

Handle garments carefully. Garments and similar materials must be thoroughly dried before packaging by air-drying in well-ventilated area. Do not expose to the sun or heat to speed the drying process.

Plastic containers promote the accumulation of moisture and encourage rapid growth of molds and bacteria, which could destroy the evidentiary value of the stains.

Each item of clothing must be wrapped separately in clean paper such as wrapping paper or paper bags and marked, sealed and delivered promptly.

Dried crusts of suspected blood should be scraped onto clean paper with a clean knife or razor blade. The paper should then be carefully folded so as not to lose or destroy any of the contents. A druggist's fold will provide the necessary security for these items. The paper should then be placed in a clean box or envelope, sealed, and marked.

Package specimens obtained from different locations in separate containers and identify where they were found. If possible, submit an unstained control sample of material because some surface materials can alter or mask test results.

If blood appears to be on an item such as a lamp, astray, or billfold, do no attempt to remove the stain. Submit the entire item to the laboratory.

DO NOT collect blood samples onto "Q-Tip" type cotton swabs. Do not use issued blood container bottles to collect liquid blood. These bottles, containing an anticoagulant, are designed for blood alcohol analyses and cannot be used for any other purpose.

Collect liquid blood in bottles or test tubes containing EDTA or no anticoagulants. The investigator should indicate which chemical was used in collection when submitting evidence.

Semen Stains and Other Body Fluids

Semen stains are frequently encountered and analysis can answer a number of important questions. The most conclusive test result is to establish the presence of intact spermatozoa. Spermatozoa are minute and extremely fragile. It is essential that garments and other items are thoroughly dried and packaged unfolded in clean paper bags. Specimen handling should be minimal and suspected stains must not be folded or creased. Careful and separate packaging is vital to prevent cross contamination.

Seminal fluid of a suspect may contain few or no spermatozoa, but the value of the stain is not negated. The laboratory will test for acid phosphatase and seminal protein.

Medical personnel should obtain evidence from human body openings. Collection swabs should be air-dried and placed in clean and dry test tubes, envelopes, or cardboard boxes as may be found in sex crimes kits, then marked and labeled. Containers should be refrigerated and promptly forwarded to the laboratory.

When collecting trace evidence, victims should stand on a clean paper sheet and disrobe one item at a time. Upon removal, each item should be placed in a clean paper bag. The paper used beneath the victim should then be carefully folded, packaged, and forwarded with the other items. It is important that known samples of blood, saliva, head and pubic hair be collected and forwarded at the same time.

WARNING: Evidence that might have been contaminated with human waste will be clearly labeled with “Biohazard" markings prior to transportation to the state laboratory.

Blood Secretors

Approximately 80% of the population of the United States can be classified as secretors. This means that blood group substances are present in other body fluids such as semen and saliva and that their blood group may be determined through analysis of their body fluids or blood. The blood group and secretor status of all individuals involved in a sexual assault case must be predetermined for thorough interpretation of any test results.

CAUTION: If the victim of a sexual assault has had sexual intercourse within the previous 48 hours, the same data must be obtained from each sex partner of the victim.

Saliva samples are necessary to confirm the secretor status of an individual. Saliva samples should be collected on filter paper with the stain outlined in pencil, air-dried, and packaged in a labeled envelope.

The laboratory is unable to positively identify the presence of saliva in an unknown stain, but a there is a test for characteristic enzyme activity, which can be conducted.

Other body fluids, such as urine, can also be detected and analyzed. ABO blood group antigens can be detected in most body fluid stains, bone, and tissues, dependent upon the amount and condition of the sample.

Firearms and Tool Marks

Routine examinations involve items such as firearms, bullets, cartridges, cartridge components, shot shell components, tools and tool marks, casting, restoration of obliterated numbers and a wide variety of physical

match comparisons. While it is true that each of these functions bears some similarity to the others, there are distinct differences requiring explanation.

Firearms Examiners

The identification of firearms requires a special expertise. While there are certain gunsmiths who are qualified to testify as to the functioning of a firearm, such knowledge of firearms is only one of the requisites of a firearms examiner.

Unless a gunsmith has considerable experience and training, he cannot be qualified as an identification expert. Gunsmiths do not provide an alternative to use of the laboratory. In order to explain how bullets, cartridge cases and other ammunition components can be identified as having been fired by a certain make or type of firearm or by a specific individual weapon, it is first necessary to insure understanding of firearms manufacturing techniques.

Documentation of Evidence

Do not mark bullets or cartridge cases. Bullets or casings should be individually placed in non-metal containers such as an envelope, sealed with tamper evidence evident tape and properly labeled.

Immersed Firearms

A special problem arises when firearms are recovered from water and cannot immediately be delivered to the laboratory. Dry the weapon as soon after recovery as possible. An excellent method, especially with long guns, is to dry the weapon with a service station air gun. After an immersed weapon is dried, it should be oiled, preferably by dunking the weapon in oil. Do not oil a firearm while it is still wet. If there is no sure methods of quick drying available, leave the weapon submerged in water and transport it to the laboratory. It may be helpful to add rust inhibitor or permanent antifreeze to the water or add soap to make the water alkaline.

Do not seal a damp firearm in a plastic bag. Due to severe rusting or damage, firearms may be recovered and it is impossible to check its status or unload the weapon. This weapon should be forwarded to the laboratory and identified and/or labeled as a loaded weapon. If the firearm is not to be immediately transported to the laboratory, it should be placed in an evidence container and clearly marked as a loaded firearm. If bloodstain pattern or latent fingerprint examinations are required, the investigator should avoid handling the weapon. The examination desired should be specified on the request sheet.

Restoration of Obliterated Serial/Identification Numbers

Serial numbers are often altered or removed. These numbers can often be detected or restored by chemical and photographic techniques. The firearm should be brought to the laboratory to facilitate the process, and permit the use of a variety of methodologies.

Tool Mark Evidence

A tool mark is an impression, cut, gouge, or similar mark caused by a tool coming into hard contact with some object or material. The manufacturing of a tool creates microscopic striations and marks. Such marks

become altered and others may be added as the tool is used. The random distributions of such marks and damage permit the individualization of the questioned tool.

Physical comparison of a tool with an impression may provide certain class characteristics, but it will usually not permit individualization of the tool.

Caution: For a variety of reasons the investigator must never attempt to fit a tool into a tool mark.

Difficulties are enormous with prying tools (i.e. a slightly different angle may result in totally dissimilar mark.) Examination requires an extensive series of tests, and case facts are extremely important to achieve actual duplication of the original conditions of use. Whenever possible, only the part of the object bearing the tool mark should be submitted. As there is no way in which something like the door of a safe can be placed under a microscope, an examination will require cutting out the part of the object which bears the questioned mark (the victim should be warned of this).

There are instances in which this procedure is impossible and casting and/or photography must be used. Plaster casting is not suitable for tool marks. Silicone photographs are not likely to produce the detail necessary for individualization, but it sometimes works.

A tool may bear important trace evidence such as: paint, fibers or grease, etc. The tool should be handled accordingly to preserve this type of evidence, which may not be visible to the unaided eye. Tool mark examination is complex, demanding and requires skill and time. Investigators should exercise good judgment when submitting tools for trace evidence examination. There is little to be gained by submitting a tool mark found at a scene along with what is obviously the implement, when there are no suspects or no way in which a tool can be tied to a suspect.

Investigators should notify the laboratory immediately, whenever a submitted case no longer requires laboratory work.

Fingerprint Evidence

Fingerprints, without question, constitute the most commonly used and frequently encountered form of physical evidence. Impressions are usually "latent" and must be developed by appropriate powders or by chemicals such as iodine fumes, Triketohydrindene Hydrate (Ninhydrin), silver nitrate, or Cyanoacrylate Ester (Super Glue). The primary determinant of the method to be used is usually the type of material being processed.

New technology has provided latent print examiners with the laser, enabling them to find and enhance latent prints.

The Connecticut State Police has single print search capability. The goal of such a system is to enhance a latent fingerprint and compare it to all prints on file, allowing a check against all possibilities.

Fingerprint Processing Methods

Nonporous surfaces such as metal, glass, and varnished wood) present little problem. They can be processed with either gray or black dusting powder, or super glue.

Investigators will be issued a fingerprint kit at their time of assignment to the Detective Division. Each investigator will be trained in the basics of dusting and lifting fingerprints by I.D. Detectives.

On reflective surfaces, gray dusting powder should be used. While there are different colored powders, only gray and black give consistently good results; avoid any other colors.

Do not use fingerprint powder on a greasy, wet, or bloody surface. Any attempt will destroy every feature of value and the fingerprint cannot be reconstructed. Latent fingerprints tend to be long lasting if undisturbed.

Never rush into processing for fingerprints. When faced with problems related to a cold or damp surface, such as an automobile covered with dew, rain, or snow, move it into a heated garage. Let it warm up and dry thoroughly, then process it, the prints will still be there. It takes very little moisture to cause fingerprint powders to cake when it is applied to a wet surface, causing a smudge.

Fingerprint powders should never be used on impressions in wet paint or a medium like dust or soot. These prints should be photographed at a scale of one to one. All latent prints should be photographed with a scale before any attempt is made to lift them. Two photographs are required. One should show the location of the print in relation to the scene and other objects. The second, a one-to-one photograph, could be used for examination if there is damage to or loss of the latent print from improper lifting or handling. If a one-to-one photograph cannot be taken, include a linear scale in the photo.

Porous or absorbent surfaces generally require chemical-processing techniques best performed at the Laboratory and by trained personnel.

Extreme care is required in the packaging of fingerprint evidence being sent to the laboratory. Evidentiary items should never be permitted to move around loosely or packed in absorbent materials, which can absorb the oils or erase the prints they are supposed to preserve. Enclose prints in a separate and sealed envelope, with appropriate identification marks on each separate envelope. The investigator may have to testify in court in regard to continuity of the chain of custody and the method in which the evidence was submitted to the laboratory. (**2.2.4**)

Palm Prints

It is recommended that palm prints be taken in felony cases where an individual might have left an impression with their palm.

Identification Unit Fingerprint Examination

Often an investigator submits a latent print with as many as twelve ridges visible and is informed that the print was unidentifiable. Such results may result from several different factors. The print may have been damaged or lacks sufficient detail.

It is not the presence of the ridges themselves which constitute points on identification, but the fine details such as endings, bifurcations and islands. If unique details are lacking, no identification can be made.

Trace Evidence

Materials occurring in small or microscopic quantities are called trace matter. When used as evidence, they are called Trace Evidence. Trace Evidence includes, but is not limited to, hairs, fibers, glass, soil, paint, wood, minerals, insects, pollens, and other animal or vegetable material.

The trace analyst combines microscopic, instruments, and chemicals to analyze trace materials. By analyzing and comparing samples, similarities and individualizing characteristics can be determined. Trace evidence is highly susceptible to loss, alteration, and contamination. Care must be taken to avoid tearing, ripping, or cutting any fabrics, which may be involved.

There are at least four considerations to be kept in mind when collecting trace for analysis. First, all items must be collected promptly in order to prevent damage or outright destruction. Second, all items must be carefully and thoroughly dried. Third, substances such as grease and oil must be sealed in leak proof glass or plastic containers. Fourth, loose materials must be sealed in strong, leak proof containers and should not be packaged or submitted in envelopes unless first wrapped in paper using a druggist's fold. Do not place hairs, fibers, paint chips, and other trace evidence directly in plastic bags.

The Collection of Hair Evidence

Hair is trace evidence, which is frequently associated with assaults, homicides, rapes, and burglaries. While hair evidence cannot individualize samples, proper examination can provide answers to several important questions. It can be determined whether it is from a human or nonhuman source. If it’s of human origin, you can determine race of the person it came from, area of the body from which it originated, whether forcefully removed, and if it has been chemically treated.

Note - You cannot reliably determine age or sex of the source person.

Obtaining Samples

The range of characteristics exhibited by hairs originating from the same area of the body is extremely wide. It is necessary to have a sufficient number of hairs to ensure that samples will be representative of all the comparative factors. To obtain known standards, the sample area should first be combed, with a clean, unused comb to remove all loose hairs. These hairs should be packaged separately and appropriately labeled. Pulled hair standards should be taken from various areas of the head (crown, nape, sides, and front), with a minimum of five (5) hairs - from each area.

In some instances, as in sexual assault cases to avoid traumatizing a surviving rape victim or a child, it is permissible to cut, rather than pull, hair standards. Pulled hair characteristics are more reliable than cut hair because the hair is Intact. In cases where cutting must be carried out, the hairs should be cut as close to the skin as possible.

Hair evidence should be wrapped in paper in a druggist fold, sealed in an envelope, and clearly marked as to from what areas of the body were the samples taken.

When collecting hair and other fibers the use of tweezers and a magnifying glass is recommended. This method is tedious and requires care not to damage collected materials, but is the best collection method.

Tape lifts may also be used. Adhesives will sometimes cause a problem for the lab, but this still is a preferred method for minute articles dispersed over a fairly large area.

Vacuums cause the evidence to become homogenized. Vacuums should not be used to collect hairs and fibers unless necessary for the collection of numerous materials over a large area.

Clothing, weapons, and other items easily packaged should be sent intact to the laboratory for trace examinations.

Fiber Evidence

Although often ignored or overlooked when collecting evidence, fibers may establish that a particular weapon was used to commit a crime, a specific bullet penetrated certain garments, a vehicle was involved in a criminal act or hit-and- run accident, the occupation or recent whereabouts of an offender or suspect, or that physical contact occurred between individuals.

Fibers will fall into one of four categories:

- Animal fibers (i.e., wool, silk, fur)
- Vegetable fibers (i.e., cotton, linen, hemp)
- Mineral fibers (i.e., asbestos, fiberglass)
- Synthetic fibers (i.e., polyester, nylon, acetate)

Fiber characteristics are classified by the microscopic, micro chemical, optical, and instrumental characteristics. In addition to identifying the type of fiber, comparisons in construction, dye content and other characteristics can be made.

Areas to be checked for fiber evidence would be the hands of the victim and/or perpetrator (especially under the fingernails), parts or areas of the body which were in contact with foreign objects or materials, on or in items of clothing, motor vehicles, and weapons.

Patterns from fibers may be ground into such things as fired bullets, blood, tissue, semen, and other body materials. Fabric impressions on motor vehicles, for example, may also indicate fabric design. Fibers are both left behind or deposited on arrival, and taken away on departure. Search efforts should address each possibility.

Fibers are collected and packaged the same way as hair.

The Collection of Insect Evidence

Insects can help to determine a time of death and to answer whether a body has been moved after death. The most important insects encountered are fly larvae (maggots), beetles, and mites. The analysis of an insect stage of development provides an estimate of the time elapsed since eggs were deposited. Insect fragments or types of insects not otherwise found at a scene may be an indication that the body has been moved from a different site.

Any insects or larvae encountered should be removed with a forceps and placed in a container filled with rubbing or grain alcohol to kill and preserve it. The relative quantities or numbers of each insect observed should be noted and documented. Before collecting live specimens, the state laboratory should be consulted.

The Collection of Other Trace Materials as Evidence

For all other trace materials contact the State Forensic Science Laboratory for specific instruction.

Questioned Document Evidence - General Considerations

Document examination may be the least understood and most frustrating laboratory function. Questioned documents refer to any type of paper, cardboard or other object bearing a signature, writing, printing or typed material or any graphic markings, of which the authenticity or original condition is in dispute.

Within the meaning of this definition, a mirror or telephone booth may be a questioned document.

Laboratory examinations may involve handwriting or hand printing when there is a question of source authenticity; or it may center on typewriting papers and inks, indented writings, obliterations, erasures and/or alterations.

Additional functional requirements may be concerned with the restoration of charred documents and matching of fragments. The examiner may sequence a series of writings.

Submitting of Evidence

While original evidence must be submitted in the same condition as it was at the time of discovery, for both examination and preparation of necessary court exhibits, the submission of copies of suitable quality may permit preliminary examinations to be done. Submitted documents should not be folded or marked in any way.

All document evidence should be placed in plastic envelopes or binders. Evidence identification data should be attached to a separate slip.

At the time of submission of the evidence, the investigator must indicate whether latent fingerprint processing is desired. The laboratory will only check for latent prints if requested.

Altering the original condition of a document with powders, stains and the like will seriously impair proper examination. Any crease, tear, fingerprint powder, or chemicals added to the document may prevent its use as evidence if proper procedures were not used.

Questioned Writings

To identify the writer of a document, the examiner must compare it to standards and other writings of known origin. The requirement for a standard is that the origin of the writing be POSITIVELY established.

In cases where pre-existing standards cannot be obtained, the last resort is to obtain necessary standards by having the suspect write them. If existing standards are to be used, it is important that they are written as closely as possible to the date on which the questioned writing was executed.

Because writing examiners will not seek and obtain standards, it is the investigator's responsibility to establish that the individual in question did, in fact, execute the written standards.

When known samples are obtained, by agreement or by means of court ordered exemplars, an investigator should dictate them and they should be repeated many times. The subject should not see original materials or writing. Each sample of writing must be removed from the subject's view as soon as it is completed. The investigator shall not instruct or comment on spelling, punctuation, or other characteristics. The same type of writing implement must be used as was used for the questioned writing. If the questioned writing was executed with a felt tipped marker, do not obtain pencil written samples. Use the same size and type of paper or printed form. If the writing involves a bank check, use a facsimile or copy of the check. Obtain as many writing samples from the subject, in word-for-word order of the text, as you can.

Make certain that the same style of writing is used, i.e. hand printed letters and numbers must not be compared to cursive writings. Obtain 15 to 20 exemplars for each writing in question.

Document Examination

Although results are very reliable, document examination consists largely of side- by-side comparison. There can be no certain determination made as to either the age, sex of the writer or whether they are left or right-handed.

Individuality of handwriting is based upon form, movement, muscular habits, skill in instrument use, implement position, line quality, shading, retracing, proportions, connections, spacing, terminals, slant, alignment, punctuation, embellishments and other factors.

Subtle factors involved in the process of handwriting, make the writer's health and age important considerations. The writing of the aged, the very young, ill, and the intoxicated will frequently appear to be forgeries.

Often the deciding factor will be the availability of the standards written, when the subject was in the same condition as when the questioned writing was executed. If such standards can be obtained, examination difficulties will be minimized.

Writing is not a static skill and will be affected by factors other than physiological ones. A new occupation or assignment requiring an increased writing volume may result in a sacrifice of form for speed. A different posture of the writer will cause variations. We write differently when seated than we write while standing.

Even if there is an attempt to disguise writing by using an opposite hand, individual writing characteristics will still be displayed. Obtain samples of the subject's opposite handwriting. Efforts to disguise writing will be defeated if the subject is unable to copy the simulated writing. For this reason each sample must be removed from the subject's view so habitual characteristics will be displayed.

Typewritten Documents and Other Imprinting Techniques

The typewriter has undergone rapid changes, from older keyboard models to those with ball elements and to electronic typewriters with print wheels. Three basic identifying features of typewriting identification; size, type style, and individual characteristics no longer apply in all cases.

Size -Typewriters can be operated on various settings or with different elements: Pica (10), Elite (12) or Small Elite (15).

Style -The form of type letters such as Courier, Prestige, and Bold type are manufactured or copied by many manufacturers and can no longer be identified with one particular typewriter manufacturer.

The individual characteristics usually found on the keyboard style typewriter, such as misalignment, broken serifs, and other features, are not found in the same quantity on ball element or print wheel typewriters. Typing element balls or print wheels can be interchanged between various models as well as between manufacturers. Damaged elements can be replaced and the damaged ball elements or print wheels discarded.

Identification of typewriting is still possible. It is suggested that the suspect typewriter, typing ribbon and correction ribbon be obtained for examination.

If the typewriter is not obtainable an original typewritten document is needed for classification and comparison. Typewritten standards or exemplars obtained from suspect typewriter(s) should contain the same text, typed three to four times, using a similar paper stock as the questioned document. The various touch settings as light, medium and heavy should be used.

On occasion typing can be dated if sufficient identifying characteristics are found on the questioned typed document. Typed correspondence verified as having been typed on a particular typewriter, either before, during, or after the date of the questioned document should be obtained.

Imprinting machines such as check writers, adding machines, etc., and rubber stamps all need verifiable standards or exemplars obtained from the particular device.

Charred Document Examination

The state laboratory uses several different restoration techniques, as well as infrared photography, in its work with charred materials. Extreme care must be specified to handling charred documents as they are among the most fragile of all physical evidence.

An extremely important concern is that the charred material be disturbed as little as possible. It should never be collected or handled in any way with bare hands. The document should be lifted with a stiff piece of paper and placed in a solid container on a bed of cotton, if possible. The danger in handling charred documents is that destruction of irreplaceable evidence will occur.

Common sense will dictate the most suitable manner in removing this type of evidence from a crime scene, but consult laboratory personnel if time permits.

Undictated or "Normal Course of Business" Standards

It is in obtaining such standards that most investigatory problems will be encountered. Host of the previously discussed requirements for acceptable standards must be met in this area, as well as the sample must have been written as close to the date of the execution of the questioned writing as possible. There must be similarity of writing. That is the standards reproduce the same letters and letter combinations appearing in the questioned writing as in: "JOHN to JOHN, DOE to DOE."

There are identical styles of writing (i.e., signatures, printing, cursive, and numerals.) The same type of writing implement is used on a similar writing surface with a similar posture while writing, etc.

Before any writing may be introduced as a standard or known specimen, its genuineness and authenticity must be established to the satisfaction of the court. The investigator can accomplish this by the testimony of witnesses who were present when the standard was written, testimony of witnesses with thorough familiarity with the writing of the subject in question, such as parents, spouses, and teachers, and by means of a variety of circumstantial evidence.

The following is a list of possible sources. The list should not be considered as all encompassing. These are suggested sources, which will serve as a stimulus for discovering other sources.

- Accounts
- Probate court forms
- Insurance forms
- Affidavits
- Recipes
- Military records
- Bills of sale
- Rental contracts
- Occupational writing
- Checks and stubs
- School papers
- Partnership papers
- Credit applications
- Passports
- Credit cards
- Tax returns & estimates
- Licenses Payroll receipts
- Depositions
- Deposit
- Greeting cards
- Attendance registers
- Property damage reports
- I.O.U.'s
- Applications
- Registered mail receipts
- Mortgage forms
- Bonds
- Safety deposit boxes
- Package receipts
- Contracts
- Social Security card
- Fingerprint cards
- Stock certificates
- Pawn tickets
- Deeds
- Title certificates
- Report card signatures
- Permit applications

Arson Evidence

Whenever arson is suspected, the assigned investigator should work closely with fire investigators in determining point of origin. Samples should be taken from the point of origin to analyze in determining whether an accelerant was used and, if so, what type.

It should be noted that a negative result, does not necessarily mean an accelerant was not used. A negative result simply indicates no hydrocarbon- derived accelerant was detected in that sample supplied. Whether or not an accelerant is detected in a submitted sample may depend on the following factors:

- How much accelerant was used?
- How long after the accelerant was used was the fire set?
- What type of medium was the accelerant poured on, such as absorbents. nonabsorbent materials?
- How long did the fire burned before it was extinguished?
- How much time elapsed between when fire was extinguished and when the samples were collected, submitted and how was the evidence sample packaged?
- What were the weather conditions and the condition of the building before samples were taken?

Samples sent to the state laboratory will be analyzed using gas chromatography, comparing the unknown (samples received) chromatograms with known accelerants, with both types of samples being run under the same conditions.

It should be noted that these tests are time consuming and the analyses are subject to the limitations of the instrumentation.

Collection of Arson Evidence

Arson evidence can pose some problems to the investigator, due to the variety of materials encountered, and the shape and size of the debris sent to the state laboratory.

Evidence Collection Containers

Unused paint cans are considered the standard packaging medium and can be obtained in various sizes. They are virtually indestructible and readily sealable and re-sealable and are airtight. Large glass jars work fairly well but is susceptible to breakage.

Plastic bags are not suitable for evidence collection and should never be packaged in this manner. Plastic bags are made of polyethylene, which have a tendency to be permeable to the highly volatile hydrocarbons.

Collecting Arson Evidence

Arson debris should be placed in an unused, uncoated paint can, filled approximately two thirds (2/3) full. Liquid samples may also be placed in an unused paint can. These cans should be appropriately labeled as

to the contents and origin of the sample. Liquids or samples found at a scene should be sent to the state laboratory, whenever possible, in its original container.

Control samples, taken from areas away from the point of origin of a fire or explosion, should be submitted to the state laboratory in the same manner as other evidence. Control samples should be clearly marked as same.

Explosive Evidence

Explosives are compounds capable of producing a large quantity of heat and expansion of gases when ignited or struck. Explosives may very often be found intact, also the chemical and physical materials, which remain after an explosion, may be found. The state laboratory can analyze both of these items. All explosive materials should be handled with extreme care and should be protected from shock, friction, fire, and extremes of heat, cold, and moisture.

Searching For Explosive Evidence

The investigator searching an explosive factory scene recognizes the materials involved, the equipment used, and the steps in the manufacturing process. The investigators will collect these loose chemicals, mixed explosive powders, and pyrotechnics in various stages of manufacture. These recovered items have to be carefully repackaged for transportation to the state laboratory. Care should be taken by the investigator not to breathe in any dust particles and avoid creating sparks or friction.

At a bomb scene, the investigator should identify the blast site and should walk approximately fifty (50') feet beyond the point where the farthest piece of debris was located. An area search should be conducted using one of the prescribed methods. The debris should be sifted with attention to bomb parts that will be twisted, shattered or burned. Springs, gears, sprockets and other clock or electronic components are resilient and survive the blast as do bomb parts such as pipes and end caps. Larger objects such as walls, window casings, or chunks of concrete or masonry should be checked for materials sticking to them.

Evidence taken from a bombsite should be individually packaged. The evidence should then be appropriately labeled, indicating the contents and the location where the sample was found.

WARNING: Explosive materials should be clearly marked when shipped.

Samples submitted to the laboratory will undergo a number of tests and examinations. Micro chemical or color tests give the examiner an idea of what type of explosive may have been used. Thin layer of chromatography, FTIF, and SEM will confirm the presence of the explosive residues.

It may be possible to determine what kind of an explosive was used. Analysis of the explosive residue is subject to the ability of the investigator to recognize explosive material, which, like accelerants, can be consumed or destroyed during the blast.

Many types of crime take place where the transfer of soil occurs. This soil transfer lends itself well to comparison examination. All soil samples should be thoroughly dried prior to packaging. As with similar types of evidence, known standards should be submitted. Standards should be collected from the surface layer and they can be scooped with a tablespoon; one (1) or two (2) are sufficient for a sample. Each standard sample should be labeled as to its exact point of origin and protected from cross contamination.

If a case involves an exhumed body, samples of soil from various depths should be collected. Whenever possible, the article with soil evidence should' be submitted to the laboratory or the area with the soil should be cut out if the object is too large to transport.

"Alibi" samples or soil taken from areas where a suspect says the sample originated should also be taken to the laboratory.

The value of soil evidence is determined by its unique composition when compared to other samples. The more characteristics, which can be determined, and the more varied the soil in the area, the greater its value.

- Laboratory analysis of soil consists of
- General morphology (color, texture, etc.)
- Particle size, distribution, and density
- Microscopic examinations, which demonstrate unique optical properties and mineral components
- Chemical tests for pH, organic components
- Micro chemical and microcrystalline tests

Glass Evidence

Since fragments occur whenever glass is broken, glass evidence is often found at crime scene (e.g. burglaries or traffic accidents.) If reconstruction or a physical match is possible, collection of glass evidence must be as complete as possible. Care should be taken when handling and packaging evidence, so as not to damage large samples or lose smaller fragments.

Clothing containing small glass fragments should be submitted without removal of the trace fragments.

The usefulness and extent of laboratory examination depends largely upon the size of the sample obtained and the availability of known or control samples. Large glass samples are useful in determining direction of force, direction of travel of the break, sequence of breaks and individualization (physical match). When a physical match is not possible or small particles of glass are found, the physical and chemical properties of the glass are determined and compared to control samples. This examination involves the use of microscopic and stereoscopic equipment, which determines the chemical and optical properties of the evidence.

An investigator should label glass fragments as to inside and outside before removing them from the window.

Proper care should be taken when packaging broken headlights. The examiner's determination as to whether the headlight was in use at the time of impact will be dependent of the condition of the filament. Should the extremely fragile filaments be broken in transit, or if glass particles deposit on the filament be disturbed, determination may not be possible.

Collection of Organic Compounds

WARNING: Many organic compounds are biohazards and/or poisons (i.e. pesticides, herbicides, and rodenticides) and should not be handled without gloves or other protective clothing.

In addition, organic compounds often emit noxious or hazardous fumes when heated or burned, and care should be taken to avoid breathing these fumes.

Collection of Evidence

Loose organic chemicals, (i.e., spills or mounds) should be scraped or spooned into a clean, sealable container such as a can or jar. Many organic compounds possess low boiling points and because of possible physical and/or chemical interaction should not be stored in plastic bags.

Any submitted item containing an organic chemical collected from a crime scene should have a label describing the type (solid, liquid), color, and odor (if any) of the material. Samples from a suspect or the property of a suspect should be labeled as described above.

Analysis of Evidence

Most organic compounds possess sufficient vapor pressure to be analyzed by gas chromatography. Other compounds and those with high boiling points are analyzed using various liquid chromatography techniques. Chromatographic methods are especially useful when mixtures of organic compounds are submitted. The identification of an unknown organic compound requires the use of known standards in conjunction with various chromatographic techniques. Whenever possible spectroscopic techniques are used to provide useful structural information about an unknown component. It should be noted that the identification of an unknown compound could be a very time consuming task requiring a variety of analytical instruments. Therefore, any request for identification of an unknown substance should be made after consultation with an examiner.

Firearms Distance Evidence

Pattern analysis is useful in reconstructing shooting events, especially distance estimation. Interpretations are dependent upon the weapon used, type of ammunition, load, etc.

In many instances, it will be possible to approximate the distance which existed between the muzzle of the weapon and the surface of the target. Test firing for distance determination will be conducted by the state laboratory under standard conditions.

Distance testing requires that not only the suspect weapon has to be used, but ammunition must be duplicated. A series of patterns must be fired. Close range shooting provides residues which are deposited around the bullet hole with black soot and smoke. The pattern is small and dense. Medium range shooting provides scattered gunshot residue without black deposits. The pattern spreads out as the distance increases. Long range shooting rarely provides powder residue. A determination of distance is made both visually and with chemical enhancement, comparing the test firings and pattern submitted.

Whenever possible, the actual (garment) pattern should be submitted to the state laboratory, in its entirety. Care must be taken to limit handling of the garment and should be submitted unfolded between layers of paper. In other instances, when the pattern is on skin, it must be photographed one-to-one with a scale.

Whenever possible, the garment should be collected prior to transport to the Medical Examiner's Office.

If the victim requires medical attention, care should be taken when removing clothing to avoid alterations of the residue pattern.

Gunshot Residue Evidence

The discharging of a firearm releases particles containing lead, barium, and antimony.

The commonly accepted techniques available to detect these particles are Atomic Absorption (AA) and Scanning Electron Microscopy Energy Dispersive X- ray Analysis (SEM/EDAX).

The presence of these elements on a subject's hands can be the results of four (4) possible circumstances:

- Firing a weapon
- Handling a weapon
- Close proximity to a weapon being fired
- Environmental effects

Bullet lead in the form of bullet shavings or fragments may be deposited on a shooter's hand.

Cartridge cases contain three (3) possible element constituents:

- Lead, antimony, and barium
- Lead and barium
- Lead only

Gunshot residue deposits are small in quantity and deposited only on the surface. This results in rapid loss due to normal activity. After approximately six (6) hours, the possibility of finding gunshot residue is quite small. Other factors, such as the chemical reactivity of some particles may affect the analysis by scanning electron microscopy.

The AA kit typically consists of a bottle of 5% nitric acid and stoppered test tubes containing swabs and labeled "control", "cartridge case", "left palm", "left back", "right palm", and "right back". While wearing gloves, the appropriate areas should be swabbed after the swabs are moistened with the nitric acid; and samples placed in the corresponding tubes. It is important to include the ampule marked "control." This swab is moistened with the nitric acid and placed back in its original tube.

If a cartridge case is available, the inside should be swabbed and placed in its corresponding tube. Information should be obtained as to the subject's occupation, hobbies, time of shooting, time of sample taking, last time the subject washed his/her hands, and other pertinent information.

AA kits are processed for lead, antimony, and barium, by flame and flameless atomic absorption spectroscopy, at the laboratory.

The SEM kit contains two (2) vials each with an SEM disc having an adhesive surface. While wearing gloves, the palm and back web areas of each of the hands are sampled until the disc looses its "tackiness." The sample discs are then placed in the appropriate containers. Information as stated above for AA collection should be noted. It is important to note that the SEM disc kit be collected before samples are collected for the AA kit.

SEM discs are analyzed at the laboratory for lead particles. When these particles are located, an elemental analysis is conducted.

Paint Evidence

Paint evidence is usually encountered in three (3) forms; chips, fragments, and smears. The transfer of paint from one object to another is most often encountered in motor vehicle and burglary cases.

Paint chips or fragments can be extremely brittle. Great care should be used in their collection. The use of tweezers is recommended for this purpose. Paint samples should never be collected using fingerprint "lifters" or scotch tape. This technique will contaminate the sample. Paint chips or fragments should be packaged in paper using a druggist's fold and then placed in envelopes. Each package should be labeled appropriately, identifying the location and origin of the sample. Care should be given when writing on the package that the pressure of the pen does not break the evidence inside.

If the paint evidence takes the form of a smear, the portion of the object containing the smear should be submitted to the laboratory. The investigator should not attempt to remove the smear from its source.

The end of a tool carrying suspected paint evidence should be carefully wrapped and covered with paper before submitting to the state laboratory.

It is important to collect known control samples of paint if comparisons are to be conducted.

These samples should be collected as close to the areas of damage as possible since differences in paint can occur even a short distance from the damaged area. These control paint samples should be collected and clearly labeled as described above.

Although it is often impossible to individualize paint samples, except in the case of a physical match, microscopic, micro chemical and instrumental analyses can identify similar structural and chemical characteristics.

Imprint Evidence

Imprint, impression, and pattern evidence is used to individualize a particular article of footwear or vehicle tire(s), or to identify other items which have come in contact with one another.

Basic forms of imprint evidence found at the scene of a crime are two-dimensional imprints or three-dimensional impressions. These patterns are documented photographically, with casting materials, alternate lighting, or electrostatic dust print techniques. The items are then submitted where their imprints enhanced, recorded, then compared against the suspect article.

Searching For Imprint Evidence

Submit, if possible, the actual item on which the imprint appears. Photographs should be taken to show the relationship of the imprint to the overall scene. Life- size or one-to-one photographs are suggested when recording two-dimensional imprints, both with and without a scale, keeping the camera's "film plane" parallel to the imprint surface.

Fingerprint processing may enhance the imprint's image. The method depends upon the surface and type of residue in which the imprint has been pressed. One exception to this process is a dust residue print. It may be necessary to use an electrostatic dust print lifter.

Imprints found in blood should be documented where found and enhanced with chemical reagents to maximize the detail present (consult with state laboratory personnel).

Alternate light sources such as laser, ultra-violet, and infrared may also locate an imprint pattern. An examination of points of entry and exit at the scene may reveal imprint patterns of value.

Use side or cast lighting with a flashlight. Examination of a suspect imprint requires photography and enhancements best accomplished by the state laboratory, under controlled conditions. Side-by-side comparisons with the actual imprint and a control imprint made from an evidence item suspected of making the mark.

As several levels of identification exist, the items should be submitted so that test imprints may be prepared at the laboratory. Items seized for imprint examination should be carefully packaged so as not to allow anything to come in contact with the imprint or the surface where it is located. Items seized for comparison against imprints should be properly packaged with consideration for trace materials that may also be present. Do not allow damage or alteration to the suspect item surface. Do not remove material from an item of evidence (i.e., a rock in a shoe) as it may become a point of identification.

Impression Processing

Impressions of footprints, tire-tracks, and various forms of patterns need proper documentation to support examination. At-the-scene notes, diagrams, overall photos and close-up photographs, with and without a scale, must be taken.

Casts should be made after proper area preparation has been made. Both the photographs and the casts should be submitted to the laboratory for examination and processing. Do not clean off a cast after it is dried and removed from a suspect impression.

Comparison of casts and the suspect item that may have caused the imprint is usually done by side-by-side comparison at the laboratory. Do no attempt to replicate impressions in the field. This is best done under controlled conditions at the state laboratory. When dealing with tire impressions, if possible, recreate the sample impression with the tire still on a suspect vehicle.

Crime Scene Photography and Video

Work from the general to the specific. Start with general overall photographs/video from all directions and then work into specific items and details. Photographs and/or video recordings collected as evidence will

be stored on a dedicated and secure server under the control of the Identification Bureau. Access to these files will be limited and password protected utilizing the Synology DiskStation system. (**2.2.3**)

Take Notes

Notes should be taken on light conditions, date, time, location, type of film, camera, and general exposure information. If the camera was an automatic type or set on an automatic mode, indicating that in your notes. If the equipment malfunctions, make a note and follow through with a possible repair later.

Construct a photomap or rough sketch of the scene indicating camera positions to provide camera perspective. Use labels and scale references.

When photographing items of evidence, take one photograph as the evidence appears and a second to include a scale and label for reference and identification. Be certain that an item has been included in an overall shot so that its location within a scene can be determined.

Photographing Burglary Scenes

Take photographs of the entire building and then zero in on the point of entry. Pry marks, tool marks, footprints, tire tracks should be taken with and without scales. When using a scale, be sure that the scale and the back, or film plane, of the camera are parallel and squared to each other. Use a tripod whenever necessary. Side or oblique lighting may be useful to bring out impressions or when photographing a reflective surface.

Photographing Violent Crime Scenes

The first photograph should again be of the overall scene, which should be repeated from various angles. If a body is present, it should be included in the overall scene photographs to show relative position within the scene.

As photographs are taken from different angles, they should overlap to insure that nothing is left out. Following the initial series of photographs, additional shots should be taken of everything that may be connected to the crime including weapons, stains, marks, etc.

Photograph the victim for identification purposes and to illustrate visible injuries.

Courtroom Testimony

Photographs taken will be introduced in court and may require testimony from the photographer. There are several general rules that should be kept in mind. Be sure to thoroughly discuss the photographs taken and your level of expertise with the prosecutor before trial begins. Make certain that he understands the limits of your photographic knowledge and experience. Don't attempt to qualify as an expert photographer unless you are one. Present yourself as being qualified in the general practice of photography using conventional methods.

The essential requirement is that you can testify that the photograph accurately represents the scene or object as you observed it. Such factors as film speed and aperture settings have little importance in this respect.

Avoid testimony that involves technicalities which will complicate your testimony and might confuse the jury.

Crime Scene Reconstruction

A crime scene Reconstruction is the process of recreating the circumstances of a crime or event. It is an art and a science, involving both deductive and inductive logic. When coupled with experience and training, reconstruction can lead to a reasonable hypothesis as to the sequence of events.

Reconstruction is often helpful to determine the actual cause of a crime, eliminating the possibilities causing a particular scene or presence of evidentiary material. Scene integrity must be maintained.

All reports, statements, photographs, maps, diagrams, and related materials of evidence should be reviewed during a reconstruction. Reconstruction should be attempted on all serious crimes and incidents, particularly homicides, shooting incidents, fatal motor vehicle accidents, complicated or large arson incidents, and major incidents involving secondary crime scenes.

The time factor is critical in crime scene reconstruction. The identification unit should be notified as soon as possible when it is determined that reconstruction is needed. The scene should be preserved and maintained until detectives have completed their examinations.

Crime scene reconstruction is time consuming and may require consultation with many involved personnel before a final report can be made. The state laboratory personnel will assist, upon request.