

PHYSICAL EVIDENCE HANDBOOK
September, 2015



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DEPARTMENT OF PUBLIC SAFETY
VERMONT STATE POLICE
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This handbook was prepared by the
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FORWARD

The Vermont State Police is pleased to publish and distribute the Physical Evidence Handbook, a Vermont Law Enforcement Officer's guide to collecting evidence.

As police officers, you must be highly aware of proper evidence collection procedures. This handbook is intended to familiarize the investigator with collection and preservation techniques. This handbook is not intended to be a comprehensive treatment of all the factors involved in evidence collection, but should be considered as a general procedural guide outlining necessary and efficient methods for dealing with physical evidence. It is important to keep in mind that the information and procedures presented here are intended to be used as guidelines.

We hope this handbook will be of value to the police officer who will be addressing the many issues involved in proper crime scene processing and evidence collection and preservation.

Colonel Matthew Birmingham
Director
Vermont State Police

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NOTE: Remember to send evidence by certified mail, return receipt requested, to the above mailing address.

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HISTORY

The Vermont Department of Public Safety was created on July 1, 1947. That year also marked the beginning of what is now called the Vermont Forensic Laboratory. The first laboratory area was a photographic laboratory constructed within the Identification and Records Division of the Vermont State Police at the original DPS Headquarters in the "Redstone" building in the City of Montpelier.

The first evidentiary examinations were conducted within a year. They included firearms comparisons and glass fracture matches. Over the next 20 years, the Laboratory grew to provide a full range of fingerprint, firearms and photographic related evidentiary examinations. However, most chemistry related examinations were conducted by out-of-state labs. During this time period, the laboratory was known as the Vermont State Police Crime Laboratory. The personnel at that time were all sworn officers.

A special budget appropriation in the 1969-1970 biennium provided for the beginning of a forensic chemistry section. Additional funding was obtained through federal grants to purchase laboratory equipment and to construct a versatile Mobile Crime Laboratory. Laboratory services, offered free of charge to Vermont law enforcement agencies, brought workload demands which soon resulted in significant backlogs. An inferior facility added to this problem.

The relocation of the Department Headquarters to the Waterbury State Complex in the Town of Waterbury in 1983 provided a satisfactory facility for the Laboratory. We could once again concentrate upon building the professional staff and obtaining the equipment necessary for a full service forensic laboratory.

In 1988, all bench positions in the lab were converted to civilian positions. State Troopers who had been performing evidentiary examinations work in the Firearms & Toolmark, Latent Fingerprint and Photography sections returned to police duty in the field. The only remaining sworn position in the laboratory was the laboratory director's position, filled by a State Police captain.

On January 1, 1995, another major reorganization occurred. The Department of Public Safety formed a division called the Division of Criminal Justice Services. The CJS Division was formerly the Support Services Division of the Vermont State Police. The lab's name changed from the Vermont State Police Crime Laboratory to the Vermont Forensic Laboratory. The new Division of Criminal Justice Services includes, besides the Forensic Laboratory, the Vermont Criminal Information Center (VCIC), the Electronic Communication and Information Systems Section, and most recently, the Governor's Highway Safety Program.

On May 1, 1998, Dr. Eric Buel, Ph.D., was named as the first civilian director of the Forensic Laboratory. A State Police lieutenant's position has been assigned to the laboratory. The lieutenant will act as a liaison to law enforcement agencies.

Now, equipped with the advanced technical instrumentation and a staff of professionals, the Vermont Forensic Laboratory offers Vermonters most of the evidentiary examinations required for the administration of justice.

VERMONT FORENSIC LABORATORY SERVICES

Firearms & Toolmarks Section

- X Firearms Examination
- X Ammunition Examination
- X Serial Number Restoration
- X Toolmark Comparison
- X Fracture Matches
- X Gunshot Residue



Firearms Comparison
Microscope

Latent Fingerprint Section

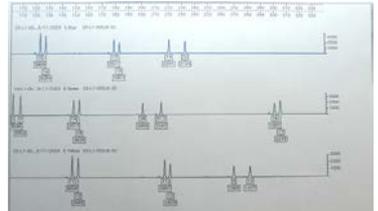
- X Latent Print Development
- X Latent Print Comparison
- X Shoe Print Comparison
- X Tire Track Comparison



Latent Fingerprint

Forensic Biology Section

- X Serology
- X DNA
 - Blood Pattern Analysis



DNA STR Profile

Photography Section

- X Color Film Processing
- X Black and White Film Processing
- X Video/Stills
- X Special Photo Work



Film Processor

Chemistry Section

- X Fire Debris
- X Trace Evidence

Drug Section

- Drug Analysis

General - All Sections

- X Expert testimony.
 - Training of other criminal justice agencies in areas relating to forensic evidence.
 - Assist state and federal prosecutors with legal interpretation of scientific results.
 - Research and development of new techniques.



Scanning Electron
Microscope



Mass Spectrometer

- **VERMONT FORENSIC LABORATORY STAFF**

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INTRODUCTION

The forensic laboratory is an integral component of the criminal justice system. The laboratory accepts evidence from all members of the criminal justice system and is responsible for the objective analysis of that evidence. The forensic scientists on staff work with the submitting officer to determine the necessary examinations and attempt to provide the maximum information from that evidence. Once an examination is completed, the scientist writes a report detailing his or her results, which is forwarded to the submitting agency. Evidence may then be returned to the submitting agency or a portion may be retained awaiting certain samples known as “standards” that are used for comparison to a questioned or evidentiary sample. Further reports may follow depending on the nature of the examinations required. At the conclusion of a case, expert testimony may be required of the forensic scientist. The laboratory staff is ready to provide the necessary testimony in court. The attorney calling the expert should discuss the case well in advance of the trial to ensure that the scientist is available, and to discuss the scientist’s testimony.

The Assistant Chief Criminal Investigator assists with the training needs of the Vermont law enforcement community. This training may occur through special courses, training bulletins or through one-on-one contact. The proper collection of evidence is a major component of the job of the submitter and laboratory staff. Improperly collected or preserved evidence will limit the extent of the analysis, and can call into question the competency or skill of the individual who collected the evidence. With this in mind, we trust you will read this manual and refer to specific sections as evidence dictates. We also encourage you to call the lab with your questions. Please get to know the laboratory staff and feel free to call them with any question concerning evidence collection, evidence preservation, or the type of examinations that may be conducted with a particular type of evidence.

CRIME SCENE INVESTIGATION

Suggested Practices for Scene Management

Authorization - Actions taken pursuant to this guide should be performed in accordance with Department Policies and Procedures and Federal and State laws.

Arriving at the Scene - Initial Response/Prioritization of Efforts

- **Initial Response/Receipt of Information**

One of the most important aspects of securing the crime scene is to preserve the scene with minimal contamination and disturbance of physical evidence. The initial response to an incident shall be expeditious and methodical. Upon arrival, the officer(s) shall assess the scene and treat the incident as a crime scene.

The initial responding officer(s) should promptly, yet cautiously, approach and enter crime scenes, remaining observant of any persons, vehicles, events, potential evidence, and environmental conditions.

The initial responding law enforcement officer(s) should:

- Note or log information (e.g., address/location, time, date, type of call, parties involved).
- Be aware of any persons or vehicles leaving the crime scene.
- Approach the scene cautiously, scan the entire area to thoroughly assess the scene, and note any possible secondary crime scenes. Be aware of any persons and vehicles in the vicinity that may be related to the crime.
- Make initial observations (look, listen, smell) to assess the scene and ensure officer safety before proceeding.
- Remain alert and attentive. Assume the crime is ongoing until determined to be otherwise.

- Treat the location as a crime scene until assessed and determined to be otherwise.

It is important for officers to be observant when approaching, entering, and exiting a crime scene.

Safety Procedures

- The safety and physical well being of officers and other individuals in and around the crime scene are the responding officer's first priorities.
- The initial responding officer(s) arriving at the scene should identify and control any dangerous situations or persons.
- The initial responding law enforcement officer(s) should:
 - Ensure that there is no immediate threat to responding personnel - scan the area for sights, sounds, and smells that may present danger to personnel. (e.g., hazardous materials such as gasoline, natural gas.) If the situation involves a clandestine drug laboratory, biological weapons, or radiological or chemical threats the appropriate personnel/agency should be contacted prior to entering the scene.
 - Approach the scene in a manner designed to reduce risk of harm to officer(s) while maximizing the safety of victims, witnesses, and others in the area.
 - Survey the scene for dangerous persons and control the situation.
 - Notify supervisory personnel and call for assistance/backup.

Emergency Care

- After controlling any dangerous situations or persons, the officer's next responsibility is to ensure that medical attention

is provided to injured persons while minimizing contamination of the scene.

- Responding officer(s) should ensure that medical attention is provided with minimal contamination of the scene.
- **The initial responding law enforcement officers should:**
 - Assess the victim(s) for signs of life and medical needs and provide immediate medical attention.
 - Call for medical personnel.
 - Point out potential physical evidence to medical personnel, instruct them to minimize contact with such evidence (e.g., ensure that medical personnel preserve all clothing and personal effects without cutting through bullet holes, knife tears), and document movement of persons or items by medical personnel.
 - Instruct medical personnel not to “clean up” the scene and to avoid removal or alteration of items originating from the scene.
 - If medical personnel arrived first, obtain the name, unit, and telephone number of attending personnel, and the name and location of the medical facility where the victim is to be taken.
 - If there is a chance the victim may die, attempt to obtain a “dying declaration”.
 - Document any statements/comments made by victims, suspects, or witnesses at the scene.
 - If the victim or suspect is transported to a medical facility, send law enforcement official with the victim or suspect to document any comments made and preserve evidence. (If no officers are available to accompany the victim/suspect, stay at the scene and request medical personnel to

preserve evidence and document any comments made by the victim or suspect.)

Assisting, guiding, and instructing medical personnel during the care and removal of injured persons will diminish the risk of contamination and loss of evidence.

Secure and Control Persons at the Scene

Controlling, identifying and removing persons at the crime scene and limiting the number of persons who enter the crime scene and the movement of such persons is an important function of a responding officer in protecting the crime scene.

Officers should identify persons at the crime scene and control their movements.

The initial responding law enforcement officer(s) should:

- Control all individuals at the scene. Prevent individuals from altering/destroying physical evidence by restricting movement, location, and activity while ensuring and maintaining safety at the scene.
- Identify all individuals at the scene, such as:
 - Suspects - Secure and separate.
 - Witnesses - Secure and separate.
 - Bystanders - Determine whether witnesses, if so, treat as above, if not, remove from the scene.
 - Victims/Family/Friends - Control while showing compassion.
 - Medical and other assisting personnel.
- Exclude unauthorized and nonessential personnel from the scene, e.g., law enforcement officials not working the case, politicians, media.

Controlling the movement of persons at the crime scene and limiting the number of persons who enter the crime scene is

essential to maintaining scene integrity, safeguarding evidence, and minimizing contamination.

Boundaries - Identify, Establish, Protect and Secure

Defining and controlling boundaries provide a means for protecting and securing the crime scene(s). The number of crime scenes and their boundaries are determined by their location(s) and the type of crime. Boundaries shall be established beyond the initial scope of the crime scene(s) with the understanding that the boundaries can be reduced in size if necessary but cannot be as easily expanded.

The first officer(s) at the scene should conduct an initial assessment to establish and control the crime scene(s) and its boundaries.

The initial responding law enforcement officer(s) should:

- Establish boundaries of the scene(s), starting at the focal point and extending outward to include:
 - Where the crime occurred.
 - Potential points and paths of exit and entry of suspects and witnesses.
 - Places where the victim/evidence may have been moved (be aware of trace and impression evidence while assessing the scene).
- Set up physical barriers (e.g., ropes, cones, crime scene barrier tape, available vehicles, personnel, other equipment) or use existing boundaries (e.g. doors, walls, gates).
- Document the entry/exit of all people entering and leaving the scene, once boundaries have been established.
- Control the flow of personnel and animals entering and leaving the scene to maintain integrity of the scene.

- Effect measures to preserve/protect evidence that may be lost or compromised (e.g., protect from the elements - rain, snow, wind, and from footsteps, tire tracks, sprinklers).
- Document the original location of the victim or objects that you observe being moved.
- Consider search and seizure issues to determine the necessity of obtaining consent to search and/or obtaining a search warrant.

NOTE - Persons should not smoke, chew tobacco, use the telephone or bathroom, eat or drink, move any items including weapons (unless necessary for the safety and well being of persons at the scene), adjust the thermostat or open windows or doors (maintain scene as found), touch anything unnecessarily (note and document any items moved), reposition moved items, litter, or spit within the established boundary of the scene.

- Establishing boundaries is a critical aspect in controlling the integrity of evidentiary material.

Turn over control of the scene and brief person(s) in charge.

- Brief the person(s) taking charge, assist with crime scene control, and help establish further investigative responsibilities.
- The first officer(s) at the scene should provide a detailed crime scene briefing to the established person in charge of the scene.

The initial responding law enforcement officer(s) should:

- Brief the person(s) taking charge.
- Assist in controlling the scene.
- Turn over responsibility for the documentation of entry/exit.
- Remain at the scene until relieved of duty.

The scene briefing is the only opportunity for the next in command to obtain initial aspects of the crime scene prior to subsequent investigation.

Document Actions and Observations

- All activities conducted and observations made at the crime scene shall be documented as soon as possible after the event to preserve information.
- Documentation should be maintained as a permanent record.

The initial responding law enforcement officer(s) should document:

- Observations of the crime scene, including the location of persons and items within the crime scene and the appearance and condition of the scene upon arrival.
- Conditions upon arrival (e.g., lights on/off; shades up/down, open/closed; doors, windows, open/closed; smells; ice, liquids; movable furniture; weather, temperature, and personal items.)
- Personal information from witnesses, victims, suspects, and any statements or comments made.
- Own actions and actions of others.

The first officer(s) at the crime scene should produce clear, concise documented information encompassing his or her observations and actions. This documentation is vital in providing information to substantiate investigative considerations.

Preliminary Documentation and Evaluation of the Scene

- **Conduct Scene Assessment**
- Assessment of the scene by the investigator(s) in charge allows for the determination of the type of incident to be investigated and the level of investigation to be conducted.

- The investigator(s) in charge should identify specific responsibilities, share preliminary information, and develop investigative plans in accordance with departmental policy and local, state, and federal laws.

- **The investigator should:**
 - Converse with the first responder(s) regarding observations/activities.
 - Evaluate safety issues that may affect all personnel entering the scene(s) (e.g., blood borne pathogens, hazards).
 - Evaluate search and seizure issues to determine the necessity of obtaining consent to search and/or obtaining a search warrant.
 - Evaluate and establish a path of entry/exit to the scene to be utilized by authorized personnel.
 - Evaluate initial scene boundaries.
 - Determine the number/size of scene(s) and prioritize.
 - Establish a secure area within close proximity to the scene(s) for the purpose of consultation and equipment staging.
 - If multiple scenes exist, establish and maintain communication with personnel at those locations.
 - Establish a secure area for temporary evidence storage in accordance with rules of evidence/chain of custody.
 - Determine and request additional investigative resources as required (e.g., personnel/specialized units, legal consultation/prosecutors, equipment).
 - Ensure continued scene integrity (e.g. document entry/exit of authorized personnel, prevent unauthorized access to the scene).
 - Ensure that witnesses to the incident are identified and separated (e.g., obtain valid ID).
 - Ensure the surrounding area is canvassed and the results are documented.
 - Ensure preliminary documentation/photography of the scene, injured persons, and vehicles.

Scene assessment allows for the development of a plan for the coordinated identification, collection, and preservation of physical evidence and identification of witnesses. It also allows for the exchange of information among law enforcement personnel and the development of investigative strategies.

Conduct Scene “Walk-Through” and Initial Documentation

The scene walk through provides an overview of the entire scene, identifies any threats to scene integrity, and ensures protection of physical evidence. Written and photographic documentation provides a permanent record.

The investigator(s) in charge should conduct a walk through of the scene. The walk through should be conducted with individuals responsible for processing the scene.

During the scene walk through the investigator(s) in charge should:

- > Avoid contaminating the scene by using the established path of entry.
- > Prepare preliminary documentation of the scene as observed.
- > Identify and protect fragile and/or perishable evidence (e.g., consider climatic conditions, crowds/hostile environment). Ensure that all evidence that may be compromised is immediately documented, photographed, and collected.

Conducting a scene walk through provides the investigator(s) in charge with an overview of the entire scene. The walk through provides the first opportunity to identify valuable and/or fragile evidence and determine initial investigative procedures, providing for a systematic examination and documentation of the scene. Written and photographic documentation records the condition of the scene as first observed, providing a permanent record.

PROCESSING THE SCENE

Determine Team Composition

- Based on the type of incident and complexity of the scene, the investigator(s) in charge should determine team composition. Trained personnel should perform scene processing.
- The investigator(s) in charge should assess the scene to determine specialized resources required.
- Following the walk through, the investigator(s) in charge should:
 - Assess the need for additional personnel. Be aware of the need for additional personnel in cases of multiple scenes, multiple victims, numerous witnesses, or other circumstances.
 - Assess forensic needs and call forensic specialists to the scene for expertise and/or equipment.
 - Ensure that scene security and the entry/exit logs are continued.
 - Select qualified person(s) to perform specialized tasks (e.g., photography, sketch, latent prints and evidence collection).
 - Document team members and assignments.
 - The scene(s) assessment determines the number of personnel and how responsibilities will be assigned.

Contamination Control

Contamination control and preventing cross-contamination at single or multiple scenes is essential to maintaining the safety of personnel and the integrity of evidence.

The investigator(s) in charge should require all personnel to follow procedures to ensure scene safety and evidence integrity.

Scene responders and/or team members should:

- Limit scene access to people directly involved in scene processing.
- Follow established entry/exit routes at the scene.
- Identify first responders and consider collection of elimination samples.
- Designate a secure area for trash and equipment.
- Use personal protective equipment (PPE) to minimize scene contamination and prevent contamination of personnel.
- Clean/sanitize or dispose of tools/equipment and personal protective equipment between evidence collection and/or scenes.
- Utilize single-use equipment when performing direct collection of biological samples.

Minimize contamination by being safe, clean, and careful to ensure the welfare of personnel and the integrity of the evidence.

Documentation

- An assessment of the scene determines what kind of documentation is needed (e.g., photography, video, sketches, measurements, notes.)
- The investigator(s) in charge should ensure documentation of the scene.
- The team member(s) should:
- Review assessment of the scene to determine the type of documentation needed.
- Coordinate photographs, video, sketches, measurements, and notes.
- Photograph:
- Scene utilizing overall, medium and close-up coverage.
- Evidence to be collected with and without measurement scale and/or evidence identifiers.
- Victims, suspects, witnesses, crowd and vehicles.
- Additional perspectives (e.g., aerial photographs, witness' view, area under body once body is removed).

- Videotape as optional supplement to photos.
- Prepare preliminary sketch(es) and measure:
- Immediate area of the scene, noting case identifiers and indicating north on the sketch.
- Relative location of items of evidence and correlate evidence items with evidence records.
- Evidence prior to movement.
- Rooms, furniture, or other objects.
- Distance to adjacent buildings or other landmarks.

Generate notes at the scene:

- Documenting location of the scene, time of arrival, and time of departure.
- Describing the scene as it appears.
- Recording transient evidence (e.g., smells, sounds, sights) and conditions (e.g., temperature, weather).
- Documenting circumstances that require departures from usual procedures.
- A well-documented scene ensures the integrity of the investigation and provides a permanent record for later evaluation.

Prioritize Collection of Evidence

Prioritize the collection of evidence to prevent loss, destruction, or contamination. The investigator(s) in charge and team members should determine the order in which evidence is collected.

- The team member(s) should conduct a careful and methodical evaluation considering all physical evidence possibilities (e.g., biological fluids, latent prints and trace evidence).
- Focus first on the easily accessible areas in open view and proceed to out-of-view locations.
- Select a systematic search pattern for evidence collection based on the size and location of the scene(s).
- Select a progression of processing/collection methods so that initial techniques do not compromise subsequent processing/collection methods.
- Concentrate on the most transient evidence and work to the least transient forms of physical evidence.

- Move from least intrusive to most intrusive processing/collecting methods.
- Continually assess environmental and other factors that may affect the evidence.
- Be aware of multiple scenes (e.g., victims, suspects, vehicles, locations).
- Recognize other methods that are available to locate, technically document, and collect evidence (e.g., alternate light source, enhancement, blood pattern documentation, projectile trajectory).
- Prioritization provides for the timely and methodical preservation and collection of evidence.

Collect, Preserve, Inventory, Package, Transport, and Submit Evidence

The handling of physical evidence is one of the most important factors of the investigation. The team member(s) should ensure the effective collection, preservation, packaging and transport of evidence. The team member(s) should:

- Maintain scene security throughout processing and until the scene is released.
- Document the collection of evidence by recording its location at the scene, date of collection, and who collected it.
- Establish chain of custody.
- Obtain known comparison and control samples from the scene.
- Consider obtaining elimination samples.
- Immediately secure electronically recorded evidence (e.g., answering machine tapes, surveillance camera videotapes, computers) from the vicinity.
- Identify and secure evidence in containers (e.g., label, date, initial container) at the crime scene. Different types of evidence require different containers (e.g., porous, non-porous, crush proof, vapor proof).
- Document the condition of firearms/weapons prior to rendering them safe for transportation and submission.
- Avoid excessive handling of evidence after it is collected.

- Maintain evidence at the scene in a manner designed to diminish degradation or loss.
- Transport and submit evidence items for secure storage.

Evidence at crime scenes that is in the process of documentation, collection, preservation, or packaging should be handled with attention to scene integrity and protection from contamination or deleterious change. During the processing of the scene, and following documentation, evidence should be appropriately packaged, labeled, and maintained in a secure, temporary manner until final packaging and submission to a secured evidence storage facility or the forensic laboratory.

Physical Evidence is any solid, semi-solid, or liquid material, however microscopic, that may aid in determining the truth during an investigation. Physical evidence assists the investigator by supporting or confirming the facts upon which a reasonable and strong suspicion is based. It helps to establish the case for or against a suspect.

The primary source of physical evidence is the crime scene; secondary sources are participants in the crime, places in which related acts of the crime occurred, or places visited by participants. Some physical evidence is hidden, or latent, so that scientific procedures are required to find and collect it. Most objects are obviously evidence and need little or no processing by experts to develop their basic evidential value. Other physical evidence requires scientific examination by laboratory technicians.

After being located and recognized during a search, physical evidence must be collected, marked for identification, packaged, and transported to a safe storage or the laboratory for examination. Known standards are collected at the crime scene and other areas involved in criminal operations to facilitate comparison analysis. Firearms, tools, and other suspect items also are collected for laboratory examinations, which may link these items with previously discovered physical evidence.

Physical evidence is more likely to show opportunity and identity by placing a suspect at a crime scene or in some contact with the victim; but it also may reveal motive.

Continuity of possession, (the chain of custody) must be established when evidence is proffered in court as an exhibit. Whenever possible, if the officer locating the evidence is not the investigator assigned responsibility for the case, the evidence should not be disturbed until its location and nature can be brought to the attention of the responsible investigator, nor should it be moved until its location and description have been noted, photographs taken at the scene, and measurements made to place it.

Depending upon the type of evidence to be collected, avoid contamination by not touching the evidence with bare hands. Use disposable gloves, forceps, or tweezers.

Special care must be taken when handling fragile items such as trace evidence.

- X Small plastic or cardboard boxes will protect items from being crushed.
- X Items can be suspended within a box or taped so as not to move.
- X Be careful that too much pressure isn't applied to tweezers or forceps when picking up fragile items.
- X Small particles can be picked up with tape.

Perishable evidence, such as liquid blood, must be refrigerated as soon as possible or collected to a non-perishable state, i.e. collected on a sterile swab and dried. The only time liquid blood should be submitted to the Forensic Laboratory is in purple top tubes used for standards.

Wet clothing must be allowed to air dry.

- **Caution:** Wet items will degrade if plastic bags are used.

- Use paper bags for moist items. Submit these items to the Forensic Laboratory as soon as possible so that they may be dried in a suitable drying cabinet.

Use proper evidence containers.

- Evidence envelope v. regular envelopes.
- Druggist folds.
- Complete information on envelopes before placing fragile items and indented writing inside.

When applicable, evidence should be individually wrapped and packaged.

Marking Evidence

Fingerprint lifts i.e., Date, Time, Case Number, Name of person collecting lift, Description where lift was taken from, diagram of lift, i.e, car door, table top, bottle; Lift direction (this can be shown on the diagram.

Tape solid objects into solid containers so sides are free. Be sure that the tape does not come in contact with the important area of the evidence, i.e, where latent prints or blood may be located. Mark evidence tag and secure to outside of the container.

Paper objects should be placed in paper bag, manila envelope, evidence envelope. Place all identification on the outside of the container. Be sure the tape does not come in contact with an important area of evidence, i.e, blood stains, fingerprints, etc.

Items that cannot or should not be marked – record necessary information on the container and tag.

Serial numbered items do not necessarily have to be marked, but must be tagged for identification.

The investigator must be able to identify each piece of evidence that he/she found and collected at the crime scene to satisfy the legal requirements for future court testimony. All markings must be

legible to include person's initials and name. Do not use Officer Call Number as they change often throughout one's career.

Packaging Physical Evidence

- Evidence needs to be packaged so as to avoid breakage, loss or contamination. Items of evidence should be packaged in separate containers to obviate possibilities of cross-contamination.
- Clean paper and cardboard are common methods of packaging.
- Paper evidence envelopes containing evidence in druggist folds are recommended for hairs, fibers, and other small articles.
- Plastic envelopes and bags need to be used with caution. Wet evidence such as bloody clothing or green marijuana can quickly degrade or their value as evidence destroyed if packaged in plastic.
- Charred fire debris should be packaged in new, clean paint cans (available from BCI Arson Investigators).
- Documents should be packaged in transparent envelopes.
- Items can be suspended within a box or taped so as not to move.
- Perishable evidence, such as liquid blood, must be refrigerated as soon as possible.
- Wet clothing must be allowed to air dry out of direct sunlight, with no added heat.
- Packaged evidence must be sealed.

Maintaining Chain of Custody

Ensure evidence tags and envelopes are completely and properly filled out. Use DPS Form 305 to record chain of custody for evidence transmitted to the Laboratory.

Keep evidence in personal custody or locked in evidence room. Keep the chain of custody as small as possible. The "Chain of Custody" must be maintained whenever evidence comes into your possession. Keep a record of all

transfers of custody of the evidence by date, time, and initials (*or name*). The initials or name must be legible.

Known Standards of Evidence

Forensic science includes the identification of physical evidence and a finding as to its origin. This individualization of evidence often requires that physical evidence collected at a crime scene be compared to a known standard of evidence or a control. Known standards may be collected at the crime scene, from the victim, from a suspect, or from other sources. A known standard is a material/substance of “known” origin. It may be a carpet sample removed from the crime scene that could be used for comparison to fibers removed from a suspect’s clothing, or it could be a known blood sample from a victim or suspect. Known standards of evidence must be collected in exactly the same manner as any other evidence, for they have equal evidential value. Here as elsewhere there is a need for recognition, legal possession, marking for identity, preservation of the integrity of the sample, and accuracy in reporting its acquisition.

Commonly required standards include:

- X fingerprints (*may be found at VCIC*)
 - palm prints (may also be found at VCIC) however ensure these are collected at the time of arrest.
- X blood/oral swabs
- X handwriting
- X hairs and fibers
- X ammunition

Handling Biohazardous Material

Acquired immune deficiency syndrome (AIDS), hepatitis B and C, and tuberculosis are lethal and/or infectious diseases more likely to be encountered at crime scenes today than in the past. The scenes of crimes of violence involving victims with one of these diseases are likely to have blood and possibly other infectious body fluids. Therefore, it is imperative that all possible precautions be taken.

The first line of defense against infectious diseases is the wearing of disposable gloves. A surgical mask and protective eye wear may also be suggested if there is any likelihood of liquid or dried blood coming into contact with the investigator's or crime scene technician's face.

The second line of defense is to avoid cutting or puncturing a finger or other portion of the body while conducting the crime-scene search and collecting evidence. A collateral line of defense is to seek medical assistance immediately if you do receive an accidental cut or other wound or believe that particles of possibly infected blood may have come in contact with your mouth or eyes.

To protect others, blood and other biological evidence should be packaged and marked clearly with **BIOHAZARD labels.**

COMPLETING AND RECORDING THE CRIME SCENE INVESTIGATION

Establish Crime Scene Debriefing Team

The crime scene debriefing enables law enforcement personnel and other responders to share information regarding particular scene findings prior to releasing the scene. It provides an opportunity for input regarding follow-up investigation, special requests for assistance, and the establishment of post scene responsibilities.

Law enforcement personnel and other responders should participate in or initiate a crime scene debriefing to ensure the crime scene investigation is complete and to verify post scene responsibilities.

The investigator(s) in charge of the crime scene should establish a crime scene debriefing team. When participating in a scene debriefing, law enforcement personnel and other responders shall:

Establish a crime scene debriefing team, which includes the investigator(s) in charge of the crime scene, other investigators

and evidence collection personnel, medical examiner(s) state's attorney, specialized personnel and Crime Scene Search Team.

- Determine what evidence was collected.
- Discuss preliminary scene findings with team members.
- Discuss potential technical forensic testing and the sequence of tests to be performed.
- Initiate any action(s) identified in discussion required to complete the crime scene investigation.
- Brief person(s) in charge upon completion of assigned crime scene tasks.
- Establish post-scene responsibilities for law enforcement personnel and other responders.

The crime scene debriefing is the best opportunity for law enforcement personnel and other responders to ensure that the crime scene investigation is complete.

Perform Final Survey of the Crime Scene

Final survey of the crime scene ensures that evidence has been collected and the scene has been processed prior to release. In addition, a systematic review of the scene ensures that evidence, equipment, or materials generated by the investigation are not inadvertently left behind and any dangerous materials or conditions have been reported and addressed.

The investigator(s) in charge should direct a walk through at the conclusion of the scene investigation and ensure that the scene investigation is complete.

The investigator(s) in charge should ensure that:

- Each area identified as part of the crime scene is visually inspected.
- All evidence collected at the scene is accounted for.

- All equipment and materials generated by the investigation are removed.
- Any dangerous materials or conditions are reported and addressed.
- The crime scene is released in accordance with jurisdictional requirements.

Conducting a scene walk through ensures that all evidence has been collected, that materials are not inadvertently left behind, and that any dangerous materials or conditions have been reported and addressed.

Documentation of the Crime Scene

Reports and other documentation pertaining to the crime scene investigation should be compiled into a case file by the investigator(s) in charge of the crime scene. This file should be a record of the actions taken and evidence collected at the scene. This documentation should allow for independent review of the work conducted.

The investigator(s) in charge should ensure that reports and other documentation pertaining to the crime scene investigation are compiled.

The investigator(s) in charge should obtain the following for the crime scene case file:

- First responder(s)' report(s)
- Emergency medical personnel documentation.
- Entry/exit log.
- Photographs/videos
- Crime scene sketches/diagrams
- Evidence documentation
- Other crime scene responders' reports.
- Record of consent form or search warrant.
- Other reports such as forensic/technical reports should be added to this file (when they become available).

Note - The above list is limited to crime scene documentation. This should not be considered a comprehensive list of the documents involved in an investigative case file.

This will ensure that reports and other documentation pertaining to the crime scene investigation are compiled into a “case file” by the investigator in charge of the crime scene and allow for independent review of the work conducted.

SUBMISSION AND DISPOSITION FORMS

DPS 305 Form

The 305 form, or Request for Laboratory Examination is a form designed to provide:

- X A permanent record of physical evidence submitted to the lab.
- X Information regarding the type of exam, test or analysis requested to be performed on the evidence. **(Please be specific on what type of examination you are looking for. An example, instead of checking the box marked firearms also include in the note section: Please compare recovered bullet to firearm submitted.)**
- X A receipt and an inventory of the items submitted from the submitting officer.
- X The 305 form shall accompany all lab submissions. The 305 form shall be in triplicate. The form shall accompany any evidence sent to the lab, either hand carried or by certified mail, return receipt requested. *(See 305 Form attached)*

When speaking to lab personnel about a particular case provide the case number or log number on the 305 form. Victim and accused names do not help locate cases.

Evidence submitted by certified mail must be addressed as follows:

Vermont Forensic Laboratory
ATTN: *(List section, i.e., chemistry, fingerprints, toolmarks)*
P.O. Box 47
Waterbury, VT 05676

X **Do not mail** *(Must be hand delivered):*

- Accelerants
- Firearms
- Explosives:

Do not deliver explosives to the Laboratory without consultation/ intervention with the Bomb Squad. Call the Senior Forensic Chemist at 244-8788, regarding any possible submission.

Submission of Evidence

Materials are briefly categorized below as general representative examples. Evidence mailed to the laboratory shall be addressed to the attention of the proper section.

Chemistry Section

- X Accelerants
- X Serology (biological fluids)
- X Chemicals
- X Clothing
- X Explosives - hazardous materials

Do not deliver explosives to the Laboratory without consultation/ intervention with the Bomb Squad. Call the Senior Forensic Chemist at 244-8788, regarding any possible submission.

- Fibers
- Glass
- Hairs
- Paints – Will be sent to outside laboratory for analysis
- Regulated drugs
- Soil

- Gunshot Residue (hand swabs)

*Fibers, Glass, Hairs without root and soil are sent to the F.B.I. for analysis.

SPECIAL NOTE: If package contains a hazardous blood sample (i.e. AIDS, Hepatitis B or C, etc.) or syringes, mark it “CAUTION: SEE NOTE INSIDE” and place a note describing the danger inside the package. **Always place biohazard labels on these packages.**

Firearms Section

- Firearm examinations
- Ammunition examinations
- Serial number restoration
- Toolmark comparison
- Fracture matches
- Gunshot residue (clothing)

Fingerprints

- Latent fingerprint examinations
- Latent fingerprint comparisons, document examinations
- Handwriting, overwriting - examinations performed by F.B.I
- Indented writing
- Various photographic examinations
- Tire and shoe impression comparisons

*******Case history and examination required are very important. If you do not specify what you are looking for with an exam other than checking off a box the examiner won't know either.*******

Each individual item to be examined must be listed on a separate line in the space provided on the DPS Form 305. Begin at Item #1 and use consecutive numbers 1, 2, 3 etc. (Do not cross out #1 and use your item Number 6.)

In those cases where you are submitting evidence and may be uncertain as to which section should receive your material, a

telephone call to the Forensic Laboratory (244-8788) should be made.

Physical evidence submitted and/or handled in any other manner will not be accepted.

NOTE: Flash cards or rolls of film submitted for photo processing do not need to be mailed certified mail and do not require a 305 Form. The exception being flash cards or rolls of film seized as evidence. Under those circumstances, treat the flash card and/or film as evidence using a 305 submission form

Disposal of Evidence

Evidence submitted to the Laboratory needs to be returned to the submitting agency. (State Police drug evidence excepted.)

ALL EVIDENCE SHOULD BE PICKED UP AT THE LABORATORY WITHIN THIRTY DAYS FROM THE DATE OF NOTIFICATION OF ANALYSIS. Extracted DNA evidence may be retained by the laboratory for two years.

(See attached DOE Forms)

The DOE forms (Disposal of Evidence) provide a detailed list of items to be returned and serves as an inventory sheet and a receipt for those items. Be sure to print name next to signature if signature is not legible.

VERMONT STATE POLICE CRIME SCENE SEARCH TEAM

Purpose

The purpose of this policy is to develop a standard regarding how the Crime Scene Search Team (CSST) and the personnel assigned to it will be requested and utilized. The CSST is a service provided by the Vermont State police, Department of Public Safety.

Policy

The Crime Scene Search Team (CSST) and personnel assigned to it, are a service provided to the Vermont law enforcement community for crime scene processing typically at the scene of major crimes in Vermont.

Major crime scenes are usually murder scenes or suspicious death scenes although occasionally other major crimes such as bank robbery, aggravated assault and aggravated sexual assault are included.

The CSST approaches major crime scene investigations in Vermont through a team concept. This means that the laboratory, police investigators, State's Attorneys, medical examiner and others are members of the team. The only way for this approach to be successful is to have open communication and cooperation between all involved.

The person in charge at a major crime scene is the lead criminal investigator for the case. This person should be identified to all involved as the person in charge. The lead investigator will often designate an investigator to work with the CSST personnel at the crime scene. The lead investigator or his/her designee is responsible for briefing the CSST upon their arrival at the crime scene.

Procedure

- (1) The Crime Scene Search Team serves all law enforcement agencies in Vermont. Those agencies that need the CSST may request CSST services by calling the State Police Barracks Dispatch Center in the geographic area of concern, 24-7.
- (2) Requests for service shall be forwarded to the State Zone Duty Officer, who will contact the Assistant Chief Criminal Investigator.
- (3) The Assistant Chief Criminal Investigator or his/her designee shall obtain sufficient information from the requesting agency in order to evaluate the situation. Details of the crime and

crime scene are needed in order to bring any special equipment which may be needed to assist in the collection of evidence.

- (4) Prior to responding to a crime scene, the Assistant Chief Criminal Investigator (ACCI), or his/her designee, will notify the Vermont State Police Criminal Division Commander or his/her designee, of such request and the identity of the agency making the request.
- (5) One individual from the CSST will at all times be on call for CSSU duty. That individual shall carry a pager and be available and ready to respond to the laboratory within one hour.
- (6) A minimum of two personnel from the CSST will respond with the CSSU to crime scenes, if possible.
- (7) It is much easier to process a crime scene in daylight. Those night scenes that can be secured should be, and processed in the morning.
- (8) Once the decision is made to call for the CSST, the scene should be evacuated and secured.
- (9) Take only such action within the confines of the crime scene as is absolutely necessary to either sustain life or arrest the rapid deterioration of evidence. Accomplish such action within the secured crime scene with a **minimum** number of people.
- (10) During the time that the CSST are in service at the scene, **all** other personnel are expected to stay out of the crime scene and the CSST vehicle unless otherwise directed by CSST personnel and the lead criminal investigator.
- (11) There should be no rush to complete a crime scene. Crime scene personnel will not work to exhaustion. In the event the members of the Crime Scene Search Team have worked long hours, the processing of the crime scene will stop, the

crime scene will be secured and processing will commence when the members have obtained ample rest.

- (12) A member from the CSST will attend the autopsy as part of normal crime scene duty.
- (13) It will be standard practice for the ACCI to send the State's Attorney and investigating agency official a report advising of the crime scene search with a copy of the evidence inventory.

SEXUAL ASSAULT EVIDENCE

Sexual assault evidence kits are available at all Vermont hospital emergency rooms. These kits include an updated and easy to follow protocol and all the necessary components to collect the evidence and specimens required for laboratory analysis, including DNA. Medical staff will collect the required evidence following instructions in the evidence collection kits. The medical staff will relinquish the appropriate forensic evidence to the police investigator for delivery to the Forensic Laboratory.

NOTE – The evidence collection kit should be sealed and securely stored until delivered to the Forensic Laboratory as soon as possible, **but within three (3) days**. The kit may be mailed if hand delivery is not possible. All kits should be delivered to the Forensic Laboratory, even those labeled victim: Non-Reported.

Victim's name should never be written on the outside of the evidence containers.

All wet items should be dried as soon as possible in an appropriate way (drying cabinet with paper under item to collect any fallen trace evidence) but otherwise, evidence should not be opened.

The kits are provided by the Vermont Center for Prevention and Treatment of Sexual Abuse, telephone 802-651-1663.

All sexual assault kits should be sent to the laboratory to be screened and any evidence recovered preserved for possible future testing. This would include all kits from individuals who wish to remain anonymous (mark evidence submission form “Non-Reported”), and from those individuals unsure if she or he wants to proceed with the case (mark evidence submission form “holding prosecution pending”). The laboratory will hold the kit for at least six months. If no victim has come forward, the evidence may be returned to the submitting agency untested. In these cases the victim signs a form indicating they have six months to come forward for prosecution on their case.

Sexual assault victims should be advised to have a kit taken even if the event occurred as long as five days prior to reporting. While time and washing will decrease the likelihood of finding trace evidence, it does not preclude it. Hence, the collection of a sexual assault kit should be encouraged. Clothing worn at the time of the assault and/or immediately after the assault can also be collected. Kits should also be collected if the victim is menstruating or has been with another person consensually.

Any questions about collection procedures should be addressed to the Forensic Laboratory, Serology Section, at 802-244-8788.

BLOOD EVIDENCE COLLECTION

Introduction

Supplies for the collection of blood or other unknown stains at crime scenes are available on-line or at your local pharmacy. State Police prepare their own kits and should go through their Troop Criminal Division for supplies. If you are uncertain what materials you need; please contact the lab for assistance.

An optional swab dryer is commercially available. The swab dryer speeds up the drying process and is available from:

Laboratory Equipment Specialists
166 Orr Road
Jericho, Vermont 05465
Telephone: (802) 899-4910

Collection Procedures for Swabs

Swab collection procedure – for wet or dry stains

Wear disposable gloves and change if they become contaminated. When documenting the stain with photographs, include a ruler or scale card before collection if possible. Document the size of the stain by measuring and recording the size if a scaled photograph is not possible. **Do not use foam tipped swabs for collection of unknown stains.**

1. Peel open the package until you can reach the shaft of the swab. Pull out the swab without touching the cotton tip of the swab and save the empty package for later use.
2. The swab may be labelled with a “flag” of tape on the swab shaft.
3. If the stain is wet, collect with a dry swab. If the stain is dry pre-wet the swab with a minimum amount of distilled water. If the swab is too wet, remove excess water by gently tapping the shaft with a finger. Do not over-wet swab. This dilutes the stain and makes examination difficult.
4. Use additional swabs if necessary.
5. For small stains, collect the stain on a small area of the swab. Do not spread across the entire swab.
6. Place the wet swabs into a holder and allow to air dry. For those with swab dryers, place the swabs in the swab rack and dry for ten to fifteen minutes, or until the swabs are thoroughly dry.
7. Do not allow the swabs to touch.
8. Collect one control swab from an unstained area near the stain with one fresh swab. If the stains are found

on different areas or surface types, separate control samples should be taken.

9. Place the dry swabs into their original swab packages or clean envelopes and seal.
10. Label the packages with the case number, item number and the investigator's hand-written initials.
11. If the stain is dry, pre-wet the swab with a **minimum** amount of distilled water. One drop should do. If the swab is too wet, remove extra water with a piece of clean tissue. **Do not over-wet swabs. They will dilute the stain and make the examination difficult for the Laboratory.**
12. Do not over-saturate the swab with the stain sample. Use additional swabs if needed. Over saturated swabs will be hard to dry and the excess amount of sample will be absorbed by the wooden portion of the swab. Collect a number of swabs if there is sufficient stain material.
13. For small stains, collect the stain on a small area of the swab. Do not spread across the entire swab.
14. Place wet swabs in wooden swab holder and allow to air dry. For those with swab dryers, place the swabs in the swab rack and dry with the fan for ten to fifteen minutes or until the swabs dry thoroughly. **Be careful not to contaminate swabs by touching them to anything.**
15. Collect one control swab from an unstained area near the stained area with one fresh swab. If the stains are found on different areas or surface types, separate control samples should be taken.
16. Place the **dry** swabs into their original swab packages or clean envelopes and seal.
17. Label the packages with the case number, location of the collection, day and time of the collection and the name of the investigator collecting the samples.

18. Preserve the swab samples at room temperature. Submit swab samples to the laboratory for examination as soon as possible.

Tape Collection Procedure - For dry stains on non-porous surfaces only. Consider this collection method if a stain appears dry and may crack/flake-off substrate and the integrity of the stain may be lost. Otherwise, in most cases, collection by swab is preferred.

Wear disposable gloves and change if they become contaminated. When documenting the stain with photographs, include a ruler or scale card before collection if possible. Document the size of the stain by measuring and recording the size if a scaled photograph is not possible.

Refer to the Evidence Handling Manual procedures for transmitting evidence between units/sections and for Disposal of Evidence forms.

1. Stains can be “lifted” off a non-porous object using regular “Scotch”-type tape.
2. Discard the first inch of tape from the roll. Place a new piece of tape over the stain. Rub the tape above the stain and lift slowly (wear clean gloves for this).
3. Place the removed stain and tape on a clean sheet of white paper. The third or fourth sheet from a pad of paper can be considered clean. Label the paper with the case number, item number and the investigator’s hand-written initials.
4. Place the stain and paper into an envelope or other proper packaging. Label the packaging with the case number, item number and the analyst’s hand-written initials. Seal the packaging.
5. If possible, obtain a control by repeating the procedure on an adjacent but unstained area of the surface containing the stain.

Collection Procedures for Cuttings

Cutting collection procedure -- for dry stains.

Wear disposable gloves and change if they become contaminated. When documenting the stain with photographs, include a ruler or scale card before collection if possible. Document the size of the stain and/or cutting by measuring and recording the size if a scaled photograph is not used.

Refer to the Evidence Handling Manual procedures for transmitting evidence between units/sections and for Disposal of Evidence forms.

1. Using a clean pair of scissors or a disposable razor blade, cut entirely around the stained area and remove it for packaging. If the stained area is large enough that not all material need be collected, then only cut out a portion of the stain.
2. Label the new packaging containing the cutting with case number, cutting item number, and initials. Seal the packaging.
3. If possible, take a control cutting from a non-stained area near the stained cutting, using a clean pair of scissors or a disposable razor. If the stain is found on different material types, take additional control cuttings.
4. Label the new packaging containing the control cutting with case number, cutting item number, and initials. Seal the packaging.

BLOOD AND OTHER BIOLOGICAL EVIDENCE

Purpose

The ability to perform successful analysis on biological evidence recovered from crime scenes depends on what kinds of specimens were collected and how they were preserved.

Procedures – Wear exam gloves whenever biological evidence is being collected. Change gloves whenever they become contaminated.

Evidence at a Crime Scene

- X Photograph the evidence before it is touched, moved or collected, and include a ruler or scale card for size determination.
- X Note and sketch the spatial relationships of the evidence relative to the crime scene and other objects present.

When collecting each item into a separate container, label from where and who collected as well as the item description, date/time/case number/item# and collector's initials.

Liquid Blood Specimens at the Crime Scene

- X Liquid blood should be collected with a clean swab(s) and air dried out of direct sunlight.
- X A blood clot, if dry, can be collected using the tape lift method.
- X Label the specimens with case number, item number and initials. The date, time, location if there is room on the packaging but must be otherwise recorded elsewhere

Liquid Blood Specimens in Snow or Water

- X Blood samples found on snow or in water should be collected immediately to avoid further dilution.
- X The largest possible quantity of these samples should be collected in a clean, suitable, water tight container, avoiding any contaminant as much as possible. Avoid excess snow, remove only the blood stained area.
- X Label the specimen as previously indicated.
- X Submit specimens to the Laboratory as soon as possible.

Wet Blood Stains

- X **Garments with Wet Blood Stains**

- X Garments bearing wet blood stains should be placed on a clean surface or hung up in a secure area and allowed to air dry out of direct sunlight without any heat source, such as a hair dryer. If this is not an option bring to the VFL immediately for drying.
- X Never package a wet garment or garment with wet blood stain in a sealed, air-tight container or plastic bag. This practice causes the specimens to retain moisture, and promotes bacterial growth and sample deterioration. At crime scenes it may be necessary to collect very wet items in plastic bags to prevent cross contamination. These items must then be dried as soon as possible after collection.

Wet Blood Large Objects

- X Large objects that cannot be removed from a crime scene may have wet blood stains on them. The wet blood should be transferred onto a clean cotton swab(s).
- X Blood-stained cotton swabs must be allowed to air-dry before packaging in a paper container.
 - Collect a standard using a swab moistened with distilled water.
- X Each object and container must be properly labeled.

Dried Blood Stains

Dried Blood Stain on Removable Items

Dried blood stains on weapons, garments and other moveable objects should be collected separately by collecting the entire item.

- X Each item should be placed in its own (*paper*) container, and these should be sealed and labeled properly.
- **Dried Blood Stains on Solid, Non-Absorbent Surfaces of Immoveable Objects or on Objects that Cannot be Cut:**

- X The blood stain pattern should be photographed with scale, documented and sketched to the extent necessary. The stains can be removed with a swab(s) or by the tape method.

- **Dried Blood Stains on Carpet, Upholstery, Wood or Other Objects that Can be Cut**

- X The stained area should be documented as previously described.
- X A portion of the item containing the blood stain can be removed by cutting with a clean, sharp instrument.
 - X Each cutting should be packaged separately, labeled and sealed.
 - X An unstained portion of the item should be collected and packaged as a control.

- **Dried Small Blood Spatters**

- X Small blood spatters are often difficult to remove from their surfaces. Collect using the sterile water and swab collection procedure.
- X After proper documentation, a swab can be used to collect the blood spatter from its surface.

Semen and Seminal Stains

- **Liquid Semen Evidence Found at a Scene**

- X Document the semen evidence by notes, photography and sketching.
- X Liquid semen from an item that can't be collected can be transferred onto a swab(s) by absorption. The material is then air-dried, packaged, sealed and labeled properly.

- **Seminal Stains on Moveable Objects**

- X Seminal stains on underwear, clothing, condoms, bed sheets, pillows and other moveable objects should be collected as is.
- X If an article has a wet stain on it, the stain must be allowed to air dry thoroughly.
- X Each item should be packaged separately in a clean paper container unless doing so would compromise the integrity of trace materials.
- X Each item's packaging must be properly sealed and labeled.
- X Packaged items should be stored at room temperature and delivered to the Laboratory.

- **Seminal Stains on Immoveable, Absorbent Surfaces**

- X Examples of large objects that can be cut, and that could have seminal stains on them are carpeting, bedding, and upholstery.
- X Document the evidence with photography using scale.
- X Use a clean cutting instrument to cut the stained area from the rest of its surface.
- X Place each cutting in a separate piece of clean paper. Make a druggist fold and place into an appropriate paper container, seal the container, and label properly.

- **Seminal Stains on Immoveable, Non-Absorbent Surfaces**

- X Examples of these surfaces are floors, counters, and metal surfaces.
- X Document the seminal stain evidence as previously described.
- X Use the swab collection procedure.

- X Dry the swab and place it into an appropriate paper container. Collect a control sample.
- X Each container should be sealed and labeled properly.

Tissue, Organ or Bone Specimens

- X **Fresh Tissue, Organ or Bone**
 - X Each item of evidence should be described in notes, and documented by photography and sketches.
 - X This type of evidence item can be picked up with a clean pair of tweezers or forceps.
 - X Each item should be placed in a clean container without any added fixatives.
 - X Each container should be properly sealed and labeled, and stored in a freezer, if possible.
 - X Evidence should be submitted to the Office of the Chief Medical Examiner as soon as possible.

- X **Dry Tissue, Organ or Bone**
 - X Each item of evidence should be photographed and sketched before collection. The size, shape and pattern, and spatial relationships to the rest of the scene should be properly documented.

 - X Each item can be picked up with a clean gloved hand. Evidence still connected should be collected together.

 - X Be careful not to contaminate any item with material from another item. Change gloves if gloves become contaminated.

 - X Each item should be placed in a clean container, the container then sealed and properly labeled as previously described.

- X Evidence can be stored at room temperature and submitted to the laboratory or the Office of the Chief Medical Examiner as soon as possible.

Note: If the item is not dry (if you can smell it), then freeze it.

Urine, Saliva and Other Body Fluids

X Liquid Samples

- Liquid urine is often found in snow. Collect as much as possible without getting too much “extra” snow. Place in a clean container. Keep cold; bring to the lab as soon as possible.
- X Liquid saliva should be collected with a swab(s) which should be air-dried. (See swab collection procedure.)

X Stains

- X Urine stains, saliva stains and other body fluid stains can be collected as is, or removed by swabbing or cutting.
- X Place each stain sample in a clean, paper container. Swabs or cuttings should be collected in a druggist fold made from clean paper or a clean envelope. The druggist fold is then placed into a secondary paper container.
- X Containers should be sealed and labeled properly.

• Hair Evidence for DNA or Biological Analysis

This material may provide excellent evidence. See the section concerning hair and fiber collection for more details.

Known Standards for Comparison

Blood or oral swabs may be used as a standard for DNA analysis. *The buccal swabs are preferred.*

- **Known Blood Sample**

Buccal Swabs from suspect/victim are preferred.

- **Oral Swab**

A buccal/cheek swab is preferred to a blood sample for DNA analysis. The buccal swab may not always provide a good DNA sample, and on those few occasions you may have to go back and collect a blood sample.

Collection of buccal samples may be done by the officer or by the individual giving the sample. Officers collecting samples should wear gloves. There are two ways to collect a buccal swab. You may use either a cotton swab or a buccal brush. Regardless of what is used to collect the sample you will need to collect it in duplicate. Collect two buccal swabs.

- Collect two buccal swabs per individual.
- Label the outside of the buccal swab package with the name of the person from whom the sample is collected and the date of collection plus initials of the collector.
- Remove the buccal swab from the package. Do not touch the cotton end of the buccal swab. Do not push on the end of the buccal swab. This will cause the release of the cotton end of the swab.
- **Gently** swab the inside cheek on both sides of the mouth. If you are using cotton swabs to collect the sample, **gently** rotate the swab to moisten all sides.
- **Allow buccal swab to completely air dry** prior to returning it to the original package.
- Tape seal the **dry** buccal swab package following collection.

- Return the sealed package to the original envelope and label package with the donor's name, the date of collection, case number and initials of the person who collected it. Swabs may be stored dry at room temperature.
- Submit the evidence to the Vermont Forensic Laboratory with a DPS 305 form.
- **Note** - Individuals who are heavy smokers may not have good cheek samples. In those cases if no DNA is recovered from the swab, a subsequent blood sample will need to be collected.
- If you have any questions, call the Vermont Forensic Laboratory at 802-244-8788 and ask to speak with someone in the Serology or DNA section.

BLOOD STAIN PATTERNS

Blood stain patterns can sometimes provide information concerning the possible actions which caused the patterns. In most cases, photographs are sufficient for interpreting patterns. Therefore, precise photographic techniques must be used in order to allow proper interpretation of bloodstain patterns. For assistance call the Laboratory or the Crime Scene Search Team Commander.

Photographing Blood Stains

- X Include immediate areas near bloodstains, even if areas appear unstained, for example, ceilings. The absence of blood in such areas is important to document.
- All bloodstains that appear to have resulted from beating, kicking, splashing, wiping, shooting, etc., should be photographed in color.
- X A sketch of the crime scene should be submitted indicating the location of each individual photograph.
- X All photographs should be taken 90° (perpendicular) to the stained surface.

- X A scale (ruler) must be included in each photograph.
- X Overall photographs of the blood stained area should be submitted. These photographs should contain a vertical scale extending from a reference point such as the floor and a horizontal scale extending from another reference point such as the edge of a wall. Seamstress tape measures with large numbers should be used for this purpose.
- X Representative stains and control samples should be collected for laboratory testing. Identify these stains by circling and labeling prior to photographing.
- X Close-up photographs of bloodstained areas should also be taken. Include a scale in each photograph.

DNA DATABASE LAW

In April, 1998 the Vermont State Legislature passed the state DNA Database and State Databank Law. The law was updated in 2005 & 2009 that requires DNA be collected from all felons and some sexual related misdemeanors. After collection and profiling, the sample profiles will be stored in the **Combined DNA Index System (CODIS)** and searched nationally. The collected profiles will assist in the investigation of future crimes in which DNA evidence is obtained.

In conjunction with the Department of Corrections approximately 1800 convicted offender samples have been collected per year. Once these samples have been typed, they will be a useful investigative tool in those crimes having biological stains but no suspect. The lab will be able to type the stain from the crime scene and compare it to the DNA database samples. If a match is found in the database it will provide an investigative lead to the investigators.

COMBINED DNA INDEX SYSTEM (CODIS)

The DNA Identification Act of 1994, which was included in the 1994 Crime Bill, formally authorized the FBI to establish the Combined DNA Index System (CODIS) for law enforcement identification purposes. CODIS is a computer database of collected DNA profiles stored in various indexes including: convicted offenders, unknown forensic profiles, unidentified remains, and population samples (for statistical purposes only).

The FBI provides CODIS software along with installation, training, and user support at no cost to state and local crime laboratories. The CODIS software permits these laboratories to administer their state DNA database programs using a standard network and nationwide database system. CODIS provides the means for laboratories to compare profiles from different crime scene evidence, perhaps finding matches that indicate a serial criminal, and in linking cases allow the investigators to information that may lead to the identification of the perpetrator. CODIS also allows the comparison of the crime scene evidence to profiles from convicted offenders from across the nation. A match of crime scene evidence to a convicted offender provides the investigator with a substantial lead.

The National DNA Index System (NDIS) went on line as a means for all participating CODIS laboratories to exchange and compare DNA profiles on a national level in October, 1998. Currently all 50 states and the Federal Court system participate in NDIS. As of May 2014 NDIS contained approximately 13 million samples, 10.9 million samples were from offenders, 559 thousand were from crime scenes. Vermont has uploaded over 15 thousand samples and nationally over 235 thousand investigations have been aided by this system. As the size of the CODIS database grows, the ability to assist law enforcement agencies around the country will expand further. The Vermont Forensic Lab currently receives convicted offender samples from the Department of Corrections. Profiles are obtained from these samples and contributed to NDIS. Through grant funding the Vermont laboratory is now profiling more evidence in cases for which a suspect has not been identified; these profiles will be contributed to NDIS in the hope

that a match will provide an investigatory lead. CODIS is not an alternative to getting a standard from a suspect. If a match is identified through CODIS, the agency submitting the casework sample will be notified with the identity of the possible suspect.

It is important to remember that the DNA Database is not a database of standards that may be accessed at any time for investigations. There are no names in the Database; it is only a collection of profiles with either a Convicted Offender number or Case Number assigned to each. If you have a suspect in your case, you will need to obtain a standard from the individual to be compared to the evidence.

If you receive a match notice, you will be asked to obtain a standard because the data base samples do not have a chain of custody. It is also important to keep in mind that your person of interest may not be in the database (even if you think they are.) The lab is unable to check the database for your suspect without a match.

The quickest way to obtain results is to submit a suspect standard if at all possible. If you do not have a suspect or have demonstrated/documented that you are unable to obtain a standard, the evidentiary profiles can be uploaded to the database as an unknown. If an evidentiary sample results in a match, the lab must confirm the match and must still have a legally obtained sample from the suspect that has a documented chain of custody.

DRUGS

Submission of Drug Evidence

- X **Hand Carried** - Drug evidence can be hand carried to the laboratory during normal business hours, Monday through Friday. **The hours are 0830 - 1530.**
- Evidence Lockers are also available for use during the hours the Evidence Intake area is closed, limited officer time or for the occasions there is a long line for evidence receiving.
- Instructions are on the lockers on how to properly submit evidence (305 completely filled out, evidence packaged

correctly, sealed) and secure the lockers when the officer is done. **** Please Do Not put evidence tape over the locker****

- X **Certified Mail** - Drugs may be sent to the Laboratory via Certified Mail, return receipt requested. The address is:

Vermont Forensic Laboratory
ATTN: Chemistry Section
P.O. Box 47
Waterbury, VT 05676

Submit only one case per certified parcel. Do not submit multiple cases in a single package. Every case must have a completed DPS 305 form.

- X **Packaging** - If hypodermic needles or other sharp objects are submitted; the items must be packaged safely and include the orange biohazard stickers. Although properly packaged hypodermic needles will be accepted as evidence, they will not be routinely analyzed because of safety concerns. Hypodermic needles may be analyzed under certain circumstances if requested.

The Laboratory encourages the use of sealed clear plastic envelopes (*strip-n-grip* or *heat sealed*) for drug evidence. Clear plastic allows for easier handling and inventory.

However, do not package green or wet marijuana in plastic – use brown paper evidence bag, clean lunch bag or paper (brown) grocery bag in a pinch.

Marijuana Cultivation Cases

Full size with dirt and roots or growing marijuana plants will not be accepted at the Laboratory.

Individual plant tops, measuring approximately 6 inches in length, should be submitted for analysis. You may submit plant starts as well. **Each plant top must be packaged in its own separate paper bag. Do not staple the bag closed. All bags will be inventoried at the door.**

X **Legal Thresholds**

The following thresholds from Title18 are included as a guide. The weights are **product weights** and must not include packaging materials. See Link for more information: <http://www.leg.state.vt.us/statutes/sections.cfm?Title=18&Chapter=084>

X **Marijuana Cultivation**

- X 3 plants or less – misdemeanor
- X More than 3 plants – 3 year felony
- X More than 10 plants – 5 year felony
- X More than 25 plants – 15 year felony

X **Marijuana Possession**

- X Less than 2 ounces – misdemeanor
- X 2 ounces or more – 3 year felony
- X One pound or more – 5 year felony
- X Ten pounds or more – 15 year felony

Marijuana Possession Civil Penalties

A person 21 years of age or older who knowingly and unlawfully possesses one ounce or less of marijuana or five grams or less of hashish commits a civil violation and shall be assessed a civil penalty as follows:

- (1) Not more than \$200.00 for a first offense.
- (2) Not more than \$300.00 for a second offense.
- (3) Not more than \$500.00 for a third or subsequent offense.

Marijuana possession by a person under 21 years of age; first or second offense; civil violation 18 VSA 4230b

•(a) Offense. Except as otherwise provided in section 4230c of this title, a person under 21 years of age who knowingly and unlawfully possesses one ounce or less of marijuana or five grams or less of hashish commits a civil violation and shall be referred to the Court Diversion Program for the purpose of enrollment in the Youth Substance Abuse Safety Program. A person who fails to complete the program successfully shall be subject to:

•(1) a civil penalty of \$300.00 and suspension of the person's operator's license and privilege to operate a motor vehicle for a period of 90 days, for a first offense; and

•(2) a civil penalty of not more than \$600.00 and suspension of the person's operator's license and privilege to operate a motor vehicle for a period of 180 days, for a second offense.

4230c. Marijuana possession by a person under 21 years of age; third or subsequent offense; crime misdemeanor

No person shall knowingly and unlawfully possess marijuana. A person under 21 years of age who knowingly and unlawfully possesses one ounce or less of marijuana or five grams or less of hashish commits a crime if the person has been adjudicated at least twice previously in violation of section 4230b of this title and shall be imprisoned not more than 30 days or fined not more than \$600.00, or both

X Marijuana Sale

- X Less than ½ ounce – misdemeanor
- X ½ ounce or more – 5 year felony
- X One pound or more – 15 year felony

X Cocaine Possession

- X Less than 2.5 grams – misdemeanor
- X 2.5 grams or more – 5 year felony
- X One ounce or more – 10 year felony

X Cocaine Sale or Delivery

- X Delivering less than 2.5 grams – 3 year felony
- X Selling less than 2.5 grams – 5 year felony
- X Selling or delivering 2.5 grams or more – 10 year felony
- X Selling or delivering one ounce or more – 20 year felony

X Heroin Possession

- X Less than 200 milligrams – misdemeanor
- X 200 milligrams or more – 5 year felony
- X One (1) gram or more – 10 year felony
- X Two (2) grams or more – 20 year felony

X Heroin Sale or Delivery

- X Delivery of less than 200 milligrams – 3 year felony
- X Selling less than 200 milligrams – 5 year felony
- X Selling or delivering 200 milligrams or more – 10 year felony
- X Selling or delivering one gram or more – 20 year felony

Refer to Title 18, Sections 4230 through 4237 for sections dealing with trafficking laws.

Policy for the Analysis of Presumed Marijuana Cases

Cases in which marijuana is the only submission will be analyzed if specifically requested or if the submission is estimated to be over 5 grams in net weight.

Those cases containing less than 5 grams of presumed marijuana will be treated as follows:

The evidence will be received as per normal protocol, except that the disposal notice (see below) will be stapled to the yellow and pink copies of the 305 form. The pink copy and attached disposal notice will be returned to the submitting agency. The yellow form and attached disposal notice will accompany the evidence. The original 305 form will be boldly marked “**NADOE**” (for no analysis DOE) in the history portion of the 305 form. When signing in these

cases, mark the “other” box in the FLIMS system and type “NADOE” in the space provided.

Log the evidence into the incoming drug room or sign it directly over to the drug evidence officer. If the evidence is logged into the incoming drug room, it is placed in the box/shelf designated for NADOE cases and the log book should be marked (in red ink) “NADOE” in the type of analysis column. The evidence should be signed over to the drug evidence officer as soon as possible. Date the log book when the case is turned over to the drug evidence officer. The chain of custody will be maintained on the 305 form. With State Police cases, the yellow 305 forms will serve as the case DOE and will be retained by the secretarial staff in a DOE file and a copy will be periodically sent to the submitting agency to determine the status of the case.

Vermont State Police refer to VSP-DIR-505 for marijuana cases less than 5 grams (NADOE). These cases will not be submitted to the Vermont Forensic Laboratory unless the analysis is requested by the prosecutor.

With local police departments, the 305 will be attached to the evidence and act as a chain of custody form for its return. Under this system, the local police departments may ask for the evidence to be destroyed or returned.

Case Number _____

Analysis of marijuana will be performed automatically when there is an estimated five grams of material for analysis. The evidence listed on this DPS 305 form is below this weight requirement and **will not be analyzed** unless required. **If this material requires analysis please fax your needs and time constraints to us at 241-5557 - please give us two weeks notice).**

This form with the attached 305 will act as a Disposal of Evidence form. If the evidence listed on this 305 can now be destroyed or returned, please sign and date in the appropriate area below and return this entire set (or copy thereof) to the lab. Please retain this form if you do not wish us to destroy or return this evidence at this time. If the case is settled in the future, and the evidence can be destroyed or returned, please forward this form to us at that time.

Thank you for your help in this matter. Through this cooperative effort we hope to reduce those analyses which are not required and focus our attention on those cases which are important to you.

The evidence described on this DPS 305 form may be:

destroyed ____ **returned** ____ (does not apply to VSP)

Signature and Date

EXPLOSIVES AND BOMBS

Do not deliver explosives or bombs to the Laboratory. If you have such items, contact the Vermont State Police Bomb Squad. **Contact your local State Police Dispatch Center for Bomb Squad assistance.**

The mission of the Bomb Squad is to render safe, with a minimum of risk, all improvised explosive devices, improvised explosives, and commercial explosives, old, abandoned, or unclaimed explosives found within the area of responsibility.

In terms of military explosives recovered, the Bomb Squad is available for identification purposes and to set up arrangements with the local military E.O.D. Team responsible for this region.

The Vermont State Police Bomb Squad is available to assist in the areas of recovered fireworks and their disposal. The team is available to assist agencies in the State of Vermont with explosive storage with some limitations.

The team is available to assist in the area of providing information on bomb threats, physical security measures, etc., within the area of responsibility.

If necessary, call the Senior Forensic Chemist at the Laboratory regarding any possible submissions.

FINGERPRINTS

Latent Fingerprints

When searching for latent fingerprints at crime scenes, personnel should concentrate recovery efforts on areas such as:

- X the point of entry
- X the object of attack
- X the path of contamination
- X the point of exit

The determination of whether to process an article of evidence for latent fingerprints at the crime scene or to package that article and transport it to the lab is somewhat dependent on the surface and/or the material the print is made up of, i.e., blood, dust. If it is a porous surface, the laboratory may be better equipped to process the article with chemicals or other methods. If the surface is smooth, the article may be processed at the scene using accepted fingerprint development and recovery methods.

Fingerprints recovered at the crime scene should be photographed with and without a scale and if possible, lifted. A sketch should also be made depicting the location and direction of any fingerprints developed.

Most of the latent fingerprint development techniques will involve the use of powders on non-porous surfaces such as glass, hard plastics, and metal. Items which are porous in nature such as paper, leather, Styrofoam or unfinished wood should be packaged and transported to the laboratory. Non-porous items that may be extremely vulnerable or immovable can be processed for latent impressions by super glue fuming, using a portable fuming wand or similar apparatus. The fixed latent print can then be recovered.

Build your own Portable Fuming Chamber

Items Needed:

- Clear plastic container with a snap tight lid.
- Hot plate, similar to a coffee warmer. (You will have to cut or drill a hole big enough to get the power cord through. This can be covered with tape or silicone.)
- Dowel supported the length of chamber using adhesive-back hooks (Command strips from 3-M for example) of varying sizes
- Baking style cooling rack or similar platform
- Small aluminum dishes to hold the glue
- Tube or bottle of super glue
- Cup/Container to hold warm water.

The above items can be purchased at your local department store for around \$50.00.

Caution - Heating the glue above 400 degrees F releases cyanide gas. Use warming plate with temperature control or make certain you can monitor the temperature by other means.

Fuming Procedure

- Place item to be fumed into the chamber. (Hang from hooks or wire, or place on rack)
- Place approximately 4 to 6 drops (or more depending upon the size of your container) of glue into a clean aluminum dish and place on the warming plate.
- Place a container of hot water into the chamber. (This provides needed moisture.)
- Place lid on the container.
- Plug in hot/warming plate and time the process.
- After fuming is completed, turn off hot/warming plate and allow it to cool.
- Bring chamber to area where there is plenty of fresh air and open the lid away from your face, allowing the fumes to dissipate.

The best way to determine the fuming time of your individual fuming chamber is to develop a test print. Lightly press your finger on the inside of the front wall of the chamber, or on a small piece of aluminum foil. (If necessary rub your finger over your face or nose prior to touching test surface area.) Fume the chamber and time how long it takes to develop the test fingerprint. This will give you a guide for the fuming time of your chamber. * Due to varying conditions a test print should be processed with the evidence. When the test print has developed, the fuming is complete.

Visible fingerprints in blood, grease, paint, etc. should not be dusted. Photograph these prints and deliver the item to the laboratory if possible.

When dusting for fingerprints, choose a fingerprint powder of a contrasting color to the surface being processed, i.e., chemist gray for dark colored surfaces, glass, mirrors, or chrome; black powder for light colored surfaces. Pour a small amount of powder onto a piece of paper to dip the brush. Do not dip the brush directly into

the fingerprint powder bottle as this may contaminate the bottle with debris.

Dip the brush into the powder and apply the brush to the object moving the brush in a rotary motion to pick up the circular patterns of the fingerprints. Do not use the side of the dusting brush as it may smear the latent print. Use only the end of the brush.

If a fingerprint is developed, dust the print in the direction of the ridge flow. This helps give the greatest amount of contrast between the latent and the background without destroying ridge detail.

Each latent fingerprint should be numbered and its location recorded. Photos **MUST** be taken with a scale card. Submit scale card with evidence so it may be used during the comparison. It is preferred that pens, pencils, coins or dollar bills are not used as scale items.

On the back of the lift card make a small drawing of the object, illustrating where the suspected latent was located on the object. This does two things:

- X It helps the latent examiner determine how the object was handled, and possibly which hand or even which finger touched the object.
- X This helps you as a memory aid later in court or any other time you may be required to explain where and how the latent was found.

The latent fingerprint should be lifted with transparent fingerprint tape and placed on contrasting background paper. **Use Caution** when lifting prints of interest, do not transfer your prints onto the edges of the lift tape. If this does occur, indicate on the lift card by placing an X over your prints along with your initials next to the X.

The date, case number, name of officer, lift direction, designated lift number, description and diagram should be placed on the lift.

Having another investigator witness the lift is recommended.

Objects to be collected and preserved must not be handled with bare fingers. Items can be picked up carefully with gloves but the items should be touched as little as possible. Avoiding bare fingers eliminates the possibility of leaving additional prints, while minimizing handling reduces the chance of wiping or smearing prints that may be present. If you think you may have left any of your own fingerprints on an item, you must submit to the laboratory a set of your fingerprints, (and palm prints if necessary) for comparison. Package and seal properly, with initials and date across the seal.

There are numerous ways to package items for safe transport to the lab. The method for packaging will depend on the size of the item of evidence. All items should be packaged so as to prevent smearing and contamination. All packages must be properly sealed, with initials and date across the seal. All items shall be properly identified with appropriate case data.

If you have any questions, do not hesitate to call the latent fingerprint section at 802-241-5281.

Tenprint Fingerprints

Fingerprints should be taken of all persons charged with crimes to establish their positive identity. Victim fingerprints, or the prints of anyone known to have access to the scene must be submitted to the laboratory for elimination purposes. **Exception:** when scene is a “public access” location, e.g., convenience store, school, etc.

X FD249 - red/white card

The following card must be used for purposes of employment, licensing, etc. Do not use FBI or DPS cards.

X FD 258 - Applicant cards (blue/white) All elimination cards will be on the FD 258 cards.

All fingerprint cards for either arrest or employment purposes must be sent to the Vermont Criminal Information Center (VCIC) at the Department of Public Safety in Waterbury.

Sign fingerprint cards legibly and fill in appropriate data. Submit to the lab as evidence, properly packaged and sealed with a DPS 305 form.

Major Case Prints

- FD 884 - red/white card - covers rolled impression, lower joint area and tips of the fingers, palms of hands.

Major case prints consist of recordings of all the friction ridge detail of the hands. Components of a complete set of major case prints:

- Full palm print
- Extreme side of palm
- Fingerprints, rolled nail to nail
- Tips of fingers
- Tips of fingers rolled nail to nail
- Joints
- Both sides of each finger and thumb

Clearly and completely recorded major case prints are utilized to conduct accurate and conclusive comparisons with all latent prints obtained during an investigation.

Clearly and completely recorded major case prints are, therefore, frequently needed to adequately compare all latent prints developed in a case. Latent impressions may be from friction ridge detail that is not recorded on the standard tenprint card.

The FD 884 (Red/White) Print Card covers rolled impressions to include the lower joint area of the fingers, tips of fingers, blade and palm of hand.

Contact the Fingerprint Section at the laboratory for further details on taking major case prints. Submit to the lab on DPS

305 form. ** Please include your telephone number on the form******

Tri-State AFIS

In late 1997 to early 1998, the Vermont Forensic Laboratory went on line with an automated fingerprint identification system (AFIS). The system, purchased from Printrak International, is shared by three New England states – New Hampshire, Maine and Vermont.

The Tri-State AFIS (TSA) combined database consists of millions of individual fingerprint impressions and is growing daily. Latent impressions received at the Vermont Forensic Laboratory or those developed on evidence submitted to the laboratory that have been deemed suitable for AFIS can be entered and searched against the TSA database. Prior to entry of a print into the AFIS database elimination comparisons will be conducted. Submit elimination print cards to the laboratory with the evidence, properly packaged and sealed.

Each latent impression searched against the TSA database will be assigned a TSA tracking number derived from the Vermont Forensic Laboratory log number given to that case upon receipt and is unique to that latent impression.

Unidentified latent impressions following TSA database searching can be added to the unidentified latent file contained in the AFIS system. Latent impressions stored in the Unidentified Latent File will be compared against all newly entered tenprint images added to the TSA system.

FIRE DEBRIS (ARSON)

Accelerants

The primary examination conducted on debris collected from fire scenes is the analysis at the laboratory for the presence of accelerants. These chemicals generally fall into two categories.

Petroleum Distillates (Most accelerants fall into this category.)

Evidence Packaging

An accelerant is defined as a substance that aids the intensity or spread of a fire. Suspected accelerants or debris should be collected by the investigator as soon as conditions at the fire scene permit. By their very nature, accelerants will tend to evaporate quickly; therefore, articles suspected of containing these chemicals must be placed in airtight containers as soon as possible.

X Metal Cans

A non-coated, ungreased, new metal paint can is the container to be used for fire debris. The investigator must bear in mind that the container must remain air tight and that many accelerants dissolve plastic and rubber.

If possible use metal cans supplied to VSP arson investigators which have a traceable lot number written on the bottom of the can.

If new metal cans from a different source such as a paint store are used please submit one blank can from the same batch to be checked for possible contamination.

Liquids can be sampled and placed in clean glass screw cap vials or brought to the lab in their original containers if they are not damaged and can be sealed.

Large fuel containers are difficult for the lab to process and if visible liquid in the container is present, a small portion of the liquid (1 or 2 ml) should be sampled into a clean screw cap vial or jar submitted for testing rather than the entire large container.

General Guidelines

When choosing a container suitable for arson evidence, choose one that will allow head space within the container, allowing the accelerant to evaporate. Containers should be no more than 2/3 full. It is from this head space that samples will be taken for analysis at the laboratory.

When placing fire debris into a metal paint; can please avoid allowing the sample to fall into the top groove where the lid seals. Material in this groove will allow the sample to leak out and possibly prevent the detection of an ignitable liquid.

The lid should be hammered shut being careful not to damage/distort the sealing lip of the can.

Samples of suspected ignitable liquids in fire debris should be submitted as soon as practical to prevent sample loss. The cans should not be stored in a hot location since increased temperature raises the rate at which volatile components evaporate.

If the evidence is soil, fill the can only ½ full. If possible, for each type of substance collect a control (*sample without the accelerant*) in a new metal can.

Microbes found in some soil samples can cause chemical breakdown of ignitable liquid materials and should be submitted the same day as taken from the scene. If immediate submission is not practical soil samples in cans should be stored in a freezer until delivery to the lab is possible.

NOTE – Fires causing injury, death, loss of property in excess of \$200.00, or fires of suspicious origin should be reported to the Vermont State Police fire investigators. They can be reached through your Local Vermont State Police station. See 20 V.S.A. §§2831-33.

The Vermont Forensic Laboratory currently does not test explosives. NO SUSPECTED EXPLOSIVE SPECIMENS should be submitted directly to the Laboratory, FBI or the BATFE. Contact your local barracks for an EOD Team Member for guidance.

FIREARMS

Firearm Safety

- Always handle all firearms as if they are loaded and keep them pointed in a safe direction.
- Keep fingers away from trigger at all times.
- Do not pick up a cocked or possibly loaded firearm by the trigger guard, even if other, safe methods of handling may smudge latent prints.
- Do not cycle ammunition through a firearm as a method of unloading. See below for unloading instructions.

Loaded Firearms

Under some extreme circumstances it may be necessary to submit a loaded, or questionable, firearm for examination.

- Prior to traveling to the lab with a loaded firearm, the submitting officer must call a firearm examiner, who will then decide on a case-by-case basis if the loaded firearm can be submitted.
- The firearm examiner will then make arrangements to be present to receive the firearm into the laboratory.

Again, if it is absolutely necessary to submit a loaded or questionable firearm, the officer must call to make an appointment with a firearm examiner before bringing the firearm to the laboratory.

Evidence Documentation

- Photograph the firearm as found at the crime scene and not its location in a sketch prior to collection.
- Be aware that the firearm may contain fingerprints. Therefore, careful handling is required and the firearm should only be handled on surfaces that would not normally yield fingerprints

such as checkered grips, edges of trigger guard, sling, or roughly machined surfaces.

- If a firearm is to be examined for fingerprints, it should be immobilized in a box to prevent the obliteration of latent prints. These firearms should be secured inside a cardboard box for transport.
- Be aware that the firearm may contain other trace evidence such as hair, blood and tissue.
- When collecting a firearm, note the following:
 - Position of the hammer.
 - Position of the safety.
 - Loaded/Unloaded
 - Slide position
 - Setting on scope
- All firearms should be tagged with an evidence tag including the case number, collection date and time, and collecting officer.
- **Never allow anything to be placed into the barrel or action of the firearm.**

Firearm Collection

If possible, all firearms should be unloaded at the crime scene.

- Firearms with removable magazine:
 - Remove the magazine. Do not remove cartridges from magazine.
 -
- Firearms with fixed magazine:
 - Remove ammunition from the chamber.
 - Remove ammunition from the magazine.
- Revolvers
 - Note the 12:00 position by drawing a line of permanent ink on each side of the top strap.
 - Open the cylinder.

- Secure the ammunition inside the cylinder, or remove the ammunition, record the location of each cartridge and seal each cartridge in a separate labeled container.
- For fixed cylinder revolvers, mark 12:00 and unload the cylinder as described above.

Black Powder weapons

- Removing percussion caps from a black powder firearm does not constitute a “safe” condition: Black powder is an **explosive**. If you must submit a black powder firearm with projectiles and propellant in place **you must call the firearms examiners and make arrangements prior to bringing the weapon to the laboratory.**

Other Evidence Collection

- Cartridge Cases and Bullets
 - Do not mark on the bullet in any way.
 - Place in individual envelopes, marked with identifying data and sealed.

Collection of Clothing for distance determinations:

- Use paper packaging
- Make sure clothing is dry
- Fold clothing neatly with clean paper between folds (Gunshot residue GSR is transient and is easily transferred)

About Firearms Identification

Firearms identification is the forensic science discipline that identifies a bullet, cartridge case or other ammunition component as having been fired by a particular firearm to the exclusion of all other firearms.

Conclusions

Examinations may positively conclude that the bullet or cartridge case was or was not fired by a particular firearm. Exams may also conclude that there are not sufficient individual microscopic marks of value on the bullet or cartridge case for identification purposes

or that the condition of the firearm precludes the possibility of making identification.

Types of Examinations

- X **Examinations of bullets** - Include the microscopic marks that are produced by the rifling in the barrel of the firearm. The diameter of the bullet and the marks left may aid in determining the caliber, manufacturer and model of the firearm and if the bullet had not been fired in a particular firearm. If there are sufficient individual microscopic marks of value on the bullet, it may be identified as having been fired from a particular firearm.

- X **Examinations on cartridge cases or shotshell casings** - Include the microscopic marks produced by the breech face, firing pin, chamber, extractor and ejector. These individual microscopic marks may identify the cartridge case or shotshell casing as having been fired in or loaded and ejected from a particular firearm. Aside from microscopic marks, cartridge cases found at the scene can determine caliber-type of firearm used and possibly the model of the firearm. Shotshell casings at the scene can tell the gauge of shotgun and possibly the original factory load of the shotshell.

- X **Examinations of shot pellets, buckshot or slugs** - Recovered from a victim or from a crime scene may identify the size of shot used. Examinations of slugs may identify the manufacturer and gauge of shotgun used.

- X **Examination of wadding** - Taken from the victim or from a crime scene may identify the manufacturer of the wadding and gauge of shotgun used. In some cases, such as with plastic wadding, a positive identification can be made to a particular firearm.

- X **Examinations of (Unfired) Cartridges or Shotshells** - Can determine the specific type of firearm for which the ammunition was intended. Examination may also identify whether the

ammunition was loaded into and/or extracted from a particular firearm.

- X **Distance determination from gunshot residues** - On evidence, such as clothing, can be conducted for muzzle-to-garment distance determination. Microscopic exams and chemical processing of the area surrounding the hole to produce patterns of gunshot residues are compared to test patterns that are shot using the suspect firearm and ammunition like that used in the crime. These tests can only be conducted if a suspect firearm is recovered, and the type of ammunition used is identified.

- X **Gunshot Residue Analysis (Primer Residues)**

Gunpowder and primer residues can be blown back in the direction of the shooter. As a result, traces of these residues can be deposited on the firing hand of the shooter.

There are limitations to this evidence. Primer residues are readily removed from hands by washing, rubbing, or wiping of the hands and therefore they remain on the hands for short periods of time.

Neither this lab nor the FBI Laboratory currently perform tests on gunshot primer residues. Some private labs, for a fee, can do this analysis. Contact the lab for further information.

Recommendation:

- X Only in rare cases is it appropriate to obtain GSR residue from hands.
- X Victims of gunshots can be expected to have GSR on their person if they were in the vicinity of a gunshot. Therefore, suicide, accident, and murder victims do not require collection for GSR.
- X *Sirchie* and other companies sell GSR collection kits.

- X **Shot Pattern Examinations** - Can be conducted for muzzle-to-garment distance determination if a suspect shotgun is recovered and type of ammunition (*shotshells*) used is identified.
- X **Trigger Pull Examinations** - Can be conducted to determine the amount of pressure necessary to fire a firearm.
- X **Alteration Examinations** - Can be conducted to determine if a firearm has been altered to fire in the automatic mode and if the firearm actually can fire in the automatic mode.
- X **Function Examinations** - Can be conducted to determine if a firearm is capable of firing as it was designed and if all safeties are properly operating.

Serial Number restorations – can be performed on a firearm to restore an identification number that has been ground off or obliterated.

- X Examinations can be conducted to determine if a firearm can be made to fire accidentally, that is, without pulling the trigger.
- X Gun parts can be examined to determine what type of firearm they belong to and whether or not they may belong to a particular firearm.

Disposal of Unlawful Firearms – See 20 V.S.A. §§ 2301-2306.

TOOLMARK IDENTIFICATION

Toolmark identification is a microscopic side-by-side comparison that attempts to link a particular tool with a particular mark to the exclusion of any other tool produced. Such a singular identification can be accomplished by comparing both class characteristics (*those marks left by a particular group of tools, such as a screwdriver blade that is one fourth of an inch wide*) and the unique microscopic marks that could only have been left by one individual tool and no other.

The term “tool” is used in a very broad sense. It could mean a screwdriver blade, vice grips, a knife or a pry tool. It could also be the comparison of a piece of paint on a tool with the surface upon which that tool was used. Further, it could be the comparison of two pieces of rubber that have been pulled apart from each other, as can happen in a car stripping operation. The tools that can be compared in these types of examinations are only limited by the imagination of the police officer or laboratory examiner.

Toolmark Examinations

Examination of the toolmark can determine:

- X Type of tool used (*class characteristics*).
- X Size of tool used (*class characteristics*).
- X Unusual features of tool (*class or individual characteristics*).
- X Action employed by the tool in its normal operation, and/or in its present condition.
- X Most importantly, if the toolmark is of value for identification.

Obtaining Evidence in Toolmark Cases

If possible, submit the actual tool marked area for direct comparison. Mikrosil is a casting material that has the ability to capture minute characteristics of tool marks to assist in the identification process. Mikrosil can be purchased through the Lynn Peavey Company at 1-800-255-6499 or www.lynnpeavey.com.

Photographs, although helpful in presenting the overall location of the mark, are of no value for identification purposes.

Do not forget to obtain samples of paint, safe insulation, and any other material likely to appear as foreign deposits on tools.

Do not place the tool against the toolmark for size evaluation to avoid contamination.

Types of Toolmark Examinations

X Fracture Matches

Fracture examinations are conducted to ascertain if a piece of material from an item such as a metal bolt, plastic automobile trim, knife, screwdriver, wood gunstock, rubber hose, etc., was or was not broken from a like damaged item available for comparison.

X Serial Number Restoration

Obliterated serial numbers on firearms and other items are often restorable.

X Locks and Keys

Locks and keys examination can be conducted to associate locks and keys with each other. Such associations are useful in establishing a conspiracy or link of commonality between or among individuals. It is often possible to illustrate this through their possession of keys which will operate a single, lockable instrumentality (*e.g., vehicle, safe house, padlock, etc.*). Laboratory examination of a lock can determine whether an attempt has been made to open a lock without the operating key.

Submitting Toolmark Evidence

Pack to preserve the evidence and prevent contamination. Pay particular attention to the part of the tool which could have made the mark.

Identify each item to facilitate court presentation. Consider the possibility that the object from which the specimen was cut may be needed in court.

Submit the tool rather than making test cuts or impressions in the field.

Conclusions

- X Examinations may positively conclude that a tool did or did not produce a toolmark. Exams may also conclude that there are not sufficient individual characteristics remaining within the toolmark to determine if the tool did or did not produce the questioned toolmark.
- X Class characteristics could not eliminate a particular tool and subsequently, the tool could have been used to produce a certain mark.

Mark ends of evidence which are or are not to be examined.

FOOTWEAR AND TIRE TRACKS

Photography

All too often photography is the only tool we have in recovering footwear and tire track evidence. This being the case there are a few simple steps or requirements that need to be followed.

- Camera position
- Reproducible scale
- Image/Negative ratio
- Oblique lighting
- B.L.H.

Camera position is extremely critical in properly documenting an impression; whether it is footwear, tire track, or a latent fingerprint. The camera should be at a ninety degree angle (90°) to the subject of the photograph. This means that the film plane (*or the flat back of the camera*) should be parallel to the ground or object containing the impression you are taking the photograph of.

By mounting your camera on a tripod or holding it at a 90° angle to your subject, you will take a photograph that can be enlarged back to life size or 1:1. This will enable the examiner to more accurately determine the size of the object making the impression.

Scale cards are the next crucial tool needed in the proper documentation of evidence of this type. Oftentimes photographs are taken using a pen or pencil or even money as a scale. This is not acceptable, nor usually reproducible, and lacks the professionalism we all strive for.

Most departments have their own scale cards available for their officers to use. If this is not the case, a standard 6 inch ruler can be used. Keep in mind that the scale card or ruler that you use must be submitted along with the photographs and negatives.

All forensic suppliers carry small plastic angular rulers which show both length and depth. This item is easily stored in the smallest of crime scene kits.

Image to negative ratio – Simply put, fill your entire frame (*or view screen*) with the object or impression you are photographing. By filling the entire frame of the film with your image it improves the detail and reproducibility of the object you photographed.

Oblique lighting (*Flash at an Angle*) – Many times footwear and tire tracks are deposited in a medium which is dark and lacks any discernable contrast. By using oblique lighting one can improve contrast by creating light and dark, or shadowy areas within the impression. Rule of thumb – Hold your flash at approximately a 45° and take a minimum of four photographs rotating your flash in a clockwise manner, i.e., 12:00, 3:00, 6:00, 9:00 o'clock.

Lastly the acronym **B.L.H.** (*Bracket Like Hell*) – When at the scene of a crime you may only have one opportunity to photograph impression evidence. With this in mind, you will realize how inexpensive film is when after getting your photographs back in several days you see that the two pictures you took of the evidence did not come out. BLH means take a myriad of photographs first using the normal operating settings on your camera. Then adjust the aperture to allow less light in and take additional photographs. Next move in the opposite direction letting more light in and repeat as above. Conversely, one can keep the amount of light constant and bracket the exposure time. Either way you are bracketing.

If these five steps are followed you have greatly improved your chances of recovering footwear and tire track evidence that can be used for identification.

Imprint and Impression Evidence

The terms “imprint” and “impression” have sometimes been misused interchangeably. While both are produced by a particular object coming in contact with a receiving surface, imprints and impressions are different. Generally, classification is according to the nature of the evidence, which falls into the following two categories.

X Residue Prints

Residue prints are two dimensional imprints found on hard flat surfaces. The imprint of an object (*e.g., shoe or tire*) is formed by residue deposited by the object itself or removal of residue from a particular surface. These residues may be visible or easily visualized by enhancement techniques. An exact imprint pattern of the object in question may be left behind after it has contacted a medium such as soil, grease, blood, or mud and may be either a positive or a negative image. Shoe imprint on window sills, and bloody fabric impressions are common examples of two-dimensional imprints.

X Impression Prints

These are three-dimension imprints or indentations which are produced when an object (*e.g., shoe, tire, or tools*) passes through a soft medium such as mud, wet sand, snow etc. When force is applied to these soft media, a detailed pattern of the object may be obtained.

Collection of Residue Imprint Evidence

X Movable or Removable Objects

It is preferable that the investigator obtain the entire object bearing the impression. If the article is small enough,

package the evidence in a manner to preserve the print intact. If the imprint is on a surface which can be cut out, remove the imprint area along with a small surrounding portion of the substrate. Package the portion of evidence to avoid damage to the imprint.

X Large Items or Immovable Evidence

Two dimensional imprint evidence is often deposited in or on surfaces which cannot be transported easily, e.g., footprints on permanent fixtures, footprints in dust. In addition, objects too large or cumbersome to move or any imprint where movement may result in the destruction of the evidence require an alternative method of evidence collection. In these situations, there is no alternative, but to use enhancement and lifting techniques in addition to photographic documentation. Several procedures have been used, depending on the nature of the imprint and substrate on which it is deposited.

The Vermont Forensic Laboratory has an Electrostatic Dust Print Lifter which has been used for collecting footprints in dust. For this or other alternative methods of collection, contact the Fingerprint Section at the Lab.

X Collection of Impression Evidence

It is imperative that proper photographs be taken BEFORE casting of impression evidence is undertaken.

The impression pattern itself must be recovered by making a positive image of the impression through dental stone casting material. This can yield both class and/or individual characteristics.

Dental stone is the preferred casting material for most impressions. Therefore, the recommended procedures covered below pertain to dental stone only. Please call the laboratory if you are attempting to cast an impression with other materials and are unsure of the exact procedure.

All times given in these instructions are approximate. Be aware that varying weather conditions may require times in excess of those given below.

Dental stone costs approximately one dollar per pound in twenty-five pound cartons. The materials needed for casting are:

Dental stone
Water
Container for mixing
Paint stirring stick or spatula

2.24 pounds (1 kg) of dental stone powder should be mixed with 14 ounces (400 ml) of water. A 12 oz soda can is a convenient measure for the water.

- X The area to be cast should be examined and large, loose articles of foreign matter should be carefully removed without disturbing the surface of the impression.
- X If the material to be cast is easily moved and damaged, such as sand or soil, it should be protected by spraying either lacquer or shellac onto a cardboard or paper held above the print at a 45 degree angle so the spray falls by gravity onto the print. **DO NOT spray directly into the impression area.** Approximately 15 minutes should be allowed for drying time.
- X Talcum powder should be sprinkled onto the print to facilitate separation of the dental stone from the impression upon completion. Alternatively, the print may be sprayed with silicone.
- X Dental stone is very strong and no form will be required if the area to be cast is relatively level. A physical barrier which will act as a dam may be required if the area is inclined. Commercially manufactured steel and aluminum frames are available for this purpose. However, any objects

that will restrict the flow of the liquid stone and confine it to the immediate area of the print will suffice if necessary.

- X The dental stone may be prepared several different ways. For a small area, the 2.24 pounds of stone powder may be pre-measured into a one-gallon plastic Ziplock bag. This pre-measured amount is the correct size for a single shoe print. For larger areas such as tire impressions, the dental stone should be prepared in a rubber mixing bowl or similar sized containers. A five pound coffee can makes a convenient disposable container for large areas.
- X Crush any lumps in the powder before mixing. Water should be mixed with the dental stone material to produce a mixture that has the consistency of pancake batter.
- X It is important that the casting material not be poured directly onto the pattern area. The dental stone should be poured (*uphill from the impression when possible*) by holding the bowl close to the print and deflecting the pouring liquid off of the stick or spatula just before the liquid reaches the impression. The dental stone should be poured until a depth of one-half inch is reached above the highest portion of the impression.
- X It is not practical to cast more than a two foot long section. Longer areas, such as tire tracks, should be cast in multiple sections.
- X After allowing the cast to dry for approximately 10 minutes, identification data is scratched into the top of the cast and it is then allowed to complete the drying process. After the cast has been allowed to dry for 30 minutes, it can be removed from the impression. No attempt should be made to clean the soil from the bottom of the cast at this time. Let air dry in a paper bag for approximately one day. Never place a fresh cast in a plastic bag or airtight container; the cast will retain moisture. After completely dry, the soil and debris may be removed carefully by using a soft brush. Efforts to remove soil prior to complete drying

may destroy the cast. The soil and debris which cling to a cast also makes an excellent known sample for soil comparisons on other evidence. Be sure to check the bag that the cast dried in, as soil will fall away from the cast as it dries.

- X There are special procedures for the casting of snow prints. Snow Print Wax is a method suitable for coating footwear impressions in snow. This product is a rust colored aerosol spray wax. First, the snow print is photographed since the application of the wax is a delicate procedure. Next, the wax is applied to the impression, forming a wax shell that preserves the detail of the footwear. The Snow Wax shell is then filled with cooled dental stone to provide support for lifting the fragile impression. The wax cast should not be touched as the detail can easily be destroyed or rubbed away. Hence, it is advantageous to photograph the finished product as soon as possible.

Dental Stone, Snow Print Wax and other casting supplies may be ordered from – Lightening Powder Co., Inc. 1-800-852-0300

Collection of Known Standards

X Shoes

Footwear to be compared to any impressions or imprints should be obtained as soon as possible to preclude additional wear markings from appearing on the shoes and possibly obliterating those already reproduced in the casting.

- X Standard inked imprints for laboratory comparison should not be collected in the field, but should be made at the laboratory after examination for other potentially important physical evidence is made. Under no circumstances should an item of footwear be placed directly into an impression.
- X These items should be packaged in paper wrapping or paper bags to prevent the possible loss of trace materials which may be present.

X Tires

In the case of tires, the original impression was made with the weight of the vehicle bearing upon the tire. Thus, the investigator must duplicate this condition when making the known standard for comparison purposes. The following procedure is recommended:

- X Check the tires for the presence of any significant trace materials such as blood, soil or fibers and remove these items prior to collecting imprint standards.
- X Jack the vehicle up so that the questioned tire clears the ground.
- X Ink the entire tread circumference of the tire with fingerprint ink. (Vegetable shortening can be used instead of ink. Use rubber gloves and apply with hands (tends to cover more completely than ink). Roll tires on paper. Then apply magna powder to the grease print on the paper. This technique reveals better detail in some cases, without any missed areas as sometimes occurs with ink and roller.)
- X Place approximately 10 feet of wrapping paper under the tire.
- X Lower the vehicle onto the paper and slowly drive it along the paper until the tire has completed one revolution.
- X Place identifying data on the paper, including which tire made the mark (*position on the vehicle*), which side of the tire mark was facing inboard or outboard of the vehicle.
- X Repeat the entire process until all tires on the vehicle have been completed.
- X It is necessary to submit the known standards to the laboratory along with the cast or photographs of the tire impression. The submission of the actual tire, in most cases, is not necessary.

GLASS

High Velocity Fracture

High velocity impact fractures and perforations are usually characteristic of the projectile being propelled by a means other than “arm thrown,” namely, a bullet from a firearm, a rock from a slingshot, a BB from an air gun and the like. These fractures and/or perforations typically produce an individual hole with small and limited radial fractures. They resemble a “cone,” with a greater amount of glass absent on the opposite side of the impact.

Low Velocity Fracture

Low velocity impacts are characterized by an increased number of well developed radial fractures, usually accompanied by concentric fractures surrounding the point of impact.

Fracture Matches

Large pieces of glass, recovered from different locations, allow the possibility of a fitted fracture match.

Submission of Glass

Glass specimens, depending on their size, should be properly preserved. Large sheets or containers should be packaged in hard, sturdy, shock absorbing containers.

Smaller particles travel well in 35 mm film canisters. All specimens should be sealed and known and questioned specimens should be isolated from each other to prevent cross-contamination in the case of damage and leakage during shipment.

The omni directional nature of breaking glass serves law enforcement by typically transferring glass particles from the window to the suspect’s hair and/or clothing and, subsequently, to the soles of his/her shoes. Particles may also become embedded in the object used to break the glass. Accordingly, the proper

preservation and examination of these specimens may associate a suspect with the crime scene long after they have departed.

HAIR AND FIBERS

Hair and fibers have an excellent potential to link an individual to a scene. The primary problem with this type of evidence is to find it. Hair and/or fibers found on the victim or victim's clothing can be compared to standards obtained from the suspect and victim to see if any hair or fibers found are foreign to the victim and could have come from the suspect. In addition, examination of the suspect for such traces may discover hair or fibers belonging to the victim.

Hairs and fibers can often indicate the following:

- X Origin (*human, head, body, pubic, animal, clothing*)
- X Identify (*sex, race – a broad grouping*)
- X Individual identity – Comparison of known standards of hair of victim with hair of defendant, comparison of fibers from clothing of a victim (*or found at scene*) with material found on suspect.
- X Hair/Fiber evidence can be picked up using a clean pair of forceps or tweezers. Pinching too hard can damage or separate the item - take care to handle gently.
- X Each group of hair/fiber evidence items should be packaged separately (*placed into a druggist fold*). The package then should be sealed and labeled properly.
- X Exercise care in collection so as not to damage any hair root tissue present.
- X Hairs/Fibers mixed with blood, tissue or other body fluids should be treated with care. Each item should be placed in a clean container that is then sealed and labeled properly.
- X If hairs/fibers are mixed with wet body fluids, they must be dried thoroughly prior to submission.

Hair and fiber comparisons do not provide absolute personal or positive identification, but good circumstantial evidence. Hairs containing root tissue can be used for DNA analysis. Hairs that

don't contain root tissue may be used for DNA analysis in some instances. Call the Laboratory for consultation.

Collection of Hair Standards

Known hair samples should consist of at least 25 pulled and 25 combed hairs from all areas of the head and/or the pubic region. The pulled hairs should be complete hairs, including a root, and should be pulled with the fingers (wear protective gloves).

Tweezers should not be used as this can contribute to pinching and breaking of the hair shaft. Known hair samples should never be cut as the root portion of the hair is an important area of examination. If the individual's hairs are extremely short ($<1/4$ "), the area may be taped and the hair removed using the tape lift method. We realize that it may be difficult to obtain 25 combed hairs from the head of some individuals but an attempt should be made to obtain combed hair samples, 25 being the desired number for analysis. The hair examination does not occur at the Vermont Forensic Laboratory. It must be sent to the F.B.I. The case officer or agency is responsible for forwarding this evidence, not the Vermont Forensic Laboratory.

Hair standards are most useful when collected closely in time to the incident. If collected too far after (or before) there may be differences in the hair that would keep the most/best information from being known. Example: if someone dyed their hair and hair collections were made a year later the dyed hair may not be present, hair cut etc.

Hair examinations do not occur at the Vermont Forensic Laboratory. They must be sent to the FBI by the officer/agency.

Head Hairs

Pull five hairs from each of the following areas, then comb five hairs from each area:

- front of head
- top of head
- back of head
- left side of head

- right side of head

Total of 25 pulled head hairs and 25 combed head hairs, grand total of 50 known head hair samples.

Pubic Hairs

- Pull 25 pubic hairs, then comb 25 pubic hairs, grand total of 50 known pubic hair samples.

Packaging

- Place hairs in a druggist fold. Package the 25 pulled head hairs in a fold and the 25 combed head hairs in a separate fold. Package the folds in an evidence envelope. Place the 25 pulled pubic hairs in a fold and the 25 combed pubic hairs in separate fold and package them in another evidence envelope. Please ensure that each fold and each envelope is properly labeled indicating what the contents of each are.
- It is important to not get hairs within the folds of the paper. Folding the hairs will damage them.

Collection of Fiber Standards

Collect the entire garment or other cloth item, if possible. If not possible, snip a representative sample of all fiber types if item has more than one then package and seal.

HANDWRITING AND DOCUMENTS

The questioned document field includes examinations of handwriting, hand printing, typewriting, mechanical impressions, such as, check writer imprints, embossed seals, rubber stamps, printed matter, photocopies, paper, altered documents, obliterated writing, indented writing, charred documents, plastic bags and others. You may want to consider having documentary evidence processed for latent fingerprints. Document examinations should be done before fingerprint processing because chemicals may preclude some document examinations.

Evidence Handling

Documentary evidence should be preserved in the same condition it was found. It should not be folded, torn, marked, soiled,

stamped, written on or handled unnecessarily. **Avoid writing on the envelope or filling out forms while the questioned document is in the envelope.**

Original Evidence or Copy

It is always best to send the original evidence to the lab. Many kinds of examinations, mechanical impressions and indented writing for example, can only be done with the original evidence. The lack of detail in copies makes other examinations such as handwritten and typewriting difficult, although photographs are better than photocopies. Sometimes, however, a copy is the best available evidence. In these cases, copies should be submitted for examination. Also, copies are normally sufficient for reference file searches.

Obtain Known Writing

Handwriting identification depends on the quality of the known writing. Handwriting examination begins with the investigator and results obtained depend on how well the investigator does the job in obtaining handwriting from suspects (*known writing*) for comparison with questioned (*disputed*) writing.

X **Questioned and Known Specimens Must be Comparable** – A's cannot be compared with G's – "John Jones" cannot be compared with "Samuel Hansen" – The J's must be compared with J's and the ohn's with ohn's. Handwriting cannot be compared with hand printing.

X Approximate the Questioned Writing Conditions

- X If handwritten – get handwritten known.
- X If upper-case hand printing – get upper-case printing.
- X If written in pencil – get known writing in pencil.
- X If ball-point pen ink – get known with ball-point pen.
- X If writing is on a check – get known writing on checks.
- X If writing is on ruled paper – get known writing on ruled paper.

X If a forgery – get copy of authentic signature.

Duplicate the wording, the writing instrument, and the space on the paper available for writing.

X Known Specimens must be Adequate

In obtaining a **dictated** known writing, get a sufficient quantity for the document examiner to study the normal variations in that person's writing. Get several specimens for each questioned document. **Do not let the suspect see previous specimen.** – Remove from sight. **Do not let the suspect copy questioned writing.** – Dictate the wording to the suspect.

In obtaining **undictated** known writing, get business papers, letters, checks, applications, etc., containing the same names, words, letter combinations and letters as the questioned writing.

Study the questioned material. – Be prepared before interview with suspect.

PAINT

Automobile Paints

It is possible to establish the color, year, and make of an automobile from a paint chip by use of the National Automotive Paint File which contains original paint systems representing paints used on all makes of American cars, light, medium, and heavy trucks, vans, and many popular imported cars.

Paint fragments are often found in the clothing of a hit-and-run victim. Therefore, the victim's clothing should be obtained and submitted to the Laboratory whenever possible.

X Paints may be transferred from one car to another, from car to object, or from object to car during an accident or the commission of a crime.

Non-Automobile Paints

Paints on safes, vaults, windowsills, door frames, etc., may be transferred to the tools used to open them. Therefore, a comparison can be made between the paint on an object and the paint on a tool.

Collection

If paint samples are to be obtained from any painted surface, if possible, chip the paint from the surface down to the foundation/substrate rather than scrape it off. When paint is chipped off a surface, its layer structure is intact. Each layer is a point of identification. It is better to have multiple layers of paint on a questioned and known specimen rather than only the top layer in the known specimen for comparison/identification purposes.

Be extremely careful in obtaining, packing and marking small paint chips and other small particles of evidence.

Submit paint chips in druggist fold placed in an envelope.

Note: Always collect a “known” standard paint sample from both the suspect and victims vehicles in automobile cases. The “known” paint sample shall be taken from an undamaged area, but as close as possible to the damaged area of the vehicle. Repair and/or repainting might have been done on vehicles which can give a compositional change to the paint. The Vermont Forensic Laboratory no longer examines paint samples. All paint sample cases will have to be submitted to another laboratory, FBI or another private laboratory for analysis.

PHOTOGRAPHY

Photographing the Crime Scene (or Accident Scene)

An investigator should not disturb the scene or any objects at the scene prior to photographing. To show the scene in its original

condition it must be kept that way until photographs have been taken.

Crime scene photography provides a permanent record of the facts at the crime scene. Photography is one means of recording facts for future use so that they can be used in reconstructing the crime scene – and sometimes the crime – but photography is not a substitute for field notes, accurate measurements, and sketches of the scene. Photographs supplement the other forms for recording the facts of a crime scene, and they are often the best way of recording and illustrating the details of a crime scene and its evidence. Sometimes, indeed, they are the only feasible means of recording and illustrating certain features of a crime and the scene.

Photographing a crime scene serves the following purposes. It provides a pictorial representation of the appearance and position of objects at the scene, and it serves as evidence to support the testimony of the investigator as to what he found at the scene, its location, nature and condition.

In general, the subject matter of crime scene photography should move from the general to the specific. Long range views should tell a story of what happened at the crime scene and serve as a backdrop to locate the subjects of close up photographs of items of physical evidence. The long range photos may show the locale, the approach route, the means of ingress to the scene or its premises. Midrange photographs pinpoint a specific object of evidence or a significant segment of the crime scene. Close up photographs are used for recording evidence in position and detail – the location, nature and condition.

Vermont Forensic Laboratory Guidelines for Image Capturing and Storage of Image Files

Digitally captured images are becoming a widely accepted economical and convenient alternative to traditional film. As more agencies are turning to this technology, the Vermont Forensic Laboratory has some helpful suggestions to answer questions with this technology. Remember, photographs may be viewed as

evidence. The proper handling of the captured images is imperative in maintaining the integrity of the evidence.

Follow the suggestions below for image handling to minimize future problems.

Resolution

Image resolution of a digital camera should be carefully considered to meet the needs of the application. Certain uses of an image may have resolution requirements for digital images if the images are to be submitted to a forensic discipline for analysis. Image resolution is usually discussed in terms of PPI (pixels per inch). For example, the capturing of fingerprints found at a crime scene will require a higher resolution (1000 ppi) of the final image used in comparison as opposed to general scene documentation, which may not have requirements. It is always good to have too much digital information than too little. Your final image resolution may be decreased when/if there is further development at a later date in an image application. The objective with resolution is to maximize the quality of your final image.

Image Capture

To achieve the best resolution, fill as much of the frame with the item as possible if taking fingerprint or other impression type evidence.

As you would for any photographic process, include case information in all photos and a scale when appropriate.

Capture your image in an appropriate format (refer to device manual for changing instructions) to maximize your need for resolution with storage capacity of media.

Example - For any analysis, the .tif file format on the camera is a universal format and will provide a complete transfer (pixel for pixel) of an image and will maximize your ppi (resolution) of your image. Taking an image in other formats, i.e., jpg, may decrease resolution, but the trade-off is the storage media will carry more

images. JPEG format is fine for documentation purposes but if analysis needs to be done, stay with the .tif format. Also be aware that some file formats need proprietary software to open the file i.e., RAW format. **Reminder** - Any loss of information could jeopardize casework if analysis is to be done.

Do not delete any images from your camera. This may cause conflict of information embedded in the files from your camera. Sequential order may be disrupted with file naming on the card and may cause some numerical discrepancies. Any missing number in series may give the appearance of deletion of files (destruction of potential evidence) even if they were unintentional photos.

Storing and Saving Digital Images

Treat your digital information card as if it is evidence and all activity should be reflected on chain of custody and worksheets if needed.

Once you have captured your images, they should be written directly from the capture disk to a non-rewritable CD disk if possible. Look at this CD as your negative from this point onward. This will alleviate any potential handling questions about residential hard drive/access issues/data loss and alteration. Multiple session downloads to one disc are okay but **put only one case on a disc**.

Once transfer is complete, the camera storage device can be used again.

If for any reason a direct transfer from media card to CD cannot be done, follow these suggestions:

- Immediately transfer the images to a designated computer hard drive (preferably independent of a network) and write them immediately to a non-rewritable CD in a .tiff image format.
- Identify the CD disk with the incident number, any appropriate identifies along with the date and your initials. The files on the

hard drive must then be erased. No alterations of the image should be made of the image on the hard drive or in the camera.

Archiving

This non re-writable CD containing the original images must be archived and handled like other evidence gathered by the examiner. (This will act in the same capacity as a negative.)

The person responsible for the image transfer will be responsible for confirming that all files are completely and accurately transferred. Compare the name, date and file size for all images. A successful transfer will have all of these factors the same as the information on the camera storage device.

Image Development i.e., image application work

Further image analysis or development using an image application should be performed on files created from the original CD, developed and then saved. These altered files are then saved as a “copy” (Example - file:name-copy.tiff)

Additional CDs can be created by copying the original file CD and use for any other use but label all CD copies as such (file name and written CD title) as “COPY”. Confirm that image transfer is complete.

Record any function/task of the image application in notes or worksheet so it can be reviewed/duplicated.

Camera/Card Maintenance

The files on the camera memory card must then be deleted (perform card reformat in the camera). Card is ready for next use.

No permanent files can be stored on the camera memory card.

These suggestions are to help your agency in developing SOPs and are not intended as a comprehensive substitution. Use any part you want but the main thing is to value a digital file the same way you would an item of physical evidence. Maintain chain of custody and archive the original digital files so at any point the original can be reviewed.

Film – The lab will process any canister or roll of film marked c-41 processing.

Prints – The lab can provide prints in the following sizes:

Contact Sheets

5" x 7"

8" x 12"

The lab recommends the contact sheet for economy purposes. If however, larger prints are required for trial or other purposes, one can submit a request for enlargements on a DPS 306 Form.

NOTE – The Vermont State Police and the Department of Fish and Wildlife should refer to their policy on photography for further information.

Photo Processing Prices

Film processed - no prints	\$2.00
Film processed - contact sheet	\$0.50

matte or glossy finish

5 x 7 prints	\$3.00 each print
8 x 12 prints	\$5.00 each print

Call the photo laboratory, 802-241-5283 for more information.

Other Photography Services

The lab can provide the following additional services on a limited basis:

X slide work - slides to photos or CD

- X digital images from video
- X consultation on photo problems

Note – Rolls of film submitted to the lab normally do not require a 305 form. Film mailed to the lab does not require certified mailing. Film seized as evidence will be submitted with a 305 form.

SOIL

Soil is generally found on shoes or clothing or on other objects associated with a criminal suspect. It is generally recommended that articles bearing soil evidence be submitted directly to the lab.

Soil Samples

Known specimens of soil should be collected from the crime scene and the area of the crime generally.

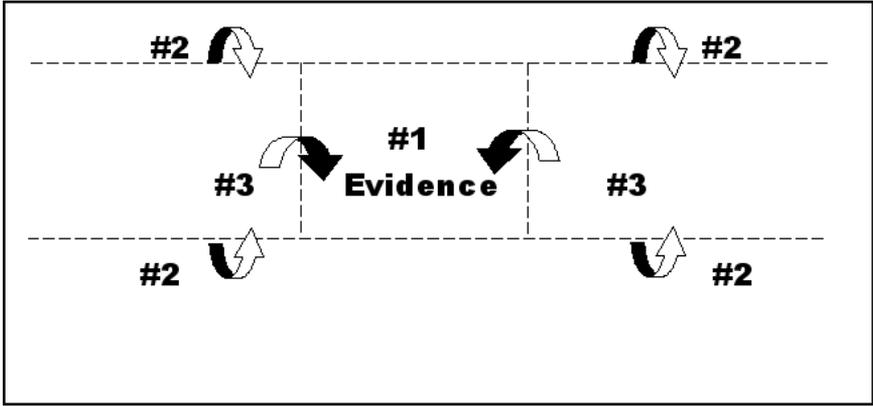
Soil samples, enough to fill a 35 mm film canister, are adequate. The soil must be air dried at room temperature prior to packaging, sealing and delivery to the lab.

DRUGGIST FOLD

Small or “trace” evidence should be packaged in a druggist fold and then placed in a sealed envelope for proper labeling and additional protection.

Directions – Using a sheet of paper:

- X Place the article of evidence in the center of the paper.
- X Fold the paper lengthwise twice in parallel folds so that the flaps overlap.
- X Fold over ends tucking the smaller end inside the larger end.
- X Place the resultant packet in a conventional envelope and seal.



A

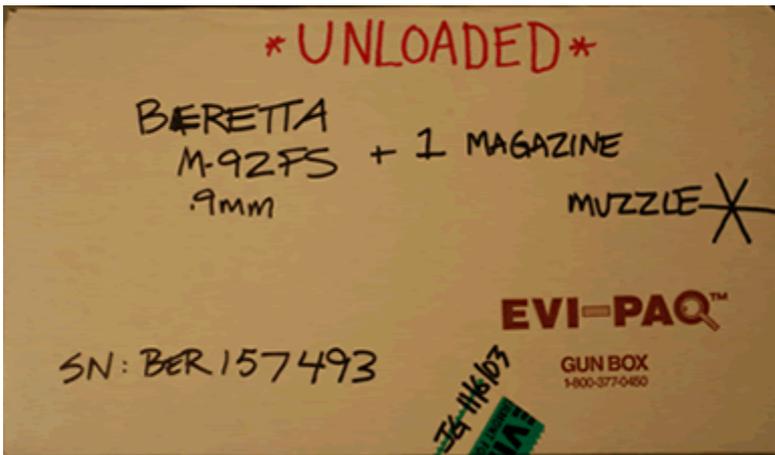
D	<p>HAIR SAMPLE</p> <p>Name _____</p> <p>R Side, L Side, Front, Top, Rear</p> <p>Date _____ Time _____</p> <p>Case # _____</p> <p>Taken By _____</p>	C
----------	--	----------

B

FIREARM EVIDENCE



Secure the firearm in the box making sure the firearm is unloaded.



External package markings should include:

- Content of the box
- Direction of the muzzle
- Make, model, serial number (if available)
- Note that the weapon is **unloaded**.

FIREARM SUBMISSION



Case #



Muzzle Direction



Serial #



Make and Model



DRUG EVIDENCE

Drug submissions should be packaged in clear evidence bags - **this saves time.**



Do not send these types of items - they take up valuable space.



DRUG EVIDENCE

Indicate the number of items submitted in the evidence bag. Make the evidence visible through the packaging.



vs



Good = 1 large bag containing 31 individually packaged plant tops.

Bad = 1 large box containing 31 individually packaged plant tops.

Remember -

- 31 plant tops - **maximum**
- Package plant tops individually (number bags sequentially 1-# #)
- Marijuana **must be dry**
- Avoid stapling evidence bags closed
- Extraneous packaging is not acceptable (i.e., jars, containers, etc.)

SUBMITTING FINGERPRINT EVIDENCE

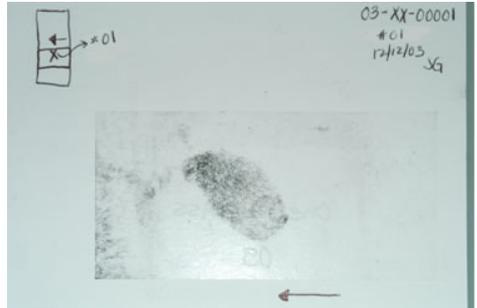
PROCESSED

LATENT LIFT CARD

Incident # 03-XX-00001
Item # 01
Date: 12-12-03
Lifted By: J. GALLE
Location: RM 347A

Lifted from: one (1) GLASS

Type of Crime: 05



Please indicate on the lift card the following:

- Sketch of the object and the location of the lift
- Time and date recovered and the case number.
- Direction of the print relative to the object.

UNPROCESSED



Package the evidence in paper - avoid unnecessary contact of object and packaging.

SEROLOGY EVIDENCE

Sexual Assault

- Oral swabs and blood standards must have the suspect's name and case number clearly marked on the external packaging, swab packets and/or blood tubes.



Sexual assault kits should be mailed or hand delivered within 48 hours of collection for the best DNA results.

- **The sexual assault kit is the most critical piece of evidence.** If seminal fluid is recovered from the kit there may be no need for further evidence submissions, i.e., blankets, towels, etc.
- **Clearly describe the case history on the 305 form:**
 - Victim and suspect
 - Nature of their contact and incident
 - Time of their contact relative to the collection of evidence
- **Package and label the victim's and suspect's evidence separately.**

PLEASE NOTE - We **do not** accept blood alcohol kits or date rape panels.

ALWAYS WEAR GLOVES

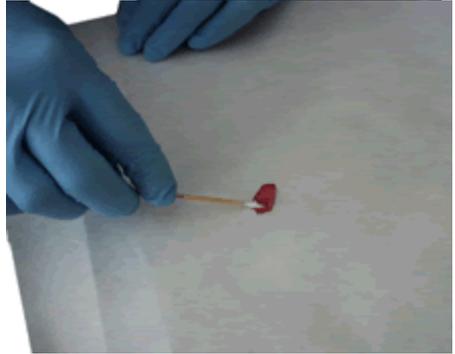
SEROLOGY/DNA

Blood Collection

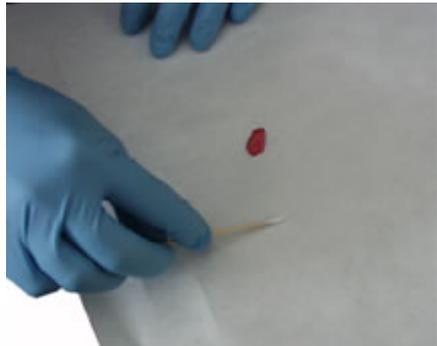
- Use **water** on a sterile swab (see the Vermont Forensic Lab for swabs)



- Rub the area of **blood** until visible on the swab.



- Also collect a swab from the same surface **without blood** for a control.

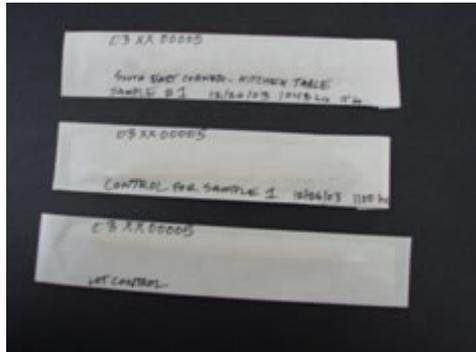


DNA evidence for serology should be dry at the time of submission to the laboratory.

ALWAYS WEAR GLOVES

SEROLOGY/DNA

- Package serology evidence in paper to prevent degradation of the DNA evidence.
- **Keep evidence refrigerated.**

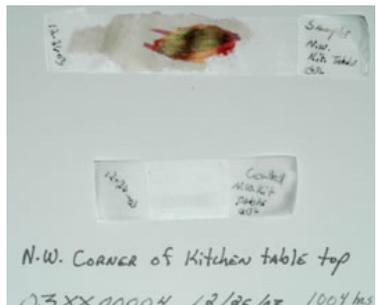
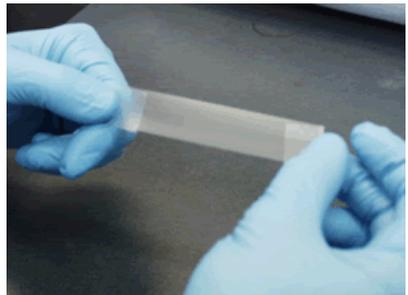
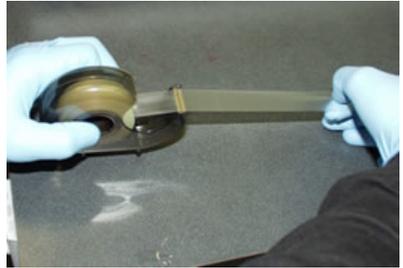


ALWAYS WEAR GLOVES

BLOOD COLLECTION

Blood can be lifted off hard surfaces with tape as well.

- Pull a long section of tape away and discard to ensure the tape used has no contaminants.
- Fold the ends in to give yourself a non-sticky surface to work with.
- Place the sticky side on **blood sample** and rub tape - press the tape down rubbing it against the blood sample using a gloved hand to avoid contamination.
- When complete, place the sample, sticky side down on an index card of paper **plus a control**.
- Record the case number and case information on an index card.



ALWAYS WEAR GLOVES

VENDORS - EVIDENCE COLLECTION SUPPLIES

There are several companies that sell products used in the collection of evidence. A few are listed below. To obtain their catalogues, call the 800 number and ask for one.

- | | |
|-------------------------------|----------------|
| X Lynn Peavey Company | 1-800-255-6499 |
| X Sirchie | 1-800-356-7311 |
| X Evident | 1-800-576-7606 |
| X Lightening Powder Co., Inc. | 1-800-852-0300 |

ACKNOWLEDGEMENTS

Handbook of Forensic Science, Federal Bureau of Investigation, June 1994.

Maine State Police – Physical Evidence Handbook, 1994.

Weston and Wells, "Criminal Investigation", Sixth Edition, Prentice-Hall, 1994.

Lee, Henry, "Physical Evidence", Magnani & McCormick.

Saferstein, Richard, "Criminalistics", 4th Edition, Regents/Prentice Hall, 1990.

Crime Scene Investigation: Suggested Practices for Scene Management, 1999, U.S. Department of Justice, National Institute of Justice.

METRIC CONVERSION

LENGTH MEASURE

1 inch	=	25.4 mm (millimeters)
		2.54 cm (centimeters)
1 foot	=	0.3048 m (meter)
1 yard	=	0.9144 m
1 mile	≈	1.609 km (kilometers)

AREA MEASURE

1 square inch	≈	6.452 cm ² (square centimeters)
1 square foot	≈	9.29 dm ² (square decimeters)
1 square yard	≈	0.836 m ² (square meter)
1 acre	≈	0.4047 ha (hectare)
1 square mile	≈	2.59 km ² (square kilometers)

VOLUME MEASURE

1 ounce, fluid	≈	29.57 ml (milliliters)
		29.57 cm ³ (cubic centimeters)
1 quart, liquid	≈	0.9464 L (liter)
1 gallon	≈	3.785 L
1 quart, dry	≈	1.101 L
1 bushel	≈	35.24 dm ³ (cubic decimeter)
1 cubic inch	≈	16.39 cm ³
1 cubic foot	≈	28.32 dm ³
1 cubic yard	≈	0.7647 m ³ (cubic meter)

MASS MEASURE

1 grain	≈	64.8 mg (milligrams)
1 ounce, advp.	≈	28.35 g (grams)
1 pound, advp.	≈	0.4536 kg (kilograms)
1 ton, short	≈	0.907 t (tonne, metric ton)

≈ indicates approximate value

To convert from an inch-pound to a metric unit, multiply by the conversion factor.

To convert from a metric to an inch-pound unit, divide by the conversion factor.