Physical Evidence Handbook

Washington State Patrol
Crime Laboratory Division
400 E. Union P.O. Box 42632
Olympia WA 98504-2632

(206) 753-0294

TP 0-20 0-468

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It is a capital mistake to theorize before one has data. Insensibly, one begins to twist facts to suit theories instead of theories to suit facts.

Sherlock Holmes

February 1, 1993

To: All Law Enforcement Officers

It is with much satisfaction that I present this revision of the Washington State Patrol *Physical Evidence Handbook*. This new publication has been revised to reflect technological advances in our crime laboratories. Our Crime Laboratory Division now has such capabilities as the examination of DNA, computerized measurement of the refractive index of glass, and the ability to locate and identify gunshot residues through the use of a scanning electron microscope. Scientific personnel are also finding improvements in the examination of such diverse evidence as paint and drugs.

The increased accuracy and sensitivity of laboratory instruments is a boon to the law enforcement community; however, at the same time, this increases the responsibilities of the investigating officer. When an instrument has the ability to analyze minute particles, it is incumbent upon the investigator to collect and treat the evidence properly.

In addition to laboratory services, we have inaugurated a new program to provide crime scene assistance to law enforcement agencies in our state. The Crime Scene Response Team is the combined effort of three of our divisions to respond on a 24-hour basis to assist in crime scene processing and investigation.

The quality of the physical evidence presented in a court of law is dependent not only on the scientific analysis performed, but on the proper collection, packaging, and preservation of that evidence as well. Toward that end, this revised edition of the *Physical Evidence Handbook* is presented as a reference. It represents the joint effort and teamwork between science and law enforcement.

Sincerely,

CHIEF ROGER W. BRUETT

RWB:tlu

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ACKNOWLEDGEMENTS

The compilation of a publication such as this with its many technical requirements is a formidable task; certainly an effort which is beyond the reasonable capability of a single person. Thus, we acknowledge and thank the following for their valuable contributions of time and energy, as well as other equally valuable resources:

- The many forensic scientists in our crime laboratories who contributed their knowledge and experience;
- The headquarters staff of the Crime Laboratory Division for their unflagging support, advice, and patience;
- The Idaho State Crime Laboratory Division and the Oregon State Crime Laboratory Division for the use of their illustrations;
- The State Criminal Justice Training Commission for their support in printing and distributing this handbook;
- And, finally, the word processors and proofreaders whose skills and sharp eyes were much in need.

PREFACE

Technological advances have created a need for a revision of the *Physical Evidence Handbook*, 1988. We are now able to conduct examinations that were not developed when the first edition was published—for example, DNA analysis. Other examinations have been refined and improved through better instrumentation, such as glass and paint analysis. It is important that the investigator be aware of the changes in evidence collection and handling which result from these technical gains.

The handbook is organized to provide the following:

- A description of services provided by the crime laboratories.
- General guidelines for the collection, preservation, and packaging of physical evidence.
- The procedure for submitting physical evidence.
- Procedures for handling various types of physical evidence. The sections on each type of evidence are structured as follows:
  - A brief introductory statement.
  - Precautions when dealing with the evidence type.
  - The significance of the laboratory results.
  - Procedures for collecting and preserving the evidence.
  - Special packaging and shipping requirements.
  - Standards and controls requirements.

The handbook is not meant to be a comprehensive reference source for the collection and handling of physical evidence. An attempt has been made to briefly highlight the basic principles and requirements for dealing with the more common evidence types. The investigator is encouraged throughout the handbook to call the crime laboratory for assistance. This is probably the best advice that we can provide: The wise investigator seeks counsel.

This handbook is a reference publication. It cannot replace the caution, care, and probing reflection that are the requisites of the thorough, successful investigator.

INTRODUCTION

The Crime Laboratory Division, within the Investigative Services Bureau of the Washington State Patrol, consists of three full-service regional laboratories and three satellite laboratories.

The Washington State Patrol crime laboratories are mandated by the Legislature to provide criminal justice agencies within the state with scientific investigative support associated with matters of a criminal nature.

Evidence from all types of crimes is accepted from local, county, and state law enforcement agencies. Other agencies are assisted on a cooperative basis when a special need arises.

The Washington State Patrol crime laboratories are responsible for providing scientific support and expert testimonies relating to physical evidence from crimes by:

- Assisting at the scenes of crimes.
- Performing scientific examinations and evaluations of physical evidence in order to provide information relevant to criminal investigations.
- Assisting prosecuting attorneys by participating in pretrial consultations and by providing reports, charts, graphs, and other exhibits.
- Providing expert testimony in court trials, hearings, and depositions.
- Providing training to the criminal justice community in crime scene investigation, the role and significance of physical evidence, and the collection, preservation, and packaging of physical evidence.

CRIME LABORATORIES AND SERVICES

Crime Laboratory Division
400 East Union
PO Box 42632
Olympia WA 98504-2632
Telephone: (206) 753-0294, SCAN: 234-0294, FAX: (206) 753-0166

REGIONAL LABORATORIES (FULL-SERVICE):

- **Seattle Crime Laboratory**
  2nd Floor, Public Safety Building
  610 Third Ave
  Seattle WA 98104
  Telephone: (206) 464-7074, SCAN: 576-7074, FAX: (206) 587-5023

  Services: Arson examination
  Biochemical analysis (serology)
  Controlled substance analysis
  DNA analysis
  Firearms examination
  Forensic chemistry
  Forensic documents
  Microanalysis (trace)
  Toolmark examination

- **Spokane Crime Laboratory**
  Room 100, Public Safety Building
  Spokane WA 99201
  Telephone: (509) 456-4144, SCAN: 545-4144, FAX: (509) 545-4051

  Services: Arson examination
  Biochemical analysis (serology)
  Controlled substance analysis
  Firearms examination
  Forensic chemistry
  Microanalysis (trace)
  Toolmark examination

- **Tacoma Crime Laboratory**
  Room B-70, County-City Building
  930 Tacoma Ave S
  Tacoma WA 98402
  Telephone: (206) 593-2006, SCAN: 462-2006, FAX: (206) 462-5582

  Services: Arson examination
  Biochemical analysis (serology)
  Controlled substance analysis
  Firearms examination
  Forensic chemistry
  Microanalysis (trace)
  Toolmark examination

SATELLITE LABORATORIES (LIMITED SERVICE):

- **Everett Crime Laboratory**
  3202 20th St
  Everett WA 98201
  Telephone: (206) 339-1840, SCAN: 261-1840, FAX (206) 585-7129

  Services: Biochemical analysis (serology)
  Controlled substance analysis

- **Kelso Crime Laboratory**
  312 SW First Ave
  PO Box 888
  Kelso WA 98626
  Telephone: (206) 577-2087, SCAN: 239-2087, FAX (206) 239-2095

  Services: Biochemical analysis (serology)
  Controlled substance analysis

- **Kennewick Crime Laboratory**
  Route 7 Box 12450
  Kennewick WA 99337
  Telephone: (509) 545-2022, SCAN: 526-2022, FAX: (509) 526-2031

  Services: Controlled substance analysis

CRIME SCENE RESPONSE TEAM

INTRODUCTION

The complexity and demands of a major crime often overwhelm the resources of a law enforcement agency. The necessity to do a thorough and complete investigation is equally incumbent upon all agencies, regardless of resources and training. The Crime Scene Response Team (CSRT) has been established to respond to calls for crime scene assistance from law enforcement agencies within the state.

GOAL AND OBJECTIVES

The CSRT will respond in a timely manner to requests by law enforcement agencies and provide a thorough examination and record of the physical crime scene. This will be accomplished by:

- Responding in an expeditious manner to avoid the loss of evidence.
- Assisting in the processing of the crime scene in order to preserve, collect, package, and identify all pertinent physical evidence.
- Recording the crime scene in an appropriate manner, including photography, sketching, diagramming, and notetaking.
- Providing the requesting agency with a written report.
- Providing expert testimony.

CALLOUT CRITERIA

The CSRT will respond to the following situations:

- Death investigations (except traffic fatalities)
- Sexual assault cases
- Kidnappings
- Assaults/shootings involving a law enforcement officer
- Other crimes as warranted by circumstance and resources

CALLOUT PROCEDURE

The requesting law enforcement agency will call the CSRT Coordinator by contacting the **State Patrol Communications Center** in **Olympia (206-753-6856, 1-800-283-7801** toll-free, or **SCAN 234-6856**) and have them contact the CSRT Coordinator.

The Coordinator will communicate with the requesting agency to assess the agency's needs and determine the level of response. If time is critical and a state aircraft is available, the CSRT may be flown to the site.

All or part of the Team will respond, depending upon the assessed need. The Team consists of forensic scientists, investigators, and latent print examiners.

RELATIONSHIP TO REQUESTING AGENCY

The requesting agency will retain the responsibility, authority, control, and direction of the overall investigation.

The requesting agency will be kept informed at all times of the status of the crime scene investigation.

The Team will not engage in any activity which they deem unethical or in violation of accepted crime scene practices, Washington State laws, or Washington State Patrol regulations.

Any requests for information, including from the news media at the scene, will be referred to the requesting agency.

The CSRT Team will provide a full report to the agency as well as all photographs, charts, sketches, diagrams, and maps. All collected physical evidence will be maintained by the requesting agency. The Team will maintain copies of selected non-evidentiary documents or other items as deemed necessary.

The Team members will be available for court testimony.

PROCEDURES FOR EVIDENCE SUBMISSION

The following procedures should be observed to properly prepare and submit physical evidence to the crime laboratory.

SHIPPING

- Check with your local crime laboratory to determine which state crime laboratory should receive the evidence. All of the crime laboratories examine controlled substances; some types of examinations are performed only at a specific laboratory.

- Choose a suitable shipping container so that the evidence can be securely packed and preserved during transmittal.

- Each item must be wrapped and sealed separately to avoid contamination.

- Seal the shipping container and clearly mark it with the notation "EVIDENCE" and the agency name and case number.

- Place the white and pink copies of the Request For Laboratory Examination (Form WSP-CL-005) in an envelope and attach to the sealed shipping container. Do **not** place the Request For Laboratory Examination form inside the sealed shipping container. (Laboratory personnel must be able to retrieve the form without breaking any evidence seals.)

- Wrap the sealed shipping container and the Request For Laboratory Examination form with paper, secure with tape, and send by U.S. Postal Service or United Parcel Service (UPS) to the appropriate crime laboratory. If using the U.S. Postal Service, send by **Registered** or **Certified Mail** with a **Return Receipt Requested.** If using UPS, request an **Acknowledgement of Delivery.**

PERSONAL DELIVERY

- Personal delivery is the preferred method when the evidence is difficult to pack for shipping, very fragile, or if the evidence is perishable.

- Personal delivery allows the investigator to discuss the case and its complexities with the forensic scientist. It is advisable to telephone the crime laboratory and arrange for a meeting with a forensic scientist at the time of delivery of the evidence.

- Remember that sending evidence by messenger increases the length of the chain of custody. Do **not** send verbal instructions regarding the case with the messenger.

REQUEST FOR LABORATORY EXAMINATION (FORM WSP-CL-005)

The Request For Laboratory Examination form is a three-part, color-coded, carbonless form provided by the crime laboratory. This form must accompany **all** submissions of evidence to the crime laboratory, **except controlled substance** cases where the (Drug Analysis Request form, WSP-CL-442) will be used.

- Fill in **all** of the requested information.
- The submission must be linked to any prior submissions on the same case.
- The phone number of the requester is important. The forensic scientist working on the case may wish to discuss the case with the requester.
- List the items in order of priority (i.e., the order in which the requester would like the evidence to be examined). Use item numbers that are assigned at the time of collection and a very brief description to identify the item.
- Forms are available from the crime laboratory.

DIRECTIONS FOR THE USE OF THE FORM

- *Has Other Evidence in This Case Been Previously Submitted to This Laboratory?*

  If evidence has been previously submitted on this case, check "yes." If this is evidence on a new case, check "no."

- *Suspects*:

  List suspects by last name, first name, and middle initial.

- *Offense*:

  Always list the most serious offense according to the Uniform Crime Reporting (UCR) system. Other crimes may also be listed.

- *Examination Requested By*:

  The requester must enter all of the information.

- *Items To Be Examined By Priority:*

  Each item must be listed according to priority. Each item must be identified by the item number assigned when collected.

- *Examination Desired*:

  Indicate the examination requested or the information desired.

- *Received*:

  List the name, agency, and the signature of the agency person delivering the evidence or the agency person preparing the evidence for shipping to the crime laboratory.

- *Disposition*:

  When returned, list the name and agency and sign where indicated.

- *Submission*:

  White and pink copies are submitted with the evidence. Place in envelope and attach to the **outside** of the sealed evidence container.

  Yellow copy is retained by the submitting agency.

  Return:

  White copy (original) is retained by the crime laboratory. A copy will be returned with the laboratory report and/or with the evidence.

  Pink copy is returned with the evidence to the agency.

CRIME LABORATORY DIVISION DRUG ANALYSIS REQUEST (FORM WSP-CL-442)

This form has been adopted to expedite drug analysis requests. The data and results are handwritten by the forensic scientist and sent directly to the submitting agency without being typed.

- Fill out the upper portion of the form completely. Do not write or type in the shaded area. The shaded area will be used by the crime laboratory to report weights and other quantities.

- When there are multiple suspects, identify the suspect by number when listing the items. Some of the items may not involve all of the suspects.

- The second (middle) section contains all of the information necessary for prosecution. If a lengthy report is required, the Additional Narrative Attached box in the upper right-hand corner of this section shall be marked and the narrative style report shall be attached.

- The third (bottom) section contains chain of custody information.

- Forms are available from the crime laboratory.

DIRECTIONS FOR USING DRUG ANALYSIS REQUEST FORM

Use for drug analysis request only. Please print or type. This form is not only the request form, but also acts as the reporting form. It is important that the form be filled out neatly and completely according to the following instructions:

- *Suspects*:

  List suspect by last name, first name, and middle initial. Note that the lines are numbered so that the suspects can be referred to by line number.

- *Offense*:

  List the most appropriate Uniform Crime Reporting (UCR) offense.

- *Offense Date*:

  Date the offense occurred.

- *Previous Submission*:

  If evidence has previously been submitted on this case, check the box marked "YES." If this is evidence from a new case, check the box marked "NO."

- *Requested By*:

  Submitting officer will list name, rank, and place signature where indicated. List agency and full address.

- *Request Date*:

  List the date that request is submitted.

- *Phone Number*:

  List agency's phone number; also SCAN or WATTS number, if applicable.

- *Item Number*:

  Each submitted item must be individually labeled with an item number.

- *Item Description*:

  List each item on a separate line. All items must be sealed. Do **not** place the request form inside the sealed items (laboratory personnel must be able to retrieve the form without breaking any evidence seals). Describe each item as concisely as possible. Do not submit miscellaneous drug paraphernalia unless it is essential to the case. **Do not submit any needles.**

- *Suspect Number*:

  Determine, if possible, from which suspect each item was seized. Suspect Number is the line number on which the suspect's name is written in the box at the top left corner of the form.

- *Lab Use Only*:

  This space will be completed by laboratory personnel.

- *Analytical Results And Certification Sections*:

  To be completed by laboratory personnel.

- *Chain of Custody*:

  The "Evidence Submitted By" block must be filled out by the agency person delivering the evidence or the agency person shipping the evidence to the crime laboratory. Check the appropriate box under "Method of Submittal," filling in the Certified, Registered, or UPS number, when applicable. When the evidence is returned, sign where indicated under "Released To."

AGENCY CASE NO.	REQUEST FOR LABORATORY EXAMINATION	LABORATORY NO.
	WASHINGTON STATE PATROL — STATE CRIME LABORATORY SYSTEM	

EVERETT	WSP DISTRICT OFFICE BUILDING	98201	(206) 339-1840	Scan 261-1840
KELSO	HALL OF JUSTICE BUILDING	98626	(206) 577-2087	Scan 239-2087
KENNEWICK	WSP DETACHMENT OFFICE BUILDING	99337	(509) 545-2022	Scan 526-2022
SEATTLE	PUBLIC SAFETY BUILDING	98104	(206) 464-7038	Scan 576-7038
SPOKANE	PUBLIC SAFETY BUILDING	99201	(509) 456-4145	Scan 545-4145
TACOMA	COUNTY-CITY BUILDING	98402	(206) 593-2006	Scan 462-2006

HAS OTHER EVIDENCE IN THIS CASE BEEN PREVIOUSLY SUBMITTED TO THIS LABORATORY? YES_____ NO_____

SUSPECT(s) LAST FIRST MI.	VICTIM(s)	
1.		
2.	OFFENSE	DATE OF OFFENSE
3.		

EXAMINATION REQUESTED BY:

NAME (Print or Type) | RANK | SIGNATURE | DATE

AGENCY | ADDRESS | CITY | ZIP | PHONE

ITEMS TO BE EXAMINED BY ORDER OF PRIORITY:	EXAMINATION DESIRED:

RECEIVED

SUBMITTED BY: _____ (type or print) _____ (pers no.) Date/Time _____ Mail #_____

_____ (signature) _____ (agency) Accepted by: _____ UPS #_____

DISPOSITION

RECEIVED BY: _____ (print) _____ (pers no.) Date/Time _____ Mail #_____

_____ (signature) _____ (agency) Released by: _____ UPS #_____

IMPORTANT: Copy Distribution: White and pink copies must be submitted to laboratory.

AGENCY CASE NUMBER

WASHINGTON STATE PATROL

CRIME LABORATORY DIVISION
DRUG ANALYSIS REQUEST

☐ Everett ☐ Kelso ☐ Kennewick ☐ Seattle ☐ Spokane ☐ Tacoma

LABORATORY NUMBER

PAGE_____ OF_____

SUSPECT(S) (Last, First, M.I.)	OFFENSE	REQUESTED BY	REQUEST DATE
		NAME RANK	
2	OFFENSE DATE	SIGNATURE	PHONE NO.
3		AGENCY	
4	PREVIOUS SUBMISSION	STREET ADDRESS	SCAN NO
5	☐ YES ☐ NO	CITY STATE ZIP CODE	

ITEM NO.	ITEM DESCRIPTION - LIST IN ORDER OF PRIORITY	SUSP. NO.	LAB USE ONLY

THIS SECTION FOR LAB USE ONLY

ANALYTICAL RESULTS ADDITIONAL NARRATIVE ATTACHED ☐

	DRUG(S) IDENTIFIED	CONTROLLED SUBSTANCE YES	CONTROLLED SUBSTANCE NO	FOUND IN ITEMS(S)	ANALYSIS TYPE COMPLETE	ANALYSIS TYPE PRELIMINARY
	COCAINE					
	HEROIN					
	MARIHUANA					
	METHAMPHETAMINE					
	NO CONTROLLED SUBSTANCES DETECTED					

The undersigned certifies under penalty of perjury:

1. He/She performed a test on the substance in question,
2. He/She received the substance in question from WSPCL VAULT;_____ PROPERTY ROOM; IN PERSON; OTHER:_____
3. That this is a true and complete official report of the Crime Laboratory, and
4. Such document is a report of the results of a test which report and test were made by the undersigned who has the following qualifications and experience:_____

Date Forensic Scientist Forensic Scientist Signature

CHAIN OF CUSTODY

EVIDENCE PACKAGING DESCRIPTION (LAB USE ONLY)

EVIDENCE SUBMITTED BY	METHOD OF SUBMITTAL	RECEIVED IN LAB BY	DATE
PRINT NAME	☐ IN PERSON	PRINT NAME	
	☐ US CERTIFIED MAIL NO.		
SIGNATURE	☐ US REGISTERED MAIL NO.	SIGNATURE	TIME
	☐ UPS (AOD) NO.		

RELEASED TO	METHOD OF RETURN	RELEASED FROM LAB BY	DATE
PRINT NAME	☐ IN PERSON	PRINT NAME	
	☐ US CERTIFIED MAIL NO.		
SIGNATURE	☐ US REGISTERED MAIL NO.	SIGNATURE	TIME
	☐ UPS (AOD) NO.		

GENERAL GUIDELINES FOR THE COLLECTION, PRESERVATION, AND PACKAGING OF PHYSICAL EVIDENCE

There are a number of general instructions that will be helpful to the investigator. Evidence requiring special handling will be discussed in the appropriate sections of this handbook.

A few precautions are continually repeated throughout the handbook. The reason for the repetition is that these precautions are important. Failure to observe them may seriously affect the crime laboratory's examination and, potentially, the outcome of the case. Precautions regarding bloodborne pathogens are mentioned repeatedly due to the hazards that biological materials present.

Some of the guidelines may vary with your department's policies. The guidelines here express the manner in which the crime laboratory would prefer physical evidence to be collected, preserved, packaged, and submitted. They should not substantially conflict with your department's policies.

PRECAUTIONS

- **Infectious evidence—Use universal precautions when handling biological specimens or stains** (i.e., act under the assumption that the specimen or stain contains a dangerous pathogen, particularly HIV or Hepatitis B, and proceed accordingly). Use appropriate protective equipment, such as face, eye, hand, and shoe protection. Practice good personal hygiene.

GENERAL GUIDELINES

- Meet **legal** requirements before entering the crime scene or collecting evidence.

  — Determine if a **search warrant** or **court order** is necessary before proceeding.

  — Maintain a **chain of custody**. Documentation is necessary to show all who have had the evidence in their possession from the time of collection until entered in evidence in court. It may be necessary to prove the integrity of the evidence at some later time.

- Collect a sufficient number and amount of samples. Remember that most of the time it is difficult, if not impossible, to return to the crime scene for more samples.

  — Collect small items of evidence on clean pieces of paper and fold the paper, seal, and label (see illustrations of paper folds at the end of section).

- ***Labeling evidence:*** The following information should be noted on the container or attached tag:

  — Item number and agency case number

  — Brief description of item

  — Source of item/name of subject (suspect/victim)

  — Location (where found)

  — Date/time of collection

  — Name or initial of person collecting item

- ***Preserving evidence:*** The general rule is to submit the evidence in the **same** condition as when collected. As with nearly all rules, there are **exceptions.** These exceptions are noted in the discussion of each evidence type (e.g., some evidence must be dried, refrigerated, or frozen).

  — The evidence must not be allowed to spoil, deteriorate, evaporate, or in any other manner be diminished in content or evidentiary value.

  — Biological stains, leather goods, and vegetable matter must be thoroughly dry before submission. After drying, this type of evidence must be stored in clean **paper** containers. Do **not** use plastic containers.

- ***Do <u>not</u> contaminate the evidence:*** The evidence must be handled in a proper manner so that no extraneous material or substance is added.

  — Place evidence directly into a container. Avoid placing the evidence on a surface, particularly one that is soiled or that may contain material similar to that of the evidence.

  — Handle the evidence as little as possible.

  — Package items separately so that transference does not occur. Care must be taken to avoid leakage and breakage so that liquid samples, such as blood, do not leak on other items of evidence.

  — Protect a stain with a clean piece of paper so that when clothing is folded, the stain will not be transferred to another portion of the clothing. An

accidental transfer may cause the forensic scientist to misinterpret the stain pattern.

- *Sealing evidence:*

  — Use clear tape or evidence tape to seal evidence. **Staples and glued flaps on envelopes do not constitute proper seals.** Every seam on the envelope, including the manufacturer's, should be sealed with tape, and each strip of tape must be initialed. The initials must be written across the tape and onto the envelope surface. Particular care must be taken when sealing envelopes containing controlled substances.

  — Bottles and jars must be capped tightly to avoid leakage and then sealed with tape. The tape must extend across the top of the lid and down both sides of the body of the container.

  — Do not lose any evidence. Package and seal the containers to avoid leakage, tearing, or the sifting of evidence through cracks or small openings.

- *Control samples:*

  — Control (known) samples are necessary when comparisons are to be made.

  — Control samples are required to determine whether the material (substrate) on which a stain is found interferes with the stain analysis.

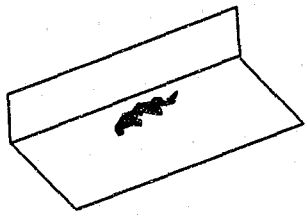
- *Shipping evidence:*

  — Ship evidence by the U.S. Postal Service using either Registered or Certified Mail. United Parcel Service (UPS) is an alternate method of shipping. Obtain proof of delivery service when using these services.

  — Follow special instructions involving the shipment of biological specimens.

  — If the evidence is very fragile or in some other way difficult to ship, it is best to deliver it personally.

HOW TO MAKE A PAPERFOLD



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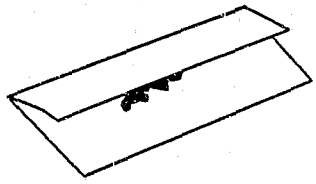

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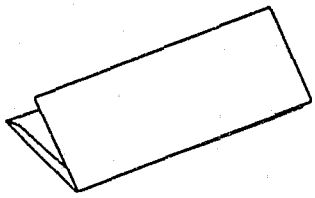

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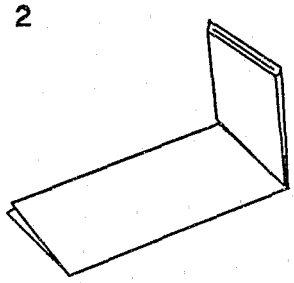

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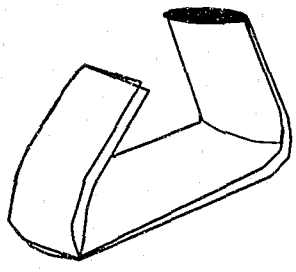

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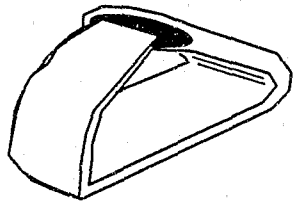

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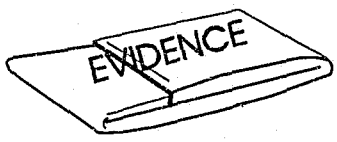

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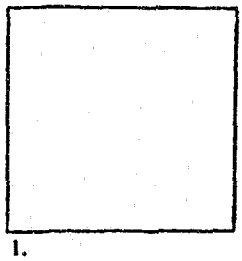

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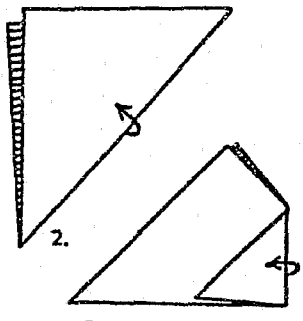

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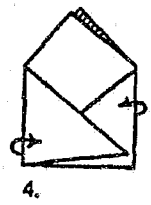

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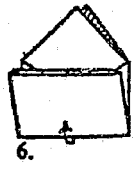

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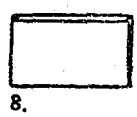


8.

BIOLOGICAL FLUIDS AND STAINS

Forensic biochemical analyses of body fluids and stains are frequently of value in certain investigations, particularly those involving violent crimes. The recognition and recovery of such evidence must be performed properly by the investigator.

PRECAUTIONS

The handling of biological fluids and stains presents a hazard due to possible presence of bloodborne pathogens. Hepatitis B (HVB) and AIDS (HIV) are of particular concern to those handling liquid blood or bloodstained items. Special care must be taken when handling such materials. **It is strongly advisable to consult your agency's Bloodborne Pathogens Exposure Control Plan, which is required by WISHA (Washington Industrial Safety and Health Act).**

Investigators must use **universal precautions** (i.e., treat **all** blood and bloodstained objects as sources of bloodborne pathogens and take appropriate protective actions). Immunization shots are available for HVB. Protective gear must be worn to protect the hands. Pointed and sharp-edged objects must be handled with extreme care. Blind searches are definitely to be avoided. Searchers must not place their hands into any space that is not first visually inspected. Eyes must be protected if splashes are likely to occur.

Eating, smoking, and the drinking of beverages at the crime scene must be prohibited. Shoes should be protected from blood on the floor or ground. The tracking of blood beyond the perimeter of the crime scene must be avoided. Careful processing of the crime scene will minimize the risk.

Good personal hygiene must be observed. The hands should be washed thoroughly after the removal of protective gloves, even if the gloves are not cut or punctured. Used protective gear must be disposed of in a manner specified by state and federal regulations.

Any questions should be directed to the Industrial Safety and Health Division, Department of Labor and Industries, Olympia, (206) 753-6502; Safety and Health Hotline, 1-800-423-7233.

SIGNIFICANCE

Biological stains can be helpful in many ways:

- Assist in locating the crime scene.
- Determine the possible commission of a crime.
- Help identify the weapon used.

- Assist in eliminating or establishing suspects.
- Establish or disprove an alibi.
- Assist in the reconstruction of events.

Biochemical and microscopic analyses can often:

- Identify the stain as blood, semen, saliva, or urine.
- Determine the species (human or animal).
- Determine the presence of various blood factors, if human.
- Establish the possibility and probability of an individual as the source through traditional and DNA analyses.

CRIME SCENE SEARCH

A careful search must be made of the scene. Although bloodstains are often obvious, care must be taken that small stains are not overlooked.

If bloodspatters or smears are present, they should be carefully recorded. The size, shape, location, and pattern may be important. The stains should be diagrammed in detail and then photographed from long, medium, and close ranges. A scale should be included in the photographs. The interpretation of bloodspatters in order to reconstruct the crime scene takes extensive training and experience. The **Crime Scene Response Team** should be contacted **immediately** if you need assistance.

COLLECTION, PRESERVATION, AND SHIPPING

Blood and bloodstained articles require special handling as evidence. The evidentiary value of blood and bloodstained articles can be reduced (or destroyed) by bacterial action and warm temperatures. To best preserve the evidentiary value of **liquid blood** evidence, it should be promptly **refrigerated.** To best preserve the evidentiary value of **bloodstained** articles, they should be promptly **air-dried** (in well-circulated air, but without the addition of heat) and then **frozen** (except as noted below).

Precautions

- Bloodstains and other biological stains must be air-dried at no higher than room temperature without the application of any heat or sunlight.

- It is best to air-dry and then freeze the stains. If unable to freeze, store the dried evidence in a cool and dry place.

- Do not use plastic bags or containers to package dried stains. After drying, store the stains in manila envelopes or brown kraft paper bags.

- When removing dried bloodstains from a surface, two methods may be employed:

  — Transfer the stain to clean cotton threads dampened with clean water using a swabbing action. **This is the preferred method for laboratory examinations.**

  — Transfer the stain onto clean paper using a clean scalpel, knife, or tweezers.

*NOTE: **It is essential that a sample of the unstained area (control), adjacent to the stain, be obtained using the same method and materials used in collecting the bloodstain.***

- Do not allow the stain and the control sample to come into contact. Package them separately and make sure that each are properly labelled with case and item numbers, location, date, and the initials of the officer collecting the items.

- Liquid blood samples should be sent to the crime laboratory within 5 days of collection due to deterioration even when refrigerated.

- Evidence containing liquid blood samples should be shipped in the early part of the week to avoid having it sit in a post office facility over the weekend awaiting delivery. To avoid delay in delivery, it is highly recommended that liquid blood samples be sent by UPS or by overnight or express mail.

Liquid Blood

- Remind the medical personnel to collect the liquid blood in **lavender-top** Vacutainer tubes. Do not confuse with gray-top tubes, which are used for alcohol and drug analysis and are sent to the State Toxicology Laboratory.

- Be sure the tubes are properly labelled with name and date.

- Refrigerate the tube of blood for at least two hours before packaging for shipping.

- Ship the liquid blood to the crime laboratory within 5 days of collection. This is particularly important if the possibility of getting a later specimen from the subject is nonexistent or highly unlikely.

Small Bloodstained Articles

- Send the entire article after air-drying at no higher than room temperature.

- Package the dried article in brown kraft paper bags. **Do not use plastic containers**. (Plastic forms a vapor barrier, and condensation may form inside the container, leading to degradation and putrefaction of the sample.)

- After drying, keep the article frozen. If freezer storage is not available, keep the dried article cool and dry.

*EXCEPTION: **Hard or metal objects such as rocks, guns, and knives should not be frozen. Condensation will form on these objects when thawed and brought to room temperature. The condensation will dilute the stain. These types of objects should be air-dried, kept cool, and sent to the crime laboratory as soon as possible.***

Large Bloodstained Objects

- Cut out the stained area or, at least, several square inches of the stained area and, if still moist, air-dry at room temperature.

- Cut out an unstained portion of the object adjacent to the stained area. This portion is called, variously, a "control," "negative control," or "clean control."

- Keep the stained sample and the control sample separate. Do not allow them to come in contact with each other. They must be packaged **separately** and properly labelled so that the control sample will not be confused with the stained sample.

- Store the stained sample and the control sample in the same manner by drying and freezing, or at least keeping them refrigerated.

Nonremovable Bloodstained Objects

- If the bloodstain is wet, collect the stain on a bundle of clean cotton fibers (about ten threads, each a quarter inch long, cut from a gauge pad). If the bloodstain is

sufficiently large, collect the stain on a piece of clean cotton gauze. Air-dry the collected stain, place it in a paper envelope, and seal and label the envelope.

- If the blood is dry and can be easily flaked off the surface, use a clean scalpel or knife and scrape it onto a clean piece of paper. Fold and tape the paper. Keep cool and dry.

- A sample of the surface adjacent to the stain must be taken as a **control** sample in the same manner as the blood sample.

- Keep the blood sample and control sample separate and properly labelled. (Clean the blade with tap water and wipe with a clean tissue before each use.)

- If the bloodstain flakes off easily, but it is very difficult or impossible to scrape off a sample of the unstained surface (e.g., a metal or glass surface), the control sample must be obtained by swabbing the unstained surface adjacent to the stain with moist clean cotton threads or a gauze pad (see next paragraph).

- If the bloodstain cannot be easily removed by scraping, the stain must be swabbed. A bundle of individual cotton threads (approximately ten threads, each a quarter inch long, cut from a gauze pad) for small stains or a small gauze pad, approximately 2" by 2", for larger bloodstains will suffice for swabbing. Do not touch the threads or the sampling area of the pad. Hold the pad by the corners—or better, hold the pad or the threads with clean tweezers. Moisten the cotton (not dripping wet, but moist enough to dissolve the stain) and lightly rub the stain. It is important to keep the stain **CONCENTRATED** on the cotton. It is preferable for the stain to be collected on threads. Small stains will diffuse on the moist gauze pad, making it difficult, if not impossible, to analyze. The stain should appear dark on the pad. As the threads become saturated with the stain, use fresh threads until an area the size of a half dollar has been collected.

- A control sample must be taken following the same procedure with a moistened gauze pad or threads, swabbing an area adjacent to the collected sample.

NOTE: ***A sealed gauze pad, such as in a first aid kit, is excellent since it is clean, sterile, untouched, and readily available.***

- Air-dry the sample and the control at no higher than room temperature. Package the samples separately in manila envelopes and freeze or keep cool and dry.

NOTE: ***It is important and necessary that the control sample be taken in the same manner as the sample. An area adjacent to the stain***

must be swabbed or scraped so that the surface on which the stain lies can be tested.

SHIPPING PROCEDURES

- Dried stained evidence and control samples must be packaged in brown paper or paper sacks. **DO NOT USE PLASTIC BAGS OR CONTAINERS**. The dried evidence should be sent by Registered or Certified Mail or sent via United Parcel Service (UPS).

- **Liquid blood samples can be sent by UPS or U.S. mail, but must be packaged according to the specific procedure described below.**

- It is advisable to obtain a return receipt as proof that the sample was received by the crime laboratory.

- Liquid blood samples, whether for typing or DNA analysis, must be shipped as follows:

  — Chill the blood at least two hours before packaging for mailing.

  — Wrap the lavender-top tubes in absorbent material (e.g., several facial tissues or a piece of paper towel), which is capable of absorbing the enclosed fluid, and place in a small resealable plastic bag. Close the plastic bag and tape the top edges together with evidence tape.

  — Place the sealed plastic bag containing the tubes into another resealable plastic bag and close and seal with tape. The double plastic bags will assure against leakage.

  — Place the sealed plastic bags containing the tubes in a styrofoam mailing container. Styrofoam containers designed to hold up to three tubes are commercially available (see following note). Seal the styrofoam container with packaging tape around the perimeter as further prevention of leakage. Place the styrofoam container in a cardboard carton. Label and mark the carton "**Clinical Specimen**" so that it is visible to shipping personnel. Do not mark the container with the word "Blood."

NOTE: The styrofoam mailing containers can be purchased from Polyfoam Packers Corp., 2320 South Foster Ave., Wheeling IL, 60090-6572; toll-free phone: 1-(800)-323-7442. The catalogue description is," #476 - Three tube safety mailer for clinical specimens-foam unit only."

SEXUAL ASSAULT EVIDENCE

Evidence in sexual assault cases may be recovered from several sites, from the scene of the assault, from the suspect, the suspect's vehicle and clothing, and from the victim's body and clothing.

It is imperative that the victim receive immediate medical attention. Promptness of an examination will also permit medical personnel to retrieve any physical evidence before being lost through washing or cleaning. Commercial kits are available to assist the attending medical personnel in collecting specimens and controls required by the crime laboratory.

The following is a brief outline of the procedures followed by medical personnel when dealing with a sexual assault victim. It is not a complete, detailed medical protocol, but a summary of the process for the investigator.

COLLECTION OF PHYSICAL EVIDENCE BY MEDICAL PERSONNEL

General Precautions

- ***Proper labeling:*** **Each** item must be identified as to contents, agency case number, item number, source, subject's name, time and date of collection, and initials of the collecting person.

- ***Proper packaging:*** **Each** item, including each article of clothing, must be packaged **separately.** Transference of materials between items must be avoided. Use clean **paper** bags and envelopes to package evidence to avoid the accumulation of moisture inside the package. The presence of moisture enhances bacterial growth. All packaging should have tape over any gum seals and all openings to ensure that small particles are not lost.

- ***Proper drying:*** Stains and swabs must be **thoroughly** dried at room temperature without the use of heat. Partially dried items will be subject to bacterial action and mold, destroying their value as evidence. Cool air fans may be used to dry swabs.

- ***Proper collection of control samples:*** Control samples that are to be compared to samples of unknown or questioned source must be collected from a known source.

Collection of Evidence

The examination should be conducted in a manner which avoids the loss of trace evidence. The preferred sequence of the examination is to first examine and collect the clothing, then the external areas of the body, and finally the internal areas of the body.

- ***Clothing:***

  — Have the patient undress while standing on a double layer of clean paper. After undressing, the top layer of paper should be folded, sealed, and properly labelled. Discard the under layer of paper which is in contact with the floor surface.

  — Clothing must be thoroughly air-dried. Do not use a fan or blow dryer which may blow off small particles, hairs, and fibers.

  — Place each article of clothing, including shoes, in a **separate** clean paper bag. Seal and label each bag, stating the article of clothing, subject's name, date, time, and initials of the person collecting the article.

- ***Foreign objects and debris:***

  — Examine the exterior surfaces of the body for the presence of objects such as hair, grass, and soil. Collect the solid material on a clean piece of paper, fold, properly label, and seal. Place the sealed paper in an envelope; seal and properly label the envelope, noting the area of the body from which the material was collected as well as the other necessary information.

  — If possible, collect oils, lubricants, lotions, and stains in a **glass** test tube or vial; otherwise, concentrate on a small gauze pad. Cut away the excess portion of the gauze pad and place the specimen in a glass test tube or vial (do not use a plastic container). Seal and label test tube and wrap carefully to avoid breakage.

- ***Pubic hair collection:***

  — Place a clean piece of paper under the patient and have the patient comb the pubic hair area with a 100% cotton-stuffed comb until no more hairs comb out. The 100% cotton-stuffed comb is prepared by taking a new comb and running it several times through clean, rolled absorbent cotton. Place the comb on the paper and fold, seal, and label. Place the paper in an envelope, seal, and label as "pubic hair combings" with other necessary identifying information.

- *Pubic hair control:*

  — After the combing, pubic hair controls must be obtained. **Pluck** at least 2 hairs from each of the following areas: center, left side, right side, and top near the navel, for a total of at least 8 hairs. Place in a properly labelled envelope which is additionally marked **"plucked pubic hairs"** and seal.

  — **Clip** an additional 4 hairs from each of the above areas and from the labia (or scrotum), for a total of at least 20 hairs. The hairs should be clipped as close to the skin as possible. More hairs should be taken if the hair is gray or graying. Place hairs in a properly labelled envelope which is additionally marked **"cut pubic hairs"** and seal.

  — **Do not package pubic hair combings with pubic hair controls.**

- *Head hair collection:*

  — Collect any loose hairs and debris. Comb the head with a 100% cotton-stuffed comb until hair stops coming out. Place the collected loose hairs, debris, and cotton-stuffed comb on a piece of clean paper. Fold paper with comb and combings, seal, and label. Place paper in a properly labelled envelope which is additionally marked **"head hair combings"** and seal.

- *Head hair control:*

  — **Pluck** at least 2 hairs from each of the following areas: left temple, right temple, top front, top center, back of head, and the back of the neck. Place on paper and fold, seal, and label. Place paper into a properly labelled envelope which is additionally marked **"plucked head hairs"** and seal.

  — Clip at least 10 additional hairs from each of the above areas at the scalp. Additional hairs are required if the hairs are many-colored or are graying. Package clipped hairs together in a folded piece of paper, fold, seal, and label. Place the paper into an envelope, seal, label, and additionally mark **"clipped head hairs."**

  — If a male subject has sideburns, include several sideburn hairs.

- *Facial hair combings:*

  — Follow the same procedure as for head hair. Comb beard with a 100% cotton-stuffed comb and place comb on a piece of paper. Fold the paper,

seal, and label. Place paper containing the comb into an envelope, seal, and label and additionally mark "**beard combings.**"

- *Facial hair controls:*

  — Pluck 2 hairs from each cheek, 2 from the chin, and 2 from the upper lip if a full beard or moustache is present. Place in paper. Fold, seal, and label. Place paper into an envelope, seal, and label and additionally mark "**plucked facial hairs.**"

  — Clip at least 10 additional hairs from each area as close to the skin as possible. Place in paper, fold, seal, and label. Place paper into envelope, seal, and label and additionally mark "**cut facial hairs.**"

  — **Do not package head hair combings with head hair controls.**

- *Fingernail scrapings:*

  — Place subject's right hand over a clean piece of paper. Using a clean toothpick, scrape any material under the fingernails onto the paper and place the toothpick on the paper. Fold, seal, and label, including the notation "**fingernail scrapings (right) hand.**" Place paper into envelope, seal, and label and additionally mark "**fingernail scrapings (right) hand**" on the envelope.

  — Repeat process with the left hand.

  — An alternate procedure is to collect fingernail cuttings. Package fingernail clippings from each hand separately.

- *Bite marks:*

  — Wipe the area of the bite with a small piece of clean, moistened cotton gauze to collect any saliva which may be present on the skin surface. It is important to keep the sampling area on the gauze small to keep the stain concentrated. A control sample must be collected from a saliva-free area, adjacent to the bitemark, in the same manner as the bite mark sample.

  — Air-dry the gauze at room temperature and package in paper. Mark paper "**bite mark area,**" label, and seal. Place the paper in an envelope, seal, label, and additionally mark "**bite mark area.**"

- Obtain a **control** sample of saliva from the suspect. The suspect must not consume any food or beverage for at least 30 minutes prior to the sampling. Have the suspect chew on a clean piece of cotton gauze. Place the gauze on a clean petri dish or clean, non-absorbent surface and air-dry thoroughly.

- Place air-dried saliva **control sample** into a paper envelope. Do **not** lick gummed envelope flap. Close and seal envelope with transparent tape. Mark "**saliva control**" and note case number, name of subject, date, time, and initials or name of person sealing the control sample.

- *Biological specimens:*

  - The crime laboratory requires four vaginal, four anal, and four oral swabs. These swabs must be air-dried before being packaged and labelled.

  - The crime laboratory requires a whole blood sample from the victim and the suspect when apprehended. The blood sample must be labelled and refrigerated.

PRESERVATION AND SHIPPING OF SEXUAL ASSAULT KITS

PRECAUTIONS

- The investigator should remind medical personnel that:

  — **Four** vaginal, **four** anal, and **four** oral swabs must be collected as appropriate.

  — All swabs must be **completely air-dried** before packaging. This can be accomplished with a cool air fan in approximately 1 hour.

  — All evidence such as tubes, swabs, envelopes, etc., must be properly **labelled** and **identified.**

  — The materials in the sexual assault kit must be enclosed in a sturdy container to avoid breakage during shipping. Some commercial kits are enclosed in cartons designed for shipping.

- The use of protective shipping containers—such as those containing "bubble" sheets or heavy padding—may be necessary to prevent breakage.

- The materials in the kit should not be subjected to a rapid rise in temperature, sudden changes in pressure and humidity, or exposed to damaging radiation, such as ultra-violet rays from the sun.

- The handling of biological fluids and stains presents a hazard due to the possible presence of bloodborne pathogens. Hepatitis B (HVB) and AIDS (HIV) are of particular concern to those handling liquid blood or bloodstained items. Special care must be taken when handling such materials. **It is strongly advisable to consult your agency's Bloodborne Pathogens Exposure Control Plan, which is required by WISHA (Washington Industrial Safety and Health Act).**

- Investigators must use **universal precautions** (i.e., treat **all** blood and bloodstained objects as sources of bloodborne pathogens, and take appropriate protective actions). Immunization shots are available for HVB. Protective gear must be worn to protect the hands. Pointed and sharp-edged objects must be handled with extreme care. Eyes must be protected if splashes are likely to occur. Eating, smoking, and the drinking of beverages at the crime scene must be prohibited. Shoes should be protected from blood on the floor or ground. The tracking of blood beyond the perimeter of the crime scene must be avoided. Careful processing of the crime scene will minimize the risk. Blind searches are

definitely to be avoided. Searchers must not place their hands into any space that is not first visually inspected.

- Good personal hygiene must be observed. The hands should be washed thoroughly after the removal of protective gloves, even if the gloves are not cut or punctured. Used protective gear must be disposed of in a manner specified by your agency's Exposure Control Plan and health and state regulations.

- Any questions regarding health and safety should be directed to local health authorities or to the Industrial Safety and Health Division, Department of Labor and Industries, Olympia, (206) 753-6502; Safety and Health Hotline, 1-800-423-7233.

PRESERVATION OF SEXUAL ASSAULT KITS

- Facts of the case, case status, and laboratory readiness will dictate when the rape kit shall be sent to the laboratory. If it is to be sent within five days of collection, the entire kit should be stored in the refrigerator at least two hours before it is shipped.

- If the kit is to be held at the police agency longer than five days after collection, the **liquid blood sample** must be removed from the kit, labelled, and **refrigerated.** The remainder of the kit must be **frozen** until the laboratory is prepared to receive it.

- In instances when the liquid blood sample becomes too aged (after one to two months), it may be necessary to draw another blood sample from the victim. This decision should be made after discussion with the laboratory personnel.

NOTE: If the case is a rape-homicide, the liquid blood sample from the victim should be refrigerated for at least two hours before shipping. The blood must be shipped to the crime laboratory within five days. The remainder of the kit must be frozen until it is requested by the laboratory.

SHIPPING PROCEDURE FOR KITS CONTAINING LIQUID BLOOD

- **Liquid blood samples can be sent by UPS or U.S. mail.** Shipping regulations require that a specific procedure be followed.

- It is advisable to obtain a return receipt as proof that the sample was received by the crime laboratory.

- Sexual assault kits containing liquid blood samples, whether for typing or DNA analysis, must be shipped as follows:

  — After chilling, wrap the lavender-top tubes in an absorbent material (e.g., several facial tissues or a paper towel), and place them in a small resealable plastic bag. Close the resealable plastic bag and seal the top edges together with evidence tape.

  — Place the sealed plastic bag containing the tubes into another resealable plastic bag and close and seal with tape. The double plastic bags will ensure against leakage.

  — Place the sealed plastic bags, the remainder of the sexual assault evidence kit, and the Request for Examination form in a sturdy container.

  — Seal the container with packaging tape for security and as a further precaution against leakage. Wrap the container, if necessary, and place an address label on the container.

  — Mark the package "**Clinical Specimen**" so that it is visible to shipping personnel. Do not mark the container with the word "Blood".

PLEASE CALL THE CRIME LABORATORY IF YOU HAVE ANY QUESTIONS OR ARE UNSURE OF THE PROCEDURES.

Sexual assault kits are available commercially from several sources. Two of the firms which supply these kits are:

Lightning Powder Company, Inc.
1230 Hoyt St SE
Salem OR 97302-2121
Phone: 1-800-852-0300

Tri-Tech Corporation
5108 Revere Rd
Durham NC 27713
Phone: (919) 544-2400 Fax: (919) 544-4755

DNA
DEOXYRIBONUCLEIC ACID

INTRODUCTION

DNA analysis has brought radical change to the forensic biochemical analysis of biological fluids and stains. The traditional serological techniques can eliminate a particular individual as a possible source of the evidence or can include an individual in the group having those specific blood group factors. The probability statement that the blood came from a certain individual can be relatively low.

DNA testing provides a potential for a much stronger probability statement. However, the biochemical process requires weeks to make a DNA comparison between the suspect's blood and the sample from the crime scene. Thus, DNA is not useful for quick identification purposes.

DNA testing has been used for other forensic applications: identification of human remains, missing children, questions of parentage, and multiple casualties such as bus and plane crashes.

SIGNIFICANCE

DNA analysis is used increasingly to identify or eliminate a suspect. Although hair follicles and other various tissues can be used for DNA analysis, **blood, saliva,** and **semen** are presently the most desirable specimens. At this time, very small samples of DNA are not being analyzed by the crime laboratory system, but this service will be available in the future. The investigator will be notified if the sample is not adequate for the present methods and alternatives will be recommended.

PRECAUTIONS

- DNA is relatively durable and resistant to environmental conditions, but does not do well in hot, moist conditions.
- Ultraviolet rays (as in sunlight) are very destructive to DNA.
- Samples are best preserved in cold, dry conditions in the dark.
- DNA testing can be performed on samples of bone marrow and dental pulp taken for some time after death. However, DNA does degrade fairly quickly in soft tissues and body fluids such as blood.
- In rape cases where the suspect is aspermic (i.e., does not produce spermatozoa due to a physiological problem, vasectomy, etc.), DNA testing cannot be

performed on seminal stains. The genetic material for DNA testing which resides in the spermatozoa is not present. Traditional serological techniques, which provide data on the presence of enzymes and proteins, will have to be used.

CRITERIA FOR SUBMISSION OF DNA CASES

The present acceptance policy is based on the following criteria:

- The offense must involve a violent crime such as homicide, sexual assault, or other felony assault.

- The date of the offense must be after July 1, 1991. Exceptions may be considered on a case-by-case basis through consultation with the DNA Section of the Seattle Laboratory.

- The suspect must be identified, and whole blood samples from the victim **and** the suspect must be submitted before any DNA testing will be performed.

- **The sample must not be sent directly to the DNA Section**; it must be sent through the biochemical analysis unit in your regional crime laboratory. Refer to the section on liquid blood for shipping instructions.

- DNA testing is very time consuming; it takes many weeks to complete an analysis. It is essential that the incoming cases be carefully screened in order to manage the DNA Section resources.

- The submitted biological samples are routinely tested using the traditional serological techniques for genetic markers. These techniques act as screening tests and often are sufficient for the case.

- The decision to perform DNA testing on evidence is basically an internal laboratory decision based on the appropriateness of the test, the condition and amount of sample, and the results of the traditional genetic marker techniques. Generally, input is sought from the investigator and the prosecuting attorney before a decision is reached.

An exception to the acceptance policy requirement of having an identified suspect will be made when an agency believes it is dealing with multiple offenses committed by the same individual or some other equally exceptional circumstance exists.

Any questions regarding the DNA process or the acceptance policy should be directed to the DNA Section, State Patrol Crime Laboratory/Seattle, Phone (206) 464-7038.

CONTROLLED SUBSTANCE EVIDENCE

Controlled substances are a major part of the crime laboratory's caseload. These drugs are physical evidence not only in illegal possession and sale cases, but also in such varied cases as burglaries, traffic fatalities, and assaults. For efficiency and accuracy, it is imperative that the evidence be selected, packaged, and forwarded in a careful manner.

PRECAUTIONS

- Do **not** submit any hypodermic needles. The crime laboratory will not accept any case which includes a needle or a syringe with the needle attached.

*NOTE: **The cutting or shearing of a needle from a syringe is completely prohibited by federal and state regulations.*** [WAC 296-62-08001 (4) (b) (vii)]

- Many drugs are very potent, and even minute amounts present a health hazard. Do not taste or hold the suspect material close to the nose in order to smell it. Do not eat, drink, or smoke while handling the material. Be sure to exercise good personal hygiene when handling suspected substances by washing the hands thoroughly after handling, even if direct contact was not made.

- Small amounts of material must be handled with care to avoid contamination and loss.

- If green or wet plant material is stored in a tight wad or pile, the biological degradation process may generate sufficient heat to produce a fire hazard.

FIELD TESTS

Drug field test kits are **presumptive** tests (i.e., a positive result indicates a probability that the substance being tested for is present). They are **not** conclusive tests which prove the presence or absence of a particular drug. These kits are useful in establishing probable cause and enabling the investigating officer to obtain a search warrant or an arrest warrant.

If the amount of suspected material is very small, a field test may consume too much of the sample and prevent further testing by the crime laboratory. In such cases, it is best not to perform a field test, but to send the material to the crime laboratory for analysis.

Do not send the used drug field test kit to the crime laboratory—the reagents are corrosive and likely to spill during shipping; the resultant colors fade and are not recognizable. The crime laboratory will confirm your field test results by analyzing the submitted evidence.

PLANT MATERIAL

Marihuana (Cannabis sativa)——The State Legislature has mandated that the crime laboratory "...shall **not** provide tests for marihuana to cities and counties **except** (1) to verify weight for criminal cases where weight is a factor, or (2) for criminal cases that the prosecuting attorney and field administrator [manager] of the crime laboratory agree are likely to go to trial" [emphasis added].

The legislative intent is to have the crime laboratory analyze only felony marihuana cases (i.e., those involving more than 40 grams of marihuana). Misdemeanor cases will be examined by certified Leaf Marihuana Identification Technicians.

If your agency does not have a certified Leaf Marihuana Identification Technician, it is suggested that the nearest agency having a technician be contacted for assistance. In cases of hardship, contact the crime laboratory servicing your area.

Training in leaf marihuana identification is conducted at least annually by the Crime Laboratory Division. If your department plans to send a candidate for training, notify the Crime Laboratory Division in Olympia (see roster for address and phone number).

Other Plant Materials——The most prevalent types in this category are psilocybe mushrooms and peyote buttons.

Dry any plant material thoroughly and then place in a paper sack or paper envelope. Do not place the dried plant material in a plastic container or a plastic-coated container. If not dried and packaged properly, the material may rot and prevent or interfere with any analysis.

If a large amount of plant material is confiscated, it is not necessary to send all of it to the crime laboratory. A representative sample of the plant material should be selected and dried, if necessary, and sent to the crime laboratory. Careful notes should be taken as to the total amount (weight) of material confiscated and the amount and locations of the sampling. If there is a question as to how to take a representative sample or the amount of the sample to be collected, contact the crime laboratory for assistance.

SOLID DOSAGE FORMS AND POWDERS

The crime laboratory is well equipped to examine and analyze controlled substances of all types.

- Make sure each item (container) is clearly identified with the case number, item number, officer's initials, and date.
- Make sure each item is sealed.

- Make sure the outer envelope or package containing the items is also thoroughly sealed (i.e., all seams are taped and initialed and properly identified).

- Use the Drug Analysis Request form (WSP-CL-442).

  — Make sure to list the items in order of priority (i.e., the order in which you want the items to be examined).

  — Write the item numbers clearly.

  — Do not write in the middle section of the form, which is for laboratory use only.

  — Do not list suspected substances as a particular drug. List substances as "suspected cocaine" or "suspected of containing heroin."

DISPOSAL OF CONTROLLED SUBSTANCES

The crime laboratory does not destroy or dispose of any controlled substances or any other submitted evidence, even if it is determined not to contain a controlled substance. All submitted evidence—except that which was consumed in the analysis—will be returned to the submitting agency.

CLANDESTINE DRUG LABORATORIES

As soon as there are good reasons to believe a clandestine laboratory exists, the investigator must not enter the premise. If you have already entered, vacate the premise immediately. Do **not** smoke. Do not turn any electrical switches on or off; leave them as they are. Do not shut off any running water. Do not pour any water on any equipment or material—some chemicals will burst into flame or explode when in contact with water. If equipment is operating or "cooking," leave it as is. Many of the chemicals involved are toxic, flammable, and even explosive.

CALL THE CLANDESTINE LABORATORY TEAM FOR ASSISTANCE IMMEDIATELY.

To contact the Clandestine Laboratory Team at any time, call:

Narcotics Duty Officer
Olympia Communications Center
Washington State Patrol
(206) 753-6856

The Clandestine Laboratory Team consists of specially trained investigators and forensic chemists who have the proper safety gear and equipment to enter and investigate a clandestine drug laboratory.

While waiting for the Clandestine Laboratory Team to arrive:

- Secure the surrounding area. Do not allow anyone to enter.
- Follow any instructions that the Team may provide.
- Treat the clandestine laboratory and surroundings as a crime scene. Any physical evidence—such as tire or foot impressions, fingerprints, records, and vehicles—must be protected for later evaluation and collection.

FORENSIC DOCUMENT EVIDENCE

INTRODUCTION

A document is defined as anything printed, written, typed, etc., relied upon to record or prove something. The role of the document has become increasingly important in a society of contracts, wills, checks, and promissory notes, as well as threat and hate notes, ransom notes, examination papers, and professional records. The authenticity of these documents is often a critical issue to the resolution of a dispute or crime.

Typically, a forensic document examiner examines checks, receipts, anonymous letters, contracts, and bills of sale. The list extends to such unusual documents as voting records and the scrawl on the wall by a dying person.

SIGNIFICANCE

Document examinations may lead to definite conclusions that identify the writer or the device that produced the questioned item.

- Handwriting examinations may identify the writer of a check, letter, or questioned signature.
- Handwriting examinations may disclose that an individual is not the writer.
- Typing is examined to determine the make of machine, and once that suspect machine is located, that machine is examined to see if it is the source of the questioned typing.
- Document examinations may reveal if a document is counterfeit.

NATURE OF EXAMINATION

The authenticity of documents is generally determined by examining for:

- Additions or deletions.
- Alterations.
- Counterfeits.

TYPES OF EXAMINATION

The forensic document examiner looks at many types of documents. Primarily, the examiner's work involves:

- Handwriting and handprinting.
- Mechanical printing devices (e.g., typewriters and check protectors).
- Obliterated writing.
- Erasures.
- Indented writing.

STRUCTURE OF EXAMINATION

The typical document case has three parts:

- The **questioned** items which are submitted by the investigator. It is always preferable to receive the original of all documents. Examinations can be made from copies; however, the probability of a definite conclusion is reduced.
- Standards (known samples) of the **suspect's** writing.
- Standards (known samples) of the **victim's** writing.

HANDLING AND SHIPPING OF EVIDENCE

Questioned documents generally do not require special handling or procedures. However, document evidence should be protected from excessive handling. There are two notable exceptions that require special handling:

- **Charred** documents require hand delivery. They should be placed in a box lined with cotton. Do not attempt to separate the pages. The Forensic Document Section should be consulted before collecting and submitting.
- **Indented** writing is the impression of the pen that transfers to the sheets under the sheet with writing. These sheets should be protected from fingerprints, excessive handling, and additional impressions (e.g., do not write on the envelope after placing indented writing evidence inside).
- Indented writing evidence must be examined **before** being processed for fingerprints. Fingerprint processing will destroy indented writing.

HANDWRITING STANDARDS

Requested standards are obtained through use of the Forensic Document Section Handwriting Exemplar Form. The exemplar, when properly used, will provide the forensic document examiner with sufficient writing by the subject to reach a definite conclusion. All

four pages of the exemplar are necessary to obtain a representative sample of the subject's writing. Fully one-half of the exemplar is designed for the investigator to dictate to the subject the various signatures, amounts, numerals, phrases, and other writings specific to the case.

- Each questioned signature, name, word, etc., should be dictated to the subject 15 to 20 times.

- The various names, dates, questioned entries, etc., should be dictated in a random manner (e.g., "John Smith, four hundred, John, John, Smith and Johnson," rather than "John Smith" 20 consecutive times).

- The exemplar should be filled out by the subject with a black ink ball point pen. Do **not** use a fiber tip or rolling marker pen.

- The Forensic Document Section Handwriting Exemplar Form can be obtained by telephoning or writing the Forensic Document Section, Seattle Crime Laboratory.

Collected standards are any writings that will be accepted in court as the genuine writing of the subject. Driver's licenses, business records, payroll checks, letters, and diaries are examples of collected standards.

There are some cases where the standard exemplar is not the best sample. The questioned item may not be typical of the normal writing situation. The investigator should obtain writing standards under circumstances similar to those of the questioned writings. For example:

- **Graffiti on a wall:** Have the subject write on a piece of paper taped to the wall.

- **Anonymous writing on unlined paper:** Have the subject write dictated, verbatim samples on unlined paper.

It is advisable to consult with the Forensic Document Section **before** submitting a case to be sure that the evidence is proper and complete:

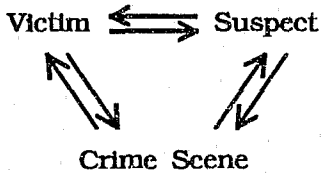
Forensic Document Section
Washington State Patrol Crime Laboratory
2nd Floor, Public Safety Building
610 Third Ave
Seattle WA 98104 (206) 464-7074, SCAN 576-7074

TRACE EVIDENCE

INTRODUCTION

Small, often microscopic quantities of material have always been of interest to crime scene investigators. These particles can be the key to a successful investigation. An individual leaves or picks up traces of materials, however brief and slight the contact with another person or an environment. This concept is referred to as Locard's Principle of Exchange.

The diagram illustrates the principle of the exchange of trace evidence between suspect, victim, and the crime scene.



Evidence that results from this exchange can connect the suspect with the victim and the crime scene. The connection is established by the comparison of trace evidence from a questioned source with samples from a known source (control); for example, glass found on a burglary suspect's clothing can be compared with glass from a broken window (known sample) at the burglary scene. The collection of known samples from the victim, suspect, and the crime scene is critical.

Technological advances enable analysis of even smaller particles, placing an even greater burden on the investigator to find and collect the evidence. The search must be done carefully and thoroughly. It can be very tedious and demanding work.

PRECAUTIONS

- Since Locard's Principle of Exchange is always active, the investigator must use caution to avoid unnecessary, damaging exchange with the crime scene. Some exchange is unavoidable; however, it must be controlled and held to a minimum.

- After the incident, the suspect and the victim must **not** come in contact; their clothing must be packaged and kept separate. Neither the suspect nor the victim must be brought back to the crime scene while it is still being processed. Samples taken from the scene should be packaged **separately** from the suspect's and victim's clothing to avoid contamination.

- Special care must be taken not to contaminate or lose any small particles of evidence.

- Avoid damaging any critical areas of the evidence which may have rips, tears, smears, impressions, stains, or cuts. When removing clothing, avoid cutting

through these critical areas. If cutting is unavoidable, such as removing clothing in an emergency room, be sure to make careful notes on the location and description of the critical area, and identify the cuts made by medical personnel.

- Control samples must be collected as soon as possible to avoid loss and change. If control samples and suspect samples are not **both** available, contact the crime laboratory to determine if the available evidence should be submitted. Both known and suspect samples must be submitted before any comparisons can be made.

- Damp or wet items, particularly clothing and leather goods, must be **air-dried** at room temperature over clean paper. After drying, handle the clothing and leather carefully so that trace evidence is not lost. Package the clothing and leather in clean **paper** or **paper bags**. Do **not** use plastic containers.

- It is critical that each item or container be properly labelled. The label must describe the contents, the donor or source if known (do not identify the item as from the "victim" or "suspect"), location found, date, time, and name of person collecting the evidence. The investigator should make notes as to the condition of the evidence and any other observations of value.

- Care must be taken to correctly label the origin of each item collected as evidence.

- Do **not** submit razor or scalpel blades.

- Do **not** submit hypodermic needles **or** a syringe with the needle attached. The crime laboratory will not accept cases which contain needles, regardless of the packaging.

*NOTE: **State regulations completely prohibit the removal of contaminated needles by shearing or breaking [WAC 296-62-08001(4)(b)(vii)].***

- Proper packaging is particularly important when handling fragile evidence such as paint flakes and glass shards.

HAIR

Hair evidence is found in all types of crimes and is frequently found in crimes where bodily contact has been made. Hair evidence is likely to be found if physical force is involved, such as in crimes involving rape, homicide, and assault.

Significance

Examination and comparison of hair can reveal:

- If the hairs are of human origin and, in some circumstances, the race and the body area.
- If the hairs may have come from a specific species of animal. An individual animal cannot be identified by hair comparison.
- If the hairs were forcibly removed from the body or were naturally shed.
- If the hairs have been freshly or recently cut.
- If the hairs have been chemically treated.
- If the hair has been subjected to trauma, such as high temperatures, flame, or a crushing blow.
- If the hair was damaged by disease.

Microscopic examination and comparison of hair **cannot** usually prove **conclusively** that the hair came from a particular individual. If hair from a person has strong similarities to hair found at a crime scene, it can be stated that the hair could have come from this person or another individual with similar hair characteristics.

A person can be excluded as a donor of a hair.

With the advent of DNA analysis, it is possible to identify an individual from tissue adhering to the roots of the hair, provided there are a sufficient number of hairs to examine and a known blood specimen (or DNA profile) from the individual is available.

Collection

- Make detailed notes showing date, time, and location of the collected hair.
- Do **not** sort hairs that are found in the same location.
- Do **not** mix hairs that are collected from different locations. Place them in separate envelopes.
- If hair is firmly attached or embedded in an object, do not remove the hair. Send the object with the adhering hair to the crime laboratory, if feasible.

Otherwise, photograph the hair in place and then remove the hair carefully, keeping it intact. Contact the crime laboratory if there is any question on how to proceed.

- Pubic hair combings in sexual assault cases are performed by medical personnel. It is important that the medical personnel have a sexual assault kit which contains materials for the collection of pubic hair as well as other necessary samples.

- Check the hands of assault and homicide victims. Hairs may be found clutched in their hands. Hairs may also be found on their bodies or on their clothing.

Packaging

- Fold the hairs in a piece of clean paper. Seal with tape and write the date, time, description of the evidence, and the location where it was found. Then place the sealed paper into an envelope. Seal the envelope and identify the contents; note the date, time, and initials of the person handling the evidence.

- If the hairs are placed directly into an envelope, make sure that all the flaps and corners of the envelope are **sealed** with tape. Even a slight gap can cause hairs to be lost.

HAIR STANDARDS: Refer to chapter on sexual assault evidence. (pages 5-2 - 5-4).

GLASS

Burglaries, hit-and-run cases, and assault cases often provide useful glass evidence. Glass taken from a burglary scene (control sample) may be compared with glass fragments found on a suspect's clothing; glass from a broken headlight may be compared with pieces of glass found on a hit-and-run victim's body or glass found at the scene. These types of cases involve comparison of the glass to determine if they have a common origin. With larger pieces of glass, it may be possible to physically fit the control samples to pieces of the suspect glass.

Glass may reveal the direction of a projectile and even the order in which several projectiles penetrated the glass pane or window.

Significance

The examination of glass may reveal:

- If two pieces of glass are of common origin.

- The direction of force that broke the glass.
- The direction of a projectile that perforates the glass.
- The type of glass (i.e., auto safety glass, headlight lens, etc.).

Glass fragments from the scene which can be physically fitted with fragments from sources—such as the suspect auto or the criminal's clothing—are of great value. These physical matches, particularly if the surface markings also match, can prove **conclusively** that the fragments were once one integral part.

Similarities in properties such as refractive index, elemental composition, color, density, and thickness increase the probability that several fragments may have or are consistent with having a common origin.

The acquisition of the automated Glass Refractive Index Measurement (GRIM) instrument provides a very precise, accurate, and sensitive measurement of the refractive index of glass fragments. The forensic scientist is now better able to differentiate glass samples.

Collection

- If the direction of force which broke the glass is to be determined, **all** of the glass must be retrieved. Glass remaining in the frame must be marked so the surfaces can be identified as "inside" or "outside." The amount of glass on the ground or floor on each side of the frame should be noted and collected separately.
- If projectile holes, such as bullet holes, are to be examined, the **entire** pane of glass should be submitted intact. Care must be taken not to disturb any possible gunshot residue on the surface of the glass. The glass may have to be taped on the exit surface to hold it together. If the exit side cannot be determined, consult with the crime laboratory.
- At traffic scenes, it is important to search a wide area. Glass fragments can fly in many directions—pieces of glass may drop off a fleeing auto some distance from the scene. All glass must be recovered, with each different location identified and packaged **separately.**
- If glass fragments are suspected to be on clothing, do **not** remove the glass. Handle the clothing carefully so that the fragments are not lost. Package each article of clothing separately.

- Glass fragments are often embedded in the soles and heels of shoes as the criminal walks over broken glass. Do not remove the glass from the shoes. Submit the shoes in paper bags. Known samples collected at the scene should be submitted separately.

- **All** of the glass must be collected if a physical match is to be considered.

- Care should be taken to preserve any other trace evidence—such as hairs, fibers, shoe prints, or stains—which may be adhering to the glass.

Packaging

- Glass found in different areas must be packaged separately.

- Small pieces of glass should be placed in a paperfold, sealed, labeled, and packaged in a small rigid container (e.g., a pill box). The box must also be sealed and properly marked.

- Large pieces of glass should be packaged in rigid containers. Use packing material such as cardboard or part of a corrugated carton to avoid breakage and to protect the edges. Hand delivery is the easiest way to submit large pieces of glass, as it avoids the task of extensive packaging and reduces the risk of breakage.

- Package so that if a container opens or tears during shipping, the glass is not lost and does not leak out and contaminate other glass evidence.

Standards

- It is important to collect and send **all** of the known broken glass (control) to the crime laboratory for comparison with fragments from the criminal, suspect vehicle, the victim, etc. If the known glass source is large, a number of representative samples may suffice. It would be well to consult the crime laboratory as to the extent and size of the samples.

- Glass such as found in the frame of a window or remaining in a headlight rim are the best control samples.

CLOTH AND FIBERS

The transfer of fibers and fragments of cloth can be the result of such actions as violence to a person with a weapon or vehicle, clothing snagged and torn, or the contact of clothing with another article of clothing. Microscopic examinations can reveal many characteristics which

can be further supported by chemical and physical analyses. The type of fiber, color, dye characteristics, thread count, and twist can be determined. The piece of cloth may be physically fitted into a garment, showing a common origin.

Significance

The examination of fibers and fabric may reveal:

- Contact between two or more persons.
- Contact with objects such as blankets, upholstery, carpets, and drapes.
- Contact between a vehicle and victim.
- Contact between the suspect and the crime scene.

Fibers may assist in locating the positions of persons riding in a vehicle if embedded or firmly adhering to a surface.

Comparison of questioned and control fibers and threads cannot conclusively establish that they are of common origin. However, the forensic scientist can determine the specific color, type, and generally the product type. The types of fibers encountered are animal, vegetable, mineral, synthetic, or a mixture. The various product types are garments, carpets, bed clothing, etc.

Collection

- Pieces of fabric, threads, or fibers may be found adhering to the front or underside of a vehicle which hit a pedestrian. They may be part of a fabric impression. Photograph the impacted fibers prior to collection.
- Fibers are readily caught in hair. An assault victim should have the head combed with a cotton-filled comb to recover any fibers. Sexual assault victims should have the pubic area combed as well, in the same manner. A suspect's head should be combed in the case of an assault or if a head covering was used as a disguise. The head covering should also be collected.
- Recover the clothing to be examined, taking care to avoid loss of fiber and other trace evidence. Dry carefully, if damp or wet, over a clean piece of paper.
- Threads and long fibers should be picked up with tweezers. Place the recovered material on a clean piece of paper and fold, seal, and label. Place the folded paper in an envelope, seal, and label.

- Small fibers should be left on the item and the entire item—or at least the part holding the fibers—submitted to the crime laboratory.

- Do **not** pick up the fibers with moistened gummed paper tape. Transparent tape can be used to pick up fibers from surfaces. The adhesive surface of "Post-it" notes is also useful for collecting fibers. The adhesive surface of the tape or Post-it should be placed on a clean glass slide or similar surface. Vacuum-cleaning is not a desirable collection procedure, since it picks up so much dirt and other extraneous material. At times, the fibers can be swept onto a clean piece of paper. A surface may have to be scraped to remove the fibers if the fibers are impressed into a surface which cannot be removed.

Packaging

- In most cases, it is best to collect the loose fibers or threads on a clean piece of paper and then fold, seal, and label. Then place the folded paper into an envelope, seal, and label.

- Since fibers, threads, and fabrics can be easily lost, care must be taken to seal the container. The corners and flaps of an envelope **must** be sealed with tape.

Standards

- All clothing that may be involved in the case must be collected for comparison with the collected questioned fibers.

- Possible sources of the collected questioned fibers—such as rugs, blankets, and upholstery—must be submitted. These controls must be representative of the source. The crime laboratory should be contacted for assistance and information on the collection of the control samples.

- If carpet fibers are involved or suspected, a representative sample of carpet must be submitted. The sample must be a piece of the carpet and not just fibers pulled from the surface. Carpets can consist of several types of fibers.

PAINT AND OTHER PROTECTIVE COATINGS

Chips and fragments of protective coatings—such as paint, varnish, lacquer, enamels, and plastics—can often be found at the scenes of hit-and-run cases and burglaries involving forced entries. A transfer of paint can occur when two vehicles collide. Chips of paint at the accident scene or on the victim's clothing may produce information regarding the vehicle which left the scene. Traces of paint on burglary tools may connect these tools to the burglary scene.

Significance

The examination and comparison of protective coating chips and fragments may reveal:

- That the paint chip from the scene came from a particular object or vehicle by a physical match (i.e., the chip edges fit like a piece of a jigsaw puzzle with edges of the damaged area).

- A probability of common origin if the chips show similarities in physical and chemical characteristics. Multi-layered chips which also show similarities and correspondence in the number of layers, order of colors, and thickness of the layers can increase the probability of a common origin to a very high degree, sometimes to the level of reasonable, scientific certainty.

- The type of paint or coating and its applications. This information may lead to a possible source. Chips left by an automobile may produce information regarding the make, model, and year of manufacture.

Collection

- Paper folds and plastic or paper envelopes can be used to collect the paint samples.

- Small samples of material should be collected on a clean piece of paper. The paper fold is then labelled, sealed, and placed in an envelope, which in turn is labelled and sealed.

- A convenient method of collecting paint scrapings is to tape an envelope or plastic bag just below the sampling area. Hold the envelope open and scrape the paint samples loose, allowing them to fall into the envelope. Be sure to sample to the underlying surface. Use a clean blade for the sampling.

- If small enough, the item containing the paint or paint smear should be submitted to the laboratory. Do not attempt to remove the paint.

- If an item is too large to submit to the laboratory, paint chips representing **all** of the layers must be submitted. Do not scrape off the sample in such a manner that the paint chip sample contains only a partial number of layers. The forensic scientist will examine a cross-section of the chip to determine the number, the depth, and the color of each layer.

Packaging

- Each of the recovered items must be packaged separately, **properly labelled,** and sealed. If a vehicle is involved, labelling should include the location on the vehicle, make, model, year, and license plate number. Envelopes must be sealed on the corners with tape to ensure that no leakage occurs.

- Tools with paint smears must be protected to avoid loss or contamination of the paint. The area containing the paint smear should be protected with soft tissue paper.

- If paint chips are to be submitted for a possible physical match, they must be packaged so that the chips do not break. The chips must be protected with tissue paper or cotton and placed in a small, rigid container.

Standards

- In all cases, the control samples must be taken immediately adjacent to the area of damage or of interest. The collected chips must contain all of the layers down to the underlying surface.

- When investigating a hit-and-run collision, at least two control samples should be taken from each vehicle. The samples should be taken from within the damaged area where paint transfer has occurred and from the undamaged area immediately adjacent to the damage. Similar samples must be taken from the suspect vehicle when it is apprehended.

- At burglary scenes, samples should be taken from an area immediately adjacent to the toolmark. Do not touch the toolmark itself; it may be altered and rendered useless for later toolmark comparison examinations.

FIREARMS EVIDENCE

INTRODUCTION

The number of incidents involving firearms evidence has increased significantly in recent years. The requests for examinations involving firearms, ammunition, and components of cartridges have grown immensely. It is important that the evidence be properly collected and handled in order to expedite and maximize the examination results.

PRECAUTIONS

- Do not pick up the firearm by placing a pencil or some other object in the barrel. Pick up by checkered portion of the grip.
- Handle the weapon carefully, even if it is on safety or is not cocked. The safety may be faulty or the trigger pull may be very light ("hair trigger").
- If the weapon is loaded, it must be unloaded before shipping to the crime laboratory. If, for some reason, the firearm cannot be unloaded, the submitting agency **must** call the crime laboratory and determine when and how to hand deliver the firearm to the laboratory.
- If the firearm is to be processed for latent fingerprints, caution is necessary not to smear or destroy the prints. The submitting agency should call the crime laboratory for instructions before packaging and sending the evidence.
- If a firearm or other metal object is recovered from fresh or salt water, it should be placed in a container of fresh water immediately. Immersion in fresh water will slow the oxidation process and remove the corrosive action of salt water.
- Do not clean the firearm before submitting.
- Do not fire the firearm before submitting.
- **Proper labeling** includes the contents, source, date, time, item number, agency case number, and the name or initials of the collector.

SIGNIFICANCE

The laboratory examination may reveal data about the firearm, ammunition, or components, information regarding the target object, and may contribute information regarding the circumstances of the firearm incident. The examination may determine:

- The caliber of the fired ammunition.
- The type of weapon by examining the recovered bullets and expended cartridge cases.
- If the recovered bullets and expended cartridges cases were fired from a particular firearm.
- Any malfunctioning of a submitted firearm.
- The entrance and exit bullet holes in clothing.
- The approximate distance from muzzle to target.
- Any obliterated serial numbers.

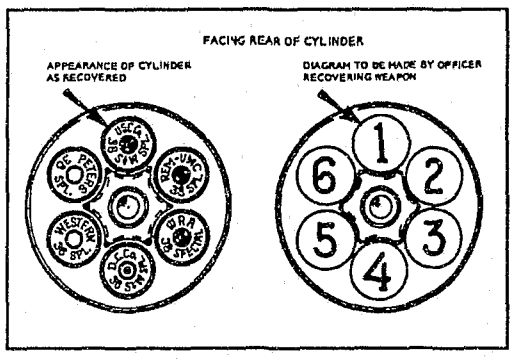
COLLECTION AND PRESERVATION

- All items should be inventoried. Record the source, date, time, agency case number, item number, and description of the item. Description of firearms should include the serial number (do not confuse with part numbers), make, model, caliber, and the condition when found (i.e., loaded or unloaded, cocked or uncocked, safety on or off, etc.).
- The area of recovery should be measured, sketched, and photographed, showing the positions of the items.
- Unload the weapon, if possible.
- Handle carefully, if trace evidence is present. Do not remove the trace evidence unless the entire object cannot be submitted. Before removing, describe the location of the trace evidence and photograph or sketch the evidence in place.

UNLOADING A REVOLVER

- Place a line on the cylinder on each side of the top strap with a pencil or felt pen prior to opening or moving the cylinder. This will inform the examiner which chamber was at the top.
- While pointing the barrel downward, open the cylinder; before moving the cylinder or removing the cartridges, make a diagram of the cylinder. Number the chambers, starting at the top and going clockwise; note any cartridge in each

chamber, whether the cartridge has been fired, and headstamp information, indicating the manufacturer. See example:



Chamber#	Condition	Headstamp Information
1	Fired	S&W
2	Fired	REM
3	Fired	WRA
4	Loaded	S&W
5	Loaded	WES
6	Loaded	PET

- Each cartridge or cartridge case that is removed must be placed in individual containers. The number of the chamber from which it was removed must be noted on the container.

- The firearm and cartridges must be marked prior to packaging and shipping. Use discreet markings to avoid depreciating the value of the firearm.

- Revolvers may be marked underneath the top strap, on the frame inside the crane hinge, on the frame beneath the cylinder, or on the frame under the grip.

- Unfired cartridges should be marked with an indelible felt tip pen along the case.

- Fired cartridges should be marked with a scribe inside the mouth. Do not mark a fired cartridge on the side.

- Never mark the base of a fired or unfired cartridge.

UNLOADING A SEMI-AUTOMATIC PISTOL

- Remove the magazine. Handle the magazine with care, if it is to be processed for latent prints. Do not remove any rounds. Mark the magazine. Package the magazine in a paper envelope, small box, etc. Seal and label the container. Submit with the firearm.

- Remove the live round, if any, from the chamber. Mark the cartridge, indicating that it was removed from the chamber, place in a container, and seal and label the container. Submit with the firearm.

- Mark the firearm on the barrel **and** inside the slide or on the frame under the grip.

RECOVERED BULLETS, PROJECTILES, AND FRAGMENTS

- **Each** bullet or fragment should be wrapped separately in tissue paper and then placed in a small box (e.g., a pill box). Seal and label the box. The fine striations on the bullet must be protected. Do not use any cotton material for wrapping—it may be confused with fibers from clothing involved in the case.

- If a projectile is buried in a wall or other object, cut around the bullet. Remove the material containing the bullet. Do not probe the hole or try to dig out the bullet—it may damage the bullet. Wrap, place in a carton, and seal and label the carton.

- Do not touch recovered bullets with bare fingers. Possible traces of blood on the bullet could be contaminated by handling. Use a clean, unused pair of plastic gloves or pick up with clean tissue.

- Shot pellets should be collected and submitted in the same manner as bullets.

- Search for shot shell wads and shot cups whenever a shotgun is involved.

- Shot patterns should be measured, sketched, and photographed. If possible, the surface containing the shot pattern should be recovered.

- Bullets and fragments recovered at an autopsy should be carefully rinsed and dried. Wrap in tissue paper and place in small carton or envelope. Seal and label the container.

FIRED CARTRIDGE CASES AT SCENE

- Consider processing for fingerprints.

- Each cartridge should be wrapped separately and placed in a small carton or envelope.

- Mark the fired cartridges inside the mouth. Do **not** mark a fired cartridge on the base or on the side.

POWDER PATTERN EXAMINATION

If fired at close range, a firearm will discharge burned and unburned gunpowder particles onto the target surface. The appearance (i.e., the pattern and density of the particles) may assist in establishing the distance between the firearm and the target surface.

- If clothing is submitted, **each** article must be air-dried and packaged **separately.** Package the clothing in paper bags or wrap in brown kraft paper. Do not package in plastic bags. Seal and label the containers, noting the contents.

- If the pattern is on a nude body, 1:1 colored photographs of the wound and entire pattern should be submitted, before and after the wound area is cleaned. Close-up photos of the entry and exit wounds should be submitted as well as close-up photos of typical particles in the pattern. Some of the particles should be picked off and folded in a piece of clean paper. The paper should be sealed, labelled, and placed in an envelope. Seal and label the envelope.

- The laboratory should be informed of the locations of the entry and exit wounds found on the body. A copy of the autopsy report is very helpful and should be submitted to the laboratory.

- The suspect firearm and the same type of ammunition must be submitted. The gunpowder pattern on the proximity test target material is then compared to the pattern developed on the submitted clothing.

FIREARM PARTS

- It is important to collect any and all firearm parts found at the crime scene.

- The firearm can be reassembled for testing; a firearm type and manufacture may be identified.

- All of the collected parts may not be from the same firearm.

SERIAL NUMBER RESTORATION

- The serial number on a firearm (as well as office equipment, bicycles, machinery, skis, etc.) may be ground off to conceal ownership. Chemical processing can often restore the number. Do not wipe or abrade the surface.

SHIPPING FIREARMS AND RELATED EVIDENCE

- Live ammunition cannot be sent through the U.S. Postal Service. Ship by United Parcel Service (UPS).

- All firearms must be unloaded before being shipped or hand-carried to the laboratory. If the firearm is difficult to unload, contact the crime laboratory for assistance.

TOOLMARK EVIDENCE

INTRODUCTION

A toolmark is a mark made by one object on the surface of another solid object. Although these marks are generally made at the entry point of a burglary, various kinds can be found elsewhere, such as fractured knife blades, cut marks on wire, abrasions left on a vehicle, cut marks on a padlock, and machine marks on a metallic surface.

TYPES OF TOOLMARKS

- Some toolmarks only show the basic shape of the tool. This type of toolmark lacks specific detail that can single out a particular tool; only the general shape and size of the tool can be determined—wood impressions are often of this type. Since wood will fracture or partially "spring" back, only the general form and size of the tool can be determined.

- The toolmark that is of more value is the type that consists of striations (a series of narrow, fine grooves, some of which are microscopic) and indentations which show the individual characteristics of the tool. These marks can often lead to the identification of a particular tool.

NOTE: ***To examine the toolmark closely, a magnifying lens is helpful. If the toolmark does not have sufficient detail, a decision must be made whether the toolmark is of value and worth expending time and effort to collect and to be examined by the crime laboratory.***

PRECAUTIONS

- Do not attempt to fit a suspected tool into the questioned mark. The toolmark may be damaged, the tool may be altered, and trace evidence may be lost or contaminated.

- Care must be taken to protect the suspected tool so that the face of the tool is not damaged, thus changing the toolmark it will produce. Protect the face of the tool with soft tissue paper.

- Protect any trace material on the face of the tool. Paint, metal particles, and other materials from a surface frequently adhere to the tool. The trace material can be compared with samples of the surface containing the toolmark.

- Samples of the surface adjacent to the toolmark must be taken. Later, when the suspect tool is recovered, trace materials on the tool can be compared to the

samples taken at the scene. This information can be very valuable, particularly if the toolmark comparison is not definitive.

PRESERVATION OF TOOLMARKS

- When possible, submit the object containing the toolmark. This may entail submitting a drawer, a metal screen door, or cutting out a portion of the object containing the toolmark.

- Close-up photos which include a scale must be made if the object containing the toolmark cannot be submitted. The film plane should be parallel to the toolmark. Oblique lighting will help show up details.

- It is important that the toolmark be kept clean and dry. An exception is when a toolmark on a metal surface is subject to rusting. To retard rusting, coat the toolmark with a film of light oil.

- Casting of the toolmark may be done as a last resort. A cast will never completely replicate the details of the original toolmark. Suitable silicone rubber casting materials, such as Mikrosil, can replicate a significant amount of the details in a toolmark. A formulation with a lesser degree of replication will cause a loss of the finer details in the toolmark and reduce the chances for a definite conclusion.

- Casting should be done by an experienced person. Improper casting may produce a worthless cast and damage the toolmark. **DO NOT PRACTICE ON THE EVIDENCE.**

TOOL FRAGMENTS

- At crime scenes, burglary tools may break while forcing open a window, door, or drawer. Fragments of the broken tool may be found on the floor or even in the toolmark itself.

- Since these fragments may be very small, a flashlight held obliquely to the floor surface is helpful. A magnet may also be used to locate the fragments which contain iron.

- The recovered fragment may be fitted to the suspect's broken tool and constitute what is called a physical match. The physical match may identify the tool as the one used at the crime scene.

GUNSHOT RESIDUE
PROCEDURE FOR SUBMITTING GSR KITS

INTRODUCTION

The high-temperature, high-pressure chemical reactions associated with the discharge of a firearm cause the formation of gunshot residue (GSR) which can be deposited on nearby surfaces, including the hands of the shooter. Therefore, the demonstration of the presence of GSR may have forensic value in cases of violent crime involving firearms.

THE DETECTION OF GUNSHOT RESIDUE

The detection of GSR on the hands of a suspected shooter has progressed significantly from the discredited "paraffin test" developed in the 1940's. Today, a subject's hands are sampled using an adhesive disc. The disc is examined in a computerized scanning electron microscope equipped with an energy dispersive x-ray spectrometer capable of elemental analysis.

The examination determines the presence of GSR particles containing lead, barium, and antimony resulting from the detonation of the cartridge primer. The presence of these particles on the hands of a subject establishes that person as having been associated in some manner with the discharge of a firearm.

PRECAUTIONS

GSR is not volatile, but can be easily removed by mechanical means, such as placing the hands in the pockets or washing. The collection of GSR evidence should therefore be done **as soon as possible** following an incident or arrest. Handcuffing subjects behind their backs may cause GSR to be lost due to contact of the exposed areas of the hands to clothing.

- GSR will generally not be present after three hours of normal hand activity; however, the laboratory will accept samples collected up to six hours following an incident or arrest.

- Care must be taken not to contaminate the subject's hands. The person collecting the samples should wear clean, unused, plastic disposable gloves.

- The analysis of GSR samples from victims of suicides or homicides is of limited value and should not normally be done. The victim is known to have been exposed to GSR, and the analysis cannot determine whether the manner of GSR deposition was homicidal or self-directed.

SIGNIFICANCE

The interpretation of analytical results requires great caution. The following statements represent general interpretations:

Positive Result:

The detection of GSR on the hands of a subject confirms that the subject was in a GSR environment within a few hours prior to sample collection. The subject likely:

- Discharged a firearm; or
- Handled a firearm, ammunition, or other object contaminated with GSR; or
- Was in the proximity of a firearm discharge; or
- A combination of the above.

Negative Result:

The failure to detect GSR on the hands of a subject indicates that the test cannot provide any information of value in determining whether the subject was in a GSR environment.

GUNSHOT RESIDUE COLLECTION KITS

Evidence kits for the collection of GSR are commercially available. Care must be taken to obtain the proper type of kit, since there are several accepted methods for the analysis of GSR. Our crime laboratory utilizes scanning electron microscopy with energy dispersive x-ray spectrometry (SEM/EDX). The sampling device is an aluminum disc with an adhesive covering. Full instructions are included in the kits. Check with the crime laboratory before purchasing kits to be sure that you have the proper type.

CASE SUBMISSION GUIDELINES

To avoid unnecessary analysis, GSR samples should **not** be submitted without **first consulting with the laboratory** in cases where:

- A victim has been shot (since the victim is known to have been exposed).
- A subject is in possession of a firearm (since the subject is known to have been exposed).

- The subject admits to discharging or handling a firearm, or can be associated with a firearm by a witness.
- Caliber .22 rim fire ammunition other than Federal brand has been used. (Except for Federal, the other brands of rimfires do not normally contain antimony.)
- The subject is sampled six or more hours after the shooting.
- The subject has washed or cleaned up after the shooting.

Gunshot residue collection kits are commercially available from several firms. Two of these firms are:

Kinderprint Company
PO Box 16
Martinez CA 94553
Phone: 1-800-227-6020 Fax: (510) 686-6696

Tri-Tech Corporation
5108 Revere Rd
Durham NC 27713
Phone: (919) 544-2400 Fax: (919) 544-4755

ARSON EVIDENCE

INTRODUCTION

Arson is an extremely difficult crime to investigate. The site is often a smoldering, charred mass on the verge of collapse. To compound the problem, most of the evidence is altered or destroyed by heat and smoke and soaked with water. The primary role of the crime laboratory is to identify petroleum residues or other flammable residues remaining in the aftermath of the fire. The crime laboratory also seeks to find inorganic residues of explosives and incendiary materials.

PRECAUTIONS

- It is important that the crime laboratory be called if there are any questions concerning the procedures for collecting and packaging arson evidence.
- Keep alert for evidence which may indicate that an attempt is being made to conceal another crime.
- The search for flammable liquids must not be delayed, since they may be lost through evaporation.
- Use a vapor detector ("sniffer"). Many flammable liquids do not have a noticeable odor. Other solvents may be masked by the odor of burnt materials. The human nose loses its sensitivity to certain odors when exposed to large quantities for an extended period of time.
- Evidence suspected of containing traces of flammable liquids must be packaged in a special manner.
- Each container must be properly labelled and sealed. The containers must be sealed with tape extending across the top of the container and down the sides. The tape must be initialed so that the initials are across the tape onto the container.

SIGNIFICANCE

Examination of the evidence may reveal:

- The presence and nature of an accelerant which may have been used to start the fire.
- The manner and area where the fire was set.

- The connection of a suspect with the arson scene through comparison of flammable fluids, trace evidence, and latent prints.

- The presence of another crime which the fire was planned to conceal, such as a homicide or fraud.

COLLECTION

- ***Flammable liquid evidence (fire debris):***

  — Locations: protected areas, lower surfaces since liquids flow, porous materials, soil, unsealed concrete.

  — Methods: cut cross-section through and below pour pattern, if possible. **Do not** use a gas-powered saw or generator near the sample area.

- ***Flammable liquids:***

  — Locations: cans, bottles, porous materials, surface of puddles.

  — Methods: pipet, pour, or syphon into proper container, blot surface with paper towel or gauze, skim surface of water with paper towel.

- ***Molotov cocktails:***

  — Package flammable liquid and wick separately from the bottle, jar, or glass fragments. If there is no visible liquid, the wick remains are more likely to contain residue than the glass.

  — If fingerprint examination is desired, the glass should be stored so it can dry out rapidly. Fingerprints are dissolved by flammable liquids.

  — If there is insufficient liquid, seal the glass in a vapor-tight container. Separate the larger pieces, which are most likely to contain latent prints for drying and fingerprint processing. If there is not enough glass to process for both prints and for liquid analysis, a decision must be made as to which of the processes to sacrifice.

- ***Burned, charred paper (for document examination):***

  — **Before** proceeding, call the Forensic Document Section, Seattle Crime Laboratory, for instructions.

- Handle as little as possible, leave charred paper where found if in a box, drawer, or wastebasket.

- If necessary to repack, place it loosely in a rigid container lined with cotton.

- Hand-carry. Do **not** mail.

- If an analysis for volatiles is desired, seal papers in a new, unused paint can. If other examinations are desired, call the crime laboratory **immediately** for instructions.

- Label all containers as **fragile.**

- ***Soil samples:***

  - Freeze all soil samples after collection. Refrigerate if unable to freeze. Bacteria in the soil can destroy petroleum-based products; low temperatures will retard bacterial action.

- ***Clothing and cloth:***

  - Gloves, shoes, and pants are the most likely to have flammable liquid stains and spills.

  - Package in the same manner as flammable liquid evidence. Do **not** stuff garment into a can; cut the garment up, if necessary. Leave at least 1/3 of the can empty.

- ***Explosive and solid accelerants:***

  - Package in plastic or paper bags. This type of evidence can be packaged while damp. If the explosives are found **with** petroleum products, call the crime laboratory for handling and packaging instructions.

PACKAGING

It is important that the correct container is used to package the evidence. It is best to keep a variety of containers in several sizes on hand. Flammable liquid residue evidence should **not** be stored in plastic containers or containers with plastic lids. Kapac bags are an exception when properly sealed.

- Small, clean paint type cans are preferable for storing liquid residues. Screw-top vials with teflon-lined caps may gradually lose the sample through evaporation.

- Unused, clean paint cans should be filled between 1/3 and 2/3 full. **Never fill the can completely.**

  — Cans are easily obtained, inexpensive, unbreakable, available in various sizes, and almost always maintain an airtight seal. Do not use cans which are lined with a gray Teflon coating. Use unlined or green expoxy-lined cans.

  — Cans will rust through, rather rapidly on occasion, and must be checked daily. They are bulky and do not nest. Once sealed, the evidence cannot be readily inspected.

  — Use a hammer or rubber mallet to tap around the circumference of the lid for a proper seal. Keep debris out of the sealing groove. **Inspect** the seal.

  — Several manufacturers sell these cans, including Preservative Paint Company, Seattle, WA.

- Kapac polyester bags and Grand River nylon bags are not recommended.

  — Do **not** use any Kapac bags purchased after 1987. Kapac has recently changed its manufacturing process to alleviate a contamination problem; however, the new bags have not yet been thoroughly tested.

  — Grand River nylon bags require special care to seal properly.

- Glass jars are not recommended.

  — Jars are breakable, difficult to store, and may not provide a good seal.

CONTROLS

A sample of material from the fire scene which is identical to the evidence submitted but does **not** contain any accelerant is necessary. This sample, called a **control,** is collected from an area adjacent to the area where the evidence is collected and must be uncontaminated by the suspect flammable liquid.

- Locations: From a protected area in the same room as the fire origin; from the room next to fire origin; or from outside of a clearly defined pour pattern.

- Precaution: A control sample area is easily contaminated by walking through a pour pattern and then through the control area; by water run-off; by condensation of a volatile which evaporated from another area of the scene; by using contaminated gloves, tools, or utensils to collect the control. It is difficult, if not impossible, for the investigator to always collect an uncontaminated control.

APPENDIX

- Membership List - Advisory Council on Criminal Justice Services
- Membership List - Crime Laboratory User Committee
- Harborview Medical Center Information Standard Emergency Medical Protocols for Victims of Sexual Assault

ADVISORY COUNCIL ON CRIMINAL JUSTICE SERVICES
COUNCIL MEMBERS
1-15-93

Chief Roger Bruett, Chairman
Washington State Patrol
General Administration Building
PO Box 42601
Olympia WA 98504-2601
Phone: (206) 753-6545 SCAN: 234-6545

Mr. Chase Riveland, Secretary
Department of Corrections
Capital Center Building
PO Box 41101
Olympia WA 98504-1101
Phone: (206) 753-2500 SCAN: 234-2500

Chief John E. Mansfield
Lacey Police Department
PO Box B
Lacey WA 98503
Phone: (206) 459-4333
Appt. expires: June 30, 1995

Chief Ron Hyland
Sumner Police Department
819 Alder Avenue
Sumner WA 98390
Phone: (206) 863-6384
Appt. expires: June 30, 1996

Sheriff Bob Shepherd
Mason County Sheriff's Office
614 Division
Shelton WA 98584
Phone: (206) 427-9670
Appt. expires: June 30, 1996

Sheriff Doug Blair
Yakima County Sheriff's Office
PO Box 1388
Yakima WA 98907
Phone: (509) 575-4080 SCAN: 665-4080
Appt. expires: June 30, 1993

The Honorable C. C. Bridgewater
Cowlitz County Prosecuting Attorney
Hall of Justice
312 SW First Avenue
Kelso WA 98626
Phone: (206) 577-3080 SCAN: 562-3080
Appt. expires: June 30, 1996

Chief Ronald G. Waldner
Tukwila Police Department
6200 Southcenter Boulevard
Tukwila WA 98188
Phone: (206) 433-1804
Appt. expires: June 30, 1995

Judge William R. Cole, Ret.
PO Box 1175
Ellensburg WA 98926
Phone: (509) 925-2666
Appt. expires: June 30, 1995

Ms. Arminda (Mindy) Benitez-Baade
Pierce County Superior Court
County-City Building
930 Tacoma Avenue South
Tacoma WA 98402
Phone: (206) 591-6091
Appt. expires: June 30, 1993

Ms. Joan Boyd
Gonzaga University
School of Law
Career Services
PO Box 3528
Spokane WA 99220-3528
Phone: (509) 328-4220 x 6122
Appt. expires: June 30, 1993

Mr. Gil Austin (AD HOC Member)
Administrator for the Courts
1206 South Quince
Eastside Plaza Building
PO Box 41170
Olympia WA 98504-1170
Phone: (206) 753-3365 SCAN: 234-3365

USER COMMITTEE
WASHINGTON STATE PATROL
CRIME LABORATORY DIVISION
10/21/92

Chief Randy Hamilton
Chehalis Police Department
473 NW Park, PO Box 516
Chehalis WA 98532
Phone: (206) 748-8605
SCAN: 621-1367 FAX: 748-1513

Sheriff Bill Wiester, Jr.
Grant County Sheriff's Office
PO Box 37
Ephrata WA 98823
Phone: (509) 754-2011
SCAN: 551-2011 FAX: 754-2058

Sheriff Bill Norton
Island County Sheriff's Office
6th and Main St., PO Box 5000
Coupeville WA 98239-5000
Phone: (206) 678-4422
SCAN: 592-4422 FAX: 678-3413

Mr. David Santos
Kent Police Department
220 Fourth Avenue South
Kent WA 98032-5895
Phone: (206) 859-3315
SCAN: 527-3315 FAX: 859-6572

The Honorable C. C. Bridgewater
Cowlitz County Prosecuting Attorney
Hall of Justice
312 SW First Avenue
Kelso WA 98626
Phone: (206) 577-3080
SCAN: 562-3080

Mr. Dan Satterberg, Chief of Staff
King County Prosecutor's Office
W. 554 King County Courthouse
516 Third Avenue
Seattle WA 98104
Phone: (206) 296-9067
SCAN: 667-9067 FAX: 296-9013

Mr. Larry Micheau
Deputy State Fire Marshal
Dept. of Community Development
1635 Grove Street
Marysville WA 98270
Phone: (206) 659-2556

Dr. Barry Logan
State Toxicologist
2203 Airport Way S #360
Seattle WA 98134-2027
Phone: (206) 343-5435 FAX: 287-8564

Captain John Sullivan
Spokane Police Department
West 1100 Mallon
Spokane WA 99260
Phone: (509) 625-4243
SCAN: 529-4050 FAX: (509) 625-4233

Mr. Larry Hebert, Manager
Washington State Patrol
Tacoma Crime Laboratory
930 Tacoma Ave. S., Room B-70
Tacoma WA 98402
Phone: (206) 593-2006
SCAN: 462-2006 FAX: 572-5582

Mr. Michael Grubb, Supervisor
Washington State Patrol
Seattle Crime Laboratory
Public Safety Bldg, 2nd floor
Seattle WA 98104
Phone: (206) 464-7038
SCAN: 576-7073 FAX: 587-5023

Captain Bruce Bjork, Commander
Mr. John Anderson, Technical Director
Washington State Patrol
Crime Laboratory Division
PO Box 42632
Olympia WA 98504-2632
Phone: (206) 753-0294
SCAN: 234-0294 FAX: (206) 753-0166

STANDARD EMERGENCY MEDICAL PROTOCOLS ESTABLISHED FOR VICTIMS OF SEXUAL ASSAULT

Currently, medical care for victims of sexual assault varies in different locations within the state of Washington. In areas of dense population, these cases are routinely seen, and a working protocol is often in place. Nevertheless, the protocols can vary from hospital to hospital within metropolitan communities. In more rural areas, where sexual assault cases are seen infrequently, there is less familiarity with appropriate procedures. This can create confusion for medical providers, victims, and law enforcement alike.

Additionally, a lack of knowledge regarding the proper collection and preservation of evidence can result in an inability to prosecute assailants. By providing a system-wide standard, we hope to minimize this problem while enhancing the professional care given victims.

The Harborview Sexual Assault Center—working in collaboration with the Washington State Patrol Crime Laboratory, Washington Association of Prosecuting Attorneys, Washington Association of Criminal Defense Lawyers, Seattle Police Department, Washington Coalition of Sexual Assault Programs, Crime Victims Compensation Program, King County Police, Seattle Area Hospital Council, and the American College of Emergency Room Physicians—has developed a set of protocols for the acute treatment of victims of sexual assault.

Protocols have been developed for the care of children and adults, male and female. Their use will enable all medical centers to provide optimal care for sexual assault patients. After final input from emergency room staff, training will be provided in a variety of locations throughout the state. It is expected that training will be conducted in Spring 1993.

If you are interested in additional information, please call Chris Feldt, Harborview Medical Center, at (206) 223-3047.