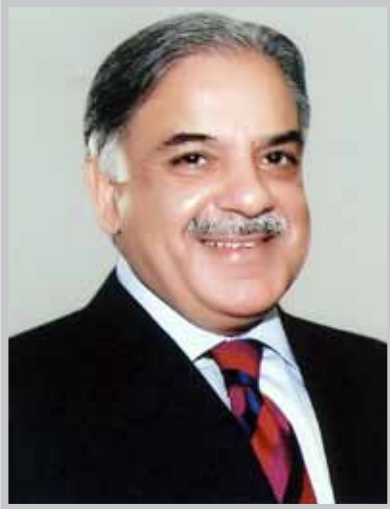


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## MESSAGE OF CHIEF MINISTER, PUNJAB



Eradicating terrorism and extremism from society is the top priority of my Government. We have made many interventions that include review of policing, integration of intelligence services, revamping of Counter Terrorism Department, prison reforms, introduction of technology, improving access to justice, effort to eradicate thana culture and introduced balanced development in the province as immediate measures under a comprehensive counter terrorism strategy. The long term reforms include de-radicalization of society, poverty reduction strategy, madrissah reform policy, legal reforms, establishment of Danish School System, reintegration of dissidents and expanding coverage of Health Care initiative (CMPHC) in Punjab.

Establishment of Punjab Forensic Science Agency is a concrete step towards materializing a tolerant society by assisting courts in disseminating speedy justice. Punjab Forensic Science Agency has been completed in a short span of two years. It is providing forensic services in fourteen forensic disciplines. Integration and unification of all forensic services under one roof will reduce chances of mishandling, manipulation, deterioration and contamination of evidence. The scientific analysis undertaken at Agency will assist investigating agencies in successful investigations and replace oral evidence with the empirical testimony in courts of law. Reliable evidence will be available to improve conviction rate. It will reduce the nominal justice gap in Punjab. The robust independent status of the Agency will ensure transparency in handling and processing of evidence. Excellence in human resource employed at the Agency is our prime focus. We have young scientists trained in forensic sciences from United States of America and appointed a Director General of the Agency who has worked for 35-years in different forensic facilities abroad. We are also endeavoring to engage international experts as mentors in different disciplines of the Agency.

We have initiated the process of modernization of archaic Criminal Justice System to achieve good governance, dispensation of justice and establishment of a modern, tolerant and just society in Punjab. I look forward to public participation and encouragement for achieving these noble pursuits.

**(MUHAMMAD SHAHBAZ SHARIF)**

## MESSAGE OF HOME SECRETARY, PUNJAB



Study of civilizations reveals that crime has always existed within human society. It also tells us that there has always been effort to curb crime and bring perpetrators to justice. These efforts, however, have met with limited success mainly due to lack of reliability of traditional evidence leading to conviction of criminals.

This warrants establishment of robust criminal justice system with capacity to detect, investigate and convict criminals to utmost degree of certainty. Government of Punjab is striving to modernize existing archaic criminal justice system by legal reforms, state of the art technologies, integration and creation of preemptive intelligence gathering systems and de-radicalizing society through initiatives for poverty reduction, health care initiatives, madrissah reforms and reintegration of disgruntled elements in the main stream.

Terrorism, most heinous and lethal of all forms of crime has pervaded society during recent times. The technologies and tactics employed by terrorists and non-state actors to destabilize state governments require matching response from the established order. It was in this background that the need of establishment of full services and completely integrated Forensic Science Laboratory was identified by the Government of Punjab. However, absence of forensic expertise both in terms of infrastructure and human resource was the greatest handicap. The indomitable will of the Chief Minister Punjab, led to overcome the challenge in a short time span of two years. Today, we have a Forensic Science Laboratory with latest technologies, equipment and trained human resource. Forensic facilities in fourteen disciplines actualized through sophisticated laboratories is a prominent feature of PFSA. These labs will be handled by young recruited scientists who have received forensic training from United States of America. The laboratory has also started training investigators and other stakeholders in collection and appreciation of forensic evidence from crime scenes.

Establishment of Forensic Science Laboratory is harbinger of a new age in the filed of detection, investigation and conviction. It will put in motion a new sequence of events which will assist deterrence of crime, dispensation of speedy justice, improvement of criminal justice system and establishment of a just and tolerant society. On the eve of this event I want to convey heartiest felicitations on behalf of Home Department and Government of Punjab to all those who have remained engaged in any capacity in this endeavor.

**(SHAHID KHAN)**

## MESSAGE OF DIRECTOR GENERAL PUNJAB FORENSIC SCIENCE AGENCY



The establishment of Punjab Forensic Science Agency in Punjab, marks new era in our national history. Being a full service, state of the art Forensic Laboratory, having 14 disciplines under one roof is 2<sup>nd</sup> only of its kind in the world. PFSA is an innovative, sophisticated, transfer of technology project spreading over 53 Kanals. It is fixed cost first of its kind project constructed on Engineering Procurement and Construction (EPC) Mode. Its structure civil works, mechanical, electrical and Air Conditioning System (HVAC) are unique and without any parallel in Pakistan. The establishment of a Forensic Laboratory of this size usually takes 5 to 7 years in developed countries, whereas here this huge task has been completed in a remarkable time less than 3 years due to continuous support and personal interest of the Chief Minister Punjab Muhammad Shahbaz Sharif. Punjab Forensic Science Agency is functioning according to international standards. With this now the provincial government has for higher level of justice confidence and trust due to PFSA's accurate and authentic forensic results. The change from eye witness testimony to scientific physical evidence testimony is colossal in our Judicial System. Human can lie, prepared itself, forget, can be threatened with to appear in the Court and can be absent from the Crime Scene but physical evidence is always present at crime scene, as a silent witness. A well qualified and properly trained scientist can with his / her knowledge make this silent witness speak in the Court of Law. I am confident that if we remain committed and focused to this valued task with the same pace and zeal, then Inshallah a day will come when we will be able to see a crime free society.

**(DR. MOHAMMAD A. TAHIR)**



**Dr. Mohammad A. Tahir**  
**Director General**  
Punjab Forensic Science Agency





**Muhammad Amir Jan**  
**Project Director**  
Punjab Forensic Science Agency

# PUNJAB FORENSIC SCIENCE AGENCY

## CRIME SCENE INVESTIGATION

Every incident, be it a crime, accident, natural disaster, armed conflict, or other, leaves traces at the scene. The goal of the subsequent investigation is to correctly interpret the facts, reconstruct the events and understand what happened.

Due to the transient and fragile nature of those traces, their reliability and the preservation of their physical integrity depend to a very large extent on initial actions at the scene of the incident. Evidence integrity can be achieved with very limited means by observing a key set of guiding principles. Acting with care throughout the crime scene investigation process is critical for the admissibility of evidence for court purposes as well as for human rights inquiries and humanitarian action.

### CRIME SCENE INVESTIGATION DEPARTMENT

The duties of Crime Scene Investigation Unit of PFSA are to ensure proper identification, preservation, collection, transportation of evidence from the crime scene to the lab and to establish the chain of custody in order to maintain the integrity of the evidence.

### CRIME SCENE

A crime scene is a location where an illegal act took place, and comprises the area from where most of the physical evidence is retrieved by trained law enforcement personnel, crime scene investigators.

Evidence is very important in criminal cases. Therefore, only trained professionals should do the collection and preservation of evidence. These professionals are called crime scene investigators. The biggest hurdle in their way to successful investigation is crime scene contamination.

### RESPONSIBILITIES OF

- General Public
- The most important responsibility of common man regarding the crime scene is;
  - To immediately inform the concerned authorities' i.e. Police and Rescue if needed.
  - To take maximum care not to allow general public to enter the premises where crime occurred.
  - Not to touch anything at the crime scene except injured persons.
  - Not to touch dead bodies if present at the scene or remove them from its actual position.
- Victim
- The responsibility of the victim is important in the cases like burglary, theft, etc. where he/she himself is safe and in his/her senses. The victim's responsibilities in such situation is;
  - To immediately inform the concerned authorities' i.e. Police and Rescue if needed.



- To take maximum care regarding entry of family members especially children on the crime scene premises.
- Not to touch or dislocate anything from the crime scene.
- To protect marks of foot/finger prints of the suspect, if found on some outdoor place or object, from environmental factors like rain, wind, etc.
- To report the law enforcement agencies soon as possible in case of sexual assault although the victim may have many reasons for delay (such as fear, guilt and confusion), any delay in reporting can lead to loss of physical evidence.



➤ Victim's Family

➤ The responsibility of victim's family is important in case the victim is injured or murdered. In such situation the responsibilities include;

- The concerned authorities Police and Rescue if needed should be immediately informed.
- Maximum care should be taken regarding entry of family members especially children on the crime scene premises.
- Not to touch anything at the crime scene except injured persons.
- Dead body if present at the scene should not be touched or removed from its actual position.
- Marks, foot/finger prints, if left by the suspect are found on some outdoor place or object, should be protected from environmental factors like rain, wind, etc.

➤ First Responders

It will be the first responder's responsibility to ensure that the crime scene remains

in a condition that allows later units (e.g. Police/Crime Scene Investigator) to do their work. If the evidence is disturbed before it is documented then it becomes nearly worthless, and certainly unlikely to be admissible in court.

## **RESCUE**

- As rescue teams are first to approach in most of the cases so they can play vital role regarding the preservation of crime scene. They should take the following steps in order to avoid contamination at the crime scene.
  - Assess medical needs/signs of life.
  - Administer emergency first aid.
  - Choose the pathway to minimize contamination/alteration of the crime scene.
  - Point out the potential physical evidence to concerned authorities.
  - As far as possible dead body if present at the scene should not be removed from its actual position.
  - Minimum disturbance should be created during the first aid/resuscitation.

## **POLICE**

The first police officer to arrive at a crime scene must take certain steps to preserve the evidence. Only after this duty is performed, analysis of the scene may begin. The steps include:

- Personal safety – Your safety comes first! You can't help others if you are injured.
- Organize your thoughts and formulate a plan on how to handle the situation.
- Evaluate the severity of the situation.
- Identify all involved and uninvolved individuals in the area.
- Be aware of weapons and hazards.
- Be aware of potential evidence.
- Don't touch anything unless necessary.
- Clear away uninvolved people.
- Establish a perimeter with survey or custodial tape.
- Investigators will adjust the perimeter if they need to.
- Safeguard the scene – limits and documents any people entering the area.
- Don't use phones or bathrooms within the scene area.
- Don't eat, drink or smoke in the area of the scene.
- Call 1122 and Crime Scene Investigators if not already called or there.
- Take good notes – such as: time, date, people at scene, weather, doors open or closed lights on or off and position of furniture.
- Be prepared to provide your notes and information to investigators.

## TRACE EVIDENCE DEPARTMENT

Trace chemistry department deals with the analysis of trace evidence. Trace evidence is evidence that occurs when different objects contact one another. The importance of trace evidence in criminal investigations was shown by Dr. Edmond Locard in the early 20th Century. Throughout the past century, forensic scientists have used trace evidence to reconstruct crimes, as well as to describe the people, places and things involved in them. Case studies of real life homicides have been published in the forensic science literature showing how trace evidence has been used to solve these crimes, free the innocent, and bring the guilty to justice. Trace evidence is also important in accident investigation, where movement of one part against another will often leave a tell-tale mark.

### FACILITIES PROVIDED BY TRACE CHEMISTRY DEPARTMENT

Analysis of following trace evidence and its comparison with the reference sample.

- Hair.
- Fiber.
- Paint.
- Tape.
- Glass.
- Primer gunshot residue.
- Foot impressions and tyre track.
- Bloodspatter pattern analysis.
- Trace metal detection test.
- Explosive.
- Soil.



## **COLLECTION AND PRESERVATION**

Due to the wide variety of evidence brought to the Trace Chemistry Department there is no single way to collect and pack the evidence. Each scene should be carefully examined for the presence and identification of trace evidence. The evidence should be collected in such a manner that collection of probative evidence is not contaminated or lost. No harm to the integrity of the evidence should take place.

### **EVIDENCE COLLECTION METHODS**

Trace evidence can be collected by the following methods.

#### **Handpicking:**

1. Use forceps or other suitable tool to gently grasp the evidence item and carefully remove the item from the substrate.
2. Pack and seal the evidence item in a suitable container so that no contamination or deleterious change can occur.
3. The packing is labeled with at least the case number, item number, and item description.

#### **Tape lifting:**

1. Remove the first several inches of tape from the roll to eliminate any possible environmental contamination.
2. Obtain a section of tape from the roll. The size of the section of tape needed depends on the size of the item being examined.
3. One or both ends of the tape are folded upon itself to establish handles from which the tape can be pulled away from the storage backing.
4. The section of tape is applied to the item being examined. The adhesive side of the tape will collect any loosely adhering trace evidence.
5. The collected tape lift is applied to a storage backing (e.g. clear acetate sheet).
6. Pack and seal the tape lift in a suitable container so that no contamination or deleterious change can occur.
7. The packing is labeled with at least the case number, item number, and item description.

#### **Shaking:**

1. A section of examination paper is placed under the item to be examined.
2. The evidence item is shaken over the section of examination paper.
3. The section of examination paper is visually examined for the presence of evidentiary material (e.g. hair, fibers, paint chips). Any evidentiary material observed on the examination paper is removed by handpicking.
4. The debris on the section of examination paper is transferred to a container and sealed so that no contamination or deleterious change can occur.
5. The container is labeled with at least the case number, item number, and item description.

### **Scraping:**

1. A section of examination paper is placed under the item to be examined.
2. The evidence item is scraped with a clean scraping tool over the section of examination paper.
3. The section of examination paper is visually examined for the presence of evidentiary material (e.g. hair, fibers, paint chips). Any evidentiary material observed on the examination paper is removed by handpicking.
4. The debris on the section of examination paper is transferred to a container and sealed so that no contamination or deleterious change can occur.
5. The container is labeled with at least the case number, item number, and item description.

### **PAINT EVIDENCE**

Paint samples collected should represent all the layers of the paint present. The sample should be chipped off down to the unpainted surface.

1. If possible, submit the entire object on which the paint is observed, including smears and transfers. **DO NOT** attempt to remove paint from clothing, tools or objects where smears and transfers are deposited.
2. If it is not feasible to submit the entire object, use a clean knife blade or scalpel to remove the area of interest including all the layers possible.
3. Small samples can be retrieved using forceps or tweezers.
4. Place sample in a paper fold or vial. **DO NOT** use an envelope. Small samples may be lost among the folds, openings and seals of the envelope.
5. Place different samples in separate containers to avoid contamination.
6. Be sure to seal the container and record the proper identifying information on the container and exterior packing.

### **REFERENCE COMPARISON SAMPLE FOR PAINT ANALYSIS**

Collect a paint standard. A paint standard is a known sample of the undamaged paint collected from the same area as that of the damaged paint being analyzed.

1. Standard paints should be at least ½ square inch of solid paint with all layers represented (down to the substrate).
2. Take standard paint samples from near the damaged areas. Paint may vary in type or composition in different locations on a vehicle or item even though the color appears to be the same. Therefore, it is important that known paint standards be collected from each separate panel or area of the object showing fresh damage.
3. Place each paint standard in a different paper fold, seal and label.
4. In addition to the case and investigator information, the label must include the specific source of the sample e.g., make and model of the vehicle, known Paint samples must be collected from every vehicle or painted object involved in the incident, even if some known paint standard is included during the removal of questioned transfers.

## HAIR EVIDENCE

For the majority of cases, the Trace Chemistry Department will evaluate human hair evidence to determine the potential for obtaining a DNA profile. Such an evaluation includes examining the hair characteristics to determine animal versus human; body origin (scalp, pubic, etc.) and growth phase.

Hair evidence can be collected in a number of ways including the following methods:

1. Picking (For visible hair).
2. Tape lifts.
3. Scraping.
4. Shaking.

If the entire object, such as an article of clothing, containing possible hair evidence is to be submitted to the lab, place the object onto clean craft paper and paper fold. Seal the fold and place in a paper bag or envelope. Seal the container and include the proper identifying information.

### HAIR SAMPLE STANDARDS:

Whenever hair is collected the roots should be included because considerable information can be obtained from the root material.

- **Head or Scalp Hair:** The hair should be representative of the center, front, back (including nape of the neck), and both sides of the scalp. Approximately 50 head hair should be collected. The sample should include both pulled and combed hair and include any variations in color and length. If additional facial hair are collected (i.e. sideburn or beard hair), these should be packed separately.
- **Pubic Hair:** When indicated by the circumstances, collect pubic hair. Approximately 30 pubic hair should be collected.
- **Animal Hair:** Comb and pull hair; pulling is necessary as roots are needed for species identification in some animals. While a minimum number of hair is difficult to determine, good judgment should be used in collecting enough hair to represent the various types and colors of hair found on the animal. Hair should be collected from various areas of the animal including the head, back, belly, tail, etc. Each sample should be packed separately and labeled with the body area from which it was collected.

## FIBER EVIDENCE

Fiber evidence may be collected in the same manner as hair evidence. These methods include picking, vacuum sweeping, tape lifts, and scraping. Please refer to "Hair Evidence" section. **DO NOT** place fiber evidence loose in an envelope, but in a paper pharmacy fold.

Fiber standards should be collected from all the sources that the victim and suspect are suspected of contacting. Submit the entire item to be used as a fiber standard. If this is not possible cut a small swatch (i.e. for a car seat), or pull random samples of fibers (i.e. for carpets). When collecting fiber standards from a vehicle, be sure to collect samples from all areas which may have transferred fibers (i.e. front and rear floorboard carpeting, all mats, front and rear seat upholstery and any trunk liners). These areas may

appear the same but may be manufactured differently from each other and laboratory analysis may be needed to tell them apart.

### **GLASS EVIDENCE**

1. Glass samples may be collected using clean/disposable tweezers. If the glass is a large fragment, one may collect the fragment by hand (wearing a clean disposable glove) exercising caution.
2. Collect a representative glass standard sample from the scene. If more than one type of glass is broken and present on the scene, collect a representative sample from each different type (e.g. windowpane, vehicle lamp, container, etc.). Be sure to pack each type separately, labeling the source of each known standard.
3. Collect and submit all glass pieces if you believe numerous glass pieces were from the same object, such as a bottle, and request the trace chemistry department to attempt a physical match.
4. Place glass fragments into a paper pharmacy fold or pill box if small particles of glass are collected. Larger fragments should be packed in a manner to prevent rubbing, shifting, or breakage.
5. If an article of clothing is being submitted for the examination of glass by the lab, allow the item to dry if it is wet. Then pack the item by paper fold into clean craft paper. Seal the paper fold and place into a paper bag. **DO NOT** attempt to remove the glass from the clothing unless absolutely necessary for its preservation.
6. Pack glass pieces from different locations into different containers.
7. Be sure to seal as well as include the proper identifying information on the container and exterior packing.

### **PLASTIC AND TAPE EVIDENCE**

1. Leave plastic and tape evidence intact.
2. Large pieces of plastic and tape evidence may be collected and packed into paper envelopes or bags.
3. Smaller pieces should be placed into a paper envelope.
4. Tape pieces that have exposed adhesive should be affixed to a clean, colorless plastic sheet (or interior of plastic bag) prior to packing.
5. Pack evidence from different locations separately. Be sure to pack the control/known separate from the questioned evidence.
6. Be sure to seal as well as include the proper identifying information on the container and exterior packing.

### **MISCELLANEOUS UNKNOWN EVIDENCE**

The category of “Miscellaneous Unknowns” covers all other types of physical evidences that cannot be analyzed under any other category. This includes but not limited to analyses concerning chemical bank dyes, polymers and plastics, abnormalities in soil, minerals, wood, building materials, cosmetics and miscellaneous chemical and biological materials.

When collecting such evidence that falls in this category, use a container appropriate for similar evidence listed

### **PRIMER GUNSHOT RESIDUE AND TRACE METAL DETECTION TEST**

For the detection of Gunshot residue analysis and trace metal detection test on the hands of the person in cases of homicide and suicide cases it is desirable that the victim/suspect should be brought to the agency with their hands bagged within 3 to 6 hours after the incident. This is necessary to prevent loss of primer Gunshot particle that may have been deposited on the hands of the person who fired the gun. Analysis of primer gunshot residues is helpful in order to narrow down the suspects in case of homicide cases and to confirm that an incident is a suicide or homicide

### **FOOT WEAR AND TYRE TRACK IMPRESSION**

It is desirable to take a photograph before lifting the cast. Casts depicting footwear and/or tyre track evidence that are submitted must be labeled. At a minimum the non-impression bearing side of the cast(s) must include a case number, cast number, recovery date, and initials of the recovering person. Do not remove any soil or sand that clings to the cast upon removing from the ground. This clinging material acts as a 'shock absorber' for the cast to prevent breakage, and acts as a protective layer for any fine impression details recorded by the cast. Although the cast's surface and clinging soil may be dry to the touch, the internal layers of clinging soil and casting material may still remain moist and fragile. Cast should be permitted to air dry for at least 24 to 48 hours prior to being packed and transported to the Agency. Pack dried casts in rigid, sturdy cardboard boxes. Use over-sized cardboard boxes if required. Avoid trying to 'force' casts into snugly-fitting cardboard boxes as this may break the cast. Avoid sealed plastic bags or plastic boxes as they retard the drying of casts.

### **EXPLOSIVE EVIDENCE**

The best sample is any unconsumed or unreacted product found on the scene or adhering to post-blast fragments of the device.

- Under no circumstance an intact incendiary or explosive device should be sent to the lab.
- Devices are to be "rendered safe" before any samples are taken.
- Post explosion debris and components (such as pipe bomb fragments, end caps, plastic bottles, paper tubes, etc...) should be sent to the lab so that they can be examined under the microscope and/or extracted for analysis. Due to the potential for corrosive action or production of static electrical charges, metal containers and some plastic containers should be avoided. Glass jars or paper envelopes or bags can be used.
- Materials that are distinct and easily separable should be sent in separate containers (e.g. the liquid and the foil balls from a plastic bottle would be sent as three separate items: The Bottle, The Foil, and The Liquid).

Take care not to cross-contaminate the samples. If you are using tools to pick up or transfer chemicals into submission containers, be certain to clean and dry the tools between each sample. Warm soapy water followed by a water rinse and drying should sufficiently clean the tool. Your hands and gloves may also act as carriers of cross-contamination. Wear nitrile or other chemically resistant gloves when collecting



samples and dispose of them between samples. **DO NOT** put them in the evidence container.

## **PACKING OF SAMPLES FOR EXPLOSIVE ANALYSIS**

### **A. Containers – General Considerations**

1. Essential properties
  - a. Unused.
  - b. Airtight (For all Fire Debris and most Explosives or Chemical Items).
  - c. Clean – no hydrocarbon or other chemical residue.
  - d. Inert – will not break down when heated or in contact with solvents.
  - e. Will not promote a static electrical charge ( For Explosives).
2. Seals
  - a. A clean seal is essential.
  - b. Containers must be completely sealed to prevent any passage of vapors or contaminants into or out of the container. Be certain can lids are tight all the way around. For plastic bags, they must be heat sealed completely with no flaws in the seam if they are being used for fire debris samples.
  - c. Tamper evident tape (tamper proof tape) must be placed across the container lid/seam in such a manner that the item cannot be partially or completely opened without tearing the tape.
  - d. Seals and Tape must be initialed/signed by the investigator of record. The date of the seal should also be included.

## **DNA AND SEROLOGY DEPARTMENT**

Biological evidence, which contains DNA, is a type of physical evidence that can connect an offender to a crime scene. Biological evidence includes blood, semen, saliva, skin and tissue cells deposited on crime scene or obtained from the suspects or victims in a crime. In addition to these common stains DNA profiles can be obtained from a variety of other samples as well. For example, cigarette butts, postage stamps, caps, shirt collars, and other items that have been in close contact with an individual can often yield a genetic profile. All biological evidence found at crime scenes can be subjected to DNA testing.

Since only a few cells are sufficient to obtain useful DNA information to help a case, the possible location of the DNA on the evidence, and the biological source containing the cells is first identified using forensic serology.

Forensic DNA scientists examine evidence from crime scenes to determine if biological material, such as blood, semen, saliva or skin cells, is present. After the serological identification of biological material, it is subjected to DNA typing procedure to generate DNA profiles from crime scene evidence and reference samples. Finally the DNA profiles of the crime scene evidence and suspects are matched with each other to identify the perpetrator of the crime.

PFSA DNA and Serology unit provides the DNA typing services in the following criminal or civil cases.

1. Crimes against a person.
  - Homicide/Murder.
  - Physical assault.
  - Rape/ or other sexual assaults.
  - Criminal Paternity.
  - Terrorism.
2. Crimes against property.
  - Burglary
  - Car Jacking.
3. Mass Fatality Incidents.
4. Accidents.
5. Paternity/Kinship/ Sibship Analysis.

### **COLLECTION OF BIOLOGICAL EVIDENCE IN DIFFERENT CASES**

#### **1. RAPE/SEXUAL ASSAULT/SODOMY CASES**

There are three possibilities in a rape/gang rape case

- A. Immediate response (within 72 hours).
- B. Victim is pregnant.
- C. Child birth

### A. Immediate response (within 72 hours)

- Victim should be examined within 72 hours by an experienced medical professional. Following guidelines should be practiced for the medical examination.
- Ask the victim not to go in the washroom and if she must have to go, then she should not wash or clean the vaginal area.
- Ask the victim about whole story and try to get any biological material from the area where biological evidence may be present.
- Ask the victim, if offender kissed the different areas of her body. If those areas are not yet washed, collect the swabs from those areas and pack them separately.
- Ask the victim, did the offender use tissue/cloth or anything else to clean himself, if yes, collect that.
- Ask the victim if she is married, when did she last time make intercourse with her husband.
- Collect at least 2-3 vaginal swabs (internal and external) and also the clothes and bed sheet of victim.
- Ask the victim, if the offender raped her in anal area; if yes then collect the 1-2 anal swabs.
- If accused is in the custody, ask him did he wash himself, if not, then get his penile swab.
- If victim has bleeding from vaginal area during examination then try to avoid too much coating of blood on the swab. Take the swab by keeping in view presence of seminal material on the swab and not the blood of the victim.
- Ask the victim, does she already know the suspect; If yes, what is the relation.





- Protect yourself from contaminating the evidence material by wearing neat gloves, face masks and disposable caps.

#### **Items to be collected**

- 2-3 Vaginal Swabs.
- 2-3 Rector/anal swabs in case of anal sex.
- 2-3 Oral swabs in case of oral sex.
- Clothes of Victim and bed Sheets.
- Swabs from kissing area.
- Buccal Swabs of Victim.
- Buccal Swabs of victim's husband.
- Buccal Swabs of the suspect (s).
- Documents including request letter, FIR copy, Medico-Legal Certificate copy, Road certificate (chain of custody), answers of questions asked from the victim, covering letter with complete description of items sent, any other supporting document etc.
- Photograph of the suspect(s) / victim(s) taken at the time of sample collection.

**Note:** Buccal Swabs of the suspect(s) / victim(s) will be collected in the agency.

#### **Packing:**

Dry swabs at room temperature and pack them in a paper/manila envelope made from thick paper and label it with case number (FIR and MLC NO.), victim's name, signature and seal.

## **B. If victim is pregnant**

If the victim is pregnant, then following samples are required for DNA testing.

- Take the pre-natal chorionic villi sample of fetus. Suspend the sample in small tube containing sterile saline solution. Label and properly seal along with a covering letter to keep the chain of custody of the sample.
- Buccal Swabs of the victim.
- Buccal Swabs of the husband if victim is married.
- Buccal Swabs of the suspect (s).

**Note:** Buccal Swabs will be taken in Punjab Forensic Science Agency.

## **C. After Child birth.**

As in paternity case.

## **2. HOMICIDE/MURDER CASE:**

In a homicide/murder case, the scenario is different from sexual assault or property crime. Following are general guideline:

- Collect the weapon or tool in homicide/murder carefully avoiding contamination.
- Collect suspected blood stains that may be foreign to victim (on victim or in the surrounding).
- Collect any foreign hair present on the victim or in near surrounding.
- Collect any evidence items/ swabs from items consumed, used or touched by suspects.
- Medical examiner should collect the vaginal /anal swab of victim, if there is chance of sexual assault as well.
- Collect swabs from kissing, sucking, bite mark area.
- Collect the nail scrapings of victim (in case of defensive activity) with the help of swab or cut the nails carefully so that scrapings in the nails should not lose. Pack it in a new and separate paper envelope. Label and Seal.
- Look for any hair embedded in the nails, ring, watch or fingers of victim or any foreign hair in the head or on the body of victim. If yes, collect it and put in the paper envelope.
- Cardiac blood sample should be collected by the medical examiner and sent as a reference for the identification of victim. Alternatively, the parents of the deceased victim should be presented to Agency for the reference samples.
- Collect the complete dress of victim along with shoes. Pack them in paper, label and seal.
- Ask the whole story from the investigation officer and look for any biological material that may make association with the offender.

## **UNIDENTIFIED BODIES AND HUMAN REMAINS**

Samples collected from unidentified bodies can include: blood, buccal swabs, hair, bone, teeth, fingernails, tissues from internal organs (including brain), muscle, and skin.

In dead body identification case, follow the following guide lines:

- Collect the 30-40 hair having roots. Do not cut the hair always pull them. Pack in paper envelope, label and seal.
- Collect 4-5 nails from dead body, remove any flesh/tissues attached and pack them in paper envelope, label and seal.
- Collect 5-6 teeth having no cavity in them, pack in a paper envelope, label and seal.
- Collect a scalp, rib and jaw bone. Remove any flesh/tissue attached. Pack them in paper envelope or neat glass container. Do not add any chemical to it. Label and seal.

**Note:** Buccal Swabs of the putative parents or siblings will be collected in the laboratory.

In the bomb blast/mass disaster case, follow the guidelines given below:

- Sample collection is the same as in the dead body identification but if different parts seem to be from different persons, collect the sample from each part and separately pack and label.
- Collect 3-4 bones if hair, nails and teeth are not available. Please do not add formalin or any other chemical to the samples collected.

#### **REFERENCE SAMPLES FOR UNIDENTIFIED BODIES**

A person inherits half of its DNA from each parent, it is possible to use reference samples collected from close relatives (e.g., biological father, mother, and/or full siblings and their children) to identify or confirm the identity of bodies that have not been identified through other means. It is also possible to use reference samples collected from close relatives for comparison with crime scene samples, for example, in missing body cases where a bloodstain or tissue sample from a possible crime scene can be tested to demonstrate a biological relationship to known individuals.

#### **PATERNITY/MATERNITY OF A CHILD/FETUS AND KINSHIP ANALYSIS**

Aborted fetal tissue can be analyzed for determining paternity, for example, in sexual assault and/or incest cases where conception occurred. Paternity and/or maternity of a child can be confirmed using Buccal Swabs or other samples listed above from the child and the alleged parent(s). The relatedness i.e., Kinship/Sibship analysis is also performed in Punjab Forensic Science Agency.

#### **REQUIREMENTS:**

1. Buccal Swabs of alleged father, alleged mother and disputed child for maternity/paternity cases.
2. Buccal Swabs of persons whose relation needs to be established in Kinship/Sibship Analysis.
3. A request letter from District Police Officer or a letter from court in favor of “Director General, Punjab Forensic Science Agency” to conduct the DNA analysis for the said case.
4. National Identity Card of alleged father and mother.
5. Buccal swab will be taken at Punjab Forensic Science Agency, or in the court.

## **GUIDELINES FOR THE COLLECTION OF EVIDENCE FROM CRIME SCENE**

There are several methods to collect biological evidence from the crime scene as given below:

- A. Collection of the entire evidence item itself.
- B. Swabbing of wet biological fluid/stain.
- C. Swabbing of dry biological stain.
- D. Cutting of stain from large items.
- E. Scratching of dried stains using scalpel blade.
- F. Collection of biological evidence in liquid form.
- G. Collection of body parts/ tissues.

### **A. COLLECTION OF THE ENTIRE EVIDENCE ITEM ITSELF**

If the evidence item, on which biological material is deposited, is of portable size, the entire evidence item should be collected and submitted to the agency. The guidelines to be followed are given below:

1. Photographs of the stain patterns on larger items must be taken using forensic photography techniques.
2. Any visible stain patterns present and any visible damage to fabrics (e.g. cuts, tears, abrasion) must be properly documented.
3. Blood-soaked evidence must be allowed to dry before packing. If it is not possible to allow the item to dry at the scene as is, then it is advisable to cut out any patterns present in the bloodstains and allow that portion to dry in a box or other form of packing which will not alter the pattern. Wet evidence must never be collected in plastic bags, since this can lead to decomposition and destruction of the evidence.
4. Blood soaked evidence must never be folded during collection and packing, since this will change the patterns and the ability to accurately document the bloodstain patterns present.
5. Pack clothing that includes damp soil or other potentially loose debris into a brown paper bag that has been thoroughly taped along all seams to prevent loss of trace evidence.
6. Smaller items with loose debris must be packed into envelopes or paper bags that have been thoroughly taped along all seams to prevent loss of trace evidence.
7. The stains that have been detected must be properly documented and cut out for further examination at the DNA Laboratory. The cutting must be larger than the stain, so that an unstained area of the fabric can be tested as a control, if necessary. Wet semen-like deposits present on a nonporous surface (e.g. wooden floor, etc.) must be collected using a sterile swab.

### **COLLECTION OF BLOOD-STAINED EVIDENCE**

1. Blood-stained evidence consists of any item contaminated with blood. This evidence must be dried before submission to the agency.
2. Wet evidence must never be collected in plastic bags, since this can lead to decomposition and destruction of the evidence.
3. Blood-stained evidence must be wrapped in a clean, paper bag, placing all

- debris or residue from the garments in clean paper or a sealed envelope.
4. Bloodstain patterns must be preserved and the creation of additional stain patterns during drying and packing must be avoided.

#### **COLLECTION OF CONDOM EVIDENCE**

1. Condoms must be properly dried prior to submission to the DNA Laboratory. The contents of the condom must be emptied onto a sterile gauze pad, and both the condom and the gauze must be dried before properly packing them in a properly labeled and sealed paper bag.
2. If it is absolutely necessary to submit a wet condom, the top of the condom must be fastened with a binder clip, bulldog clip, twist tie, or other suitable closure to prevent leakage. The properly fastened condom must then be placed in a properly sealed and labeled paper bag. After being packed, wet biological evidence degrades quickly, the evidence must be refrigerated immediately after collection and dried as soon as possible. The Forensic Evidence Specialist must be notified upon submission if evidence needs to be dried.
3. Condoms must never be submitted in a bag with the condom wrapper (even if semen is not visible). This can cause the contents of the condom to contaminate the wrapper and destroy the opportunity to develop latent prints on the wrapper.
4. Even if semen is not visible on the condom, it should still be submitted to the DNA Laboratory, since the penile skin cells will adhere to one side of the condom and the victim's skin cells will adhere to the opposite side of the condom.

#### **B. SWABBING OF WET BIOLOGICAL FLUID/STAIN**

If wet blood stain is present at crime scene, the following items are needed for the collection of that stain:

- a. Aliquots of sterile distilled water (may be purchased at a pharmacy) may be dispensed into multiple containers for one-time use.
- b. Individually wrapped, sterile swabs.
- c. Disposable sterile plastic droppers or dropper bottle.
- d. Tape and marker to label the swabs.
- e. Individual envelopes for each swab or individual swab boxes.
- f. Evidence tape.

Procedure of collection of bloody evidence is as follows:

1. To collect a wet bloodstain, use a dry sterile swab.
2. Apply a small portion of the swab to rub the stain. This will allow the stain to be concentrated in one spot on the swab.
3. Collected swabs must be labeled with an evidence identifier by adhering a label or a piece of tape directly on the swab shaft.
4. The swabs must be allowed to air dry before returning them to their original packing or clean envelopes.
5. Swabs must never be packed in plastic tubes, since this allows condensation to form, leading to the decomposition and destruction of the evidence.
6. Gloves must be changed between the examination and collection of each piece of evidence to avoid cross-contamination.



### **C. SWABBING OF DRY BIOLOGICAL STAIN**

If a dry blood stain is present at crime scene and the evidence item is either too large to be transported or it is fixed (immovable). This method can be used for dry stains on floor, wall and other hard surfaces. Moist swabbing technique can also be employed for the collection of touch DNA evidence (skin cell) from the area of potential contact with suspect's body e.g. door handle, window, rope, pipe etc.

The following things are needed for the collection of that stain:

- a. Aliquots of sterile distilled water (may be purchased at a pharmacy) may be dispensed into multiple containers for one-time use.
- b. Individually wrapped, sterile swabs.
- c. Disposable sterile plastic droppers or dropper bottle.
- d. Tape and marker to label the swabs.
- e. Individual envelopes for each swab or individual swab boxes.
- f. Evidence tape.

Procedure of collection of bloody evidence is as follows:

1. Take photographs of the stain at the crime scene.
2. To collect a dried blood stain, moisten a swab with sterile water. Culture swabs and vials of sterile water are available at medical stores.
3. To collect a very small stain from a surface, use a small portion of the swab to rub the stain. This will allow the stain to be concentrated in one spot on the swab.
4. Collection swabs must be labeled with an evidence identifier by adhering a label or a piece of tape directly on the swab shaft.
5. The swabs must be allowed to air dry before returning them to their original packing or clean envelopes.
6. Swabs must never be packed in plastic tubes, since this allows condensation to form, leading to the decomposition and destruction of the evidence.

Gloves must be changed between the examination and collection of each piece of evidence to avoid cross-contamination.

### **D. CUTTING OF STAINS FROM LARGE EVIDENCE ITEMS**

1. Large pieces of evidence (e.g. mattresses, car seats, etc.) will not be accepted in their entirety by the agency.
2. The collecting officer must cut out the evidence stain on the large item. The cutting must be larger than the stain, allowing for a control sample, if necessary.
3. The officer will take possession of any remainder of the large item, which they will submit to their agency

### **E. SCRATCHING OF DRIED STAINS USING SCALPEL BLADE**

If a dry blood stain is present at crime scene and the evidence item is either too large to be transported or it is fixed (immovable). The stain can be scratched and collected on a clean paper. This method can also be used for dry stains on floor, wall and other hard surfaces.

The following things are needed for the collection of bloodstains:

- a. Disposable sterile scalpel blades.
- b. Clean white sheets of paper.
- c. Markers and evidence tape.
- d. Outer container such as an envelope.

Procedure of collection of dried blood stain is as follows:

1. Use a disposable scalpel to scrap the dried blood into a clean white sheet of paper.
2. Fold the collection paper to ensure that the sample does not spill out (make druggist told).
3. Place the folded paper into a small envelope.
4. Properly seal and label the envelope.

#### **F. COLLECTION OF BIOLOGICAL EVIDENCE IN LIQUID FORM**

In some cases, liquid biological material may be present on a surface or inside a container. This biological material can be collected using a sterile 3ml/5ml syringe and transferred to a sterilized vial/container. Properly seal and label the container.

#### **G. COLLECTION OF BODY PARTS/ TISSUES**

In Dead Body Identification/Mass Disaster cases body parts/tissues should be collected in a dry, clean plastic jar/bag. Properly seal and label the container.

### **POTENTIAL SAMPLES FOR FORENSIC DNA ANALYSIS**

Following are the items which can be used for the forensic DNA Analysis;

<b>No.</b>	<b>Evidence</b>
1	Body (Vaginal/Anal/Oral Swabs)
2	Clothes, Beddings
3	Items of personal use
4	Facial tissue, cotton swab
5	Dirty laundry
6	Toothpick
7	Used cigarette butt
8	Stamp or envelope
9	Tape or ligature
10	Bottle, can, or glass
11	Used condom
12	Blanket, pillow, sheet

13	Weapons used in an offence
14	Bite mark
15	Fingernail, fingernail scrapping or cutting
16	Chorionic Villi Sample
17	Bones, Teeth
18	Hair
19	Trace evidence
20	Body tissues/fluids

### **GENERAL GUIDELINES:**

1. Do not add any chemical in the evidence material.
2. Dry the evidence material at room temperature before packing in a paper envelope. If wet evidence material is submitted in a paper bag, the submitting person must inform the collector that the evidence needs to be dried.
3. Pack different items separately.
4. Always pack the evidence material in paper envelope, Never use plastic/glass bottles.
5. Seal properly along with signature on each seal.
6. The small evidence i.e. blood scrapings, hair, nail cuttings must be placed in drug-fold packing then placed in paper envelopes.
7. Do not contaminate the evidence material by yourself. Take necessary measures to avoid your sweat, hair shedding, saliva during talking, or touching the evidence material with naked hand. Always use Personal Protective Equipment; i.e. Gloves, Face Mask, Lab Coats etc.
8. Buccal Swabs of the suspect(s)/victim(s) will be collected in the laboratory.

### **LABELING OF EVIDENCE**

All evidence submitted to the DNA Laboratory must be properly labeled with a minimum of the following:

1. Date/Time.
2. Victim's Name.
3. Location.
4. Collector's Name.
5. FIR Number.
6. Police Station Name.
7. Description of item.
8. Item number.

### **DISPATCH**

Do not use any ice covering. A case will be received through police, the investigation officer should bring the case with complete history and a request letter from district police officer.

## FREQUENTLY ASKED QUESTIONS ABOUT FORENSIC DNA ANALYSIS

**Q.1. What is DNA and how it is important in crime investigation?**

**Ans.** DNA stands for deoxyribonucleic acid. DNA is a hereditary molecule that has genetic code for the structure and function of a living organism. DNA is found in all living organisms. DNA is a long molecule and its structure is like a twisted ladder. The steps of the ladder are made up of four “bases” Adenine (A), Thymine (T), Cytosine (C) and Guanine (G) whereas the sides of the DNA ladder is made of sugars and phosphate molecules. The genetic information lies in the sequence (orderly arrangement) of nucleotide base along the length of DNA molecule.

An adult human body contains approximately 100 trillion cells. All the cells in our body have DNA with the exception of red blood cells. DNA is same in all the cells of an individual. DNA is packed in the form of chromosomes. Humans have 23 pairs of chromosomes.

DNA sequence is 99.7% same in all the humans. Only 0.3% variable region in DNA sequence is unique in every individual. A set of markers in this variable region is studied by forensic DNA scientists to reveal the unique genetic identity of human individual using biological evidence.

Biological evidence, which contains DNA, is a type of physical evidence that can connect an offender/victim to a crime scene if the DNA profile of a suspect matches the DNA profile of crime scene evidence. Biological evidence includes blood, semen, saliva, skin and tissue cells deposited on crime scene or obtained from the suspects or victims in a crime.

**Q.2. Is DNA of every individual unique?**

**Ans.** Yes, DNA of every individual is unique except for identical twins who share 100% of their DNA profile. Other siblings share more than 50% of their DNA profile. A parent and child share 50% of their DNA profile. Unrelated individuals have several dissimilarities in the DNA profile.

**Q.3. How DNA evidence is preserved for DNA analysis?**

**Ans.** If the biological evidence is properly dried and it is prevented from heat, chemicals, bacteria, fungus, moisture and sunlight; it will not be degraded and will remain suitable for DNA analysis.

**Q.4. How long DNA evidence can survive?**

**Ans.** DNA evidence can survive indefinitely if it is dried and protected from heat, moisture, microbes and chemicals.

**Q.5. In which cases Blood can play its role as evidence?**

**Ans.** Blood may be significant in the cases of murder (homicide), attempt of murder and physical assault.

**Q.6. What forms of Blood evidence can be present on a crime scene?**

**Ans.** Blood may be present in liquid form or as dried stains on the body and clothing of victim/suspect; on the weapons/tools used in physical assault; on articles used for self-defense; or it may be found deposited on crime scene.

**Q.7. What are the collection methods for each form of blood evidence?**

Ans. Liquid blood is collected in sterile syringe or container. Dried blood can be collected using a moist, sterile cotton swab. Thick dry stains of blood may be scratched with a sterile blade and collected in paper and a druggist fold is made. Wet blood stains can be collected using a dry, sterile cotton swab. Small blood stained articles may be collected, dried and packed as a whole.

**Q.8. If victim's blood is present on suspect's body/ clothing/ crime scene; is it helpful in solving a crime?**

Ans. Yes, this type of biological evidence can be helpful in linking the victim/suspect to the crime.

**Q.9. If victim's blood is present on an article retrieved from suspect's home, car or office; is it helpful in solving a crime?**

Ans. Yes, this type of biological evidence can be helpful in linking the suspect to the crime.

**Q.10. If suspect's blood is present on victim's body/ clothing/ crime scene; is it helpful in solving a crime? How to identify whether the blood belongs to victim or the suspect?**

Ans. Yes, this type of biological evidence can be helpful in linking the suspect to the crime. Any blood stains foreign to victim may be identified by the blood spatter pattern.

**Q.11. What reference sample of deceased victim is collected in homicide cases?**

Ans. Usually, cardiac blood sample is collected as a reference sample during autopsy (post-mortem). If autopsy samples are not available, then the DNA identity of victim may be determined by DNA analyses of personal belongings of victim e.g. tooth brush, razor, clothing etc. Alternatively, the reference samples from victim's parents would be required.

**Q.12. In which cases, semen acts as an evidence?**

Ans. Semen acts as probative evidence in cases of rape, sexual assault and sodomy.

**Q.13. Where semen evidence can be found on crime scene?**

Ans. Semen may be found in vagina, rectum, oral cavity, body surface, hair, or clothing of the victim, crime scene surfaces and condom used during rape.

**Q.14. What type of evidence is collected from the rape victim?**

Ans. Following evidence items should be collected from the rape victim:

- Vaginal, rectal and oral swabs of the victim (for the detection of semen and DNA analysis).
- Swabs from bite marks and licked/kissed areas (for the detection of saliva and DNA analysis).
- Any foreign hair on victim's body (for the detection of foreign DNA).
- Victim's clothing (for the detection of semen and DNA analysis).
- Fingernail scrapings in case of self-defense and scratching of the suspect's body.

**Q.15. What type of evidence is collected from suspect of the rape?**

Ans. If the rape suspect is arrested within few hours of rape, his penile swabs must be taken for the detection of victim's DNA along with reference buccal swabs.

**Q.16. Is the reference sample of victim's husband also required for forensic DNA analysis?**

Ans. Reference buccal swabs of victim's husband/sexual partner are required for elimination purpose.

**Q.17. Is semen required as a reference sample from suspect in rape cases?**

Ans. No, semen is not required as a reference sample from suspect in rape cases. All body cells contain similar DNA; therefore, buccal swabs will be collected as reference sample.

**Q.18. For how long semen remains detectable in a vaginal swab of the victim?**

Ans. Generally, semen may be detectable on vaginal swab collected within 72 hours of sexual intercourse.

**Q.19. Who collects the vaginal/rectal swabs of the victim?**

Ans. An authorized and qualified medico-legal doctor will perform medical examination and collect vaginal/rectal swabs. The swabs must be completely dried, packed and sealed in paper envelopes.

**Q.20. What is a reference sample and why it is required? What type of reference sample is taken for DNA analysis in PFSA?**

Ans. A reference sample is required for determination of a suspect's, victim's or witness' DNA identity so that it could be compared with DNA profiles obtained from crime scene evidence. This comparison between crime scene and reference sample may result in a match, mismatch or inconclusive results. In case of a match, a link between reference and crime scene sample is established that can be proved in the court of law.

**Q.21. What is touch DNA? Where it can be present at crime scene?**

Ans. Touch DNA is the DNA obtained from skin cells of an individual that are transferred to an article on intimate contact. Touch DNA may be found on firearms, tools, eating and drinking utensils, jewelry items, mobile phones and contact areas of clothing of the individual.

**Q.22. In which type of cases saliva may be useful as biological evidence and where it is found on crime scene?**

Ans. Saliva may be useful in any type of case where the oral contact of an individual is suspected. Evidence items that may contain saliva include cigarette butts, drinking bottles and cups, chewing gums, eaten food items, bite marks and licked articles.

**Q.23. Which body parts may be useful in DNA analysis for dead body identification in mass disaster, accident and unidentified bodies?**

Ans. Long bones, teeth and nails may be useful for dead body identification.

**Q.24. What reference samples may be required for missing person and unidentified body identification?**

Ans. The reference sample required for the determination of DNA identity of a missing person or unidentified body includes the personal belongings of victim e.g. tooth brush, razor etc. Alternatively, the reference samples from victim's parents would be required.

**Q.25. Can victim change clothes, wash clothes and body parts or urinate after the rape/sodomy incident before evidence collection?**

Ans. No, victim must not change clothes, wash clothes and body parts before evidence collection. She/he should urinate only if there is an urgent need, however, the genital area should not be washed after urination. Only dry tissue papers can be used to wipe the genital area and this tissue is also preserved and collected as evidence.

**Q.26. Why should blood and semen stains on clothing be dried before packing? Which type of bag is used for the packing of biological evidence?**

Ans. Blood and semen stains on clothing must be dried before packing so that the DNA evidence is well preserved. The dried biological evidence should be sealed in a brown paper bag and labeled properly.

**Q.27. What information must be written on the evidence packing and what documentation is required?**

Ans. Description of item, case number, item number, date and time of collection, initials of the collector and victim's name should be written on the packing. Date and initial should be written in a way that part of them is on the evidence tape and the rest is on envelope. Photographs of the evidence items should be taken before collection and after packing using size scales.

**Q.28. What is contamination and how it is prevented?**

Ans. Contamination is the addition/mixing of foreign DNA in biological evidence. The source of this contamination may be the person(s) handling the evidence, the environment, or other evidence items. Following measures may be taken to avoid contamination.

- Employing careful collection technique and using personal protective equipment i.e. gloves, face mask and coat.
- Changing gloves between handling of different evidence item.
- Having minimal contact with the evidence items i.e. by using sterile forceps.
- Avoiding drinking, eating, sneezing and talking near the biological evidence.
- Preventing mixing of different evidence items in same packing.

**Q.29. Is biological evidence hazardous for the person collecting it? What preventive measure should be taken while handling biological evidence?**

Ans. All biological evidence must be considered potentially hazardous because hepatitis and AIDS viruses, pathogenic bacteria and human parasites may be present in biological material. Personal protective equipment (gloves, face mask, coat, goggles) must be worn during evidence handling.

# COMPUTER FORENSIC DEPARTMENT

## COMPUTER FORENSIC

Computer forensics is a branch of Forensic Science pertaining to legal evidence found in computer systems and digital storage medium. It is to perform forensic investigation on digital evidence while maintaining the documented chain of custody so that it can be presented as evidence in the court of law.

## SCOPE OF COMPUTER FORENSICS UNIT

- Scientific examination and analysis of Digital Storage Media for example Hard Drives, Flash Memory, Floppy Disks, CD/DVD etc.
- Forensic Analysis of Mobile Phones and Personal Digital Assistants (PDAs).
- Forensic Examination of standalone/networked computers after a break-in, for example, to determine how the attacker gained access and what the attacker did.
- Retrieve/acquire evidence from digital media.
- Recovery of deleted digital data in case of damaged hardware that may have evidentiary value.
- Recovery of deleted digital data in case of software failure that may have evidentiary value.
- Forensic Analysis of retrieved and/or submitted media.
- To provide expert testimony on resultant analysis on Agency cases in the Court.

## COLLECTION, PRESERVATION AND TRANSPORT OF DIGITAL EVIDENCE

When packing digital evidence:-

1. All items should be packed in suitable sized containers that will prevent contamination or deleterious change.
2. Ensure that all digital evidence collected is properly documented, labeled, marked, photographed and inventoried before it is packed.
3. Remember that digital evidence may also contain latent, trace, or biological evidence and take the appropriate steps to preserve it.
4. Pack all digital evidence in anti-static packing to prevent it from static electricity. Only paper bags and envelopes, cardboard boxes and antistatic containers should be used for packing of digital evidence.
5. Evidence should be packed in a manner to avoid from being bent, scratched or otherwise deformed. Plastic material should not be used for packing.
6. Collect all power supplies, cables and adapters for all electronic devices seized.
7. Shock resistance packing should be used to avoid physical damage to any component of the device(s).
8. Label all containers used to pack digital evidence clearly and properly.
9. Main system units and/or notebooks need to be secured in an appropriate container to avoid tampering or spoliation of the potential digital evidence that could reside in it.
10. The packing areas should be void of ultraviolet (UV) light (present in some types of fluorescent tubes). UV may hasten the degradation process.



11. The packing environment should have a mould temperature and humidity. An extreme environment can lead to spoliation of potential evidence, example mould growth.
12. The collected digital device(s) should be stored in a secure environment or a location that is not subject to extreme temperature or humidity. It should not be exposed to magnetic fields, dust, vibration, moisture or any other environmental elements that may damage it.
13. Leave Mobile Devices/ Smart Phones in the power state (On or Off) in which they are found.
14. Mobile Devices/ smart phones should be isolated from the Network using Network Isolation Techniques i.e. Faraday Isolation bags, Radio Frequency shielding material, anti-static packing and aluminum foils.
15. All items are packed in containers that can be sealed.
  - a) The seals must display the initials of the Submitting Agency Personnel, creating the seal.
  - b) The seals must display the date when the seal is created.
  - c) The seals must be made from a material that is tamper evident. The removal of the seal must cause some visible damage to the container that can indicate that the seal has been removed or tampered with.
16. The evidence packing is labeled with at least the Submitting Agency case number and item number.

#### **EVIDENCE TRANSPORTATION PROCEDURES**

When transporting digital evidence:-

1. The Potential Digital Evidence should not be left unattended during the transportation process.
2. The DEFR should maintain the Chain of Custody throughout the transporting process to prevent possible tampering or spoliation, and maintain the integrity and authenticity of the digital devices and evidence.
3. Keep digital evidence away from magnetic fields such as those produced by radio transmitters, speaker magnets, and magnetic mount emergency lights. Other potential hazards are seat heaters and any device or material that can produce static electricity.
4. Avoid keeping digital evidence in a vehicle for prolonged periods of time. Heat, cold, and humidity can damage or destroy digital evidence.
5. Ensure that computers and electronic devices are packed and secured during transportation to prevent damage from shock and vibration.
6. Document the transportation of the digital evidence and maintain the Chain of Custody on all evidence transported.

#### **EVIDENCE STORAGE PROCEDURES**

When storing digital evidence:-

1. Ensure that the digital evidence is inventoried.
2. Ensure that the digital evidence is stored in a secure, climate-controlled environment or a location that is not subject to extreme temperature or humidity.

3. Ensure that the digital evidence is not exposed to magnetic fields, moisture, dust, vibration, or any other elements that may damage or destroy it.
4. Potentially valuable digital evidence including dates, times, and system configuration settings may be lost due to prolonged storage if the batteries or power source that preserve this information fails. Where applicable, inform the evidence custodian and the forensic examiner that electronic devices are battery powered and require prompt attention to preserve the data stored in them.
5. If more than one computer is seized as evidence, all computers, cables, and devices connected to them should be properly labeled to facilitate reassembly if necessary. All computers, connections and cables should be marked with a unique label.
6. Subsequently seized computers can be labeled in alphabetical order. The corresponding connections and cables can be labeled with the letter designation for the computer and a unique number to ensure proper reassembly.

## FORENSIC TOXICOLOGY DEPARTMENT

**Forensic Toxicology** is the medico-legal investigation of death, poisoning, and drug abuse.

**Postmortem Forensic Toxicology** determines the absence or presence of drugs and their metabolites, chemicals such as ethanol and other volatile substances, carbon monoxide and other gases, metals, and other toxic chemicals in human fluids and tissues, and evaluates their role as a determinant or contributory factor in the cause and manner of death.

**The mission of Forensic Toxicology Department** is adherence to international standard operating procedures, provision of professional and unbiased scientific services to the community in the field of forensic analysis of toxic substances. Aim is the use of latest techniques and technologies to obtain accurate and reliable results and their interpretation.

The forensic toxicologists, working at PFSA, are trained in latest instrumentations used all over the world including:-

- Gas Chromatography-Mass Spectrometry (GC-MS).
- Headspace Gas Chromatography-Flame Ionization Detector (HS-GC-FID).
- Gas Chromatography-Flame Ionization Detector (GC-FID).
- Gas Chromatography-Nitrogen Phosphorous Detector (GC-NPD).
- Tox Analyzer (GC-MS with NPD).
- High Pressure Liquid Chromatography (HPLC).
- Enzyme-linked Immunosorbent Assay (ELISA).
- Fourier Transform Infrared Spectroscopy (FTIR).
- Thin Layer Chromatography (TLC).
- Co-Oximeter.
- Chemistry Analyzer.
- Atomic Absorption Spectroscopy.

### **Services provided by forensic toxicology unit of PFSA are:**

- IDENTIFICATION of toxic substances.
- SCREENING AND CONFIRMATORY tests for toxic substances.
- QUANTIFICATION of toxic constituents.
- EXPERT WITNESSING in criminal and civil courts.
- RESEARCH AND DEVELOPMENT in the field of forensic toxicological analysis.
- TRAINING in forensic toxicology.

### **FACILITIES OFFERED BY FORENSIC TOXICOLOGY LABORATORY:**

Forensic Toxicology department provides facilities for identification of drugs and poisons in antemortem and postmortem cases. Both Qualitative and Quantitative tests

are performed.

Tests performed in Forensic Toxicology Department are:

Sr. No	TEST NAME	DESCRIPTION	SPECIMEN
1.	Alcohol Panel (Liquor)	Screening and quantitation for Ethanol (Ethyl Alcohol) and other Volatiles.	2-3 Ounce Sample Or Blood or Urine Or other specimen for drunken alcohol
2.	Individual Drug Analysis	Individual testing can be requested for the following drug classes and includes screening, confirmation and quantitation: <b>NAME OF DRUG(S):</b> Cannabonoids, Cocaine, Opiates, Amphetamines, Benzodiazepines, PCP etc.	Blood or Urine Or other specimen
3.	Drug of Abuse Panel	Includes screening, confirmation and quantitation for the following drugs/chemicals: opiates, amphetamine, barbiturates, benzodiazepines, cannabonoids, carisoprodal, cocaine, fentanyl, methamphetamine, oxycodone, PCP, tricyclic anti-depressants, methadone etc.	Blood or Urine Or other specimen.
4.	Comprehensive Drug Screen	Includes screening, confirmation and quantitation for drugs of abuse, most therapeutic drugs and compounds. Also includes Alcohol Panel and sedative and hypnotic drugs.	Blood or Urine Or other specimen
5.	DFSA - Drug Facilitated Sexual Assaults Drug Panel	Additional benzodiazepine and GHB analysis.	Blood or Urine Or other specimen
6.	Carbon Monoxide	Includes screening, confirmation and quantitation of Carbon monoxide.	Blood
7.	Heavy Metals	Includes screening, confirmation and quantitation of Heavy Metals (Al, Sb, As, Ba, Bi, Cr, Cu, Au, Fe, Pb, Li, Hg, Ni, Se, Ag, Zn, Th, Cd etc.).	Blood or Urine or other specimen
8.	Clinical Chemistry	Includes quantitation of Na <sup>+</sup> , K <sup>+</sup> , Cl <sup>-</sup> , glucose, CO <sub>2</sub> , BUN, Creatinine.	Vitreous humor
9.	Cyanide Screen	Includes Screening of cyanide.	Blood or Urine or other specimen
10.	Glucose Ketone	Includes Screening of Glucose and ketones.	Blood or Urine



## **COLLECTION, PRESERVATION AND TRANSPORT OF EVIDENCE**

Collect toxicology samples as soon as possible after the offense, in death cases before embalming. Pack specimens in well-sealed, leak-proof containers, all samples must be collected in separate containers. For most specimens, disposable hard plastic or glass tubes are recommended. Blood tubes should be sealed and kept cold, but do not freeze. Never expose specimens to hot temperatures.

### **LABELING**

For a valid chain of custody, all items of evidence must be labeled with the following information:



- Name of victim or suspect.
- Case number.
- Type of specimen (i.e., Blood, Urine).
- Site of collection (i.e., Femoral, Heart).
- Amount of specimen.
- Time and date of collection.
- Name(s) of the medical examiner or person collecting the sample.

Finally, **tamper-resistant tape** with the collector's initials and the collection date should be placed over the specimen lid and container to document specimen integrity.

Alternatively, all the samples collected for a given case may be placed in a **tamper-evident container** labeled with the case number and name.

**LIQUOR:**

Liquor	50-100 ml (about 2-3 Ounce) Liquor in plastic or glass container. Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
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**LIST OF RECOMMENDED SPECIMENS FOR POSTMORTEM  
TOXICOLOGY EXAMINATION**

<b>Specimens of Choice for Drugs and Poisons Cases</b>	<b>Quantity</b>
Heart blood	50 to 100 ml in plastic or glass container (add sodium fluoride as a preservative and potassium oxalate as an anticoagulant). Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
Peripheral blood	10 to 20 ml in plastic or glass container (add sodium fluoride as a preservative and potassium oxalate as an anticoagulant). Seal the lid / cap with an evidence tape and sign across the seal as shown in Image 01.
Urine	All available up to 100 ml in plastic or glass container (do not add any preservative). Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
Vitreous Humour	All available in plastic or glass container (do not add any preservative). Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
<b>Other Specimens</b>	
Brain	100 g in plastic or glass container. Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.

Liver	100 g in plastic or glass container. Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
Bile	All available in plastic or glass container (do not add any preservative). Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
Cerebrospinal Fluid	All available in plastic or glass container (do not add any preservative). Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
Gastric contents	All available (or 100 g and record total present in stomach). Seal the lid/ cap with an evidence tape and sign across the seal as shown in Image 01.
Crime Scene Samples	Collect case related evidence found at the crime scene i.e. drugs, drug paraphernalia, cups or bottles and suspicious household products. Seal with an evidence tape and sign across the seal as shown in Image 01.



# FORENSIC PATHOLOGY AND HISTOLOGY

## INTRODUCTION

A reliable death investigation system is essential to a properly functioning justice system, which in turn strengthens a safe and fair society. Forensic pathology is the core discipline in the medico-legal investigation of death. It is not the only discipline, but it is the main one, and it is common to every developed death investigation system. Forensic pathology applies the principles and knowledge of the medical science to many legal issues within the field of law. The Department of Forensic Pathology is responsible for determining the cause and manner of death, identifying the deceased if unknown and determining the approximate time of death or injury. Forensic pathology is concerned primarily with the investigation of sudden, violent, suspicious and unexpected deaths.

## SERVICES PROVIDED BY FORENSIC PATHOLOGY DEPARTMENT

The department of forensic pathology provides the following services:

- A full fledge autopsy service is available in department of Forensic Pathology.
- Well established and state of the art autopsy hall is available for postmortem examination.
- Forensic pathology also has an additional autopsy room for the postmortem of decomposed bodies.
- Fixed and mobile X-ray units are available to take x-rays of the desired parts of the dead body.
- Histopathology lab, equipped with all necessary and latest instruments, provides the histological/ microscopic findings of the tissue specimens taken from the autopsy or the tissue samples received from outside hospitals or laboratories.
- Forensic pathology has two body storage refrigerator rooms and two body





storage freezers for temporary storage of dead body.

- PFSA provides Forensic Histopathology services to ascertain cases and manner of death after examination of body tissues from autopsy centers of entire Punjab, where Forensic Histopathology service is not available.

## **COLLECTION, PRESERVATION AND TRANSPORT OF EVIDENCE**

Mini Autopsy means examination of all viscera (heart, lungs, liver, spleen, kidneys, gastrointestinal tract and brain), along with tissues of special interest (e.g. neck tissues in cases of strangulation, tissues around the bullet tract with tissues from exit and entry wound in gunshot cases, etc). Mini autopsies constitute a QC and QA procedure for autopsies conducted in 800 autopsy centres of Punjab and elsewhere, where Forensic Histopathology services are not available. Approx. 1/3<sup>rd</sup> of all Medico legal autopsies are referred for Histopathological examination of the tissues, to reach the final diagnosis as to cause and manner of death, injuries inflicted during life or after death; and to ascertain the role of various contributory factors in the process of death. More than 2500 such cases are referred per year. Major problems encountered in such tissues sent from outside, are briefly mentioned here:

### **POOR FIXATION:**

The tissues are fixed in formalin solution, which is formaldehyde gas dissolved in water. With time, it's concentration declines gradually, especially if the lid of container is not tightly closed.

If the tissues are sent in formalin which is below 10%, the tissues get autolysed. Therefore, good quality, freshly prepared formalin should be used to fix the tissues.

Brief medical history of the deceased should be clearly mentioned in the forwarding letter.

### **PACKING OF HISTOPATHOLOGY (TISSUE) SAMPLES:**

Completely immerse the tissues into 10% formalin solution in a plastic jar having screwed lid.

Quantity of formalin solution should be 3 – 4 times the tissue size.

Tightly close the lid. Place evidence tape around the lid. Sign the evidence tape at regular intervals so that half part of the signature is on the evidence tape and the other half of the signature is on the container. Place stamps on the evidence tape in a similar manner. If evidence tape is not available, stamped red wax seals may be used as an alternative. Place the sealed container/jar in a plastic bag and tie the knot.

### **LABELLING OF SAMPLES:**

Mention following information on the label on sample jars:

- i. Name of the deceased.
- ii. Case number.
- iii. Sample details.
- iv. Date and Time of sampling.
- v. Collectors name, designation and signature.

### **TRANSPORTATION OF SAMPLES:**

Place the sealed jar/s in an appropriately sized card board box and secure the containers in the box. Mention upper side on the box. Apply evidence tape at all opening slots of the card board box. Sign and stamp the evidence tape as mentioned above. Attach chain of custody form with the box.

The sample jars may be transported individually as well. However, make sure that during transportation, they are kept in upright position, so that formalin is not drained out. Otherwise tissues would get dry and autolysed.

Put postmortem report and all other documents along with sample of evidence tape and sample of signatures and stamp in an envelope. Seal the envelop with evidence tape with signature and stamp as described above. If evidence tape is not available, stamped red wax seal may be used alternatively, as described above.

Send the histopathology samples and documents to PFSA .

# FIREARMS AND TOOL MARKS DEPARTMENT

**Firearms Identification is one of the prominent disciplines of forensic science.**

Firearms identification can be defined as;

*A discipline of forensic science which has its primary concern to determine if a bullet, cartridge case or other ammunition component was fired via particular firearm.*

Firearms Identification is actually a form of tool marks identification where the firearm acts as a tool to leave unique marks on the various ammunition components that come into contact with the firearm as it is made of a material harder than the ammunition component.

## SERVICES

- Examination of submitted firearm to determine its manufacturer, model, caliber, serial number, and its functionality.
- Examination of evidence bullets and cartridge cases to determine (with submitted firearms) if either or both of ammunition parts were fired in or from the firearms.
- Examination of the evidence ammunition to determine the manufacturer, bullet type, and country of origin (where manufactured).
- Examination of submitted tools in conjunction with evidence tool marks to determine if the tool was used to create the tool mark.
- Restoration of altered, modified, or obliterated serial numbers on a wide variety of numbered items such as firearms, motor vehicles, bicycles, electronics, etc.
- Analysis of Gunpowder Patterns and Shotgun Shot Pattern Analysis on a variety of evidence, using submitted firearms and ammunition to determine the distance from muzzle to the point of impact.
- Shooting scene reconstruction – using trajectory analysis to determine the sequence of two or more events in a particular incident utilizing information derived from the physical evidence.
- Analysis of Gun Shot Residue (GSR) – using various chemical instrumental techniques to determine if an individual has either fired a firearm or been in close proximity when the firearm was discharged.

## COLLECTION, PRESERVATION AND TRANSPORT OF EVIDENCE

In order to minimize safety risks and contamination of evidence the following measures should be followed while packing the evidence:

1. Every evidence exhibit must be packed separately.
2. Every firearm must be packed in unloaded condition with safety on.
3. There must not be live rounds in the chamber of the firearm, magazine or in the parcel.
4. Every cartridge case and bullet must be packed separately.
5. Evidence submitted for Gun Shot Residue (GSR) analysis must be packed in hard box instead of cloth bag or paper envelope. Layers of the clothes

containing GSR must not touch with the other layers. Clothes must be wrapped by placing a white paper sheet between the layers of clothes before packing it in a hard box.

6. For serial number restoration of firearms, area containing obliteration should be marked clearly if there is more than one location of obliteration.
7. Nature of examination must be clearly indicated in the docket.
8. For trajectory analysis, vehicles must not be washed or cleaned at all prior to examination. Suspected bullet holes must be covered with white paper.
9. Seals must be intact and as per mentioned in the docket.
10. If firearm is recovered from water or any other liquid, then submit the firearm with the same sample of water or liquid from which it has been recovered.



## **AUDIO VISUAL ANALYSIS DEPARTMENT**

Audio Visual Analysis Department deals with the scientific examination, comparison and/or evaluation of audio and video evidence in legal matters.

The Audio Visual Analysis Department is equipped with latest forensic tools for audio and video analysis which are used all over the world in Forensic Community and are also approved by LEVA (Law Enforcement/Emergency Video Association). We provide the following services:

- Clarification of Audio evidence using different noise reduction and other algorithms.
- Clarification of Video evidence for identification and association of different events captured by video surveillance systems.
- Analysis of images extracted from video evidence using forensic enhancement and clarification tools

### **COLLECTION, PRESERVATION AND TRANSPORT OF EVIDENCE**

1. All items should be packed in containers of suitable size.
2. All items should be packed in containers that will prevent contamination or deleterious change.
3. Ensure that all evidence collected is properly documented, labeled, marked, photographed and inventoried before it is packed.
4. Remember that evidence may also contain latent, trace, or biological evidence so take appropriate steps to preserve it.
5. Pack all digital evidence in anti-static packing to prevent it from static electricity. Only paper bags and envelopes, cardboard boxes and antistatic containers should be used for packing of digital evidence.
6. The video evidence should be collected in its original format as it is recorded on the recording device (DVR, VCR, etc).
7. Evidence should be packed in a manner to avoid getting bent, scratched or otherwise deformed. Plastic material should not be used for packing.
8. Collect all power supplies, cables and adapters for all electronic devices seized.
9. Shock resistance packing should be used to avoid physical damage to any components of the device(s).
10. Label all containers used to pack digital evidence clearly and properly.
11. The packing areas should be void of ultraviolet (UV) light (present in some types of fluorescent tubes). UV may hasten the degradation process.
12. The packing environment should have a mild temperature and humidity. An extreme environment can lead to spoliation of potential evidence, for example mould growth.
13. All items are packed in containers that can be sealed.
  - a. The seals must display the initials of the personnel creating the seal.



- b. The seals must display the date when the seal is created.
  - c. The seals must be made from a material that is tamper evident. The removal of the seal must cause some visible damage to the container that can indicate that the seal has been removed or tampered with.
14. The evidence packing is labeled with at least the Submitting Agency case number and item number.

#### **EVIDENCE TRANSPORTATION PROCEDURES**

When transporting audio/video evidence:

1. Keep the evidence away from magnetic fields such as those produced by radio transmitters, speaker magnets, and magnetic mount emergency lights. Other potential hazards are seat heaters and any device or material that can produce static electricity.
2. Avoid keeping the evidence in a vehicle for prolonged periods of time. Heat, cold, and humidity can damage or destroy the evidence.
3. Ensure that computers or electronic devices are packed and secured during transportation to prevent damage from shock and vibration.
4. Document the transportation of the evidence and maintain the Chain of Custody on all evidence transported.

#### **EVIDENCE STORAGE PROCEDURES**

When storing audio/video evidence:

1. Ensure that the digital evidence is inventoried.
2. Ensure that the digital evidence is stored in a secure, climate-controlled environment or a location that is not subject to extreme temperature or humidity.
3. Ensure that the evidence is not exposed to magnetic fields, moisture, dust, vibration, or any other elements that may damage or destroy it.

## QUESTIONED DOCUMENTS DEPARTMENT

The Questioned Documents Section of the Punjab Forensic Science Agency, Lahore is responsible for examining any document about which a question has been raised concerning its authenticity in the court of law. These examinations can take many forms. They include the examination of handwriting and signature to determine its author, the examination of typewriting, the examination of altered documents, the examination of indentations on paper, the non destructive examination of inks and other types of examinations.

The handwriting of most adults does lend itself to identification. Handwriting examinations involve the comparison of known writing from one or more subjects with the questioned writing. The questioned writing may be on cheques, anonymous and/or threatening letters, bank hold-up notes, wills, mutations etc.

Sometimes, Photocopied documents can be matched back to their source by the observation of “trash marks” on the paper.

Altered documents can be of several different varieties. Erasures can be detected with proper lighting techniques, although identification of the original information may not be possible in every case. Obliterations may take several forms, including the use of opaquing material, marker pens or simply using a ballpoint pen to mark over earlier writing. Special lighting and magnification techniques and the use of the Video Spectral Comparitor (VSC) can frequently reveal the information underneath the obliteration. On the bank cheques, the amount may have been altered. The VSC can reveal the presence of different inks in the amount area.

Handwriting indentations are caused when someone writes on the top sheet of a pad or stack of paper. Indentations of the original writing will be impressed into the pages below. The Electrostatic Detection Apparatus (ESDA) is a non-destructive method to develop and preserve these indentations.



## **COLLECTION, PRESERVATION AND TRANSPORT OF EVIDENCE**

1. Pack the questioned document evidence in paper envelope of appropriate size and do not fold the questioned documents.
2. Write the necessary information on the envelope before packing the questioned document evidence in it. Do not write anything on the envelope after the evidence has been packed.
3. If the questioned document evidence is requested for indented writing/latent fingerprints test, then pack the evidence carefully in such a way that it is not rubbed with other packed documents.
4. Envelopes used for packing the evidence should protect the evidence from wear and tear and contamination.
5. Make sure that all the necessary documents required for the case are attached with and properly documented.
6. Case documents should be protected from severe environmental conditions such as moisture and fire.
7. If the questioned evidence consists of charred or water soaked documents, then pack them in a suitable hardboard box/container packed with cotton cushion so as to protect them from further destruction.
8. Dispatch the evidence in properly sealed form {sealed with wet seal (lock)/evidence tape}.



# LATENT FINGERPRINT DEPARTMENT

## INTRODUCTION:

Thousands of years ago, Chinese used thumb prints on legal documents and on criminal confessions. It is perhaps the first sign of recognition that a person's fingerprints are unique.

The use of fingerprints in the identification of criminals is the most frequently applied technique in forensic science. Fingerprints offer a powerful means of personal identification and still remain the most commonly used forensic evidence worldwide. No two individuals possess the same fingerprints. Because of this, fingerprints are an excellent means of identification. Moreover, while other visible human characteristics change – fingerprints do not change.

The Latent Fingerprint Department has fully equipped Labs and high-quality scientific services are provided. It is ensured that all examinations and documentations are in compliance with ASCLD-LAB and SWGFAST guidelines.

## SERVICES OFFERED BY LAB:

The high quality scientific services offered by the Lab are:

- Scientific examinations in the area of friction ridge analysis and comparison of latent finger and palm prints.
- Comparison of the patent fingerprint impressions in the property cases.
- Development and processing of latent prints.
- Report the findings and provide expert testimony related to these examinations in the legal proceedings.
- Establish the identity of unknown deceased persons.



<b>Date:</b>	<b>-Sketch of Latent Lift Location- (indicate latent lift orientation)</b>
<b>Case#</b>	
<b>Offense</b>	
<b>Recovery Location (Address):</b>	
<b>Location of Latent Lift #:</b> _____ _____ _____	
<b>Officer:</b> _____	
<b>Badge/Code #:</b> _____	

If latent prints at a crime scene appear to be visible (patent prints), or if the lift process may pose unique challenges, the latents should be photographed. However, if any item of evidence is to be submitted to the lab for processing, it is best not to attempt any field recovery of latent prints.

**Item** - Non-porous or non-absorbent surfaces (Glass, Metal, Tile, etc. may be processed in the field.)

**Method** – Generally, fingerprint powders should be used. Black powder is preferred because it produces the best ridge reproduction and is easier to compare. For powders to be used, the surface must be dry. Wet items should be allowed to fully air-dry. The use of a hair dryer may produce too much heat causing the moisture in the latent print to evaporate.

**\*Reminder:** Whenever possible, non-porous items should be processed at the crime scene and the processed latent print(s) lifted, providing no other evidence (hair, fibers, blood, etc.) are present.

**Discussion** - Unnecessary transportation and handling may damage or even destroy a print(s). In some cases, Cyanoacrylate Ester (commonly referred to as Super Glue Fuming) may be considered.

This technique has proven successful in developing latent prints on items such as plastic baggies, Firearms, Styrofoam, and some types of leather.

**Item** - Porous or absorbent surfaces (Paper, Untreated Wood, Cardboard, etc.)

**Method** – Generally, a variety of chemical processes are available. The photography of chemically developed latent prints is essential. Prints may fade or even completely disappear from the surface.

**EXAMPLES OF CHEMICAL PROCESSES:**

Cyanoacrylate Ester, Ninhydrin, Physical Developer, Amido Black.

### **DRY PAPER ITEMS:**

Dry paper items can be collected and placed into plastic check (document) protectors or plastic bags (zip-lock).

### **WET PAPER ITEMS:**

Wet paper items should be air dried and once dried can be packed.

### **DISCUSSION:**

Identifiable prints have been developed on items that have been exposed to water. Care should be taken when handling these items. Keep to a minimal amount of handling, even when wearing vinyl or cloth gloves. Glove marks have been developed with certain processes. Powder processing will prevent the application of chemical processes which might have given more favorable results; therefore, avoid processing porous items prior to lab submission.

### **SAFETY CONSIDERATIONS:**

1. Chemical processing should not be performed in the field.
2. Safety goggles, approved mask and/or respirator, gloves and other safety apparel should be worn.
3. A fuming hood is recommended.
4. As with cyanoacrylate fuming, it is recommended that you should not attempt to chemically process items if your agency does not have the capability to perform the latent examinations and comparisons of the developed prints.
5. If you feel chemical processing will yield the best results and your agency does not have a latent prints examiner, submit the untreated item to the laboratory for processing.

**Item** - Patent (Visible) prints.

**Method**- Close-up Photographs should be taken before the prints are collected.

### **IMPORTANT COLLECTION CONSIDERATIONS:**

For visible prints on small objects, such as a window pane, collect the entire object. If the item is too large to submit, such as a bloody patent print on a wall, it may be





necessary to cut out a section of the wall with the patent print. Be sure to leave a reasonable amount of wall surface material surrounding the patent print. A protective covering may be placed over the print provided that the covering does not come into contact with the print. An example: if the print is on a door, a small paper box can be taped to the door, over the print for protection.

**DISCUSSION** – Photographs are important because damage to the impression may occur during attempts to remove the surface containing the print.

Avoid pressing or touching the impression with your finger or any object to see if the substance is dry or tacky. Doing so may result in damage to the print.

#### **SUBMISSION REMINDERS**

Indicate all requested forensic examinations on the Request for Laboratory Examination Form. If it is a re-submission, note the previous Forensic Laboratory number in the appropriate space on the request form.

Do not process any items that you are planning to submit to the laboratory and do not place tape over items of evidence where you think there might be latent prints.

Ensure that sharp objects such as broken glass or knives are packed safely and are properly labeled: e.g.;

**NOTE:** *Paper bags are not considered to be good packing materials for sharp or broken objects. Sharp objects can easily puncture the bag and cause injury.*

Good quality known prints are important and necessary. Smudged or blurred prints, overlays, too much ink, prints outside the blocks or off-centered, etc., will reduce the chances for an identification to be effected.

If suspects are known, please obtain a set of *Major Case Prints*, or an original set of fingerprint and palm print cards and submit them with the evidence.

Clear, full size copies of attested known fingerprints may be submitted in lieu of originals if the originals are not available.

Take elimination fingerprints of the victims, family members, caretakers, etc.

# NARCOTICS DEPARTMENT

## INTRODUCTION

The Narcotic Unit is routinely called upon to analyze drug evidences submitted by criminal justice agencies which involve controlled drugs, narcotics and Marijuana. This laboratory provides continuous and routine controlled substances analysis services for law enforcement agencies by Chemical testing procedures which are employed to analyze natural and synthetic controlled materials. Chemical specialists use technical equipment such as Gas Chromatography/Mass Spectrometer, Fourier Transform Infrared Spectrometer, Ultraviolet-Visible Spectrophotometer, Stereoscopes to analyze samples.

## CAPABILITIES OF NARCOTIC UNIT:

Presently narcotic unit is equipped with most advanced instruments for the identification and confirmation analysis of controlled substances e.g.

- Cannabis (Bhang).
- Heroin.
- Hashish (Charas).
- Hallucinogen either natural or synthetic origin e.g. LSD, MDMA.
- Identification of pharmaceutical products (controlled drugs) in tablet, capsule and injectable (morphine, benzodiazepines, barbiturates).

The active ingredient quantity (percentage purity) of the controlled substance can also be determined.

Collect the Narcotics samples as soon as possible after the offense. Pack specimens in well-sealed, leak-proof neat plastic bag, cloth wrap or paper wrap. All



samples must be collected in separate plastic bag, cloth wrap or paper wrap properly sealed and stamped by the collecting personnel along with necessary information. Never expose specimens to hot temperatures.

#### LABELING

For a valid chain of custody, all items of evidence must be labeled with the following information:

- Name of victim or suspect.
- Case number.
- Type of specimen (i.e., Narcotic Plant material, narcotic medicines, Injections, cigarettes, used syringes, Chars, capsules, opium).
- Amount of sample.
- Time and date of collection.
- Names, stamp, designation of person collecting the sample.

Finally, the sample collected must be sealed with molten wax seal to document specimen integrity. A reference seal sample must be attached along with the packed sample.

Alternatively, all of the samples collected for a given case may be placed in a **tamper-evident container** labeled with the case number and name.

#### LIST OF RECOMMENDED SPECIMENS FOR NARCOTICS EXAMINATION

Specimens of Choice For Narcotics Cases	Instructions for preservations
Whole Plant or plant parts (Bhang, Opium, Leaves, Stem, Flowering Tops, Floral Buds etc.).	Plant materials should be dried in shade and packed in paper bag properly sealed and signed thereof by collecting personnel (as shown in picture 1).
Charas, Gardaa, Hashish Oil, or resinous material such as Charas.	Charas and Gardaa are preserved in paper wrap, paper envelop, or cloth or plastic bag properly sealed with red wax seal and signed thereof by collecting personnel along with date. Hash Oil should be preserved in plastic or glass bottle with cap evidently sealed and signed (as shown in picture 2).
Heroin and other suspicious powders.	Such samples must be preserved in paper wrap or plastic bag, sealed and stamped with red wax seal duly signed by collecting personnel along with name of sample, date and quantity.
Suspicious Narcotic Pharmaceuticals (Medicines).	Bulk tablets/capsules or blisters of tablets / capsules (complete or used), controlled injections (ampules/vials) should be preserved in zip lock plastic bag duly sealed and stamped with wax stamp, and signed by collecting personnel along with date.

- (1) Paper Envelop Packing of Plant Material. (Write name of sample, signature, date and amount of sample at the sealing evidence tape).



- (2) Cloth sealing. (Write name of sample, signature, date and amount of sample at the sealing evidence).



- (3) Paper strip, Plastic zip lock, Envelop Packing of powder material (write name of sample, signature, date and amount of sample at the sealing evidence tape).



- (4) Plastic zip lock Envelop Packing of pharmaceutical blister or bulk tablets/ capsules (write name of sample, signature, date and amount of sample at the sealing evidence tape).



## POLYGRAPH DEPARTMENT

A polygraph (popularly referred to as a lie detector) is an instrument that measures and records physiological changes in blood pressure, pulse, respiration, and skin conductivity while the subject answers a series of questions, in the belief that deceptive answers will produce physiological responses that can be differentiated from those associated with non-deceptive answers.

Polygraph testing can be successfully employed:

- To verify the statements of victims.
- To establish the credibility of witnesses.
- To evaluate the truthfulness of suspects and to help exonerate the innocent who is surrounded by circumstantial or uncorroborated evidence.
- To hire and select potential employees (pre-employment screening).
- For security clearance of potential employees.
- For the surveillance of employees working on sensitive positions.
- For the detection or deterrence of spying in military and intelligence communities.
- To solve domestic disputes such as spouse, cheating or infidelity.
- For solving disputes over property and business matters.
- By employers and companies on issues of employee theft.
- To detect and deter computer and other workplace crimes like fraud, corruption, collusion with vendors/suppliers, sabotage, theft of corporate.

Based on the studies now available, experts assess the accuracy of polygraph examinations administered by a competent examiner to be about 90%. *Level of skill and experience of the examiner plays an important part in the accuracy of the examination.* Comparative studies have shown that polygraph tests yield an accuracy that equals or exceeds that of many other forms of evidence.

