PHYSICAL EVIDENCE MANUAL

OREGON STATE POLICE

FORENSIC SERVICES DIVISION

PREFACE

The purpose of this handbook is to educate our customer in the Criminal Justice System regarding the services provided by the Oregon State Police Forensic Services Division, and the recommended methods of documenting, collecting, and preserving physical evidence to ensure the best analysis results.

The value of properly collected physical evidence followed by examination and interpretation by the forensic laboratory cannot be over-emphasized.

Every attempt has been made to make this handbook as current and up-to-date as possible; however, it should be noted that the field of forensic science is expanding at a rapid rate. New techniques and procedures are constantly being developed, providing new capabilities or refinements to existing capabilities.

Consequently, techniques, procedures and capabilities contained herein may change in the future. All agencies are encouraged to keep in regular contact with their local laboratory to keep abreast of any such changes. This handbook will be stored on the State Police Internet site: http://www.oregon.gov/osp/FORENSICS/docs/PhysEvidenceManual.pdf

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FORENSIC SERVICES DIVISION MISSION STATEMENT

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MISSION STATEMENT
The mission of the Department of Oregon State Police is to enhance livability and safety by protecting the people, property and natural resources of the state.

The purpose of the Forensic Services Division (FSD) is to provide timely and accurate scientific, technical, and investigative support to the criminal justice system through forensic analysis.

GOALS AND OBJECTIVES
The goals and objectives are based upon the needs of the Criminal Justice System and the agencies served by the Forensic Services Division laboratories.

FORENSIC SERVICES DIVISION GOALS

- provide timely, uniform delivery of services.
- match services with customer expectations.
- continue to provide a reliable, scientifically sound, high quality work product.
- maintain a highly qualified, motivated staff.
- strive for effective communication within the Division.
- make every effort to obtain adequate resources (monies, equipment, facilities and staffing) and optimize their use to achieve its goals and objectives.

INTRODUCTION

Oregon's first forensic laboratory was established on June 14, 1939 under ORS 181.080 and located at the University of Oregon Medical School in Portland.

The laboratories have been nationally accredited since 1985, and are accredited to ISO/IEC 17025, the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) supplemental standards. Additionally, the DNA unit is also accredited to the FBI Quality Assurance Standards.

The services of the laboratories are available to all local, state, and federal law enforcement agencies in Oregon for the purpose of rendering assistance in criminal investigations and judicial proceedings. Casework will also be conducted for the defense upon court order. Normally, all laboratory examinations, court appearances, and travel expenses are available without charge.

There are five laboratories across the state of Oregon located in Bend, Central Point, Clackamas (Portland Metro), Pendleton and Springfield. The labs will provide services in the scientific examination of physical and digital evidence, collection and preservation of evidence, reconstruction of major crime scenes and expert testimony regarding the scientific examinations according to the legal directions listed above. In addition, the FSD manages and administers the CODIS database and the State of Oregon's breath-testing instruments and officer certification.

The following is a list of the disciplines and a brief description of the type of forensic services provided.

BIOLOGY PROCESSING
The screening and preliminary processing of physical evidence for biological material (e.g., blood, semen, saliva).

BREATH ALCOHOL PROGRAM (IMPLIED CONSENT UNIT)
The Implied Consent Unit services Oregon's Breath Alcohol Program. The Unit approves breath alcohol instruments, certifies the instruments, provides instrumentation, training and certification for the users and offers expert testimony.

CONTROLLED SUBSTANCES
Qualitative analysis of solid dose physical evidence to determine if a controlled substance is present. Also includes the analysis of evidence collected from suspected clandestine laboratory scenes to determine the identification of chemicals and processes used to manufacture controlled substances. Quantitative analysis may be performed on an as needed basis for methamphetamine cases only.

CRIME SCENE/FIELD INVESTIGATIONS
The analysis of physical locations or objects suspected to be involved in a crime. Analysis will include recognition, documentation, collection and preservation of evidence and/or performing

scientific analysis, interpretation, and reconstruction.

DNA ANALYSIS
The analysis of biological evidence for the presence of nuclear DNA. If a DNA profile is developed it will be compared to relevant standards and/or searched in the CODIS database. Current DNA analysis is accomplished using the polymerase chain reaction and capillary electrophoresis to examine short tandem repeats. The DNA unit also manages and administers the State's CODIS database.

FIREARMS/TOOLMARKS
Screening and comparisons of bullets and cartridge cases, firearm functionality, caliber determination of cartridge cases and projectiles, proximity determination tests and restoration of obliterated markings. Tool mark analysis compares marks left during the commission of a crime to test marks from a tool possibly used in the crime. The IBIS database is used for the correlation of fired cartridge cases to other entered cartridge case evidence in an attempt to provide links to previously unknown related crimes.

LATENT PRINTS
Latent print processing is the physical and chemical processing of evidentiary items to develop and preserve friction ridge detail. Latent print comparison is the subsequent comparison of friction ridge detail to a person or persons. AFIS and IAFIS databases, databases composed of known fingerprint standards, are used for searching unknown latent prints.

TOXICOLOGY
The qualitative analysis of biological fluids (e.g., blood and urine) for alcohol, controlled and non-controlled substances and poisons. Quantitative analysis is performed on blood alcohol and post-mortem toxicology cases.

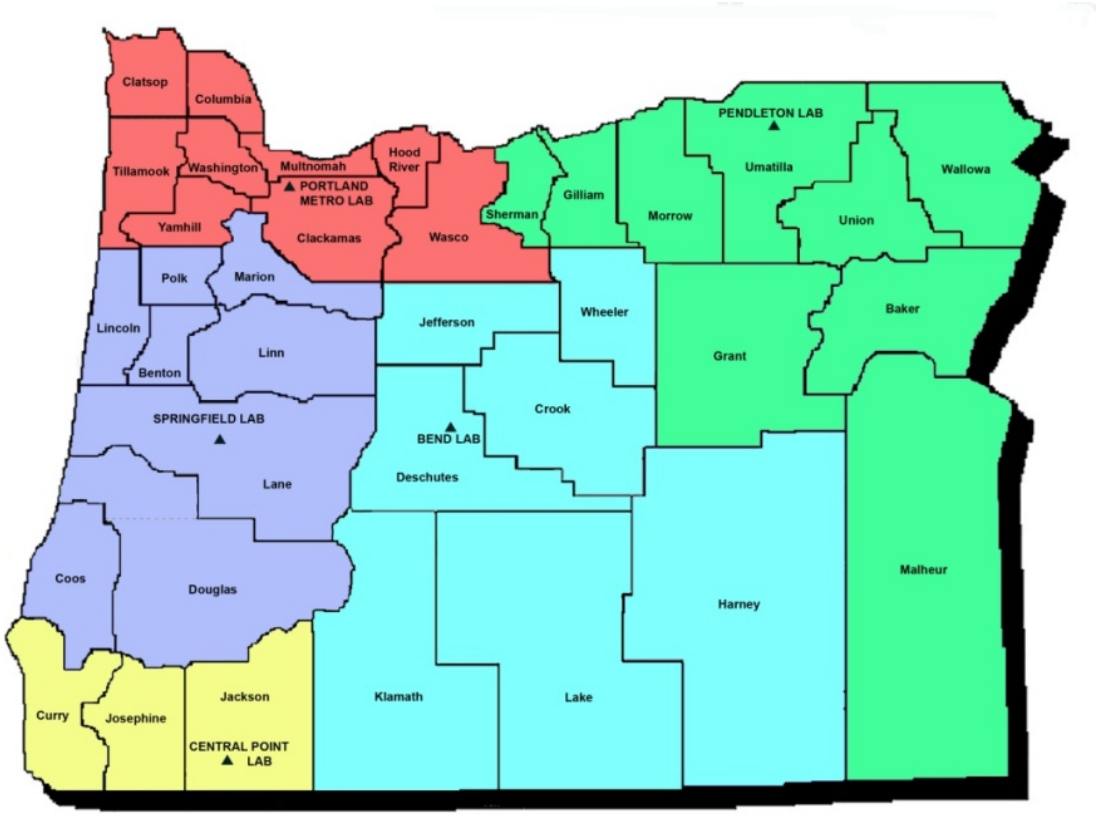
TRACE EVIDENCE
The screening for and the analysis of ignitable liquids, fibers, soil, glass, paint, hair, explosives, footwear, tire impressions and miscellaneous evidence.

INTRODUCTION

OFFICE	PHONE	EMAIL
Bend Forensic Laboratory 20355 Poe Sholes Drive Suite 200 Bend, OR 97701	Phone: 541-388-6150 Fax: 541-633-2323	bend.lab@state.or.us
Central Point Forensic Laboratory 4500 Rogue Valley Highway Suite B Central Point, OR 97502	Phone: 541-776-6118 Fax: 541-664-8742	centralpoint.lab@state.or.us
Pendleton Laboratory 405 SE 8th Street Pendleton, OR 97801	Phone: 541-276-1816 Fax: 541-278-1725	pendleton.lab@state.or.us
Portland Metropolitan Forensic Laboratory 13309 SE 84th Avenue Suite 200 Clackamas, OR 97015	Phone: 971-673-8230 Fax: 971-673-8309	portland.lab@state.or.us
Springfield Forensic Laboratory 3620 Gateway Street Springfield, OR 97477	Phone: 541-726-2590 Fax: 541-726-2524	springfield.lab@state.or.us

Laboratory Locations and Services

Figure 1: Service Areas for the Oregon State Police, Forensic Services Division Laboratories



PHYSICAL EVIDENCE MANUAL

LABORATORY LOCATIONS AND SERVICES

The following is a list of service provide in each laboratory in the Forensic Services Division, however; evidence maybe moved from one lab to another in order to complete the work more efficiently.

Portland Metro Lab

Biology Processing

Chemistry

- Controlled Substances
- Clandestine Lab Analysis
- Meth. Quant

DNA

- DNA analysis
- Y-STR analysis
- CODIS

Field Investigations

Firearms/Tool mark analysis

Implied Consent Program

Toxicology

- Post Mortem
- Ante Mortem
- Blood Alcohol analysis

Latent Print analysis

Trace Evidence analysis

- Arson
- Glass
- Fibers
- Explosives
- Impressions
- Hairs

Central Point Lab

Biology Processing

Chemistry

- Controlled Substances
- Clandestine Lab Analysis

Field Investigations

Firearms Processing

Latent Print analysis

Serial Number Restoration

Trace Processing

Bend Lab

Biology Processing

Chemistry

- Controlled Substances

Field Investigations

Latent Print analysis

Trace Processing

Pendleton Lab

Biology Processing

Chemistry

- Controlled Substances

Crime Scenes

Field Investigations

Firearms Processing

Serial Number Restoration

Trace Processing

Springfield Lab

Biology Processing

Chemistry

- Controlled Substances
- Clandestine Lab Analysis
- Meth. Quant

Crime Scenes Field Investigations

Firearms/Tool mark analysis

Latent Print analysis

Toxicology

- Ante Mortem
- Blood Alcohol analysis

Trace Evidence analysis

- Glass
- Impressions
- Hairs

GENERAL EVIDENCE HANDLING

It is important that evidence be collected, handled, and stored in a way that will ensure integrity.

General Evidence Guidelines

Protect yourself and others

Protect the evidence

Consider all types of forensic evidence

Document the chain of custody

Document location with notes, sketches, and/or photographs

Mark evidence and/or packaging with a case identifier, description of evidence, initials, and date

Package all evidence separately

Allow wet biological stains to air dry

Obtain standards if needed for a comparison of evidence

Use packaging that is appropriate for the specific type of evidence such as paper bags, envelopes, plastic bags, cardboard boxes, tamper-proof sealing, etc.

Select packaging size that allows the item to be removed/replaced for examination

Evidence Collection

Packaging

The type you choose depends on the type of evidence, the condition of the evidence, and the examination(s) you want the laboratory to perform. Use the information in Table 1 below or consult the section specific to the type of evidence you have to select the proper way to package it. All packaging types should be clean and unused (e.g. no recycled grocery bags).

Evidence Packaging	
Packaging Type	**Uses**
Paper bags or envelopes	Most biological material (marijuana, psilocybin mushrooms, blood or semen stained items, condoms, etc.). *If unable to air dry prior to packaging, submit to the laboratory as soon as possible and notify them that it is a wet sample.*
Plastic bags or Ziplocs	Dry non-biological material such as powder drug samples
Metal cans	Arson evidence
Plastic buckets	Samples from clandestine laboratories that are individually packaged in glass vials and set in an absorbent material (e.g. vermiculite, kitty litter, etc.) in the plastic bucket.
Glass or plastic container	Liquid drug samples, syringe contents, samples from clandestine laboratory, etc.
Paper folds and Post-It notes, then placed into a clean envelope	Small pieces of trace evidence, hairs, fibers, minute glass particles, paint chips, residue amounts of powder drugs, etc. Place inside a larger paper envelope. Use of Post-It notes: use either gloved fingers or a tool (e.g., forceps, tweezers, etc.) to collect the trace evidence, place on the adhesive of a post-it note, and then fold the note over on itself.
Cardboard boxes	Firearms, knives, large pieces of plate glass, a piece of flooring with a shoeprint, etc. Offers protection from sharp edges and the depth protects one surface of the evidence from rubbing.

Sealing

A proper seal ensures that evidence has not been accessed, altered, compromised, or lost during storage/transportation. Evidence seals must be tamper-evident (e.g., heat seals, tamper-evident adhesive seals, tamper-evident tape, etc.). Sealed evidence should be initialed; when possible, the initials should cross over the seal in such a way as to provide visual indication of entry into the evidence packaging if the seal is broken. Staples and other sealing techniques can be used **in addition to** the acceptable tamper-evident seal.

Evidence must be sealed before submission to the laboratory:

ACCEPTABLE

NOT ACCEPTABLE

Chain of Custody

The FSD maintains a chain of custody for all evidence from time of receipt at the lab to when it is returned to the agency. Each laboratory utilizes a secure electronic chain of custody record through the JusticeTrax Laboratory Information Management System (LIMS) for all evidence submitted to the laboratory regardless of method of submission. For evidence that is personally delivered, the initial COC (when evidence is received in the laboratory) is documented on the Form 49 with a date, time and signature of person receiving the evidence submission. For evidence that is delivered via USPS, UPS or the State of Oregon Shuttle, the initial chain of custody (when evidence is received in the laboratory) will be documented by the person who signed for/received the shipment either on the Receipt of Shipment Log or on the Form 49.

Submission of Evidence to Your Forensic Laboratory

Evidence should be submitted to your local laboratory, even if your local laboratory does not offer the service you are requesting, unless it falls under one of the exceptions listed below. For example,

although DNA analysis is only performed at the forensic laboratory in Portland, you should still submit all evidence needing DNA analysis, including standards, to your local laboratory.

Exceptions: High throughput property crime cases for DNA analysis, arson, blood alcohol, toxicology, and emailed images for footwear or tire make/model search.

Prior to submitting a large quantity of evidence in a single case, it is recommended that a meeting be arranged with an analyst in your local laboratory to triage the evidence. OSP Forensic Scientists are trained to manage the evidence in your case by ensuring that the evidence gets to the appropriate person for examination. That person may be in another laboratory and the evidence will be transferred to them without any additional request by you. The analyst(s) that is managing your case evidence in your local laboratory will be your contact person for status updates.

Sealed evidence may be submitted to the forensic laboratory by one of the following methods:

- Personal/Individual delivery (please call for an appointment before delivering to the lab)
- First Class U.S. Mail
- Federal Express
- United Parcel Service (UPS)
- Electronic transfer of digital images or data

For all methods, care should be taken to ensure that evidence is not lost, damaged, or contaminated and that the chain of custody on all exhibits can be established and maintained.

The Department of Transportation has Federal Regulations on packing and shipping items.

Upon receipt, the evidence packaging will be checked for an acceptable seal. If evidence is received improperly sealed, the submitting officer or a laboratory staff member must seal and initial the evidence. Evidence items received will be inventoried against the Forensic Services Request Form (Form 49) to ensure that the items indicated on the Form 49 are the items received. If a discrepancy is noted it will be documented on the Form 49 and the customer notified.

Forensic Services Request Form

All submissions should be accompanied by a Forensic Services Request (Form 49)[1] or other submission form that has been deemed acceptable by the laboratory. The Form 49 is available at http://www.oregon.gov/osp/FORENSICS/docs/ospform49sept201.pdf , through the local Forensic Laboratory or the local State Police Office. Much of the form is self-explanatory; however, an explanation of what each field in the form means is described below.

- **Rush—**indicate due date and reason for rush (e.g. trial date)

[1] See "Appendix A" for a copy of the Forensic Services Request Form 49.

- **Additional Suspect Information Only and Previous Evidence Submitted to this/any**
- **Laboratory** – check if either applies.
- **Agency** – fill in your agency. List all involved agencies.
- **Agency Case #** – if more than one case number applies to the evidence being submitted, list all.
- **Case Restriction**—see back of Form 49 for more information.
- **Offense** – fill in all offenses associated with the case (be specific).
- **Offense Date** –date the crime occurred, *not* the date the evidence was collected or turned into an agency's property room.
- **County of Venue** – District Attorney's Office that will receive a copy of the laboratory report. Fill in the county that the case will be prosecuted in which may not necessarily be the county your agency is in.
- **Names of Involved Individuals** –all victims, suspects, and other involved individuals. Complete all fields if known.
- **Investigating Officer and phone number** – name of the individual the laboratory report will be issued. If a Deputy collected the evidence submitted, but a Detective is handling the case, put the Detective's name, telephone number and email in the appropriate spaces. Please make phone numbers direct lines, when possible.
- **Submitting Officer** –individual that delivered, mailed, or shipped the evidence to the laboratory.
- **Agency Exhibit** – fill in your exhibit numbers for the evidence that is being submitted.
- **Description of Evidence** – describe the evidence that is being submitted. The list of evidence should be exactly the same as the evidence being submitted. Do not list additional evidence that was **not** submitted, or submit evidence that is not listed. Indicate from where/who each evidence item was collected, if known.
- **Exam Requested** – this is what you want the laboratory to do with the evidence. Be as complete as you can with your request or use the drop-down menu. If you do not know what request is appropriate, please contact your local laboratory for assistance. The Forensic Services Division Laboratory reserves the right to select appropriate methods of analysis based on the type of evidence and information provided.
- **LEAVE SHADED AREAS OF THE FORM BLANK**.

Agency Reports

An agency report specific to the items of evidence submitted should accompany the evidentiary items for all requests with the exception of toxicology, drug chemistry, blood alcohol, methamphetamine quantitation, and anonymous analysis requests.

Rushes
If your request is a "Rush", indicate so in the appropriate location on the Forensic Services Request (Form 49), along with the date the request needs to be completed, if known. Common reasons for "Rushes" are upcoming grand jury and trial dates, and an immediate need for investigative leads.

Laboratory Reports
A final report is released electronically to the agency/customer that made the request for service through the Laboratory On-line Information System (LOIS). An automatic notification of the report availability is also sent to a designee at the District Attorney's office that serves that agency/customer.

Forensic Laboratory Evaluation Form and Surveys
Periodically, the Forensic Services Division will send evaluation forms or surveys to its service agencies. The following are the different categories of evaluation forms or surveys that may be sent:

- Intoxilyzer (sent via LOIS)
- Crime Scene Investigation
- Court Room Testimony
- Laboratory Analysis (sent via LOIS)

These evaluations and surveys provide valuable feedback on our goal of providing quality and timely scientific, technical, and investigative support. Should you receive an evaluation form or survey, please take the time to provide your feedback.

FIELD INVESTIGATIONS (CRIME SCENES)

OSP FSD is available to assist with crime scene investigations at the request of any law enforcement agency, District Attorney's Office or the State Medical Examiner's Office. A request can be made during normal business hours (8:00am to 5:00pm, Monday -Friday) by calling your local laboratory (see laboratory contact information).

After hours, call OSP Regional Dispatch Center at 541-776-6111 (Southern Regional Dispatch Center) or 503-375-3555 (Northern Regional Dispatch Center) and they will contact the on-call forensic laboratory supervisor for you.

Laboratory management will assess each request based upon the crime type, the complexity of the forensic services needed, available resources within the laboratory and the investigating agency, and the anticipated response time. Crime scene response is primarily limited to homicides/attempted homicides, buried body recovery and officer involved shootings. If special circumstances exist which require the skills of trained forensic personnel, crime scene assistance may be provided for person crime cases such as assault and robbery. The FSD does not respond to property crimes cases but FSD resources are available to consult via telephone for any crime scene

If a search warrant is deemed necessary, it should be procured prior to the arrival of laboratory staff and available for them to review. It is the responsibility of the investigating agency to provide crime scene security for the duration of the crime scene processing.

Crime Scene Services Offered

Evidence identification, documentation, preservation, and collection
Buried body excavation and scattered remains recovery
Crime scene photography
Bullet trajectory determinations
Advanced bloodstain pattern analysis and reconstruction
Shooting scene reconstruction
Locating occult blood
Alternate light source processing
Impression enhancement, casting or lifting, e.g., shoe or tire
Metal detection
Latent Print processing
Trace Evidence Collection
Body Processing
Vehicle Processing
Autopsy photography and assistance
Crime scene reconstruction

Processing a Crime Scene
Crime scene documentation consists of notes, photographs and diagrams/sketches. Using a combination of these techniques will create a detailed record and will provide a basis for the investigator's future recollection of the scene.

Notes
Crime scene notes should be clear, legible, detailed, and should be taken in chronological order throughout the processing of the crime scene. Observations (e.g., description of the body, weapons, and bloodstains), processing techniques and results (e.g., dusted with black fingerprint powder and lifted one print) should be documented.

Photography
Photographing a crime scene should be performed in a systematic manner to ensure that all necessary photos are taken. Photographs should to be taken before any evidence is moved. The best approach to crime scene photography is to sequentially take overall, midrange and close-up photographs.

- **Overall Photographs**
  These photographs show the relationship of evidence in an area (e.g., photographs of a living room showing a body and numerous other items of evidence), or document the location of a crime scene (e.g., a photograph of the outside of a house showing the street number). Overlapping photos are recommended to ensure that the entire area is documented. If placards are utilized to identify the location of evidence at the scene, photos should be taken before and after their placement.

- **Midrange Photographs**
  These photographs document the relationship of evidence items to other items within an area.

- **Close-up Photographs**
  These pictures show the detail of an individual item of evidence. Close up photographs should be done with and without a scale.

- **Examination-quality Photographs**
  High-resolution, close-up photographs containing a scale, taken of specific items in a manner to capture maximum detail. Examination-quality photographs are required for footwear and tire impression and latent print comparisons.

Diagrams/Sketches
Scene diagrams/sketches can provide an overall view of a scene and the location of evidence items. They can also be used to document detail of specific items or areas.

Accident Reconstructionists should be utilized to diagram the scene whenever possible. The diagram should include all relevant measurements (e.g., dimensions of the room, measurements to all evidence

from two independent points, heights of objects/evidence for a 3-D computerized rendition of the scene, etc.)

A key/legend is necessary if you are using item numbers or evidence markers to show the locations of items on the sketch.

Conduct a Detailed Search
Conduct the search of the crime scene using a systematic search approach. Room to room searches and logical association searches (e.g., following a blood trail from one point to another) are commonly used indoors. For outdoor scenes, areas are typically searched in overlapping sections.

Vehicle Examinations
Note the following information about the vehicle:

- Year
- Make
- Model
- License plate
- VIN
- Color
- Damage

Below is a list (not all-inclusive) of things to consider, based on the case circumstances, when examining a vehicle. It may help to divide the interior into quadrants and search each quadrant from ceiling to floor.

- Examine the exterior of the vehicle. Look for transfer evidence relevant to the case (e.g. paint from a hit and run vehicle, clothing impressions on the plastic of a front bumper, hair caught on the broken edge of windshield glass, etc.).
- Document tire information for all tires including manufacturer, type, size, and tire pressure. If the tires need to be compared to tire track evidence the forensic laboratory should be contact to assist in collecting to an exemplar from each tire.
- Note the position of seat(s), tilt wheel, accelerator and brake pedals, and rear view mirror.
- Vacuum or tape lifts of specific areas for trace evidence.[2]
- Examine the interior of the vehicle and the trunk for potential evidence.
- Examine the engine compartment and undercarriage of the vehicle for potential evidence.
- Take known standards from the upholstery, carpet, or other vehicle for possible later comparisons.

Body Processing
To prevent potential loss of fragile biological evidence, it may be necessary to collect swabs from the body at the crime scene prior to transporting it to the medical examiner's office for autopsy. Take into consideration the position of the body, the context of the scene and the case scenario in deciding when

[2] See "Fiber Evidence – Collection of Fiber Evidence."

to collect. To achieve optimal collection of the evidence listed below, a total of **two** water-moistened swabs should be used. Information about what evidence was collected at the scene should be disseminated to the deputy medical examiner or agency representative so that additional collection of the same swabs is not duplicated during autopsy.

Evidence of:	**Collect the Following:**
Manual strangulation	Swabs from neck and behind ears
Ligatures/bindings	Swabs from ends of ropes/ties
Dragging	Swabs from ankles/arms/wrists, as applicable
Pocket-rifling	Swabs from turned-out pockets
Stretched/torn clothing	Swabs from stretched/around torn areas
Possible sexual assault	Swabs from inner thighs[3]

Postmortem Examinations
Photograph the following:

- Full body photographs of victim as delivered to the postmortem examination.
- Full body photographs of victim unclothed, before and after clean up.
- Mid-range and close-up photographs of exterior wounds and/or identifying marks (e.g. tattoos) with and without a scale.
- Photograph any body parts or evidence requested by the Medical Examiner (e.g. bullets, bullet tracks, etc.).

It is recommended that the following evidence be collected during a postmortem examination. Remember that the postmortem examination may be the only (or last) chance to collect this evidence, so it is prudent to collect more than you think you need, rather than less, in these situations.

- DNA standard. Either a blood standard on filter paper or swabs, one lavender/purple-stoppered EDTA tube or oral swabs can be collected. For recently transfused decedents, an oral swab standard is an appropriate DNA standard.
- Blood sample for blood alcohol and/or toxicology. Collect at least two (2) gray-stoppered tubes.
- Urine sample for toxicology. Collect at least one (1) red-stoppered tube.
- Head hair standard from various areas on the head. Standards must be pulled, not cut.
- Pubic hair standard from various areas in the pubic region. Standards must be pulled, not cut.
- Sexual Assault Forensic Evidence (SAFE) kit[4]

[3] A full SAFE kit is the responsibility of the Medical Examiner and can be collected at autopsy.
[4] Consider collecting this evidence even when sexual assault is not immediately suspected. If it is not collected and becomes

- Penile Swabbing Forensic Evidence (PSFE) kit
- Fingernail scrapings
- Clothing, one item per bag
- Evidence items located in or on the body
- Finger and palm prints (for elimination print purposes and identification)

Decomposed Remains

If the human remains are too badly decomposed, it may be impossible to obtain an adequate oral or blood standard and thus necessary to collect an alternate type of DNA standard. Contact your local laboratory for instructions on other collection and preservation options.

Bloodstain Pattern Analysis

Analysis of bloodstain patterns can reveal significant information in some cases. In such cases, the relevant issue may be how the blood was deposited rather than from whom the blood came. When this is the situation, contact your local laboratory for a qualified expert to assist in the bloodstain pattern interpretation.

relevant later in the investigation, the samples may be difficult or impossible to recover. See “Biological Evidence – Sexual Assault Evidence Kits and Penile Swabbing Evidence Kits” for further information.

MISSING PERSONS

A DNA sample should be obtained from a missing person, if the case remains active after 30 days have elapsed. DNA Analysis on the majority of missing person cases should be performed by the University of North Texas (UNT), at their Center for Human Identification. The law enforcement agency that accepted the missing persons report shall attempt to obtain a DNA sample from the missing person or from family members of the missing person. Documentation necessary to enable the agency to use the sample in conducting searches of DNA databases should be provided. Collection kits can be obtained by contacting the University of North Texas at 1-800-763-3147. The local laboratory can also assist with obtaining these collection kits.

Secondary Victim Standards or Direct Reference Sample

Agencies should attempt to obtain DNA samples known to be from the victim. Sources of DNA known to be from the victim may include:

- Previously collected medical specimens (which may have been stored at a hospital or clinic).[5]

- Personal items, items used only by the victim or rarely used by anyone else (e.g., a toothbrush, lipstick, or other item containing saliva or blood). A family reference sample (see below) must also be submitted to confirm the personal item is from the missing person.

Other Secondary Victim Standards (not preferred)

- Hairs are not the preferred direct reference sample because of various concerns and contamination. UNTs discourage hair submission if at all possible and ask agencies to work to get a better sample. When hairs are the only direct reference sample available the UNT requires that a qualified hair examiner examine the hair to determine if the hair was human and that roots were intact. The report and the examiner's credentials would need to be accompanying the submission from the agency.

- Baby teeth are not preferred due to the potential for mix-ups with other children's teeth and the possible lack of mitochondrial DNA.

Additional Note:

- The University of North Texas will not accept clothing as a direct reference sample due to contamination with other mitochondrial DNA. Both a mitochondrial DNA profile and nuclear DNA profile may need to be obtained in order to have a match to any unidentified remains.

These items should be submitted directly to the University of North Texas. Your local laboratory is available for questions.

DNA from the Victim's Relatives (Family Reference Standards)

[5] Include information from the medical facility detailing how the sample was stored (i.e., was a fixative like formaldehyde or formalin used). The use of fixatives may compromise the ability to obtain a usable DNA profile.

When medical specimens and the personal items mentioned in the section above are not available, DNA testing can be done on DNA samples from biological (blood) relatives. DO NOT collect DNA samples from adoptive parents, adopted children, stepparents and other non-biological relatives. DNA from these relatives cannot be used to identify the victim. The closer the family relationship to the victim the more likely a match can be made. It is more difficult to make a match between victim remains and distant relatives. In some cases, it is useful to have DNA samples from specific relatives. If DNA from the victim's children is used, it is helpful to have DNA from the children's other biological parents.

Preferred Family Reference Samples in order of preference

1. Both parents or known identical twin
2. One parent, spouse and children
3. Children and spouse
4. One parent and sibling
5. Siblings (two or more)

Family Reference Sample Collection Kit
This is the kit produced and disseminated by the University of North Texas to be used to collect oral swab DNA from family members of missing persons. Collection kits are available with instructions and supplies for retaining the DNA samples from family members (contact the University of North Texas at 1-800-763-3147). Each kit is for one family member. Several kits may need to be collected. The oral cells on swabs will be collected by the law enforcement agency involved using the President's DNA Initiative Family Reference Sample Collection kit or the FBI collection instructions. A signature of the person giving consent to the collection and testing of the DNA sample is required. A signature of the officer witnessing the collection is also required. Do not submit these collection kits to the OSP Forensic Laboratories. The kits will be sent directly to the FBI or UNT for nuclear and mitochondrial DNA analysis. The FBI and University of North Texas have the capability to enter the profiles into the appropriate CODIS databases. For more information on the CODIS database go to the following website: http://www.fbi.gov/about-us/lab/biometric-analysis/codis

UNIDENTIFIED REMAINS

Refer to ORS Chapter 146 - Investigations of Deaths, Injuries and Missing Persons.

Unidentified Remains

"Unidentified human remains" do not include human remains that are part of an archaeological site or suspect of being Native American. Archaeological remains are covered under ORS chapters 97 and 390 and ORS 358.905 to 358.961.

All unidentified human remains will be initially processed by the Medical Examiner's Office. The OSP Forensic Laboratories will not accept human remains in any form from any agency other than the Medical Examiner's Office.

Skeletal remains may be mailed to the Oregon State Medical Examiner's Office for anthropological examination. All agencies should contact the OSP-ME Anthropology Section at 917-673-8200 for instructions prior to sending the remains.

All investigative processes (e.g., dental record comparison, history/healed fracture comparisons, personal effects) will be utilized in order to identify remains before DNA analysis will be attempted. If the remains are not identified after these processes, they will be sent to either the FBI or UNT for nuclear and mitochondrial DNA analysis. The decision for DNA analysis will be made by the Oregon State Medical Examiner's Office.

Contact information:

Oregon State Medical Examiner's Office
13309 SE 84th Avenue, Suite 100
Clackamas, Oregon 97015
971-673-8200

DNA Collection Kits for Family Reference Standards
University of North Texas
1-800-763-3147

Additional online resources:

The National Missing and Unidentified Persons System (NamUs) is the first national online repository for missing persons records and unidentified decedent cases. For more information on NamUS go to the following website: http://www.namus.gov/.

BIOLOGICAL EVIDENCE

Biological fluids such as blood, semen, and saliva are frequently encountered as physical evidence in many types of criminal investigations such as homicides, sexual assaults, assaults, and robberies.

Safety and Contamination Prevention

Current DNA technology allows for very small amounts of sample to be analyzed. For example, a bloodstain the size of a sharpened pencil point may be enough to perform DNA analysis on, as would the residue amount of skin cells on the inside rim of a ball cap. Because of this, inadvertent contamination of the evidence is possible if you do not take proper precautions. Individuals who routinely collect biological evidence may want to work with their local laboratory to submit a DNA elimination standard for profiling, so they may be ruled out as possibly having contaminated a particular item of evidence. Precautions to guard against contamination include:

- Wearing gloves and, if desired, a mask and eye protection while collecting biological samples.
- Changing gloves frequently or anytime your gloves are contaminated with biological material.
- Avoid touching the tips of cotton swabs with your fingers or to other unintended surfaces
- To prevent contamination when collecting swabs, avoid talking over the swabs, blowing on the swabs to make samples dry faster, etc. Consider purchasing individually wrapped sterile swabs.
- Do not touch the water dropper bottle tip to any surface or evidence.
- Cleaning tools (such as scissors or tweezers) that you might use to collect evidence with a dilute bleach solution (approximately 10%) and dry thoroughly.
- Do not lick envelope seals.

General Collection Guidelines

In general, wet or moist biological evidence should be dried and packaged into clean and previously unused paper containers (e.g., envelopes, bags, cardboard boxes). Do not wrap the evidence first in plastic and then inside paper (or vice versa) as these conditions could cause the evidence to degrade. Package each item separately and properly label and seal the container. Mark the packaging with a "BIOHAZARD" label.

Biological evidence is best maintained dried at temperature controlled room temperature (preferably individually packaged in paper bags). If evidence cannot be air dried, liquid evidence should be refrigerated, and wet evidence should be frozen.

Biological Material: Storage and Laboratory Submission

	Blood (liquid)	Urine	Bones	Hair	Swabs or items with biological material (including standards) [DRIED]	Swabs or items with biological material that cannot be dried [WET]	SAFE Kits & PSFE Kits	Feces
Frozen						Best	Acceptable	Best
Refrigerated	Best	Best				Acceptable	Acceptable	
Temperature Controlled			Best	Best	Best		Best	
Room Temperature				Acceptable	Acceptable			

UV Light Searches

Use of an ultraviolet (UV) light, Woods lamp, or other alternate light source may assist in the search for biological stains. Such devices can be helpful in a search, given that many biological stains such as semen and saliva may fluoresce, or appear bright, when viewed with UV light in a darkened room.

However, there are three important points to remember when using a UV light to assist with searching for biological stains:

1. Many other substances may exhibit fluorescence. Examples include but are not limited to urine, food, drink, and laundry detergent.
2. Not all semen or saliva stains will necessarily fluoresce with a UV light.
3. Blood will *not* fluoresce when viewed with a UV light; rather, it will appear dark.

Blood Evidence

Blood evidence is common in violent crimes and property crimes. Bloodstains may appear red, reddish-brown, tan, gray, or yellowish. Bloodstains may be undetectable to the unaided eye (occult or non-visible blood) depending upon evidence and stain characteristics. In addition to DNA, blood contains cells and proteins that allow the laboratory to perform the following examinations:

- Presumptive blood testing
- Testing to indicate human or non-human origin

Collecting Dried Blood

If the stained object is transportable, the entire item may be collected and submitted to the laboratory. Be careful to seal all openings of a package since dried blood may flake off of an object. If the stained object is not being transported, collect the blood by one of the following methods:

Swabbing

1. Moisten a sterile cotton swab using 1-2 drops of distilled water or tap water.
2. Gently swab the stain with the moistened swab tip until the swab thoroughly absorbs the blood. Continue collecting the stain until it is either completely collected or a sufficient number of swabs (up to 4) have been saturated. Attempt to concentrate the stain on as few swabs as possible.
3. Allow the swabs to thoroughly air dry.
4. Place the dried swabs in a paper container (e.g., paper envelope or bag). Swabs collected from the same stain should be packaged together and in the same direction
5. Properly label and seal the container.
6. When the amount of blood is small, it is advised to select an unstained area adjacent to the suspected bloodstain to collect (known as a substrate control). Repeat steps 1 through 5 on the *unstained* area. Package the substrate control separately.

Cutting

This collection method may be desirable when the dried bloodstain is on an object such as the upholstery of a car seat or carpeting. Use a clean, sharp knife or scissors to cut the stained area, leaving unstained margins surrounding the stain. Package into a paper container and properly label and seal the container.

It is recommended that you consult with the District Attorney's Office before destroying property since the item may need to be repaired or replaced.

Collecting Liquid or Moist Blood – <u>Large</u> Quantity

1. Saturate 4-6 sterile cotton swabs with the blood.
2. Blood will coagulate so it is important to collect a good mix of clotted cells and serum.
3. Allow the swabs to thoroughly air dry.
4. Place the dried swabs in a paper container (e.g., paper envelope or bag). Swabs collected from the same stain should be packaged together and in the same direction
5. Properly label and seal the container.

Collecting Liquid or Moist Blood – <u>Small</u> Quantity

1. Attempt to concentrate staining on **as few swabs as possible**. Use swabs to collect the blood, concentrating the blood onto each swab.
2. Allow the swabs to thoroughly air dry.
3. Place the dried swabs in a paper container (e.g., paper envelope or bag). Swabs collected from the same stain should be packaged together and in the same direction.
4. Properly label and seal the container.

Saliva Evidence
Saliva stains are not usually evident from a visual examination. However, certain types of evidence frequently contain traces of saliva (e.g., cigarette butts, drinking containers, adhesive surfaces of envelopes, chewing gum, bite marks, ski and/or nylon masks, etc.).

Collecting Saliva Evidence
If the stained object is transportable, submit the item to the laboratory. If it is not transportable, such as bite marks on a body, collect the saliva stain in the following manner:

1. Moisten a sterile cotton swab with 1-2 drops of distilled or tap water.
2. Gently swab the suspected saliva stain.
3. Follow with a dry swab to collect any remaining moisture.
4. Label the swabs as “wet” and “dry”.
5. Allow the swabs to thoroughly air dry.
6. Place the dried swabs in a paper container (e.g., paper envelope or bag). Swabs collected from the same area should be packaged together and in the same direction.
7. Properly label and seal the container.

Semen Evidence
When the perpetrator of a sexual offense is a male, semen stains may be found on the victim as well as on clothing, bedding, rags, upholstery and other objects. Semen stains may appear off-white, yellow, tan or colorless and may have a crusted appearance. Semen stains may be undetectable to the unaided eye depending upon evidence and stain characteristics.

Consider collecting the suspect’s underwear, pants, or other clothing items, as victim DNA could also be transferred to the suspect or the suspect’s clothing.

Collecting Semen Evidence
Collect all suspected stained material (e.g., bedding, underwear or other clothing, etc.). **Each item of evidence should be packaged separately** and carefully to prevent loss of any trace evidence (e.g., hairs) that may be present.

Evidence with damp stains should be air dried. Consider marking the location of a damp stain by circling it with permanent marker, as it may not be visible when dry.

Clean paper should be spread under the item to catch any debris, which may be dislodged during the drying process. Clean paper should be placed between items hanging next to each other to prevent cross-contamination. Package each item *separately* in paper bags or envelopes, along with any paper used.

If the semen stain is on an object that cannot be easily submitted to the laboratory, contact your local laboratory for collection instructions.

Adult and Child Sexual Assault Forensic Evidence (SAFE-A and SAFE-C) Kits

Biological evidence associated with the body of a potential sexual assault victim needs special attention. The victim needs to be transported to a medical facility for a sexual assault examination. This should be done as soon as possible in order to preserve what remains of the biological evidence and to document any physical trauma. Consider having photographs taken of any physical trauma and collecting blood or urine as well. Attending medical personnel should collect the evidence by using the appropriate Sexual Assault Forensic Evidence Kit provided by the Forensic Services Division.

In general, if more than 84 hours has elapsed from the time of the sexual assault to the time of the medical examination, the chances of finding semen evidence in the body of a living victim are greatly diminished. However, it may be prudent to collect a SAFE Kit if you have any doubts or concerns. This time range does *not* apply to deceased victims; it is recommended that you collect a SAFE Kit from deceased victims regardless of the elapsed time.

Bathing, showering, and douching by the victim does not necessarily eliminate the possibility of finding semen evidence on the *interior* of the body. A SAFE Kit should be collected under these circumstances. Showering or bathing may eliminate saliva, semen, and trace evidence deposited on the *exterior* of the body.

Undergarments, worn by the victim during and/or immediately after the assault, are also good sources for collecting semen and hair evidence. Package each clothing item separately.

Penile Swabbing Forensic Evidence (PSFE) Kits

If a male suspect is taken into custody within 24 hours of the incident and he has not showered or bathed, a Penile Swabbing Forensic Evidence (PSFE) Kit provided by the Forensic Services Division should be collected. The purpose of the PSFE Kit collection is to collect cells that may have been transferred *to the subject* as the result of sexual contact. If a PSFE Kit is not available, sterile cotton swabs may be used. Follow the below instructions or contact your local laboratory for instructions.

The suspect's underwear should also be collected as such evidence may provide an excellent source of the victim's DNA.

Step 1: Collect two penis shaft swabs.

- Lightly moisten one sterile cotton swab with water. Swab the entire penis shaft, rolling the swab as you go and being careful to swab in the creases and under the foreskin.
- Allow the swab to dry, and then place in an envelope; labeled "Penis Shaft Swab #1".
- Repeat the swabbing with another moistened sterile swab.
- Allow the swab to dry, and then place in an envelope; labeled "Penis Shaft Swab #2".

Note: Avoid swabbing the penile orifice.

Step 2: **Collect two scrotum swabs**

- Lightly moisten one sterile cotton swab with water. Swab the upper and front scrotum area, rolling the swab as you go.
- Allow the swab to dry, and then place in an envelope; labeled "Scrotum Swab #1".
- Repeat the swabbing with another moistened sterile swab.
- Allow the swab to dry, and then place in an envelope; labeled "Scrotum Swab #2".

Step 3: **Collect any dried/moist secretions on pubic hair**

- Examine the pubic hair for dried or moist secretions.
- If observed, collect dried/moist secretions on the pubic hair by cutting the matted hair and placing in an envelope labeled "Dried/Moist Secretions on Pubic Hair".

Step 4: **Collect two pubic hair swabs**

- Lightly moisten one sterile cotton swab with water. Swab the pubic hair area at the base of the penis.
- Allow the swab to dry, and then place in an envelope labeled "Pubic Hair Swab #1".
- Repeat the swabbing with another moistened sterile swab.
- Allow the swab to dry, and then place in an envelope labeled "Pubic Hair Swab #2".

Step 5: **Head hair standards**

- Collect 24 pulled and shed hairs from various areas on the head.
- Place the hairs in the provided envelope.

Step 6: **Pubic hair standards**

- Collect 24 pulled and shed hairs from various areas of the pubic region.
- Place the hairs in the provided envelope.
- If pubic hair standards are not collected, please document why.

Step 7: **Collect four oral swabs**

- Swab the inside of mouth with four sterile cotton swabs.
- Allow the swabs to dry, and then place in an envelope labeled "Oral Swabs".
- Mark the envelope with the purpose of collection (DNA standard or oral sodomy).

Step 8: **Collect any additional evidence**

- Rectum, bite mark, hickey, finger swabs, external body swabs, or other sites of evidence transfer.
- Evidence can be collected using sterile cotton swabs and envelopes.
- Use four swabs to collect evidence from internal body sites (e.g., rectum).
- Use two swabs to collect evidence from external body sites (e.g., hickey).
- Place the swabs from each location in a separate envelope and write on the envelope the body location of collection and the purpose of collection (For saliva? For semen?).

Step 9: **Distribute forms and package evidence**

- Place the evidence collected in an envelope and seal.

Step 10: **Collect the subject's underwear**

- If the subject was not wearing underwear at the time of sexual contact or afterward, collect the subject's pants.
- Package clothing in separate paper bags and seal.
- Label each paper bag with the subject's name.

DNA ANALYSIS

Since blood, semen, and saliva originate as liquids, they quickly coat or penetrate surfaces on which they are deposited, and can be difficult to remove when dried. Because no two humans are genetically the same (except for identical twins) these body fluids are unique to the person from which they originate. By performing DNA analysis of these fluids or stains, a genetic marker profile can be obtained which can then be compared to DNA profiles obtained from reference standards or from other items of evidence.

Because DNA analysis lends itself to a computerized identification system, DNA profiles from qualifying items of evidence can be compared to the Combined DNA Index System (CODIS), a database that maintains qualifying DNA profiles from convicted offenders, items of evidence, and missing persons. In Oregon, this information is maintained at the state level. Searches of the database also occur at a national level.

The type of DNA analysis currently performed at the Oregon State Police Forensic Laboratories on biological material can yield much information.

Touch

DNA analysis **can**:	DNA analysis **cannot**:
Associate evidence DNA to a person and give the frequency of occurrence in a random population	Determine the age or race of the person who donated the sample
Positively exclude a person from being the donor of an evidentiary DNA profile	Determine how old the sample is
Determine the gender of an evidence DNA donor	Determine how the sample was deposited (see "Crime Scene Investigations - Bloodstain Pattern Analysis")
Determine that the biological material is from a human	Determine whether or not force was used in a suspected rape from the analysis of semen evidence

Evidence

Touch evidence is DNA evidence defined as originating from evidence that had limited and casual contact by an individual with a surface or material. This would primarily include objects touched by an individual's hand for a short period of time, such as cigarette lighters, keys, door handles, gun grips and triggers, light switches, drawer handles, countertops, gear shift knobs, steering wheels, etc.

Touch evidence will only be analyzed with prior approval from the DNA Unit Supervisor. The case should meet all of the following criteria:

1. The case is a rape, attempted rape, homicide, or attempted homicide.

2. All other forensic avenues to identify a suspect or link a known suspect to the crime have been exhausted.
3. A DNA result, possibly in conjunction with the CODIS database, is necessary to identify a suspect or link a known suspect to the crime. Evidence items will not be processed to determine, establish, or corroborate path of travel or location.
4. There should be a reasonable expectation that the suspect handled the item.
5. Every reasonable effort has been made to collect elimination standards from individuals who have routine or recent contact with these items.

If a case does not meet the above criteria, a private DNA laboratory may be of assistance if a suspect standard is also available. If there is no suspect, analysis by a private laboratory may be of limited value unless the OSP DNA laboratory is involved in the submission process. Generally, the OSP DNA Unit is unable to accept profiles generated by private laboratories for entry into CODIS.

Touch evidence should be collected prior to using any latent print processing techniques on an item. The definition does **not** generally apply to items of "aggressive handling", which may include ligatures or a weapon that was used in a repeated, aggressive manner to cause homicide (e.g., knife). Whether touch evidence or aggressive handling evidence, an abundance of caution should be used when swabbing the item or packaging the entire item for submission. If there is some ambiguity with respect to whether the item falls under the touch or aggressive handling category, the DNA Unit should be contacted for more guidance.

Collecting Touch Evidence

1. Moisten a sterile cotton swab with 1-2 drops of distilled or tap water.
2. Gently swab the area suspected of having been touched.
3. Allow the swab to thoroughly air dry.
4. Place the dried swab in a paper container (e.g., paper envelope or bag).
5. Properly label and seal the container.
6. Select an unstained area and collect a substrate control in the same manner as described above. Package the substrate control separately.

Wearer-type DNA

Wearer-type DNA is not limited and not casual, and results from contact from (mostly) the same individual repeatedly (e.g., clothing items, baseball caps, and gloves.).

Items considered for wearer-type DNA should be submitted to the laboratory for examination.

Aggressive Handling DNA

Aggressive handling DNA evidence is limited, but not casual contact or casual, but not limited contact by an individual with a surface or material (e.g., ligature, victim's clothing where suspect groped or grabbed violently).

Items considered for aggressive handling should be submitted to the laboratory for examination.

Criminal Paternity
Because half of the genetic material is inherited from each parent, given the DNA profiles of child and one biological parent, the likelihood of an individual being the second parent can be established. DNA standards from parent, child, and alleged parent are needed for analysis. A database sample for the alleged parent may be used if a profile is on file. Criminal paternity cases are accepted on a case-by-case basis. Please contact your local laboratory before submitting evidence.

Y-STR
Y-STR testing, which involves the analysis of genetic material on the Y-chromosome (male chromosome), is useful in DNA mixtures where there is an abundance of female DNA and little male DNA. Suspect standards are needed for comparison. Traditional nuclear DNA analysis will be attempted before Y-STR analysis.

DNA Standards
DNA standards should be obtained from all listed individuals in a case who may have contributed DNA to evidentiary items, if those items will be referred for DNA analysis. This includes the victim(s), suspect(s), and, in sexual assault cases, any recent (within 3 days) consensual sexual partner(s). These standards are compared to the DNA profiles obtained from the evidence to determine inclusions and exclusions.

Oral Swab Standards
Oral swabs are recommended for routine use as a DNA standard for living individuals; however, blood samples are also acceptable. It is <u>not recommended</u> to swab the bleeding wounds of a living individual for submission as a DNA standard in lieu of collecting oral swabs.

1. Vigorously swab the inside of the mouth, one swab at a time, until 2-4 swabs are collected. The individual may do this him/herself under your direct supervision.
2. Allow the swabs to air dry thoroughly.
3. Seal in a paper envelope labeled with the individual's name, date, and "Oral Swab Standard." The swabs collected from one individual should be packaged together.

Blood Standards
Blood is preferred as a DNA standard for deceased individuals that are not severely decomposed or have not recently received a blood transfusion. For recently transfused decedents, an oral swab standard is an appropriate DNA standard.

1. Collect at least one vial of blood into a lavender top tube, which contains the preservative EDTA. If the blood is being collected from a decedent,
2. 4-6 swabs of blood may be collected instead of a vial of blood.
3. Label the vial with the individual's name and date collected, and then seal it in a box or padded envelope to prevent breakage. Label the outer packaging with the individual's name, date, and "Blood Standard."
4. Never store liquid blood tubes in the freezer. Refrigerate them instead.

Decomposed Remains
If the human remains are too badly decomposed, it may be impossible to obtain an adequate oral or blood standard and thus necessary to collect an alternate type of DNA standard. Contact your local laboratory for instructions on other collection and preservation options.

Secondary Standards
When a person from whom a standard is desirable based upon case scenario is unable to be located (e.g., missing person, fled area, etc.), secondary standards may be used. Occasionally, secondary standards may also be used if oral swab standards cannot be obtained from a person of interest for other reasons, such as lack of probable cause. Suitable secondary standards include personal care items known to have been used only by the person in question (e.g., toothbrush, razor, etc.), or cigarette butts and drinking containers which the person in question is known to have used. An agency should keep in mind that DNA standards in this form are not always successful as they are used in lieu of the best evidence, which is a DNA sample documented as being directly from an individual.

No Available Standards
Evidentiary items may still be referred for DNA analysis even if no suspect standards are available, as the DNA profiles from the evidence may be suitable for comparison to the CODIS database; however victim and/or other elimination standards may be necessary before DNA analysis is initiated. It is important to note that in the event of a probative association to a CODIS profile, a known standard (e.g., oral swabs) will likely be required for confirmation.

Private Laboratory Analysis
The Oregon State Police Forensic Services Division is unable to offer DNA analysis for urine, mitochondrial DNA, drug paraphernalia associated with possession of a controlled substance (PCS), and cases in which there is no victim.

For information regarding private laboratories available to conduct DNA testing, please contact your local forensic laboratory.

FINGERPRINT (FRICTION RIDGE SKIN) AND LATENT PRINT EVIDENCE

Fingerprints (friction ridge skin) are a widely recognized means of identification. Most crime scene evidence has the potential to reveal comparable latent print impressions (friction ridge detail). Thus, one should assume that latent prints could be present on any object.

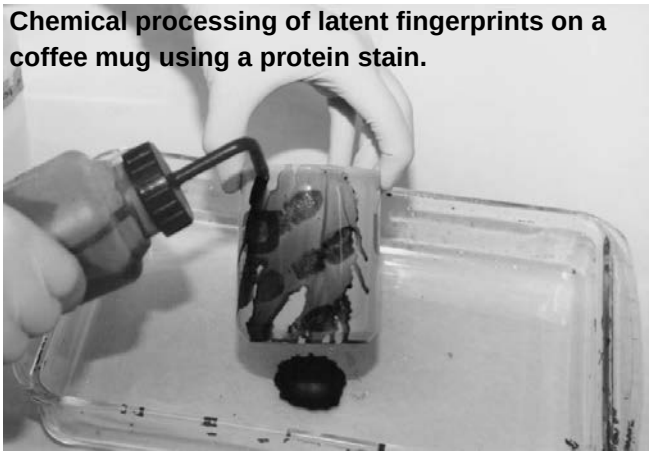
Fingerprints can be divided into three categories:

- Latent - invisible prints made by perspiration and other substances on the skin surface that require development by physical or chemical methods.
- Plastic - visible prints made in soft pliable substances as putty, modeling clay, etc.
- Patent – visible prints made by contamination of the skin with such substances as blood, paint, ink, etc.

The chemical composition of latent print residue is such that chemical techniques can be used effectively to process impressions on porous and non-porous substrates.

By examining the evidence submitted, the laboratory will be able to:

- Determine the presence of latent, patent or plastic print impressions.
- Determine if these print impressions are of comparison quality.
- Compare these print impressions with the known friction ridge impressions of suspects and those of others for elimination purposes.
- Search for a possible latent donor by utilizing the Automated Fingerprint Identification System (AFIS).



Chemical processing of latent fingerprints on a coffee mug using a protein stain.

Collection, Packaging, and Submission of Evidence

When processing evidence, consideration should be given for all types of physical evidence and the order in which the evidence should be collected. The most common form of latent print processing in the field is powder processing; dusting for latent prints. Field processing should be limited to large items that cannot be easily transported and fixed structures. **In most circumstances, smaller items of evidence should be collected for a full sequential processing in the lab.**

If an item is going to be submitted to the laboratory for Latent Print processing, no processing (photographs with scales, dusting, etc.) should be conducted by the agency unless absolutely necessary.

If items have been processed *prior* to submission to a laboratory, package those items to prevent smudging of the latent prints. Information regarding what type of processing was performed on the evidence should be documented and submitted to the laboratory. Chemical processing of items should only be done by staff in a laboratory setting. Digital images of the latent, with a scale in the image, may be submitted.

Evidence collected from the crime scene should be submitted to the laboratory for latent print processing and comparison examination using the Forensic Services Request (Form 49) and should be submitted for examination as soon as possible.

Latent print evidence should be packaged in paper (manila envelope, brown paper bag, or cardboard box). The packaging should minimize the movement of the object without being too restrictive to cause wiping/rubbing (this may destroy latent fingerprints present on the object).

Evidence exposure to water or dampness should be avoided. However, this exposure does not necessarily destroy all latent prints. It is important that any wet or damp object be air-dried before it is packed for shipment.

Any number of paper items may be placed in a single envelope for submission.

Latent prints of comparison quality will be imaged and the original lifts or evidence will be returned to the submitting agency.

Automated Fingerprint Identification System (AFIS)
After comparisons are conducted with any known suspect's prints or submitted inked standards, the remaining unidentified latent prints may be evaluated for AFIS quality and may be searched against the AFIS database. Unidentified latent prints of AFIS quality will be stored in the Unidentified Latent Database (ULD) for future searches against new standards added to the database. The agency will be notified via a report if a print registered in the ULD is later individualized. In the event the submitting agency should identify any latent prints that should be cleared for any reason, the agency should notify the laboratory so these latent prints can be purged from the ULD

Submission of Inked Prints for Comparison Purposes
The investigator should take inked prints from all persons known to have legitimately handled the evidence (elimination prints) to permit comparison with any latent prints. If the individual already has prints on file, their **full name, date of birth, and SID number** must be listed on the Form 49.

Often latent prints found at the scene of a crime involve areas of the palms, second and third joints of the fingers, and the finger sides and tips. For this reason the analyst may request that the investigator take complete inked prints (major case prints) of all ridges on the hands of suspects or persons known to have legitimately handled the evidence (elimination prints) to permit comparisons. Palm prints should always include recordings of the lower finger joints, as well as an extra recording of the outer edge of the palm (writer's palm).

Inked prints for comparison with latent prints should be submitted with the evidence itself.

Identifying the Deceased
The State Medical Examiners (ME) Office is responsible for identifying deceased persons. The Forensic Services Division may on occasion be requested to assist the Medical Examiner's Office, or another agency, with these identifications .Requests of this type should be made through the State ME's Office. Friction ridge impressions obtained from unknown deceased persons may be compared with known standards and/or searched through AFIS for the purpose of individualization or exclusion.

Routine identifications for the purpose of clearing a Computerized Criminal History (CCH) record should be made through the Identification Services Section in Salem.

Guide to Collection and Packaging of Latent Print Evidence	
ACCEPTABLE	**NOT ACCEPTABLE**
DO use gloves to pick up items of evidence being careful not to wipe possible latent prints off the surface.	**DON'T** apply powder to obviously greasy, wet or bloody surfaces, or to prints left in dust or soft putty. Please photograph these prints or submit the items to the laboratory.
DO minimize handling of evidence.	**DON'T** wrap nonporous items in cotton or cloth as they may damage or destroy the latent impressions.
DO fasten down large articles containing latent prints with string or wire to a rigid surface to prevent shifting and contact with other items. Mark containers with the words "latent print evidence."	**DON'T** use "packing peanuts" directly in contact with the evidence.
DO put developed latent lifts in envelopes and mark and seal.	**DON'T** directly cover exhibits to be examined for latent prints with evidence tape.
DO take complete and legible, inked prints of all of subjects without SID numbers and/or FBI numbers.	
DO include inked fingerprints and palm prints of all individuals who may have handled the items before or after the crime.	
DO include full name, date of birth, and SID numbers for all involved persons on the Form 49.	

DO place papers and documents containing latent prints in manila envelopes, seal and submit to the laboratory

The following guidelines apply **only** when the item itself is **not** being submitted to the laboratory.

Latent Print Assessment & Photography
Assess evidence for the presence of visible friction ridge detail. When friction ridge detail is visible, mark the friction ridge detail with a scale (units of measurement must be visible). Areas of friction ridge detail should be imaged in a lossless file format (i.e. TIFF or RAW). . An overall photograph should be taken of the item (or scene) such that the friction ridge detail can be re-located on the item (or within the scene).

Latent Print Lifts
Lifts should be attempted on all imaged prints. Multiple prints in close proximity may be collected on the same lift. In some instances, one may need to perform multiple lifts of the same print to capture the best quality latent lift. Once lifted, affix the tape to either a lift card of appropriate color (i.e., white cards for black and bi-chromatic powder; black cards for white powder) or a transparency cover. Lift cards will be marked with appropriate identifying information such that the card can be matched back to the image(s) and the scene location. If it is unlikely that the impression can be lifted, then attempt to collect and package the evidence with the area of ridge detail.

CONTROLLED SUBSTANCES

Controlled substance analysis is the identification of specific chemicals that are designated as controlled by the Oregon Administrative Rules.

Analysis of Controlled Substances

There are three categories of analysis related to control substances.

- **Controlled substance analysis –** Qualitative analysis and identification of controlled substances. In general, non-controlled substances are not identified and Oregon law requires only the presence of a controlled substance, not its purity. Evidence can be found in both in liquid and solid samples (e.g. tablets, powders, plant material, etc.), varying in size from a residue to multi-kilogram submissions. Concentrations can vary from a few parts per million to almost 100% purity.
- **Clandestine laboratory analysis** - Samples (controlled and non-controlled) are analyzed to determine the method being used to manufacture an illegal drug. Theoretical drug yields based upon the quantity of chemicals and precursors seized may also be possible. Typical clan lab analyses involve methamphetamine and MDMA production – please contact your laboratory if you suspect a substance other than one of these.
- **Methamphetamine Quantitation** – Quantitative (purity) testing is performed for federal sentencing in methamphetamine cases only. Request by a US Attorney is required prior to laboratory analysis.

Submission Policies

Each laboratory limits analysis to two items per defendant, so the investigating officer should use discretion and submit only those two items that are essential to the case. Exceptions can be made by District Attorney's Office request to the laboratory. In cases with multiple suspects, an indication should be made as to what evidence belongs to which suspect.

Large seizures of over a kilogram of powder or large amounts of marijuana should not be submitted directly to the laboratory. A small sample of the material should be removed, packaged, and submitted for analysis. In certain circumstances where a seizure's entire weight is needed, laboratory personnel can assist with the weighing of large submissions. However, the officer must maintain possession of the evidence. A small sample will be retained by the laboratory for analysis. It is recommended that the submitting officer contact the laboratory prior to submission to discuss analytical needs.

Syringes

The following conditions must be met prior to submission of a syringe with a needle.

A.) The syringe must be the only drug item in the case **or** must be needed to establish probable cause.

NOTE: If there are other suspected controlled substances, we analyze that first. In the event the other items do not contain controlled substances, then the syringe can be submitted for analysis if still required for the case. The syringe will be analyzed when necessary to support the probable cause even if other suspected controlled substances are present in the case.

B.) The syringe **must be properly packaged in a puncture proof container**. If the evidence is submitted in improper packaging, the syringe will be returned to the agency for proper packaging.

C.) The **DA must agree to prosecute the case.**

D.) Submission of syringes **require prior laboratory approval**. The labs will grant approval if conditions A through C above are met.

If the above conditions are not met and the Officer still wants the syringe analyzed, then either the evidentiary material must be removed from the syringe (i.e. empty the contents of the syringe into a sealed vial) or evidence rendered safe (i.e. safely remove the needle from the syringe) prior to submission to the laboratory.

Razors and Other Sharp Objects

Razors and other sharp objects should be separated from other evidence that requires analysis and must be adequately labeled and packaged in such a manner as to protect personnel during handling. The packaging must be protective enough to ensure *no* possibility of being injured or punctured.
*Commercially manufactured puncture-resistant containers are available for purchase. Contact your local laboratory for information.

Biohazards

Items removed from a body orifice as well as syringe contents should be labeled with a "BIOHAZARD" label and the Form 49 should indicate from where the item originated as well as any identification of known concerns (e.g., "suspect positive for hepatitis C"). Please do not label typical drug submissions as "biohazard" unless there truly is cause for concern.

Collection and Packaging

All submitted items should be written on the Form 49. It is recommended to separate out drug evidence from items not needing analysis (e.g. submit only the bindles of drugs, not the entire purse and contents). Care should be exercised when packaging more than one exhibit in the same package to prevent cross contamination. It is also recommended that exhibits which are loose, open, leaking, or have cut corners/unsealed edges be individually secured to prevent loss. If such internal agency bags are used, please label them as such to distinguish from the actual evidence.

Plants/Wet Evidence
Live plant material and other damp/wet evidence should be dried prior to submission. This includes marijuana (Figure 2), mushrooms, peyote, or opium poppies. Fresh plant material, when packaged in airtight containers such as plastic bags, decays rapidly and can inhibit or possibly eliminate the chance for detecting a controlled substance. Suspected fresh khat should be frozen and submitted as soon as possible. Suspected LSD should be kept away from direct light. This can be accomplished by storing in dark packaging or wrapping in foil. Potentially spiked liquids should be submitted in a timely manner.

Latent Prints
Drug packaging that needs processing for latent fingerprints should be separated from the drugs when possible. The evidence for latent fingerprint processing is then submitted separately from the drugs.

Field Test Kits
When using commercially purchased field test kits, remember a positive result with the kit only indicates the possible presence of a drug. There can be other substances that give a similar reaction (e.g. marijuana resin can turn brown in a test that normally turns orange in the presence of amphetamines). Generally, the colors of a positive reaction indicated on the test kit are very apparent and interpretation of the result is usually not necessary.

The field test kits should be discarded after use. Please do NOT submit them to the laboratory. Many of the kits contain concentrated acids that can leak, creating a chemical hazard and potentially destroying evidence or packaging. In addition, drugs tested in these kits cannot be further analyzed.

Officers should not use field test kits on a residue amount of drug. In cases where quantities are limited, omit the field test and submit the evidence directly to the laboratory for analysis.

Clandestine Drug Laboratories
Clandestine drug laboratories range from crude makeshift operations to sophisticated and technologically complex facilities. They can be set up anywhere and are often found in private residences, hotel and motel rooms, trailers, barns and outbuildings, and commercial buildings. At these locations sophisticated surveillance equipment and booby-traps may be set up to deter intruders and law enforcement personnel from entering.

There are usually two situations when a clandestine laboratory is encountered. The first is when police or fire agency personnel encounter a previously unknown lab. When this occurs the personnel should secure the scene, allow no unauthorized or unnecessary entry, and contact the local specialized unit or trained personnel to process clandestine laboratories.

When clandestine drug laboratory chemicals are detected during a vehicle stop, treat the site as a crime scene. Contact the local law enforcement unit trained to handle this situation for assistance.

The second situation would involve prior knowledge by the local law enforcement agency of the illegal activity. A raid is planned and personnel needed for the proper shut down and dismantling of the laboratory have been contacted

Types of Clandestine Drug Labs
Although methamphetamine is by far the most commonly encountered clandestinely manufactured drug in Oregon, the OSP clan lab analysts are prepared to analyze samples from other types of manufacture. These include but are not limited to amphetamine, methcathinone, MDMA & related compounds, PCP, LSD and other compounds in the phenethylamine, tryptamine and piperidine classes.

Collection of Clandestine Drug Lab Samples
Extreme care and caution should be exercised whenever investigating or processing a clandestine drug lab site. The chemicals and substances used in the manufacturing process can be caustic, explosive, carcinogenic, poisonous, irritating, and/or flammable. Personnel participating in clandestine drug laboratory investigations should have specialized training in the use of protective equipment and the appropriate health and safety procedures.
Clandestine laboratory samples and reagents include highly corrosive acids, caustic bases, volatile respiratory irritants, flammable liquids and many other dangerous substances. The appropriate use of personal protection equipment is strongly recommended. In addition, samples must be packaged in a safe manner for long term storage and transport.

The processing of clandestine drug laboratories also involves the sampling, removal, and proper disposal of hazardous toxic chemicals. For forensic purposes, representative samples of all substances that could be used for the synthesis of a controlled substance should be submitted to the lab. In the case of multi-layer liquids, be sure the submitted sample contains sufficient material from both layers. Alternately, layers may be submitted in separate containers, but be sure to appropriately label which container is the top/bottom layer. Such information can be extremely important to the analyst.

In addition, photographs of the scene depicting any glassware along with any officer's report should also be submitted. If at any time the investigating personnel have questions about what should be sampled on scene, it is encouraged that they contact their local forensic laboratory for assistance. The transportation and disposal of all chemicals at the scene is regulated by state and federal environmental protection agencies and as such, any questions regarding disposal procedure should be directed to them.

Methamphetamine Quantification
The Oregon State Police Forensic Services Division performs quantitative analysis on solid dose methamphetamine only. This type of analysis requires a separate request, usually by a federal attorney, and is conducted when cases are being prosecuted at the federal level.

TOXICOLOGY

During investigations when there is cause to believe that an individual may have been under the influence of alcohol and/or drugs, efforts should be made to obtain blood and/or urine for toxicological analysis.

Type of Sample

Alcohol - In cases where it is necessary to determine the level and effect of alcohol on the individual, blood is the specimen of choice. Urine may be tested for the *presence* of alcohol, however it is not a legally recognized testing medium for blood alcohol determinations and therefore a percentage of alcohol will not be reported.

Drugs - In cases where the use of controlled substances or other drugs is in question, urine is the specimen of choice.

The laboratory is also able to determine the alcohol concentration of unknown liquid samples.

Many drugs leave the blood very rapidly and may be difficult or impossible to detect unless the blood is collected expeditiously. Generally, drugs are present in the urine in greater abundance than in blood, and are therefore more readily detected. When there is a question as to which medium is best, collect both blood and urine.

The Forensic Services Division is not able to test blood for the presence of drugs other than alcohol at this time. If blood-drug analysis is required, the laboratory may be able to assist you in locating an outside laboratory that is able to perform the work.

Triaging

If both urine and blood are submitted, the laboratory will test the blood for alcohol and the urine for drugs.

The laboratory may not test blood for alcohol concentration if a valid breath test has already been administered, and may not test urine for drugs if the subject's blood alcohol concentration is greater than 0.08% (w/v).

Cases that have pending criminal charges are prioritized higher than those that do not have pending charges.

Blood Alcohol

Collection, Packaging, and Storage

At least 4 milliliters of blood should be collected in a commercially available gray-top tube that contains sodium fluoride and potassium oxalate or EDTA. Ideally, two 10 milliliter tubes will be collected at the same time. Normally, the analyst will test one and leave the other unopened so it is available for additional testing if desired.

When gray-stoppered tubes are not available, other types of blood samples may be submitted (serum or plasma samples or tubes with other-colored stoppers).

The Forensic Services Division does not recommend the collection of multiple sequential blood draws. Testimony given at the time of trial will be the same whether there is one blood draw or several.

Blood Alcohol Specimen Kits can be purchased for packaging and securing the blood tube. Contact the laboratory for information on where to purchase these kits.

A specimen labeling system must be employed which assures unequivocal matching of the specimen with the person from whom it was collected. The tube(s) should be labeled with the individual's name, date, and time of the blood draw. If two or more vacutainer tubes are collected consecutively during the same blood draw, they should be labeled with the same time.

Do not place evidence tape or other seals over the stopper of the vial, as the tape can obstruct the information on the vial label, and can interfere with resealing of the tube. Instead, the packaging containing the blood tube(s) should be securely sealed with evidence tape.

Care must be taken to maintain proper chain of custody. Blood should be submitted to the laboratory as soon as reasonably possible, and should be refrigerated during any delay in submission. Blood evidence returned to the submitting agency should be stored under refrigeration.

Urine

Only qualitative analysis (identification of drugs) is performed. Quantitation of drug in a urine sample is not performed because urine drug concentrations cannot be correlated to a level of impairment. It should be noted that the mere presence of a drug in the urine cannot, by itself, support a determination that the subject was under the influence of the drug at a particular time. Likewise, the laboratory may be unable to detect drugs that are actively impairing a person due to limitations of the analytical methods or because the drug has not yet been metabolized to reach a sufficient concentration in the urine.

It is recommended that you include suspected drug information that is known and consider a Drug Recognition Evaluation (DRE) in conjunction with obtaining a urine sample. If a DRE evaluation has

been completed, please include a copy of the DRE face sheet when submitting the evidence to the Laboratory.

Drugs Tested in Routine Toxicological Analysis
Samples generally undergo screening by EMIT (Enzyme Multiplied Immunoassay Technique) and confirmation by Gas Chromatograph/Mass Spectrometer (GC/MS). The analyst looks for the following types of drugs in a routine toxicology analysis:

- Opiates/Narcotic analgesics (e.g. morphine, Vicodin, codeine, etc.)
- Amphetamines/Stimulants (e.g. amphetamine, methamphetamine, MDMA, etc.)
- Barbiturates (e.g. butalbital, phenobarbital, etc.),
- Benzodiazepines (e.g. Valium, Klonopin, Ativan, etc.)
- Marijuana metabolite
- Cocaine and its metabolites
- Methadone
- Other prescription drugs (e.g. Prozac, Soma, Ambien, etc.)
- Other potentially impairing over the counter drugs (antihistamines, dextromethorphan, etc.)

The laboratory currently is unable to test for inhalants (e.g. paint thinner, “Dust Off,” etc.), synthetic cannabinoids (e.g. “K2” or “Spice”) and LSD. If any of these types of drugs is suspected, collect a blood sample, store it in a cool, dark place, and contact the laboratory for help in locating a lab to analyze the sample.

If you suspect that lorazepam (Ativan), psilocin (mushrooms), or a date rape drug (e.g. GHB, etc.), was used, this should be specifically noted on the Forensic Services Request (Form 49). These drugs may not be detected in a routine toxicology analysis, and notice ensures that specialized detection methods can be utilized if necessary.

Collection, Packaging, and Storage
Urine Collection Kits are provided by the Oregon State Police and should be available at all Intoxilyzer locations. These kits can also be obtained through the OSP stockroom by calling 503-378-4348.

Urine samples should be collected in the plastic screw-top container provided in the kit. Be sure the lid is **tightly** secured, and seal and label the container with the following information:

- The individual’s name (not just initials)
- The date of collection
- The time of collection

Make note of the temperature of the urine specimen. If the temperature of the specimen is less that 90 degrees, or if there is any other reason to suspect tampering, try to obtain another sample from the subject, and send both samples to the laboratory.

Do not place evidence tape over the lid of the container, as this can obstruct the information on the label and interfere with reclosing. Instead, the packaging containing the urine specimen should be securely sealed.

Secure the urine cup in the plastic bag provided to contain any possible leaks. It should be noted that urine that leaks into the plastic bag will not be analyzed.

Care must be taken to maintain proper chain of custody. Urine should be submitted to the laboratory as soon as reasonably possible, and should be refrigerated during any delay in submission. Urine evidence returned to the submitting agency should be stored in a secure freezer or in a refrigerator if freezer space is limited.

FIREARMS EVIDENCE

Firearm examinations compare marks or impressions which result when two objects make contact with each other. These resulting impressions are characteristic of the "tool", which is usually the harder of the two objects. When a bullet, which is composed of relatively soft metals, travels through the harder barrel of a firearm the barrel leaves markings on the bullet. These markings are unique and can often be associated with a specific firearm. Fired cartridge cases can also be identified to a firearm in a similar manner.

Firearm examiners conduct the following types of examinations:

- Determining firearm function and safety.
- Determining if a firearm discharged in a manner other than designed (e.g. accidental discharge, full automatic conversion, etc.).
- Generating a list of possible firearm(s) based on the class characteristics found on fired bullets and/or cartridge cases.
- Comparison of bullets, cartridge cases, or fired shot shells to a firearm to determine if they were fired in a particular firearm.
- Cartridge comparisons to determine if they had been worked through the action of a questioned firearm.
- Determination of proximity, which is the distance from muzzle to target determined by powder or shot patterns.
- Manufacturer and type of ammunition.
- Examinations and conclusions regarding the identification of gunpowder.

  Trajectory analysis- see Crime Scene section

Integrated Ballistics Identification System (IBIS)
IBIS is a system that captures and compares images of known test-fires and unknown fired cartridge cases. These images are searched against a database. When similarities are observed, the evidence is referred to a firearms examiner for confirmation. All firearms on the IBIS eligible list are automatically entered at into IBIS, regardless of whether the examination is requested.

To request entry of evidence into IBIS, contact your local Forensic Laboratory for information on how to submit. Firearms eligible for IBIS entry generally include the following:

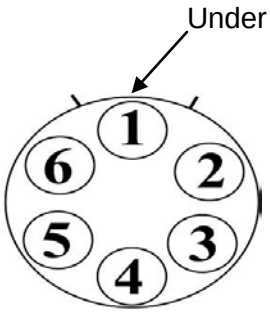
- Centerfire and rimfire semiautomatic pistols
- 7.62x39mm, 5.56/223 REM, and 22LR caliber rifles
- Pump and semiautomatic shotguns

Collection and Packaging of Firearms Evidence

The primary concerns when packaging firearms are safety and the preservation of the evidence including blood, trace evidence, and latent prints that may be present.

- Never insert anything into the barrel of a firearm.
- Minimize handling because it is possible to recover latent prints from firearms and ammunition.
- Do not remove cartridges from magazines, however, do remove the magazine.
- Absent special circumstances, recovered firearms and ammunition components should not be physically marked in any manner (see exception listed below). Label the packaging instead.
- Mark the position of the cylinder on both sides of the top strap before opening the cylinder of a revolver and make note of the position of fired and unfired cartridges in the cylinder. This is so the position of the cylinder, as recovered, can be determined after the cylinder is opened.
- Store and transport firearms unloaded and rendered safe. If unable to do so, hand-deliver the firearm to the laboratory and inform lab personnel immediately of the firearm's condition.
- Any evidence with possible blood or body fluids should be air-dried, then packaged in paper bags, envelopes, or cardboard boxes labeled as containing a biohazard. It is preferred that a "BIOHAZARD" label is attached.

Recover any unused ammunition of the same brand and type for laboratory examinations



1 Rem 38 Spl (fired)
2 W-W 38 Spl (fired)
3 F-C 38 Spl (unfired)
4 F-C 38 Spl (unfired)
5 W-W 38 Spl (unfired)

Figure 5: Example of how to note the positions of cartridges and cartridge cases in the cylinder of a revolver.

ARSON AND FIRE DEBRIS

Many times it is difficult to ascertain whether a fire was accidental or arson. Flammable liquids readily evaporate and thus arson evidence should be collected and packaged in an air tight container to prevent loss by evaporation and possible contamination. *Moisture is not a problem; do not dry arson evidence.*

An arson investigator should be contacted with specific questions regarding the type of scene being worked, what evidence collection is appropriate, and how to package/preserve evidence for submission to the laboratory.

Arson Scene Indicators

- Multiple fires in unrelated areas of the fire scene
- Odor of petroleum products, paint solvents, alcohol, etc.
- Stains on floor or other material
- Evidence of explosions not due to heat (shattered glass)
- Rapid spread of fire not explainable by structure, weather, or other conditions
- Smoke not explainable by building materials
- Fire trails such as cloth or paper trails, burn trails on carpeting, or deep charring in hardwood
- Removal of household property and valuable items
- Evidence of another crime which the fire might conceal (items stolen, evidence of violence)
- Recent similar fires in the vicinity

Collection of Evidence

- Charred debris and related material from the origin where the accelerant was placed
- Igniting devices (fuses, rags, candles, etc.) including mechanical and electrical devices
- Samples of upholstery, drywall, plaster, wood, or other material that may have been penetrated by flammable liquids
- Samples of soil that may have been penetrated by flammable liquids (freezing these samples prevents degradation)
- Trace evidence possibly left by the arsonist such as hairs, clothing fibers, matches, etc.
- Suspect clothing worn at time of crime, including shoes (nylon fire debris bags are the preferred packaging for clothing items. Paper bags should be avoided.
- Liquids containing possible accelerants (for comparison to unknown samples)

- Comparison sample - a sample of uncontaminated carpeting and/or padding, drywall, wood, etc. should be collected and packaged separately
- Material used as a wick (shirt, sock, towel, etc.) from an incendiary device. This material may be analyzed for DNA comparisons.
- Control samples – new, unused gauze, bags, swabs, etc.

Packaging of Evidence

- Use airtight containers. Unused, clean metal paint cans are preferred. Lined or unlined cans work equally as well, but the lined cans will not rust through over time. Heat sealed bags manufactured for flammable evidence collection may also be used. When these bags are used you need to submit an unused bag as a control. Contact the laboratory for information on where to purchase these packaging supplies.
- Do not use paper bags
- Do not put gloves (used by the investigator while collecting evidence) in the container with the evidence. Throw them away.
- Gauze pads can be used to soak up or collect residual liquid. Do not use cotton swabs, as they do not collect enough material to test effectively. Using swabs to collect ignitable liquid residues does not equate to collecting blood or biological material.
- Seal each collected item separately and securely.
- Mark all containers with appropriate identifiers.
- Document locations from which evidence samples were collected by notes, sketches, and/or photographs.

EXPLOSIVES

The Forensic Services Division accepts limited amounts of bulk explosives (less than 1 oz.) and post-blast residues for laboratory analysis. A wide variety of chemicals and energetic materials may be encountered in an explosives investigation scene. Analysis of some of these materials may be beyond the capability of the OSP Forensics Services Division. It is recommended your agency consults with an Explosives Analyst in the Portland Forensic Laboratory at (971) 673-8230. Evidence from a post-blast explosives scene should be collected by individual with specialized training. It is recommended that you call ATF or you agencies bomb squad for the contact information.

SERIAL NUMBER RESTORATION

The obliteration of serial numbers and manufacturer's marks is often done to prevent tracing ownership of articles. The laboratory uses mechanical and chemical processes that may restore the original marking in whole or part. Firearms, bicycles, motorcycles, chainsaws, boats, and cameras are all evidence items where serial numbers have been restored.

Collection and Packaging of Evidence

Package the evidence in a manner that will protect the area where the serial number has been obliterated. Contact the laboratory prior to delivering large items.

TOOL MARK EVIDENCE

Tool marks are impressions or marks produced when a tool comes into contact with an object; the tool is generally the harder of the two objects. Physical contact between a tool and the surface of an object produces marks not only characteristic of the type of tool used, but marks that may be unique to a single tool.

In the absence of a suspect tool, tool mark impressions can be examined in an attempt to determine the type of tool(s) that may have produced them. The following are types of tools that may be encountered are: hammers, screwdrivers, pry bars, knives, bolt cutters, pliers, tin snips, pipe wrenches, axes, and hatchets.

Do not attempt to determine if a found tool fits in the tool mark. This may alter or obliterate the tool mark and trace evidence may be lost or added.

Collection and Packaging of Evidence

The recovered tool should be carefully packaged to prevent the prying blade or cutting edges from having contact with any other objects that may cause an alteration of the tool.

Send the whole object containing the tool marks to the laboratory. If this is not possible, photograph the tool mark, then cut out the area with the tool mark or make a cast of the mark. Information about casting material that is appropriate for tool marks may be obtained by contacting the laboratory.

Mark the cast or cut object with appropriate information indicating its orientation such as up/down, inside/outside, and left/right directions. Package the object containing the tool mark in such a manner as to prevent alteration or damage during shipment and storage.

GUNPOWDER AND SHOT/PELLET PATTERNS

When ammunition is fired, a mixture of partially burned\unburned gunpowder, and vaporized primer compounds are expelled out of the firearm's muzzle, in addition to the bullet, shot pellets and wad(s).

Examination of the evidence may reveal the following:

- Proximity, which is the distance from muzzle to target determined by gunshot residue and/or shot pellet patterns
- Ammunition type
- Ammunition manufacturer
- Firearm condition
- Bullet or pellet entry angle
- Stippling or sooting around the entrance

Collection of Gunpowder Evidence

Submit the clothing or other object(s) that may have gunshot residue or bullet/pellet holes. Carefully handle and package the evidence to avoid losing deposited gunpowder and/or other residue(s).

If possible, collect and submit ammunition of the same type used in the crime (e.g., ammunition from the firearm's magazine, unused ammunition from a box at the scene, etc.)

GLASS EVIDENCE

Glass is one of the more important types of physical evidence that is commonly overlooked. Glass is frequently encountered in burglaries and hit and run cases, and glass fragments may be found adhering to garments, hair, embedded in shoe soles, or may be transferred to other property belonging to the victims and suspects.

Glass evidence cannot be individualized to a single source, however, there are some instances where two fragments can be physically matched together and a common origin can be conclusively established.

Glass examinations may demonstrate the following:

- The presence and number of glass particles recovered from clothing or other surfaces.
- Whether or not fragments of recovered evidence glass are similar to glass from a known source of broken glass
- The type of glass found (e.g., tempered glass, container glass, etc.)
- The direction of force (from inside or outside) used to break a window
- The order of shots fired into a window or windshield

Consider that large glass pieces may have latent fingerprints present and the broken edges of glass may have other trace evidence present such as blood, hair or snagged fibers.

Collection and Packaging of Glass Standards

A comparison of evidence glass to a possible source requires the submission of glass standards. A separate glass standard should be submitted for each broken glass item at the scene. **For each glass standard, submit <u>at least</u> ten fragments of broken glass from that item**. These fragments should represent the entire broken area of the item (i.e. taken from different areas of the broken item, if possible) since physical properties may vary even within a single glass object.

For window glass standards, collect the glass that is still adhering to the window frame when possible. Collecting glass standards from the ground increases the likelihood of introducing contaminant glass into the standard. A second comparison standard may be collected from the ground and submitted separately.

Vehicle windshields and some structural glass may be double paned, meaning that two different panes of glass are present. Standards should be collected from multiple areas on *both* glass panes. Package the standards from each pane separately, if possible.

Submit glass evidence in packaging that reduces the chance for further breakage.

GLASS EVIDENCE

Collection and Packaging of Recovered Glass Evidence

- Package glass pieces from different locations into different containers, clearly marking the outside packaging as to the location and description of the evidence.
- Collect and submit *all* glass pieces if you believe numerous glass pieces were from the same object (e.g. a window, a bottle, vehicle headlights, etc.) and request the laboratory to attempt a physical match.
- Label large glass pieces with orienting marks (e.g. up/down, inside/outside) when applicable.
- Collect and package a large glass piece in a rigid container such as a cardboard box. Protect the broken or fractured edges of the glass from any additional damage or breakage.
- Depending on the size, small glass pieces can be packaged in envelopes, bags, paper folds, or on Post-It notes. For very small glass particles, place the particle onto the adhesive of a Post-It note and use a pen to circle around it. Fold the note in half, covering the glass particles, and then put the folded Post-It note in a paper envelope.
- Tape over any holes in the packaging through which small glass particles could be lost.
- Glass pieces that are slightly bigger can be packaged in envelopes or bags, and then secured in a padded envelope to protect from further breakage or injury to those handling the evidence.

Clothing Items and Hair Combings

An individual who breaks a window with force or who is in contact with or nearby a breaking glass object may have very small particles of glass on his/her clothing and hair..

Collect clothing items, taking care not to shake or handle the clothing more than necessary. Doing so may dislodge these small glass particles. If the clothing is not stained with biological material (e.g. blood), package in a paper bag carefully sealing all possible openings. If the clothing is stained with biological material, allow the clothing to air-dry on a clean, dry surface and package in a paper bag. If this is not possible, collect *and submit to the lab ASAP.*

To collect glass particles from hair, have the person stand or lean over a large clean sheet of examination or butcher paper. Comb the hair to dislodge any particles so that they will fall onto the paper. Fold the paper to enclose any debris from the hair and tape closed.

Vacuum Sweepings / Large Objects

In some cases, it is useful to screen large objects such as carpets, car mats/vehicle flooring, or backpacks for glass particles. The entire object may be submitted, or a vacuum sweeping may be made of these objects. Adhesive lifts are not recommended for collection of glass evidence from these surfaces, as the lifts too quickly become saturated and lose the ability to pick up any glass present.

PAINT EVIDENCE

Paints are used as surface coatings for a variety of surfaces such as vehicles, structures, and appliances. Many crimes, such as burglaries, hit and run vehicle investigations, and others involve forceful activities that can result in the transfer of paint from the original source to another place, person, or thing. Paint transfer may also occur if wet paint is applied in the commission of a crime.

Paint evidence may be transferred from one object to another from contact or loose paint chips may be collected at the crime scene for later comparison with a suspected source. Paint chips may also fracture in such a way that a conclusive physical match can be made between the loose chips and the object they came from.

Paints contain a multitude of components, many of which may be detected in very small samples such as those encountered as evidence. Analysis and comparison of paint samples can be successful even when they are extremely small in size

Paint examinations can determine:

- Whether evidence paint sample(s) are similar to a paint standard
- The type of paint (vehicle, architectural, etc.)
- Lists of possible make and model of a vehicle by using Paint Data Query (PDQ), a computerized database
- If a physical matches exists between paint coatings on two pieces of an object that was at one time joined

Collecting and Packaging Paint Evidence

Paint comparison standards from a known object are required when the laboratory is required to perform a paint comparison. Paint comparisons are performed on a variety of paint types including vehicle paints, architectural paints, spray paints, cosmetic lacquers, etc.

A potential paint source may have one or more different kinds and colors of paint that are present (e.g. vehicles), and the differences may only be apparent using microscopic or instrumental techniques. Because of this, it is important to obtain paint standards that adequately represent all of the paint types present on a potential source. If multiple body panels of a vehicle show damage, a paint standard should be collected from each.

If paint transfer is loosely adhering to a surface, place a loose paper cover over the area to protect it during packaging and transport. Do not place tape directly onto an area of paint transfer.

Procedures:

Small Items (Easily Transported)

If an item that is a potential source or recipient of paint transfer is small enough to be easily packaged and transported, then it should be submitted in its entirety (e.g. tools, keys, knives, spray paint cans, etc.).

Large Items (Not Easily Transported)

If the potential paint source or paint transfer is on a large object or one not easily transported, such as a vehicle part or a door from a residence, use the following method for sample collection:

1. Locate the area of damage. If paint transfer from one object to another is suspected, collect both the area of suspected paint transfer and a nearby area of a paint standard that shows no paint transfer. Collect a standard from an area as close to the point of damage as possible; on vehicles, they should be from the same body part (i.e. hood, right front quarter panel, driver's door, etc.).
2. When contact between two painted surfaces is suspected, the possibility of cross-transfers must be considered. Collect both objects, or collect areas showing paint transfer and standards from both surfaces.
3. If broken paint edges are present, care should be taken to collect as much of the damaged edge material as possible. The potential for a physical match may exist.
4. Use a clean razor blade, scalpel, or sharp knife to gently pry, carve, or chip the paint from the surface down to the foundation or substrate.
5. Always clean collection tools between each use to avoid cross-contamination of one sample with another.
6. Collect a total of about a nickel-sized amount of paint from each damaged area, when possible.
7. Place each paint sample into a paper fold or small paper envelope. Securely seal all possible openings in the packaging, including seams and corners if necessary.
8. Securely seal and label the package(s) with a description of where the sample came from.
9. Continue to collect paint from each damaged area in the same manner, even if the object appears uniformly painted. Also collect any samples that are visually different. Package and label each area separately.
10. Paperwork should clearly document the locations of collection of any paint evidence to be submitted to the laboratory.

CAUTIONS

- Do not package paint standards in the same envelope as recovered paint evidence. This could allow cross contamination to occur.
- Do not collect paint evidence on tape. The adhesive from the tape may interfere with instrumental analysis of the paint. Post-it-type adhesive notes are acceptable.
- Substantial variations in thickness and layer sequences over short distances can exist across a painted surface. This is particularly true in architectural paint and for vehicle paint where curves, corners, and edges are often impact points and may have been subjected to previous damage,

sanding, or over-painting. Known paint samples shoul d be collected from these areas, when recognized.

- Do not use plastic bags (including evidence bags) that have small holes in them. Such bags are manufactured to allow excess air out; however, they are not appropriate for trace evidence collection as small particles may be lost.
- Be aware that when a vehicle's clear topcoat of paint is abraded, it may appear white to the naked eye.
- When observing road debris, be on the lookout for paint chips and plastic parts that may form a physical match with a damaged vehicle. Collect these items now for later comparison to a suspect vehicle.

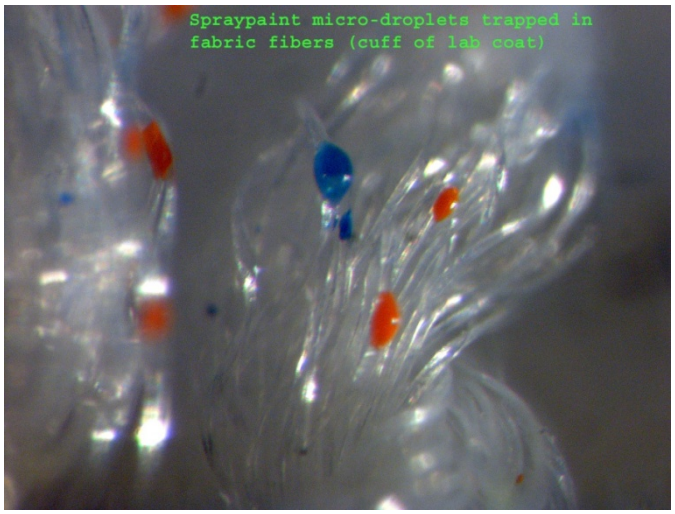


Figure 2: Micro-droplets of spray-paint on fibers of a sleeve cuff

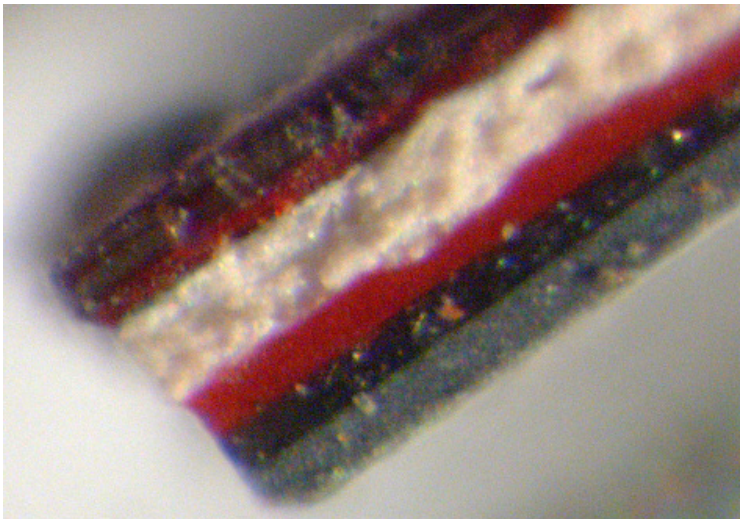


Figure 3: Layers of original and aftermarket paint from a vehicle

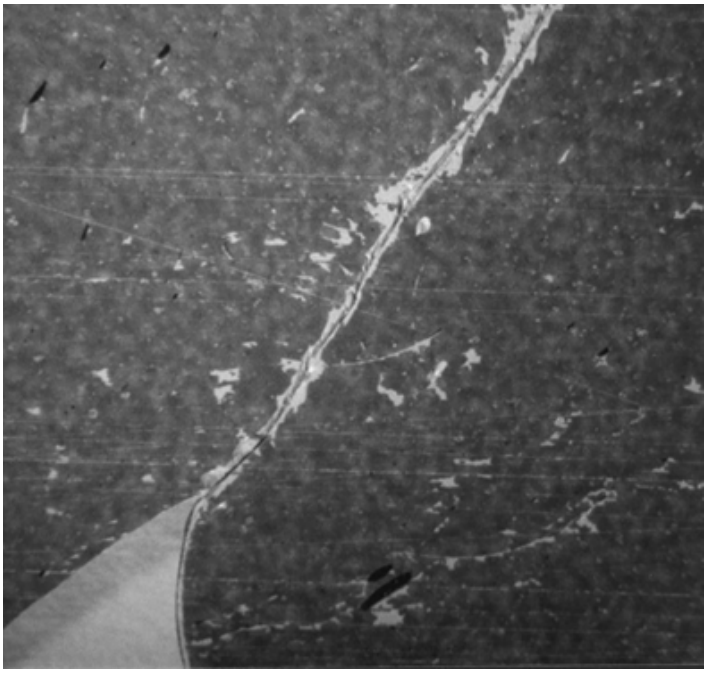


Figure 4: A physical match of two paint chips. Paint chip "A" was recovered from the scene of a hit-and-run; paint chip "B" was collected from the damaged area of a suspect vehicle. Note the microscopic scratches in the paint extending across the break.

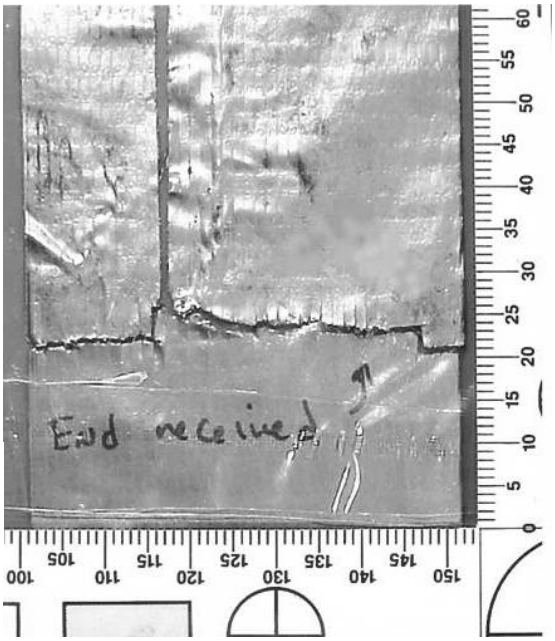


Figure 5: Physical match of duct tape pieces. The piece on the right was recovered from the suspect's possession; the pieces on the left were recovered from the crime scene.

PLASTIC AND TAPE EVIDENCE

Plastics are composed of polymers that are manufactured into a variety of different objects. Plastic evidence that may be encountered includes broken vehicle reflectors, smears on clothing, and small pieces of plastic from tapes and garbage bags.

Laboratory examination may be able to determine the type of plastic and whether or not it is similar to a suspected source. For large, rigid plastic pieces (e.g. broken reflectors), the laboratory can attempt a physical match.

Plastic fusion marks might be present on an individual's clothing as a result of a high-energy impact with a plastic component of a vehicle interior. Because a variety of different plastics may be present on the interior of the same vehicle, it may be possible to establish the position of the individual within the vehicle by comparing the plastic fusion mark to standards from the vehicle interior. Remember that a high-energy impact can cause a plastic component in a vehicle interior to have fibers or a fabric impression from the clothing, as well.

Collection of Plastic Evidence

Large, rigid plastic pieces may be collected and packaged into paper envelopes or bags, plastic bags, or cardboard boxes.

Small pieces of pliable plastic evidence (e.g. tape pieces, piece of garbage bag, etc.) should be placed into a paper envelope. Tape pieces that are adhesive should be affixed to a clear plastic sheet, *not* to a piece of paper, prior to packaging.

Clothing with possible plastic fusion marks should be packaged separately into paper bags.

MISCELANEOUS TRACE EVIDENCE (INCLUDING POISON)

A number of forensic examinations do not fall neatly into one of the other laboratory categories. These are assigned to Trace Miscellaneous. The most common types include analysis of food for suspected poisons and of cosmetics and household products for harmful tampering.

It is extremely helpful to the examiner to receive a complete police report that details the suspected poison or adulterant and any symptoms of the person(s) exposed. If the type of chemical is unknown, the examiner will perform general screening tests that will include, as appropriate, controlled substances, heavy metals, volatiles, and some pesticides/organics. It is not possible to screen evidence for every possible poisonous substance.

In addition to the item in question, the lab may request the submission of a control sample. For instance, were you to suspect that a beverage had been contaminated with antifreeze, you would submit the beverage in question, plus an untainted sample of the same beverage. If a sample of the contaminant is available, it should also be submitted.

Miscellaneous Trace examination also includes the general chemical identification of unknown solids, liquids and gases, measurement of physical, chemical or elemental properties, and the comparison of contents to product labeling. Again, case details should be submitted with the evidence in order that the analysis can proceed efficiently.

FIBER EVIDENCE

Textile fibers can be exchanged between individuals, between individuals and objects and between objects. When fibers are associated with a specific source, such as fabric from the victim, suspect or scene, a value is placed on that association.

A fiber that is transferred and detected is also dependent on the nature and duration of the contact between the suspect and the victim and/or scene and the persistence of the fibers after they have been transferred.

Research has shown that with few exceptions the largest quantity of fibers on an object is from the last object to be in contact with it. Therefore, it is advantageous to consider collecting fiber evidence prior to processing for other types of evidence. Caution should be used to prevent cross contamination of evidence collected for fiber examinations, particularly when crime scene personnel will also be responsible for collecting suspect or victim clothing items or for the processing of related scenes or vehicles. Caution should also be used to not add fibers from your own environment and clothing to the evidence (e.g. fleece coat, wool sweater).

Fiber examinations involve a comparison of samples from known and questioned sources to determine whether they are consistent with having originated from the same source (e.g., carpet from a suspect's car compared with fibers removed from the victim's clothing). Laboratory analysts examine various physical, chemical, and microscopic properties of fibers when performing a comparison between evidence fibers and a potential source. Common conclusions include statements regarding the similarity or dissimilarity of the evidence fiber(s) to the possible source or standard. This comparison involves the recognition and evaluation of class characteristics, which associate materials to a group, but never to a single source. Conversely, individual characteristics allow the association between two or more items with each other to the exclusion of all other items. For fiber examiners, this most often occurs when pieces of fabric or cordage are physically matched.

Determining whether a textile has been cut or torn may be a probative question for a piece of evidence. It may be possible to distinguish a cut from a tear depending on the object used, the textile type, the type of damage, and other factors.

Fiber Examinations

The following may be determined from fiber examinations:

- The type of fiber (e.g. natural or synthetic, animal fiber, glass fiber, etc.)
- The possible product uses for the fiber (e.g. carpet fiber, clothing fiber, etc.)
- The degree of similarity between evidence fiber(s) and a fiber source
- Whether a textile has been cut or torn and if a particular object could have been used to create the defect

Collection of Fiber Evidence
Fiber evidence can be collected in a number of ways. Refer to "Fiber Collection Methods" table.

Collection of Fiber Standards
A fiber standard (or a possible source) is required when the laboratory is requested to perform a fiber comparison. If the possible source can be packaged and transported to the laboratory with ease, submit the entire object (e.g., clothing items, throw rugs, etc.).

Fiber Collection Methods

Method	Description	Packaging	When to Use
Adhesive lifts*	Use fingerprint tape, cellophane tape, or other clear adhesive substrate and pat over the item. Take care not to miss any areas or allow the tape to become "overloaded." Post-It notes may also be used for small areas.	Stick adhesive tapes onto a clear, colorless plastic sheet (e.g. transparency film). Place into a paper envelope or bag. Fold Post-It notes in half and place into a paper envelope.	For fibers you cannot see, or to be sure you have not missed any. Good on car seats, surfaces of clothing, and other medium to large surfaces.
"Pick" method	Using your fingers or tweezers, carefully retrieve the fiber taking care not to pinch, crush, or stretch it.	Place the fiber into a paper fold, in a folded Post-It note, or paper envelope.	For fibers you can see.
Vacuum sweepings	Use a portable vacuum cleaner equipped with special traps holding a piece of filter paper. *Lightly* vacuum the surface of interest. The goal is to collect fiber evidence that is on the surface of the object, not to clean it.	Carefully remove the filter trap, cover with the lid or cap, and package in a paper or plastic bag.	For fibers you cannot see, or to be sure you have not missed any. Good on car seats, sections of carpeting, and other large surfaces.

Cautions

- Care should be taken to store adhesive lifting materials in such a way that they will not become contaminated prior to use
- Use of tools, such as forceps and tweezers, may cause damage to the trace evidence.

- Clean any collection tools thoroughly between samples to prevent cross-contamination.
- Avoid serrated tools as they may be more difficult to clean thoroughly.

If the fiber source is believed to be from a large object or one not easily transported, such as car upholstery or carpeting from a dwelling or vehicle, cut representative samples from various areas of the carpeting. Be sure to collect samples from areas that are visually different (e.g. different colored areas, faded areas due to sunlight, worn sections, etc.). Samples should be about 1x1 inch unless you see variations in the item that would warrant a larger sample cutting.

Package the garment, object, or sample cuttings in paper envelopes or bags and clearly label with a description of from where the standard came.

Do not package standards with evidence fibers, or allow them to be near or in contact with each other. This could allow cross contamination to occur.

Adhesive lifts are **NOT** acceptable for collection of standards.

Cut vs. Tear
If it is necessary to determine if textile defects are the result of a cut, the item suspected of creating the defect (e.g. knife, scissors, screwdriver, etc.) should also be submitted.

HAIR EVIDENCE

Hair evidence can be obtained from the victim, the suspect, a crime scene, or from other evidence such as clothing. Hair is valuable evidence, particularly in cases where the perpetrator is a stranger to the victim or an environment.

Hair Examinations

The following may be determined with hair examinations:

- Similarity or dissimilarity between evidence hairs and a hair standards
- Determination of human or non-human origin
- Determination of animal species
- Determination of human body origin (e.g. head hair, pubic hair, etc.)
- Determination of classic racial characteristics
- Whether there are indications that a human hair was forcibly removed
- Alterations exhibited in a human head hair (e.g. bleached, dyed, etc.)
- Whether the root of a hair appears appropriate to attempt nuclear DNA analysis

Whole human head hairs and pubic hairs (where the root is present) generally have enough microscopic features to allow for a meaningful comparison to a standard. Hairs from other parts of the body, or hair fragments (where the root isn't present), are typically *not* well suited for a comparison.

A hair examiner will examine and compare evidence hair to standards, basing their conclusion(s) on the features of the hair samples. Common conclusions include statements regarding the similarity or dissimilarity of the evidence hair to the standard; however, hair comparisons are not a means of identification.

DNA Analysis of Hairs

Because nuclear DNA analysis of hairs is destructive and does not always end in a useable DNA result, it is the policy of the Forensic Services Division to perform microscopic hair comparisons prior to DNA analysis when possible.

The hair examiner will evaluate the hair for nuclear or mitochondrial DNA. The nuclear DNA analysis targets the root section of the hair. Mitochondrial DNA analysis of hairs can be performed on the root or the shaft portion of the hair. The Forensic Services Division does not perform mitochondrial DNA analysis, but can assist with the transfer of evidence to the FBI or a private laboratory when necessary. The amount of DNA in a hair is very small and therefore contamination may occur if precautions are not taken. Do not touch hair evidence with your bare hands or contaminated gloves.

Collection of Hair Evidence

Hair evidence can be collected in a number of ways. The "Hair Collection Methods" table lists the various methods and when they are appropriate.

Hair Collection Methods

Method	Description	Packaging	When to Use
"Pick" method	Using your gloved fingers or tweezers, carefully retrieve the hair taking care not to pinch, crush, or stretch it.	Place hair into a paper fold, in a folded Post-It note, or paper envelope.	For hairs you can see.
Vacuum sweepings	Use a portable vacuum cleaner equipped with special traps holding a piece of filter paper. *Lightly* vacuum the surface of interest. The goal is to collect trace evidence that is on the surface of the object, not to clean the object.	Carefully remove filter trap, cover with the lid or cap, and package in a paper or plastic bag.	For hairs you cannot see, or to be sure you have not missed any. Good on car seats, sections of carpeting, and other large surfaces.
Adhesive lifts*	Use fingerprint tape, cellophane tape, or other clear adhesive substrate and pat over the item. Take care not to miss any areas or allow the tape to become "overloaded." Post-It notes may also be used for small areas.	Stick adhesive tapes onto a clear, colorless plastic sheet (e.g. transparency film). Place into a paper envelope or bag.	For hairs you cannot see, or to be sure you have not missed any. Good on car seats, surfaces of clothing, and other medium to large surfaces.
Scraping	Use a clean spatula or long, flat tool to scrape the surfaces of an object onto a large, clean piece of paper. For this to work well, the object should be hanging or held up vertically over the paper, scraping downwards.	Carefully shake any trace evidence on the paper to the center and fold the paper. Seal the paper fold and place into a paper envelope or bag.	For hairs you cannot see. Works well on clothing or other pliable objects.

Cautions

- Care should be used to avoid contamination prior to use.
- Use of tools, such as forceps and tweezers, may cause damage to the trace evidence.
- Clean any collection tools thoroughly between samples to prevent cross-contamination.
- Avoid serrated tools as they may be more difficult to clean thoroughly.

Collection of Hair Standards

Because of the variation in characteristics among different hairs from the same body region of one person, it is important to obtain a sufficient number of hairs in order to adequately represent the ranges of all characteristics (e.g., color, length, etc.) present. If the ranges of characteristics are large, it becomes necessary to obtain a large number of hairs.

Hairs should be collected from the head and pubic area if appropriate. Hairs from different regions have different characteristics. Head hair standard cannot be used for comparison to pubic hair evidence.

Collect hair standards in the following manner:

- Obtain standards from all persons who might reasonably be considered a source of an unknown hair (e.g., suspect, victim, and other individuals common to an environment).
- Obtain standards as soon as possible after the crime occurred. Hair naturally changes in its characteristics over time because it is constantly growing. The standards should reflect the individual's hair as close to the date of the crime as possible.
- It is recommended that a known head hair sample consists of at least 24 hairs collected from 5 different areas of the scalp (center, front, back, and both sides). These hairs should be obtained by both pulling and combing. The recommended procedure for obtaining combed hairs is to use a clean, unused comb and repeatedly comb the hair over a large sheet of clean paper.
- If appropriate to the case pubic hair standard should consist of at least 24 hairs obtained by both pulling and combing from different areas of the pubic region
- Gather all the hairs collected from a single body region and place into a paper fold or paper envelope
- Seal and label the envelope with the individual's name and the body region it was collected from.
- Do not package paper folds containing different individual's hair in the same envelope, or package hair standards with hair evidence. This could allow cross contamination to occur.

Secondary Standards

A secondary standard is not obtained from an individual directly, but from an object or location where the individual is believed or known to have deposited hair (e.g., a hairbrush). Necessity should be the only reason to obtain secondary hair standards vs. pulled/combed hair standards (e.g., missing person, person buried/cremated before collection could occur).

Secondary hair standards may be acceptable if it can be demonstrated or documented that the hair collected from the object/location is unlikely to include hair(s) from other individuals. The acceptance of a secondary standard for comparisons will be evaluated by the hair examiner on a case-by-case basis.

IMPRESSION EVIDENCE

Shoe, tire and fabric impressions are routinely present at crime scenes and are frequently overlooked by law enforcement personnel. Examination of these impressions may provide the investigator with valuable leads such as the type, make/model, and approximate size of the footwear or tire. If properly documented and collected, almost every impression left by a shoe or tire has value for forensic comparison to a suspected source. Even when suspect footwear is not available, images of impressions from scenes may be submitted to the laboratory for search in the SICAR (Shoeprint Image Capture and Retrieval) database for make/model determination and comparison to impressions from other scenes.

Impressions made by other objects (e.g., weapons) may also be encountered and may be collected/documented using the methods described below.

Impression Evidence General Guidelines

- If impression evidence can be collected without damage, it should be photographed, packaged, and submitted to the laboratory for examination under controlled conditions.
- Always include a scale when taking photographs of impressions to be used for examination. The scale should be a two dimensional ruler and should be placed on the same plane as the impression.
- Impressions in soil, sand, snow, or impressions which cannot be sent to the laboratory should be photographed and collected via casting or lifting.

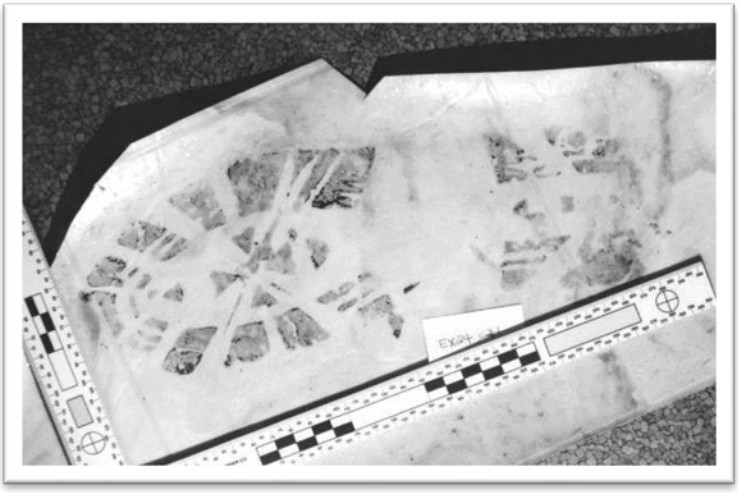
Photographing impression evidence

- Photographs of the evidence should always be taken *before* any attempt to collect it.
- Photograph the general scene that contains the impression evidence.
- Impression evidence should be photographed in an uncompressed format (e.g., TIFF or RAW). Digital photography is acceptable; however, low resolution images may be of limited use in comparisons.[6]
- Place the camera on a tripod with the camera directly over and perpendicular to the impression. If the impression is on an angled surface adjust the camera to tilt it to a plane parallel to the impression.t is important to avoid taking the photos at an angle to the impression. This can result in the inability to accurately enlarge the images as needed for comparison.
- Adjust the camera height so the impression and scale fill the frame.
- Use overlapping exposures to record large impressions.
- Use side lighting at various angles and from various directions to illuminate tread design more clearly. This may require shading the camera setup from high, bright sunlight with a makeshift tent and access to a detachable flash unit.

[6] If using a film camera, select a camera with a large negative format such as 35mm or 4 x 5 inch.

Representation of the camera and tripod setup for shoeprint photography

Photograph of a shoeprint impression. Notice the shoeprint fills the frame, a scale is present, and the camera is directly over the shoeprint, not at an angle.



Three-Dimensional Impressions

Three-dimensional impressions are those that have a significant depth, in addition to the length and width of the impression. Commonly, they may be found in soil, sand, snow or other materials and the

detail within the impression may vary according to the substrate. Casting is an effective method of collecting these types of impressions. Impressions should always be photographed prior to casting. Photographs, however, are not considered a substitute for a cast. If a lengthy tire track is encountered, an attempt should be made to cast a section at least three feet in length. Do not clean out debris that is part of the impression or was present when the impression was made.

Casting Methods

Note: The methods described below are not applicable to casting of impressions in snow. Specialized techniques are required for casting of snow impressions. Should the need arise to cast impressions in snow, please contact the laboratory for assistance or advice regarding the casting of snow impressions.

Dental stone or die stone should be used to cast three-dimensional footwear and tire tread impressions. Plaster of Paris is no longer recommended as an acceptable casting material. Dental stone can be obtained from local dental supply houses or in pre-made ready to use kits at minimal cost.

If using bulk dental stone, two (2) pounds of dental stone may be placed into an 8x12 inch Ziploc plastic bag; this amount will cast an average sized shoe impression. In preparation for use at crime scenes, numerous two-pound bags can be prepared and stored.

When using a commercially prepared kit, follow manufacturer instructions for mixing.

The following is the procedure for making a cast from a self-made (bulk) dental stone kit:

- Retrieve a two-pound bag, add about 10 ounces of water, and thoroughly mix in the closed bag. The mixture should have the consistency of thin pancake batter. If needed, add more water or dental stone to create the correct consistency.
  - Metal forms may be placed around the impression to contain the casting mixture. These are less critical with the advent of dental stone and other forensic casting materials[7].
  - Open the bag and with the bag at ground level, carefully pour the mixture into or next to the impressions, allowing it to gently flow into it. Fill the impression completely so that the mixture overflows out of the impression.
  - When the cast is firm but still soft, scratch identifying marks on the exposed surface or write identifying marks with a permanent marker when the cast is dry.
  - Allow the cast to dry for a minimum of twenty minutes in warm weather, longer in cold, wet conditions.
  - Carefully lift the cast. **Do not try to clean the cast**; cleaning will occur in the laboratory.

[7] This was more critical when plaster of Paris was used as the casting material. The form was required because the cast had to be about 2 inches thick to be reinforced properly. This is no longer a concern with dental stone and other modern forensic casting materials.

- Package the cast in a large brown paper bag or cardboard box (not plastic) and allow to dry for an additional 48 hours.

Two-Dimensional Impressions/Prints

A two-dimensional impression is one where there is no significant depth to the impression. A thin deposit of dust, mud, blood, or other material from a shoe onto a hard surface may create these impressions.

- Floors, glass, desktops, doors, paper items, etc. can retain a dust or residue impression at a scene. Some impressions may be clearly visible while others may be partially or totally latent.
- Latent dust shoeprints can often be located by turning out all lights and shining a flashlight across the surface of interest at a low angle. For example, to search for latent shoeprints on a vinyl floor, place the flashlight on the floor (or near it) and allow the long beam of light to shine across the floor.
- Photograph the impressions before collecting.
- Attempt to enhance or lift the impression **only** if the entire item cannot be retrieved from the scene and submitted to the laboratory.
- Dry dust and residue impressions may be lifted with an electrostatic lifting device, gelatin lift, or adhesive lift. Contact the laboratory for purchasing information.
- Impressions made by wet or damp footwear can sometimes be enhanced by carefully dusting with fingerprint powder. A small portion of the impression should be dusted first to test the success of the powdering technique. The impression is then photographed and can be lifted with a contrasting gelatin or adhesive-lifting material. Contact the laboratory for information on where to purchase lifts.

Collection and Packaging

- Whenever possible, collect the impressioned item and submit it to the laboratory.
- Protect the impressioned item so that the impression does not rub off.
- Package in a cardboard box or paper bag. Carefully securing the item to the bottom of a thin cardboard box is a good way to protect flat impressioned items.
- Submit the photographs of the impression to the laboratory. These should be properly packaged as evidence and submitted along with any casts or lifts.

EXEMPLARS AND STANDARDS

Footwear Exemplars

There may be several people who have legitimately walked into a crime scene. These include first responders, medical personnel, members of the crime scene team, funeral home or Medical Examiner's Office personnel, individuals from the District Attorney's Office, etc. These people may leave shoeprints at the scene and it can become difficult to distinguish evidentiary shoeprints from those that are artifacts of the crime scene processing.

Exemplars may be collected from people entering the crime scene in a number of ways. A good time to do this is have the person keeping the crime scene log require everybody entering the scene to give a shoeprint exemplar before proceeding into it. This may be accomplished by:

- Taking a photograph of the shoe sole.
- Greasing the soles with a thin film of petroleum jelly and having the individual step onto a clean piece of paper. Dust the grease print with fingerprint powder for visualization.
- Using a commercially available kit consisting of an ink pad with non-visible ink and foot-sized pieces of paper for collection.

Footwear Standards

If a comparison is to be performed, footwear should be submitted to the laboratory as standards from all individuals thought to have left evidence impressions.

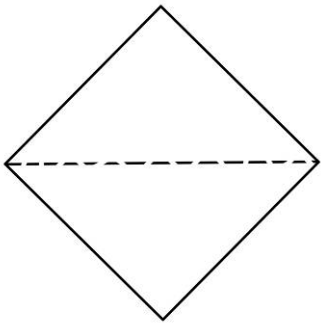
Tire Exemplars and Standard

It is highly recommended that tires be submitted to the laboratory for the making of tire exemplars and comparison to unknown tire tracks. Whenever possible, tire exemplars should be made with the tire still in place on the vehicle. If it is not possible to transport the vehicle or to collect the tire, please contact your local laboratory for recommendations on how to proceed.

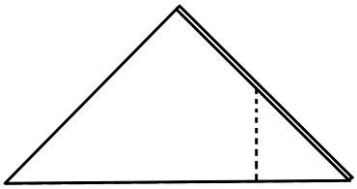
COMPUTER EVIDENCE

The Forensic Services Division does not examine this type of evidence. The Federal Bureau of Investigation (FBI) accepts this type of evidence at its regional laboratory in Portland, Oregon. Please refer to the FBI's NWRCFL website: http://www.nwrcfl.org/.

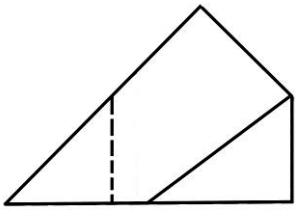
HOW TO MAKE A PAPERFOLD



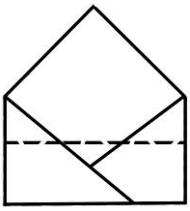
1. Fold a square piece of paper into a triangle. If using a rectangular piece of paper, make the same fold as above and then cut off the excess.



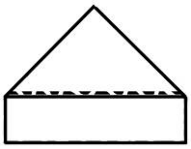
2. Take one corner at the folded edge and bring the corner just past the center point, keeping the two folded edges together.



3. Take the second corner at the folded edge and bring the corner just past the center point on the opposite side, keeping the two folded edges together.



4. Bring all folded edges up together to the point where the top of the paper starts to angle.



5. Take the top center point and tuck into the opening created by the folded edges.

6. Fold and tape seal along this opening.

MANUAL REVISION HISTORY

Revisions Table to Physical Evidence Manual

Date	Revision #	Revision	Author
May 2002	0	Creation and Adoption of Physical Evidence Manual	
February 2004	1	Removed references to Coos Bay Lab, added "gum seal" as ok for use as evidence sealer,	
January 2006	2	Re-write to comply with ISO requirements; changes in programs	
October 20, 2006	3	Removed gum seal w/ dye indicator as an acceptable method of sealing evidence.	
December 11, 2006	4	Updated lab area service map to show all Douglas Co. to Springfield.	
October 26, 2007	5	Added information regarding touch evidence to 6.0; added 25.0 Missing Persons and 26.0 Unidentified Remains. Deleted lab survey card from appendix. Slight changes/corrections/clarifications made to Fingerprints, Firearms	
January 31, 2008	6	Updated/added information to Missing Persons 25.0. Also changed contact info in 25.0 & 26.0 to UNT.	
December 13, 2011	7	Complete revision of entire manual – Susan Hormann Operations Manager	S. Hormann
June 3, 2014	8	Complete revision of entire manual	Technical Leaders, Odessa Siegel and S. Hormann