Crime Scene Investigation: A Guide for Law Enforcement

Written and Approved by the Technical Working Group on Crime Scene Investigation

January 2000
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Actions taken at the outset of an investigation at a crime scene can play a pivotal role in the resolution of a case. Careful, thorough investigation is key to ensure that potential physical evidence is not tainted or destroyed or potential witnesses overlooked.

While many agencies have programs in crime scene processing, the level of training and resources available varies from jurisdiction to jurisdiction, as does the opportunity to practice actual investigation. To help these agencies, the National Institute of Justice supported the development of this guide.

I commend the hard work of the 44 members of the technical working group that created this guide. They are representative of law enforcement, the prosecution, the defense, and forensic science, and their collective expert knowledge, experience, and dedication to the task made this effort a success.

The guide is one method of promoting quality crime scene investigation. The type and scope of a crime scene investigation will vary from case to case. Jurisdictions will want to carefully consider the procedures in this guide and their applicability to local agencies and circumstances.

Janet Reno
Attorney General
The Technical Working Group on Crime Scene Investigation (TWGCSI) is a multidisciplinary group of content-area experts from across the United States, from both urban and rural jurisdictions, each representing his or her respective agency or practice. Each of these individuals is experienced in the area of crime scene investigation and evidence collection in the criminal justice system from the standpoints of law enforcement, prosecution, defense, or forensic science.

At the outset of the TWGCSI effort, the National Institute of Justice (NIJ) created a planning panel—composed of distinguished law enforcement, legal, and science professionals—to define needs, to develop initial strategies, and to steer the larger group. Additional members of the technical working group were then selected from recommendations solicited from the planning panel, NIJ’s regional National Law Enforcement and Corrections Technology Centers, and national organizations including the American Academy of Forensic Science, National District Attorneys Association, National Association of Criminal Defense Lawyers, National Legal Aid and Defender Association, International Association of Chiefs of Police, National Sheriffs’ Association, International Association for Identification, and the American Association of Crime Laboratory Directors/Laboratory Accreditation Board.

Collectively, over a 1-year period, the 44 members of TWGCSI listed below worked together to develop this guide, *Crime Scene Investigation: A Guide for Law Enforcement*.

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Acknowledgments

The National Institute of Justice (NIJ) wishes to thank the Technical Working Group on Crime Scene Investigation (TWGCSI) for their dedication and endurance. This 44-member network of experts from a variety of backgrounds gave their time to draft and review the guide, providing feedback from all areas of the Nation. The true strength of this document is derived from the commitment of the TWG members to produce a guide that could be implemented across the country, from small, rural townships to large, metropolitan areas. In addition, the agencies and organizations that employ each member of the group share in this endeavor. Through their support, each member was given the flexibility needed to complete the project.

NIJ also wishes to thank Attorney General Janet Reno, whose support and commitment to the improvement of the criminal justice system made this work possible. In addition, appreciation is extended to David G. Boyd, Director of NIJ’s Office of Science and Technology, and to Richard M. Rau, Ph.D., the NIJ Project Monitor, for his unwavering support of, and guidance through, the process and production of this guide.

NIJ would like to thank all the individuals from various national organizations who responded to the request for nominations of experts with a wide expanse of knowledge and experience in the field of crime scene investigation. It was from their recommendations that the members were selected. In particular, thanks to Jim Polley from the National District Attorneys Association, Dan Rosenblatt from the International Association of Chiefs of Police, Stuart Statler from the National Association of Criminal Defense Lawyers, Clinton Lyons from the National Legal Aid and Defender Association, Aldine N. “Bubby” Moser, Jr., from the National Sheriffs’ Association, and Ronald C. Jackson from the International Association for Identification. NIJ would also like to thank Mike Grossman, Director of NIJ’s Technology Assistance Division, for his nominations of law enforcement candidates and his help in obtaining
recommendations from NIJ’s regional National Law Enforcement and Corrections Technology Centers (NLECTC), as well as the directors of those centers: James A. Keller, Robert Pentz, Chris Aldridge, John Ritz, Thomas Sexton, and Tom Burgoyne. NIJ would also like to thank the more than 120 individuals and organizations who were sent a copy of the draft guide for review and comment.

NIJ thanks CSR, Incorporated—particularly Tammy Kilgore, Terrylynn Pearlman, and Stephanie Tiller—for their support in arranging all of the meetings necessary to develop this guide. In addition, special thanks are extended to Aspen Systems Corporation and its editors who participated: Michele Coppola, Gayle Garmise, Rita Premo, and Jackie Siegel.

NIJ would like to express appreciation for the input Chris Asplen, Janice Munsterman, Karl Bickel, Luke Galant, and Lisa Kaas gave the meetings and the document and for the administrative support provided by Celeste Descoteaux, Todd Spires, and Heidi Prue.

Special thanks to Lisa Forman, Carole Chaske, and Kathleen Higgins for their contributions to the TWG and especially their tireless patience.

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This guide is intended for use by law enforcement and other responders who have responsibility for protecting crime scenes, preserving physical evidence, and collecting and submitting the evidence for scientific examination. Physical evidence has the potential to play a critical role in the overall investigation and resolution of a suspected criminal act. Realization of this potential depends on actions taken early in the criminal investigation at the crime scene. Developments in technology and improvements in the analysis and interpretation of physical evidence recovered from crime scenes will place even greater importance on properly documented and preserved evidence. An important factor influencing the ultimate legal significance of this scientific evidence is that investigators follow an objective, thorough, and thoughtful approach. The goal of this process is to recognize and preserve physical evidence that will yield reliable information to aid in the investigation.

Investigators should approach the crime scene investigation as if it will be their only opportunity to preserve and recover these physical clues. They should consider other case information or statements from witnesses or suspects carefully in their objective assessment of the scene. Investigations may change course a number of times during such an inquiry and physical clues, initially thought irrelevant, may become crucial to a successful resolution of the case.

It is recognized that all crime scenes are unique. The judgment of the investigator on the scene, with the assistance of other responders, such as the prosecutor, should be given deference in the implementation of this guide. It is impossible to propose a single, step-by-step procedure to approach every type of situation. There are, however, fundamental principles of investigating a crime scene and preserving evidence that
should be practiced in every case. This document is not intended as a comprehensive or rigid scheme of activities, but as a guide for law enforcement, while recognizing the authority of Federal and State statutes, case law, and local policies and procedures.

Although the development of a guide for crime scene investigation is instructive in addressing issues surrounding the management of crime scenes, the Technical Working Group on Crime Scene Investigation (TWGCSI) recognizes that local logistical and legal conditions may dictate the use of alternative procedures. Further, crime scene investigation procedures that differ from the practices in this guide may not necessarily invalidate or detract from the evidence in a particular case.

The authors encourage crime scene personnel to develop and continually update their knowledge, skills, and abilities with respect to the processing of a crime scene through training. In fact, successful implementation of this guide can be realized only if staff possess basic (and in some cases advanced) training in the fundamentals of investigating a crime scene. However, this document does not address the mechanics of evidence collection or the training requirements of investigative personnel.

The application of this guide may vary from case to case. Most of the procedures described in this document are typically ones that would be followed in a major crime scene investigation. Some of the procedures listed may not necessarily be followed in less serious or less complex investigations. In addition, the order in which actions may be performed will vary depending on the nature of the particular crime scene. In some investigations, the responsibilities described in each section may be performed by the same individual. The authors acknowledge that law enforcement agencies may be faced with the dilemma of responding to more reported crimes than their resources allow. It is one of the primary responsibilities of the investigator to assess the case at hand and, after judging the seriousness of the case and the availability of resources, to decide the level of investigation that will take place. For potentially devastating situations, such as biological weapons or radiological or
chemical threats, the appropriate agencies should be contacted. The user should refer to the National Institute of Justice’s (NIJ’s) publications for fire and arson investigation, bomb and explosives investigation, electronic crime investigation, and death investigation where applicable.

The authors recognize that the size of the agency, availability of resources, and the level of expertise vary greatly from jurisdiction to jurisdiction. The experts who have proposed this guide strongly suggest that agencies unable to adhere to it seek assistance from other agencies. Assistance may take the form of securing additional training, sharing resources, forming partnerships with neighboring jurisdictions, and/or seeking additional funding. The authors also recognize that many agencies already have programs in crime scene processing, and much of the information contained in this document is derived from these sources, including many of the resources identified in the reference list.

Based on this guide, agencies may determine that improvements are needed in their training and policies concerning the investigation of crime scenes. This guide may be a justification for strengthening an agency’s resources.

**Background**

NIJ was asked by Attorney General Janet Reno in 1995 to study cases in which convicted sex offenders were later exonerated by DNA testing. This study resulted in the 1996 publication, *Convicted by Juries, Exonerated by Science: Case Studies in the Use of DNA Evidence to Establish Innocence After Trial*. After being briefed on this publication, Attorney General Reno asked NIJ to develop a consistent approach to the processing of crime scenes. As a result, NIJ initiated the Technical Working Group on Crime Scene Investigation to develop recommended practices for crime scene management.
Origin of the National Crime Scene Planning Panel and the Technical Working Group on Crime Scene Investigation

In the spring of 1998, the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) and ASCLD supported the principle of NIJ’s establishment of TWGCSI. The NIJ Director selected an 11-member planning panel called the National Crime Scene Planning Panel (NCSPP). The NCSPP members represent independent, multidisciplinary organizations whose constituents are responsible for investigating, evaluating, and analyzing evidence from crime scenes. The rationale for their involvement was twofold: they represent the diversity of the professional disciplines and each organization is a key stakeholder in the conduct of crime scene investigations and the implementation of this guide.

The NCSPP was charged with the development of the outline for a guide for crime scene investigations using the format in Death Investigation: A Guide for the Scene Investigator. The NCSPP also was charged with identifying the expertise necessary for the composition of a Technical Working Group on Crime Scene Investigation, a task the panel completed at a meeting in Washington, D.C., in August 1998.

Candidates for TWGCSI were recommended by organizations representing law enforcement, forensic science, crime scene training, the prosecution, and the defense. The following criteria were used to select TWGCSI members:

◆ Each member was nominated/selected for the position by the NCSPP, national organizations, and NIJ’s four regional National Law Enforcement and Corrections Technology Centers—Northeast, Southeast, Rocky Mountain, and West.

◆ Each member had specific knowledge regarding the investigation of crime scenes.

◆ Each member had specific experience with the process of crime scene investigation and the outcomes of positive and negative scene investigations.
Each member could commit to the project over at least a 6-month period.

The experts invited to TWGCSI consisted of 44 members from 25 States. Their expertise was distributed among 18 law enforcement officers and trainers, 16 forensic analysts and educators, 5 prosecutors, and 5 defense attorneys. This distribution of expertise, detailed below, brought together all the nonmedical crime scene investigators to develop this guide.

### Technical Working Group on Crime Scene Investigation

**Membership Distribution**

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Participants</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Northeast</td>
<td>14</td>
<td>31.8%</td>
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<td>Southeast</td>
<td>16</td>
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<td>Rocky Mountain</td>
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<td>15.9%</td>
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<tr>
<td>West</td>
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<tr>
<td><strong>Total:</strong></td>
<td><strong>44</strong></td>
<td><strong>100%</strong></td>
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☆ Law Enforcement
■ Prosecutors
○ Defense Attorneys
♦ Forensic Scientists
Chronology

NCSPP meeting. In August 1998, the NCSPP met in Washington, D.C., to review the existing literature and technology, prepare the project objectives, and begin the guide development process. The NCSPP’s objective was to develop an outline for a guide based on existing literature and present it for review to the assembled TWGCSI at a later date. During this initial session, four investigative tasks were identified. Each task included subsections which when developed provided a guide for investigators to follow while conducting a crime scene investigation.

The guide’s format has the following content:

◆ A statement of principle, citing the rationale for following the guide.

◆ A statement of policy to the investigator on performing each section of the guide.

◆ The procedure for performing each section of the guide.

◆ A summary statement citing justification for performing the procedures.

TWGCSI meetings. In December 1998, TWGCSI assembled in Washington, D.C., and, after introductory remarks, separated into four breakout sections to draft the guide. The four sections were: Arriving at the Scene: Initial Response/Prioritization of Efforts, Preliminary Documentation and Evaluation of the Scene, Processing the Scene, and Completing and Recording the Crime Scene Investigation. An editor from Aspen Systems Corporation attended each breakout section to audibly record the proceedings. Once all breakout sections completed their work, the full TWG reassembled to review the initial draft.

The full TWG met again in January 1999 in Washington, D.C., to make revisions and complete initial review as a group. The draft was edited and TWGCSI members were asked to recommend organizations, persons, or agencies they felt should comment. The draft was then mailed to this wider audience and to all TWG members.
Organization review. The NCSPP reassembled in March 1999 in Washington, D.C., to review and incorporate comments received from the wider audience into the document. In April 1999, TWGCSI met in La Jolla, California, to review the latest draft, make revisions, and approve changes. The document was edited, and the NCSPP met in Washington, D.C., in July 1999 to review the glossary, title, introduction, and appendices for the document.

This document is divided into five sections: Arriving at the Scene: Initial Response/Prioritization of Efforts, Preliminary Documentation and Evaluation of the Scene, Processing the Scene, Completing and Recording the Crime Scene Investigation, and Crime Scene Equipment. At the end of the document are appendixes containing a glossary, a reference list, and a list of organizations to which a draft copy of the document was sent.

Training Guide

The national crime scene investigation project includes tasks to develop training criteria to fit the investigative guide. For each of the investigative tasks presented in this document, “minimum levels of performance” will be developed and verified by TWGCSI members. This “training guide” will provide both individuals and educational organizations the material needed to establish and maintain valid training programs. A set of sample forms with suggested information to be recorded at the crime scene will be included in the training guide.

—Technical Working Group on Crime Scene Investigation
<table>
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<tr>
<th>Section A</th>
<th>Arriving at the Scene: Initial Response/Prioritization of Efforts</th>
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<td>Section B</td>
<td>Preliminary Documentation and Evaluation of the Scene</td>
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<td>Section C</td>
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<td>Section D</td>
<td>Completing and Recording the Crime Scene Investigation</td>
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<tr>
<td>Section E</td>
<td>Crime Scene Equipment</td>
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Authorization: Actions taken pursuant to this guide shall be performed in accordance with department policies and procedures and Federal and State laws.
This handbook is intended as a guide to recommended practices for crime scene investigation.

Jurisdictional, logistical, or legal conditions may preclude the use of particular procedures contained herein.

For potentially devastating situations, such as biological weapons or radiological or chemical threats, the appropriate agencies should be contacted. The user should refer to the National Institute of Justice’s publications for fire and arson investigation, bomb and explosives investigation, electronic crime investigation, and death investigation where applicable.
1. Initial Response/Receipt of Information

Principle: 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.

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

Procedure: The initial responding officer(s) should:

a. Note or log dispatch information (e.g., address/location, time, date, type of call, parties involved).

b. Be aware of any persons or vehicles leaving the crime scene.

c. 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.

d. Make initial observations (look, listen, smell) to assess the scene and ensure officer safety before proceeding.

e. Remain alert and attentive. Assume the crime is ongoing until determined to be otherwise.

f. Treat the location as a crime scene until assessed and determined to be otherwise.
1. Initial Response/Receipt of Information

Summary: It is important for the initial responding officer(s) to be observant when approaching, entering, and exiting a crime scene.

2. Safety Procedures

Principle: The safety and physical well-being of officers and other individuals, in and around the crime scene, are the initial responding officer(s’) first priority.

Policy: The initial responding officer(s) arriving at the scene shall identify and control any dangerous situations or persons.

Procedure: The initial responding officer(s) should:

a. Ensure that there is no immediate threat to other responders — scan 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.

b. 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.

c. Survey the scene for dangerous persons and control the situation.

d. Notify supervisory personnel and call for assistance/backup.

Summary: The control of physical threats will ensure the safety of officers and others present.
3. Emergency Care

**Principle:** After controlling any dangerous situations or persons, the initial responding officer(s’) next responsibility is to ensure that medical attention is provided to injured persons while minimizing contamination of the scene.

**Policy:** The initial responding officer(s) shall ensure that medical attention is provided with minimal contamination of the scene.

**Procedure:** The initial responding officer(s) should:

a. Assess the victim(s) for signs of life and medical needs and provide immediate medical attention.

b. Call for medical personnel.

c. Guide medical personnel to the victim to minimize contamination/alteration of the crime scene.

d. 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.

e. Instruct medical personnel not to “clean up” the scene and to avoid removal or alteration of items originating from the scene.

f. 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.

g. If there is a chance the victim may die, attempt to obtain “dying declaration.”

h. Document any statements/comments made by victims, suspects, or witnesses at the scene.
3. Emergency Care

i. If the victim or suspect is transported to a medical facility, send a 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.)

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

4. Secure and Control Persons at the Scene

Principle: 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 the initial responding officer(s) in protecting the crime scene.

Policy: The initial responding officer(s) shall identify persons at the crime scene and control their movement.

Procedure: The initial responding officer(s) should:

a. 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.

b. Identify all individuals at the scene, such as:
   - Suspects: Secure and separate.
   - Witnesses: Secure and separate.
• Bystanders: Determine whether witness, if so treat as above, if not, remove from the scene.

• Victims/family/friends: Control while showing compassion.

• Medical and other assisting personnel.

c. Exclude unauthorized and nonessential personnel from the scene (e.g., law enforcement officials not working the case, politicians, media).

**Summary:** 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.

### 5. Boundaries: Identify, Establish, Protect, and Secure

**Principle:** 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.

**Policy:** The initial responding officer(s) at the scene shall conduct an initial assessment to establish and control the crime scene(s) and its boundaries.

**Procedure:** The initial responding officer(s) should:

a. Establish boundaries of the scene(s), starting at the focal point and extending outward to include:

- Where the crime occurred.
5. Boundaries: Identify, Establish, Protect, and Secure

- 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).

b. 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).

c. Document the entry/exit of all people entering and leaving the scene, once boundaries have been established.

d. Control the flow of personnel and animals entering and leaving the scene to maintain integrity of the scene.

e. 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).

f. Document the original location of the victim or objects that you observe being moved.

g. 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 boundaries of the scene.

Summary: Establishing boundaries is a critical aspect in controlling the integrity of evidentiary material.
6. Turn Over Control of the Scene and Brief Investigator(s) in Charge

**Principle:** Briefing the investigator(s) taking charge assists in controlling the crime scene and helps establish further investigative responsibilities.

**Policy:** The initial responding officer(s) at the scene shall provide a detailed crime scene briefing to the investigator(s) in charge of the scene.

**Procedure:** The initial responding officer(s) should:

a. Brief the investigator(s) taking charge.

b. Assist in controlling the scene.

c. Turn over responsibility for the documentation of entry/exit.

d. Remain at the scene until relieved of duty.

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

7. Document Actions and Observations

**Principle:** All activities conducted and observations made at the crime scene must be documented as soon as possible after the event to preserve information.

**Policy:** Documentation must be maintained as a permanent record.

**Procedure:** The initial responding officer(s) should document:

a. 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.
7. Document Actions and Observations

b. 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.)

c. Personal information from witnesses, victims, suspects, and any statements or comments made.

d. Own actions and actions of others.

Summary: The initial responding officer(s) at the crime scene must produce clear, concise, documented information encompassing his or her observations and actions. This documentation is vital in providing information to substantiate investigative considerations.
1. **Conduct Scene Assessment**

**Principle:** 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.

**Policy:** The investigator(s) in charge shall identify specific responsibilities, share preliminary information, and develop investigative plans in accordance with departmental policy and local, State, and Federal laws.

**Procedure:** The investigator(s) in charge should:

a. Converse with the first responder(s) regarding observations/activities.

b. Evaluate safety issues that may affect all personnel entering the scene(s) (e.g., bloodborne pathogens, hazards).

c. Evaluate search and seizure issues to determine the necessity of obtaining consent to search and/or obtaining a search warrant.

d. Evaluate and establish a path of entry/exit to the scene to be utilized by authorized personnel.

e. Evaluate initial scene boundaries.

f. Determine the number/size of scene(s) and prioritize.

g. Establish a secure area within close proximity to the scene(s) for the purpose of consultation and equipment staging.

h. If multiple scenes exist, establish and maintain communication with personnel at those locations.

i. Establish a secure area for temporary evidence storage in accordance with rules of evidence/chain of custody.
1. Conduct Scene Assessment

j. Determine and request additional investigative resources as required (e.g., personnel/specialized units, legal consultation/prosecutors, equipment).

k. Ensure continued scene integrity (e.g., document entry/exit of authorized personnel, prevent unauthorized access to the scene).

l. Ensure that witnesses to the incident are identified and separated (e.g., obtain valid ID).

m. Ensure the surrounding area is canvassed and the results are documented.

n. Ensure preliminary documentation/photography of the scene, injured persons, and vehicles.

Summary: 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.

2. Conduct Scene “Walk-Through” and Initial Documentation

Principle: 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.

Policy: The investigator(s) in charge shall conduct a walk-through of the scene. The walk-through shall be conducted with individuals responsible for processing the scene.
**Procedure:** During the scene walk-through, the investigator(s) in charge should:

a. Avoid contaminating the scene by using the established path of entry.

b. Prepare preliminary documentation of the scene as observed.

c. 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.

**Summary:** 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.
1. **Determine Team Composition**

**Principle:** Based on the type of incident and complexity of the scene, the investigator(s) in charge shall determine team composition. Trained personnel shall perform scene processing.

**Policy:** The investigator(s) in charge shall assess the scene to determine specialized resources required.

**Procedure:** Following the walk-through, the investigator(s) in charge should:

a. 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.

b. Assess forensic needs and call forensic specialists to the scene for expertise and/or equipment.

c. Ensure that scene security and the entry/exit documentation are continued.

d. Select qualified person(s) to perform specialized tasks (e.g., photography, sketch, latent prints, evidence collection).

e. Document team members and assignments.

**Summary:** The scene(s) assessment determines the number of personnel and how responsibilities will be assigned.
2. **Contamination Control**

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

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

**Procedure:** Other responders and/or team members should:

a. Limit scene access to people directly involved in scene processing.

b. Follow established entry/exit routes at the scene.

c. Identify first responders and consider collection of elimination samples.

d. Designate secure area for trash and equipment.

e. Use personal protective equipment (PPE) to prevent contamination of personnel and to minimize scene contamination.

f. Clean/sanitize or dispose of tools/equipment and personal protective equipment between evidence collections and/or scenes.

g. Utilize single-use equipment when performing direct collection of biological samples.

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

3. **Documentation**

**Principle:** An assessment of the scene determines what kind of documentation is needed (e.g., photography, video, sketches, measurements, notes).
**Policy:** The investigator(s) in charge shall ensure documentation of the scene.

**Procedure:** The team member(s) should:

a. Review assessment of the scene to determine the type of documentation needed.

b. Coordinate photographs, video, sketches, measurements, and notes.

c. 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).

d. Videotape as optional supplement to photos.

e. 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.

f. Generate notes at the scene:
   - Documenting location of the scene, time of arrival, and time of departure.
   - Describing the scene as it appears.
3. Documentation

- Recording transient evidence (e.g., smells, sounds, sights) and conditions (e.g., temperature, weather).
- Documenting circumstances that require departures from usual procedures.

**Summary:** A well-documented scene ensures the integrity of the investigation and provides a permanent record for later evaluation.

4. **Prioritize Collection of Evidence**

**Principle:** Prioritize the collection of evidence to prevent loss, destruction, or contamination.

**Policy:** The investigator(s) in charge and team members shall determine the order in which evidence is collected.

**Procedure:** The team member(s) should:

a. Conduct a careful and methodical evaluation considering all physical evidence possibilities (e.g., biological fluids, latent prints, trace evidence).

b. Focus first on the easily accessible areas in open view and proceed to out-of-view locations.

c. Select a systematic search pattern for evidence collection based on the size and location of the scene(s).

d. Select a progression of processing/collection methods so that initial techniques do not compromise subsequent processing/collections 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/collection methods.

e. Continually assess environmental and other factors that may affect the evidence.

f. Be aware of multiple scenes (e.g., victims, suspects, vehicles, locations).

g. Recognize other methods that are available to locate, technically document, and collect evidence (e.g., alternate light source, enhancement, blood pattern documentation, projectile trajectory analysis).

Summary: Prioritization provides for the timely and methodical preservation and collection of evidence.

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

Principle: The handling of physical evidence is one of the most important factors of the investigation.

Policy: The team member(s) shall ensure the effective collection, preservation, packaging, and transport of evidence.

Procedure: The team member(s) should:

a. Maintain scene security throughout processing and until the scene is released.

b. Document the collection of evidence by recording its location at the scene, date of collection, and who collected it.

c. Collect each item identified as evidence.

d. Establish chain of custody.

e. Obtain standard/reference samples from the scene.
5. Collect, Preserve, Inventory, Package, Transport, and Submit Evidence

f. Obtain control samples.

g. Consider obtaining elimination samples.

h. Immediately secure electronically recorded evidence (e.g., answering machine tapes, surveillance camera videotapes, computers) from the vicinity.

i. 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, nonporous, crushproof).

j. Package items to avoid contamination and cross-contamination.

k. Document the condition of firearms/weapons prior to rendering them safe for transportation and submission.

l. Avoid excessive handling of evidence after it is collected.

m. Maintain evidence at the scene in a manner designed to diminish degradation or loss.

n. Transport and submit evidence items for secure storage.

Summary: 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 crime laboratory.
1. **Establish Crime Scene Debriefing Team**

**Principle:** 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 followup investigation, special requests for assistance, and the establishment of post-scene responsibilities.

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

**Procedure:** 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 should:

a. Establish a crime scene debriefing team, which includes the investigator(s) in charge of the crime scene, other investigators and evidence collection personnel (e.g., photographers, evidence technicians, latent print personnel, specialized personnel, and initial responding officer(s) if still present).

b. Determine what evidence was collected.

c. Discuss preliminary scene findings with team members.

d. Discuss potential technical forensic testing and the sequence of tests to be performed.

e. Initiate any action(s) identified in discussion required to complete the crime scene investigation.
1. Establish Crime Scene Debriefing Team

   f. Brief person(s) in charge upon completion of assigned crime scene tasks.

   g. Establish post-scene responsibilities for law enforcement personnel and other responders.

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

2. **Perform Final Survey of the Crime Scene**

**Principle:** 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.

**Policy:** The investigator(s) in charge shall direct a walk-through at the conclusion of the scene investigation and ensure that the scene investigation is complete.

**Procedure:** The investigator(s) in charge should ensure that:

   a. Each area identified as part of the crime scene is visually inspected.

   b. All evidence collected at the scene is accounted for.

   c. All equipment and materials generated by the investigation are removed.

   d. Any dangerous materials or conditions are reported and addressed.
The crime scene is released in accordance with jurisdictional requirements.

Summary: 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.

3. Documentation of the Crime Scene

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

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

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

a. Initial responding officer(s’) documentation.

b. Emergency medical personnel documents.

c. Entry/exit documentation.

d. Photographs/videos.

e. Crime scene sketches/diagrams.

f. Evidence documentation.

g. Other responders’ documentation.

h. Record of consent form or search warrant.
3. Documentation of the Crime Scene

i. 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.

Summary: This will ensure that reports and other documentation pertaining to the crime scene investigation are compiled into a case file by the investigator(s) in charge of the crime scene and allow for independent review of the work conducted.
Crime Scene Equipment

1. Initial Responding Officer(s)

**Essential***
- Consent/search forms.
- Crime scene barricade tape.
- First-aid kit.
- Flares.
- Flashlight and extra batteries.
- Paper bags.
- Personal protective equipment (PPE).

* These items should be in police vehicles or readily available to initial responding officer(s).

**Optional**
- Audiotape recorder.
- Camera with flash and extra film.
- Chalk.
- Directional marker/compass.
- Disinfectant.
- Maps.
- Plastic bags.
- Pocket knife.
- Reflective vest.
- Tape measure.
- Tarps to protect evidence from the weather.
- Traffic cones.
- Waterless hand wash (towelette with germicide).
- Wireless phone.

2. Crime Scene Investigator/Evidence Technician

**Essential***
- Bindle paper.
- Biohazard bags.
- Body fluid collection kit.
- Camera (35 mm) with flash/film/tripod.
- Casting materials.

**Consent/search forms.**
- Crime scene barricade tape.
- Cutting instruments (knives, box cutter, scalpel, scissors).
- Directional marker/compass.
- Disinfectant.
- Evidence collection containers.
2. Crime Scene Investigator/Evidence Technician

Evidence identifiers.
Evidence seals/tape.
First-aid kit.
Flashlight kit.
Flashlight and extra batteries.
High-intensity lights.
Latent print kit.
Magnifying glass.
Measuring devices.
Permanent markers.
Personal protective equipment (PPE).
Photographic scale (ruler).
Presumptive blood test supplies.
Sketch paper.
Tool kit.
Tweezers/forceps.

* These items should be in police vehicles or readily available to initial responding officer(s).

**Optional**
Audiotape recorder.
Bloodstain pattern examination kit.
Business cards.
Chalk.
Chemical enhancement supplies.
Entomology (insect) collection kit.
Extension cords.

Flares.
Forensic light source (alternate light source, UV lamp/laser, goggles).
Generator.
Gunshot residue kit.
Laser trajectory kit.
Maps.
Marking paint/snow wax.
Metal detector.
Mirror.
Phone listing (important numbers).
Privacy screens.
Protrusion rod set.
Reflective vest.
Refrigeration or cooling unit.
Respirators with filters.
Roll of string.
Rubber bands.
Sexual assault evidence collection kit (victim and suspect).
Shoe print lifting equipment.
Templates (scene and human).
Thermometer.
Traffic cones.
Trajectory rods.
Video recorder.
Wireless phone.
3. Evidence Collection Kits (Examples)

**Blood Collection**
- Bindle.
- Coin envelopes.
- Disposable scalpels.
- Distilled water.
- Ethanol.
- Evidence identifiers.
- Latex gloves.
- Photographic ruler (ABFO scales).
- Presumptive chemicals.
- Sterile gauze.
- Sterile swabs.
- Test tubes/test tube rack.

**Fingerprint**
- Black and white film.
- Brushes.
- Chemical enhancement supplies.
- Cyanoacrylate (super glue) wand/packets.
- Flashlight.
- Forensic light source.
- Lift cards.
- Lift tape.
- Measurement scales.
- One-to-one camera.
- Powders.

**Bloodstain Pattern Documentation**
- ABFO scales.
- Calculator.
- Laser pointer.
- Permanent markers.
- Protractor.
- String.
- Tape.

**Impression**
- Bowls/mixing containers.
- Boxes.
- Dental stone (die stone).
- Evidence identifiers.
- Measurement scales.
- Permanent markers.
- Snow print wax.
- Water.

**Excavation**
- Cones/markers.
- Evidence identifiers.
- Metal detectors.
- Paintbrushes.
- Shovels/trowels.
- Sifting screens.
- String.
- Weights.
- Wooden/metal stakes.

**Pattern Print Lifter**
- Chemical enhancement supplies.
- Electrostatic dust lifter.
- Gel lifter.
- Wide format lift tape.

**Toolmarks**
- Casting materials.
3. Evidence Collection Kits (Examples)

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<th>Trajectory</th>
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<td>Flashlight (oblique lighting).</td>
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<td>Mirror.</td>
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<td>Trace evidence vacuum with disposable collection filters.</td>
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Appendixes

Appendix A  Glossary
Appendix B  Reference List
Appendix C  List of Organizations
Appendix A. Glossary

The definitions contained herein apply to terms as used in this document.

**ABFO scales:** (American Board of Forensic Odontology scales). An L-shaped piece of plastic used in photography that is marked with circles, black and white bars, and 18-percent gray bars to assist in distortion compensation and provide exposure determination. For measurement, the plastic piece is marked in millimeters.

**Alternate light source:** Equipment used to produce visible and invisible light at various wavelengths to enhance or visualize potential items of evidence (fluids, fingerprints, clothing fibers, etc.).

**Bindle paper:** Clean paper folded to use to contain trace evidence, sometimes included as part of the packaging for collecting trace evidence.

**Biohazard bag:** A container for materials that have been exposed to blood or other biological fluids and have the potential to be contaminated with hepatitis, AIDS, or other viruses.

**Biological fluids:** Fluids that have human or animal origin, most commonly encountered at crime scenes (e.g., blood, mucus, perspiration, saliva, semen, vaginal fluid, urine).

**Biological weapon:** Biological agents used to threaten human life (e.g., anthrax, smallpox, or any infectious disease).

**Bloodborne pathogen:** Infectious, disease-causing microorganisms that may be found or transported in biological fluids.

**Boundaries:** The perimeter or border surrounding potential physical evidence related to the crime.

**Case file:** The collection of documents comprising information concerning a particular investigation. (This collection may be kept in case jackets, file folders, ring binders, boxes, file drawers, file cabinets, or
rooms. Sub-files are often used within case files to segregate and group interviews, media coverage, laboratory requests and reports, evidence documentation, photographs, videotapes, audiotapes, and other documents.)

**Case identifiers:** The alphabetic and/or numeric characters assigned to identify a particular case.

**Chain of custody:** A process used to maintain and document the chronological history of the evidence. (Documents should include name or initials of the individual collecting the evidence, each person or entity subsequently having custody of it, dates the items were collected or transferred, agency and case number, victim’s or suspect’s name, and a brief description of the item.)

**Chemical enhancement:** The use of chemicals that react with specific types of evidence (e.g., blood, semen, lead, fingerprints) in order to aid in the detection and/or documentation of evidence that may be difficult to see.

**Chemical threat:** Compounds that may pose bodily harm if touched, ingested, inhaled, or ignited. These compounds may be encountered at a clandestine laboratory, or through a homemade bomb or tankard leakage (e.g., ether, alcohol, nitroglycerin, ammonium sulfate, red phosphorus, cleaning supplies, gasoline, or unlabeled chemicals).

**Clean/sanitize:** The process of removing biological and/or chemical contaminants from tools and/or equipment (e.g., using a mixture of 10-percent household bleach and water).

**Collect/collection:** The process of detecting, documenting, or retaining physical evidence.

**Comparison samples:** A generic term used to describe physical material/evidence discovered at crime scenes that may be compared with samples from persons, tools, and physical locations. Comparison samples may be from either an **unknown/questioned** or a **known** source.
Samples whose source is **unknown/questioned** are of three basic types:

1. Recovered crime scene samples whose source is in question (e.g., evidence left by suspects, victims).

2. Questioned evidence that may have been transferred to an offender during the commission of the crime and taken away by him or her. Such questioned evidence can be compared with evidence of a known source and can thereby be associated/linked to a person/vehicle/tool of a crime.

3. Evidence of an unknown/questioned source recovered from several crime scenes may also be used to associate multiple offenses that were committed by the same person and/or with the same tool or weapon.

Samples whose source is **known** are of three basic types:

1. A **standard/reference** sample is material of a verifiable/documented source which, when compared with evidence of an unknown source, shows an association or linkage between an offender, crime scene, and/or victim (e.g., a carpet cutting taken from a location suspected as the point of transfer for comparison with the fibers recovered from the suspect’s shoes, a sample of paint removed from a suspect vehicle to be compared with paint found on a victim’s vehicle following an accident, or a sample of the suspect’s and/or victim’s blood submitted for comparison with a bloodstained shirt recovered as evidence).

2. A **control/blank** sample is material of a known source that presumably was uncontaminated during the commission of the crime (e.g., a sample to be used in laboratory testing to ensure that the surface on which the sample is deposited does not interfere with testing. For example, when a bloodstain is collected from a carpet, a segment of unstained carpet must be collected for use as a blank or elimination sample).
3. An **elimination** sample is one of known source taken from a person who had lawful access to the scene (e.g., fingerprints from occupants, tire tread impressions from police vehicles, footwear impressions from emergency medical personnel) to be used for comparison with evidence of the same type.

**Contamination**: The unwanted transfer of material from another source to a piece of physical evidence.

**Control/blank sample**: *See* comparison samples.

**Cross-contamination**: The unwanted transfer of material between two or more sources of physical evidence.

**Documentation**: Written notes, audio/videotapes, printed forms, sketches and/or photographs that form a detailed record of the scene, evidence recovered, and actions taken during the search of the crime scene.

**Dying declaration**: Statements made by a person who believes he or she is about to die, concerning the cause or circumstance surrounding his or her impending death.

**Elimination sample**: *See* comparison samples.

**Evidence identifiers**: Tape, labels, containers, and string tags used to identify the evidence, the person collecting the evidence, the date the evidence was gathered, basic criminal offense information, and a brief description of the pertinent evidence.

**First responder(s)**: The initial responding law enforcement officer(s) and/or other public safety official(s) or service provider(s) arriving at the scene prior to the arrival of the investigator(s) in charge.

**Impression evidence**: Objects or materials that have retained the characteristics of other objects that have been physically pressed against them.

**Initial responding officer(s)**: The first law enforcement officer(s) to arrive at the scene.
**Investigator(s) in charge:** The official(s) responsible for the crime scene investigation.

**Known:** See comparison samples.

**Latent print:** A print impression not readily visible, made by contact of the hands or feet with a surface resulting in the transfer of materials from the skin to that surface.

**Measurement scale:** An object showing standard units of length (e.g., ruler) used in photographic documentation of an item of evidence.

**Multiple scenes:** Two or more physical locations of evidence associated with a crime (e.g., in a crime of personal violence, evidence may be found at the location of the assault and also on the person and clothing of the victim/assailant, the victim’s/assailant’s vehicle, and locations the victim/assailant frequents and resides).

**Nonporous container:** Packaging through which liquids or vapors cannot pass (e.g., glass jars or metal cans).

**Other responders:** Individuals who are involved in an aspect of the crime scene, such as perimeter security, traffic control, media management, scene processing, and technical support, as well as prosecutors, medical personnel, medical examiners, coroners, forensic examiners, evidence technicians, and fire and rescue officers.

**Personal protective equipment (PPE):** Articles such as disposable gloves, masks, and eye protection that are utilized to provide a barrier to keep biological or chemical hazards from contacting the skin, eyes, and mucous membranes and to avoid contamination of the crime scene.

**Porous container:** Packaging through which liquids or vapors may pass (e.g., paper bags, cloth bags).

**Presumptive test:** A nonconfirmatory test used to screen for the presence of a substance.
**Projectile trajectory analysis:** The method for determining the path of a high-speed object through space (e.g., a bullet emanating from a firearm).

**Radiological threat:** The pending exposure to radiation energy. (This energy can be produced by shortwave x-rays or through unstable isotopes.)

**Single-use equipment:** Items that will be used only once to collect evidence, such as biological samples, then discarded to minimize contamination (e.g., tweezers, scalpel blades, droppers).

**Standard/reference sample:** See comparison samples.

**Team members:** Individuals who are called to the scene to assist in investigation or processing of the scene (e.g., scientific personnel from the crime laboratory or medical examiner’s office, other forensic specialists, photographers, mass disaster specialists, experts in the identification of human remains, arson and explosives investigators, clandestine drug laboratory investigators, as well as other experts).

**Trace evidence:** Physical evidence that results from the transfer of small quantities of materials (e.g., hair, textile fibers, paint chips, glass fragments, gunshot residue particles).

**Transient evidence:** Evidence which by its very nature or the conditions at the scene will lose its evidentiary value if not preserved and protected (e.g., blood in the rain).

**Unknown/questioned:** See comparison samples.

**Walk-through:** An initial assessment conducted by carefully walking through the scene to evaluate the situation, recognize potential evidence, and determine resources required. Also, a final survey conducted to ensure the scene has been effectively and completely processed.


Appendix C. List of Organizations

The following is a list of organizations to which a draft copy of this document was mailed.

Accomack County, Virginia, Sheriff’s Office
Alaska Crime Laboratory
Alaska State Troopers
Albuquerque Police Department
American Academy of Forensic Sciences
American Bar Association
American Correctional Association
American Jail Association
American Prosecutors Research Institute
American Society of Crime Laboratory Directors
American Society of Law Enforcement Trainers
Arapahoe County, Colorado, Sheriff’s Office
Armed Forces Institute of Pathology
Association of Federal Defense Attorneys
Baltimore Police Department, Laboratory Division
Bridgeport Forensic Laboratory
Bristol, Virginia, Police Department
Brownsville, Texas, Police Department
Bureau of Alcohol, Tobacco and Firearms
California Department of Justice, Bureau of Forensic Services
Cameron County, Texas, Sheriff’s Office
Campaign for Effective Crime Policy
Chicago Police Department
Children’s Defense Fund
Cleveland State College Basic Police Academy
Commission of Accreditation for Law Enforcement Agencies
Conference of State Court Administrators
Connecticut State Police Forensic Laboratory
Council of State Governments
Crime Scene Academy
Criminal Justice Institute

Dade County, Florida, Medical Examiner’s Office
Davidson County, Iowa, Office of the Attorney General
Donna, Texas, Police Department
Drug Enforcement Administration
Edinburg, Texas, Police Department
Fairbanks, Alaska, Police Department
Federal Bureau of Investigation
Federal Law Enforcement Training Center
Florida Department of Law Enforcement
Harlingen, Texas, Police Department
Hidalgo County, Texas, Sheriff’s Office
Illinois State Police
Indiana State Police Laboratory
Institute for Genomic Research
Institute of Police Technology and Management
International Association of Bomb Technicians and Investigators
International Association of Chiefs of Police
International Association for Identification
International City/County Management Association
International Homicide Investigators Association
Iowa County Attorneys Association
Juneau, Alaska, Police Department
Kent County, Michigan, Sheriff’s Office
Laredo, Texas, Police Department
Law Enforcement Training Institute
Maine State Police Crime Laboratory
Massachusetts State Police Crime Laboratory
McAllen, Texas, Police Department
Metro Nashville Police Department
Michigan Department of State Police
Mission, Texas, Police Department
About the National Institute of Justice

The National Institute of Justice (NIJ), a component of the Office of Justice Programs, is the research agency of the U.S. Department of Justice. Created by the Omnibus Crime Control and Safe Streets Act of 1968, as amended, NIJ is authorized to support research, evaluation, and demonstration programs, development of technology, and both national and international information dissemination. Specific mandates of the Act direct NIJ to:

- Sponsor special projects, and research and development programs, that will improve and strengthen the criminal justice system and reduce or prevent crime.
- Conduct national demonstration projects that employ innovative or promising approaches for improving criminal justice.
- Develop new technologies to fight crime and improve criminal justice.
- Evaluate the effectiveness of criminal justice programs and identify programs that promise to be successful if continued or repeated.
- Recommend actions that can be taken by Federal, State, and local governments as well as by private organizations to improve criminal justice.
- Carry out research on criminal behavior.
- Develop new methods of crime prevention and reduction of crime and delinquency.

In recent years, NIJ has greatly expanded its initiatives, the result of the Violent Crime Control and Law Enforcement Act of 1994 (the Crime Act), partnerships with other Federal agencies and private foundations, advances in technology, and a new international focus. Some examples of these new initiatives:

- New research and evaluation is exploring key issues in community policing, violence against women, sentencing reforms, and specialized courts such as drug courts.
- Dual-use technologies are being developed to support national defense and local law enforcement needs.
- Four regional National Law Enforcement and Corrections Technology Centers and a Border Research and Technology Center have joined the National Center in Rockville, Maryland.
- The causes, treatment, and prevention of violence against women and violence within the family are being investigated in cooperation with several agencies of the U.S. Department of Health and Human Services.
- NIJ's links with the international community are being strengthened through membership in the United Nations network of criminological institutes; participation in developing the U.N. Criminal Justice Information Network; initiation of UNOJUST (U.N. Online Justice Clearinghouse), which electronically links the institutes to the U.N. network; and establishment of an NIJ International Center.
- The NIJ-administered criminal justice information clearinghouse, the world's largest, has improved its online capability.
- The Institute's Drug Use Forecasting (DUF) program has been expanded and enhanced. Renamed ADAM (Arrestee Drug Abuse Monitoring), the program will increase the number of drug-testing sites, and its role as a “platform” for studying drug-related crime will grow.
- NIJ's new Crime Mapping Research Center will provide training in computer mapping technology, collect and archive geocoded crime data, and develop analytic software.
- The Institute's program of intramural research has been expanded and enhanced.

The Institute Director, who is appointed by the President and confirmed by the Senate, establishes the Institute's objectives, guided by the priorities of the Office of Justice Programs, the Department of Justice, and the needs of the criminal justice field. The Institute actively solicits the views of criminal justice professionals and researchers in the continuing search for answers that inform public policymaking in crime and justice.

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To access this site, go to http://www.ncjrs.org
If you have questions, call or e-mail NCJRS.
Crime Scene Investigation: A Reference for Law Enforcement Training
Sarah V. Hart  
_Director_  
National Institute of Justice

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Opinions or points of view expressed in this document represent a consensus of the authors and do not reflect the official position or policies of the U.S. Department of Justice.

The National Institute of Justice is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, the Bureau of Justice Statistics, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime.
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Introduction

Note: Words and phrases that are defined in the glossary appear in bold italics on their first appearance in the body of the report.

Thorough crime scene analysis is vitally important to effective law enforcement. In particular, rapid technological advances have greatly expanded the amount of information that can be obtained from the analysis of physical evidence from a crime scene. In order to take advantage of these new opportunities, the investigator should use sound scene processing practices to recover useful evidence. Critical to the administration of a crime is the objective recognition, documentation, collection, preservation, and transmittal of physical evidence for analysis.

This reference material is designed to assist trainers and administrators in developing training programs for crime scene investigators. It is intended to accompany Crime Scene Investigation: A Guide for Law Enforcement, published by the National Institute of Justice (NIJ) in January 2000. Both publications were developed by NIJ’s Technical Working Group on Crime Scene Investigation (TWGCSI). The earlier guide and these training materials are divided into four primary sections that mirror the tasks of the investigator: Arriving at the Scene: Initial Response/Prioritization of Efforts; Preliminary Documentation and Evaluation of the Scene; Processing the Scene; and Completing and Recording the Crime Scene Investigation. Each part of this document includes proposed performance objectives for the student to ensure attainment of the material. NIJ recommends that student performance be measured using written and practical examinations, including the processing of a mock crime scene.

This document can provide the basis for a new training program or as a supplement to an existing program. Any training program, however, must be adapted to the policies and experience of the administering law enforcement agency. The crime guide and these curriculum materials provide instructors with a framework grounded in research and based on the expertise of the TWGCSI members. The recommendations do not represent the only correct course of action and may not be feasible in all circumstances. In no case should the guide or this reference document be considered a legal mandate or policy directive. We expect that each jurisdiction will be able to use these recommendations to develop policies and procedures that are best suited to its unique environment.

We gratefully acknowledge the contributions of the TWGCSI members. They gave their time and valuable expertise for this project. NIJ relies on the contributions of experienced practitioners and researchers to advance scientific research, development, and evaluation to enhance the administration of justice and public safety.
The Technical Working Group on Crime Scene Investigation (TWGCSI) was a multidisciplinary group of content-area experts from across the United States, from both urban and rural jurisdictions, each representing his or her respective agency or practice and a unique area of expertise. Each of these individuals is experienced in the area of crime scene investigation and evidence collection in the criminal justice system from the standpoints of law enforcement, prosecution, defense, or forensic science.

A planning group, the National Crime Scene Planning Panel (NCSPP), composed of distinguished law enforcement, legal, and science professionals, was formed to steer the larger group.

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<td>Arriving at the Scene: Initial Response/Prioritization of Efforts</td>
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Section A

Arriving at the Scene:
Initial Response/Prioritization of Efforts

1. Initial Response/Receipt of Information
2. Safety Procedures
3. Emergency Care
4. Secure and Control Persons at the Scene
5. Establish and Preserve Scene Boundaries
6. Transfer Control of the Scene to the Investigator(s) in Charge
7. Document Actions and Observations at the Scene

At the conclusion of this training section, the student is expected to demonstrate a working knowledge of the essential components of the initial response to a crime scene. This includes demonstrating the ability to assemble the information related to the initial actions upon arrival at the crime scene and the ability to assess a scene to ensure officer safety and scene control. The student is expected to demonstrate competence in each of the topic areas through testing—either written, practical, or both.
1. Initial Response/Receipt of Information

   a. Note or log dispatch information.
   b. Be aware of any persons or vehicles leaving the crime scene.
   c. Approach the scene cautiously.
   d. Assess the scene for officer safety.
   e. Remain alert and attentive.
   f. Treat location(s) as a crime scene until determined to be otherwise.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate overall scene awareness by noting all essential information initially received, documenting all persons or vehicles leaving the crime scene, and assessing the scene to ensure officer safety and scene status.

1. Initial Response/Receipt of Information

   a. Note or log dispatch information.
      
      NOTE: The responding officer is expected to obtain this key information (e.g., from dispatch or direct citizen complaint to officer, or officer observation onsite).
      
      1. Address.
      2. Location (e.g., storefront, second floor rear, garage, mile marker, compass direction).
      3. Time.
      4. Date.
      5. Type of call.
      6. Parties involved.
      7. Weapons involved.
      8. Ongoing and/or dangerous scene.

   b. Be aware of any persons or vehicles leaving the crime scene.
      
      NOTE: The officer is expected to, as soon as possible, write down information.
      
      1. Note arrival time.
      2. Describe vehicles.
      
      NOTE: Make, model, color, condition, license plate number, age.
      3. Describe individuals.
NOTE: Height, weight, race, age, clothing, sex, distinguishing features.
4. Describe direction of travel (from first observation).

c. **Approach the scene cautiously.**
   1. Scan the entire area to thoroughly assess the scene.
   2. Note any possible secondary crime scenes (e.g., different areas where evidence/activity is observed).
   3. Be aware of any persons in the vicinity who may be related to the crime.
   4. Be aware of any vehicles in the vicinity that may be related to the crime.

d. **Assess the scene for officer safety.**
   1. Assess the scene for ongoing dangerous activity.
      NOTE: Look, listen, smell (e.g., downed power lines, animals, biohazards, chemicals, weapons).
   2. Ensure officer safety before proceeding.
      NOTE: Discretion is advised. Unreasonably dangerous scenes should not be entered (e.g., anthrax, bomb scene).

e. **Remain alert and attentive.**
   1. Assume crime is ongoing until determined to be otherwise (e.g., keep looking, listening, smelling).

f. **Treat location(s) as a crime scene until determined to be otherwise.**
   1. Use all information initially received.
   2. Use all senses.
      NOTE: The scene may not be what it initially appears to be.
2. Safety Procedures

a. Evaluate the scene for safety concerns.
   1. Scan the area for present dangers (look, listen, smell).
   2. Check for hazardous materials (e.g., gasoline, natural gas, electrical lines, biohazards).
   3. Check for weapons.
   4. Check for radiological or chemical threats.
   5. Notify appropriate support agencies to render the scene safe (prior to entry) (e.g., fire department, HazMat, bomb squad).

b. Approach the scene with caution.
   1. Ensure officer safety.
   2. Reduce risk to victim(s).
   3. Reduce risk to witnesses.
   4. Reduce risk to others.

c. Survey the scene for dangerous persons and control the situation.
   1. Be aware of violent persons.
   2. Be aware of potentially escalating conflicts.
   NOTE: Remember that officers’ actions can contribute to the escalation or de-escalation of the situation.
   3. Apply communication and defensive training skills.

d. Notify supervisory personnel and call for assistance/backup.
   1. Follow departmental guidelines for notification of supervisors.
   2. Call for assistance/backup as appropriate.
3. Emergency Care

a. Assess the victim(s) for injury.
   1. Assess medical needs/signs of life.
   2. Administer emergency first aid (if needed).

b. Call for medical personnel.
   1. Follow departmental guidelines/practices for notification of emergency medical personnel.
   2. Continue to assist the victim(s) as necessary.

c. Guide medical personnel to the victim(s) at the scene.
   1. Choose pathway to minimize contamination/alteration of the crime scene.
   2. Direct medical personnel along the chosen pathway.
   3. Remain with emergency medical personnel, if possible.

d. Point out potential physical evidence to medical personnel.
   1. Instruct emergency medical personnel to avoid contact with evidence items/material.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the ability to preserve the integrity of the scene by recognizing potential physical evidence, informing medical personnel of its presence, and instructing medical personnel not to “clean up” the scene. The student is also expected to demonstrate the ability to document any scene alteration, and/or any statements and comments by individuals, including those made by individuals during transport to a medical facility.
2. Instruct emergency medical personnel to preserve all clothing (avoid altering bullet holes, knife tears, etc.).

NOTE: Altering includes cutting, tearing, ripping through existing bullet holes.


4. Document movement of scene items by emergency medical personnel (e.g., furniture, blankets, weapons).

e. Instruct emergency medical personnel not to “clean up” the scene.

1. Avoid removal of items originating from the scene (e.g., removal of trace and other physical evidence by adherence to emergency medical equipment and personnel cleaning the victim’s skin surface).

2. Avoid alteration of items originating from the scene.

NOTE: Alterations to the scene can include additions of items by emergency medical personnel.

f. Document emergency medical responder(s) at the scene.

NOTE: This is for future investigative purposes (e.g., information about scene alteration and/or to obtain elimination and/or standard/reference samples).

1. Name(s).
2. Unit(s).
3. Agency name and business telephone numbers.
4. Name/location of medical facility to which the victim(s) is being transported.

g. Obtain “dying declaration” as appropriate.

NOTE: Review jurisdictional law regarding dying declarations.

1. Assess victim’s level of injury (life-threatening injury).
2. Note any statement.

h. Document statements and comments.

NOTE: Documentation should include to whom and under what circumstances statements/comments were made.

1. Document statements and comments made by victims.
2. Document statements and comments made by suspects.
3. Document statements and comments made by witnesses.

i. Document statements and comments made during transport.

1. Accompany the injured person(s) to the medical facility, if possible.
2. Document statements and comments made by the injured person(s) during transport.
3. If law enforcement is unavailable, request that medical personnel who accompany the injured person(s) to the medical facility document statements and comments.

NOTE: Remind medical personnel to preserve evidence.
4. Secure and Control Persons at the Scene

a. Control all persons at the scene.

b. Identify all persons at the scene.

c. Exclude unauthorized/nonessential personnel from the scene.

**Performance Objective**
Given a crime scene scenario, the student is expected to assess and implement the levels of control required for persons or personnel at a crime scene while ensuring the safety of others and the integrity of potential evidence. The student also is expected to demonstrate the ability to identify persons at the scene.

4. Secure and Control Persons at the Scene

a. **Control all persons at the scene.**
   1. Restrict movement of persons at the scene.
   2. Prevent persons from altering physical evidence.
   3. Prevent persons from destroying physical evidence.
   4. Continue to maintain safety at the scene.
   5. Restrict areas of movement within the scene.
   6. Continue to control the scene by maintaining officer presence.

b. **Identify all persons at the scene.**
   
   NOTE: Identify means to obtain verifiable personal information.
   1. Identify suspects (secure and separate).
   2. Identify witnesses (secure and separate).
   3. Identify bystanders (remove from the scene).
   4. Identify victims/family members/friends (control while showing compassion).
   5. Identify medical and assisting personnel.

c. **Exclude unauthorized/nonessential personnel from the scene.**
   1. Law enforcement officials not working the case.
   2. Politicians.
   4. Other nonessential personnel (e.g., any persons not performing investigative or safety functions at the scene).
5. Establish and Preserve Scene Boundaries

a. Establish scene boundaries by identifying the focal point(s) of the scene and extending outward.

b. Set up physical barrier(s).

c. Document entry of all people entering and exiting the scene.

d. Maintain integrity of the scene.

e. Attempt to preserve/protect evidence at the scene.

f. Document the original location of the victim(s) or objects at the scene that were observed being moved.

g. Follow jurisdictional laws related to search and seizure.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the ability to establish scene boundaries, set up physical scene barrier(s) to ensure the containment and protection of all physical evidence, and document all people entering and exiting the scene and the original location of all items that were/are moved. The student is also expected to demonstrate knowledge of applicable jurisdictional search and seizure law.

5. Establish and Preserve Scene Boundaries

a. Establish scene boundaries by identifying the focal point(s) of the scene and extending outward.

NOTE: Be aware of trace and impression evidence during scene assessment.

1. Secure areas where the crime occurred.

2. Secure areas that are potential points and paths of entry/exit of suspects/witnesses.

3. Secure areas where victim(s)/evidence may have moved or been moved.

4. Initially secure a larger area, since it is easier to contract than to expand the boundaries.

b. Set up physical barrier(s).

1. Set the physical perimeter for established scene boundaries (with crime scene tape, rope, cones, vehicles, personnel, etc.).

2. Set the physical perimeter for established scene boundaries by using existing structures (walls, rooms, gated areas, etc.).

c. Document entry of all people entering and exiting the scene.

1. Record the names of persons entering the scene.

2. Record the names of persons exiting the scene.
d. **Maintain integrity of the scene.**
   1. Control the flow of personnel and animals entering and exiting the scene.

e. **Attempt to preserve/protect evidence at the scene.**
   1. Protect evidence from environmental elements, if possible.
   2. Protect evidence from manmade intrusions (e.g., shoe or tire impressions).
   3. Protect evidence from mechanical devices (e.g., sprinklers, helicopters).
   4. Protect evidence from animals.

f. **Document the original location of the victim(s) or objects at the scene that were observed being moved.**
   NOTE: Care should be taken to use nondestructive techniques to document locations.
   1. Document point of origin of the victim(s) or items at the scene.
   2. Document alternate location.

g. **Follow jurisdictional laws related to search and seizure.**
   1. Determine the need for obtaining consent to search or a search warrant.
6. Transfer Control of the Scene to the Investigator(s) in Charge

a. Brief the investigator(s) taking charge of the scene.
   1. Introduce yourself and explain role.
   2. Relay information regarding the incident.
   NOTE: Information to include roles and identities of the parties, facts of the incident, observations, comments by the parties, and information by other responders.
   3. Point out scene boundaries.
   4. Point out chosen pathway.

b. Assist in controlling the scene.
   1. Check with the lead investigator for instruction.

c. Transfer control of entry/exit documentation.
   1. Relinquish responsibility for continued documentation to a designated person.
   2. Assure responsibility is understood.

d. Remain at the scene until relieved of duty.
   1. Contact the investigator(s) in charge for instruction.
   2. Document scene departure time.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the ability to inform the investigator(s) taking charge of the scene of all known scene information and to transfer scene control.
7. **Document Actions and Observations at the Scene**

a. **Document observations of the crime scene.**

b. **Document conditions upon arrival at the scene.**

c. **Document personal information, statements, and/or comments from witnesses, victims, and suspects.**

d. **Document own actions and actions of others.**

**Performance Objective**  
Given a crime scene scenario, the student is expected to demonstrate the ability to document information encompassing his or her observations and actions at the crime scene. Information includes locations, appearances, and conditions of all persons and items noted, and should communicate scene conditions, information from witnesses, victims and suspects, and the actions of other personnel.

---

7. **Document Actions and Observations at the Scene**

a. **Document observations of the crime scene.**

   - NOTE: Observations should be based on facts, not opinions.
   1. Location of persons within the crime scene.
   2. Location of items within the crime scene.
   3. Appearance of persons within the crime scene.
   4. Appearance of items within the crime scene.
   5. Condition of persons within the crime scene.
   6. Condition of items within the crime scene.

b. **Document conditions upon arrival at the scene.**

   1. Climate (weather, indoor and/or outdoor temperature).
   2. Lighting (day/night, artificial/natural).
   3. Fixtures (doors, windows/shades, gates).
   4. Odor(s)/color(s) (gas/oil, cleaners, perfumes, smoke, fire).
   5. Furniture (moved/in place).
   6. Personal items (missing/in place).
   7. Changing or deteriorating items (melting ice cream, impressions in snow/sand, ambient temperature indoors).
8. Appliances (on/off, hot/cold, functional/broken).

c. **Document personal information, statements, and/or comments from witnesses, victims, and suspects.**
   1. Include all personal identifying information provided.
   2. Include all statements/comments as provided.

d. **Document own actions and actions of others.**
   1. Note all tasks performed and by whom.
   2. Note all tasks delegated.
   3. Note all areas entered and by whom.
   4. Note own dispatch, arrival, and departure times.
   5. Note all items moved or changed, by whom, and for what purpose.
1. Conduct Scene Assessment

2. Conduct Scene “Walk-Through” and Initial Documentation

At the conclusion of this training section, the student is expected to demonstrate the ability to assess the scene by evaluating issues concerning scene and evidence integrity/security, maintain communication between personnel, and ensure that necessary tasks are assigned and completed. The student is expected to be familiar with the critical aspects of selecting a pathway, conducting a walk-through, and documenting preliminary aspects of the crime scene. The student is expected to demonstrate competence in each of the topic areas through testing—either written, practical, or both.
1. Conduct Scene Assessment

a. Talk to the first responder regarding his/her observations/activities.

b. Evaluate safety issues for personnel entering the scene.

c. Evaluate search and seizure issues.

d. Evaluate/establish the path of scene entry/exit.

e. Evaluate initial scene boundaries.

f. Determine/prioritize the scene investigation(s).

g. Establish a staging area for consultation and equipment.

h. Establish communication between individuals at multiple scenes (as necessary).

i. Establish a secure area for temporary evidence storage.

j. Determine additional resource requirements.

k. Ensure scene integrity/security.

l. Ensure that witnesses to the incident are identified and separated.

m. Ensure that the surrounding area is canvassed.

n. Ensure preliminary documentation/photography.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the ability to obtain information from the first responder; evaluate safety and search and seizure issues; evaluate scene boundaries and entry and exit path(s); prioritize investigative activities; allocate current resources and determine the need for additional resources; ensure that witnesses are separated and identified, the area is canvassed, and the scene is secured and properly photographed and documented; and establish, if necessary, areas for consultation and storage of equipment and evidence.
b. **Evaluate safety issues for personnel entering the scene.**
   1. Re-evaluate and modify, as necessary, current safety practices.
   2. Require *personal protective equipment (PPE)* as appropriate.

c. **Evaluate search and seizure issues.**
   1. Determine the need for obtaining consent to search.
   2. Determine the need for obtaining a search warrant.
   3. Determine the need for prosecutorial/legal resources.

d. **Evaluate/establish the path of scene entry/exit.**
   1. Establish pathway by reassessing and modifying, as necessary, the chosen pathway.
   2. Ensure that authorized personnel are informed of any modifications to the established pathway.

e. **Evaluate initial scene boundaries.**
   1. Determine appropriateness of the initial scene boundaries.
   2. Ensure that the areas where the crime occurred are secure.
   3. Ensure that the areas that are potential points and paths of entry/exit of suspects/witnesses are secure.
   4. Ensure that areas where victim(s)/evidence may have moved or been moved are secure.
   5. Make modifications as necessary.

f. **Determine/prioritize the scene investigation(s).**
   1. Determine the size and number of scene(s).
   2. Prioritize the steps in the scene investigation(s).
   3. Allocate current resources.

g. **Establish a staging area for consultation and equipment.**
   1. Identify an area in close proximity to the scene.
   2. Identify an area not involved in the incident.
   3. Secure the staging area and limit access.

h. **Establish communication between individuals at multiple scenes (as necessary).**
   1. Establish type of communication equipment to be used.
   NOTE: When selecting equipment, consider security of communication.
   2. Update with current information as necessary.

i. **Establish a secure area for temporary evidence storage.**
   1. Evaluate environmental factors that could effect degradation/loss of evidence when selecting a secure area for temporary evidence storage.
2. Establish a secure area for temporary storage for evidence.

NOTE: Consider rules of evidence/chain of custody.

j. **Determine additional resource requirements.**
   1. Determine the need for additional investigative resources.
   2. Determine the need for specialized units.
   3. Determine the need for legal consultation.
   4. Determine the need for specialized equipment/supplies.
   5. Request additional resources as determined.

k. **Ensure scene integrity/security.**
   1. Maintain scene entry/exit documentation.
   2. Prevent unauthorized access to the scene.

l. **Ensure that witnesses to the incident are identified and separated.**
   1. Ascertain potential witnesses.
   2. Separate witnesses from each other and from others present.
   3. Obtain valid identification from witnesses.
   4. Document witness identification(s).

m. **Ensure that the surrounding area is canvassed.**
   1. Assign appropriate personnel to conduct the canvass.
   2. Ensure that results of the canvass are documented.

   NOTE: Documentation should also include locations where persons are not found for future followup.

n. **Ensure preliminary documentation/photography.**

   NOTE: The purpose of this section is to ensure that the presence and/or appearance of items, persons, and conditions that are likely to be lost if not immediately documented or photographed are recorded (see section A7a,b).
   1. Photograph or document items that may change.
   2. Photograph or document conditions that may change.
   3. Photograph or document persons, including injuries or lack thereof.
2. Conduct Scene “Walk-Through” and Initial Documentation

a. Minimize scene contamination.

b. Prepare preliminary documentation.

c. Identify and protect fragile/perishable evidence.

Performance Objective Given a crime scene scenario, the student is expected to demonstrate the ability to establish and follow the established pathway to conduct a preliminary walk-through, to document initial observations, and to identify, document, and protect the integrity/security of the evidence.

2. Conduct Scene “Walk-Through” and Initial Documentation

a. Minimize scene contamination.
   1. Use established entry/exit points and pathway.
   2. Determine the need for personal protective equipment prior to entry.
   3. Conduct walk-through with individuals responsible for processing the scene, if available.

b. Prepare preliminary documentation.
   NOTE: Document factual observations, not opinions.
   1. Document scene as first observed (e.g., preliminary photograph, rough sketch, notes).

c. Identify and protect fragile/perishable evidence.
   1. Evaluate crowds/hostile environment(s) and ensure that evidence is secure, as necessary.
   2. Evaluate weather conditions and ensure that evidence is protected, as necessary.
   3. Identify fragile/perishable evidence.
   4. Ensure documentation/photography of fragile/perishable evidence (immediately, if possible).
   5. Ensure collection of fragile/perishable evidence, as appropriate.
Section C

Processing the Scene

1. Determine Team Composition
2. Ensure Contamination Control
3. Document the Scene
4. Prioritize Collection of Evidence
5. Collect, Preserve, Inventory, Package, Transport, and Submit Evidence

At the conclusion of this training, the student is expected to demonstrate scene processing practices. These practices include the ability to select the team, knowledge of contamination issues, documentation of the scene, prioritization of the collection of evidence, and the actual collection and subsequent handling of the evidence. The student is expected to demonstrate competence in each of the topic areas through testing—either written, practical, or both.
1. Determine Team Composition

   a. Assess the need for additional personnel.

   b. Assess forensic needs.

   c. Ensure scene(s) security.

   d. Select qualified person(s) for specialized tasks.

   e. Document team member assignments.

   **Performance Objective**

   The student is expected to demonstrate the ability to assess the scene by evaluating the factors that determine team composition. Given a crime scene scenario, the student also is expected to assess the need for additional personnel resources to ensure complete scene processing.

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1. Determine Team Composition

   a. **Assess the need for additional personnel. Consider:**

      1. *Multiple scenes* (see glossary).

      NOTE: Multiple scenes may involve multiple jurisdictions.

      2. Multiple victims.

      3. Numerous witnesses.

      NOTE: Separate and interview.

      4. Additional resources (e.g., lighting, ladders, fire department, air support).

      5. Other circumstances that may require the preservation and recovery of evidence, such as parties or vehicles that may be transported to a different location (e.g., hospital, law enforcement facility, impound lot, medical examiner/coroner’s office).

      6. Specific crimes may require other specialized personnel (e.g., forensic nurse, gang crime units, other Federal or State agencies. Individual departments may determine that a public information officer is necessary).

   b. **Assess forensic needs.**

      NOTE: If in doubt consult/call outside sources.

      1. Determine what forensic specialists are needed (e.g., *latent print* analyst, bloodstain/blood-spatter analyst, forensic anthropologist, accident reconstructionist).

      2. Determine what specialized equipment is needed (see section E).

   c. **Ensure scene(s) security.**

      1. Identify the individual responsible for maintaining entry/exit documentation.
3. Maintain security of scene boundaries.

d. Select qualified person(s) for specialized tasks.
   1. Identify photographic needs (e.g., aerial, underwater).
   2. Identify sketch needs.
   3. Identify special evidence collection needs (e.g., latent prints, firearms, blood spatter, trace evidence, arson/bomb, forensic anthropology).

e. Document team member assignments.
   1. Establish task priority.
   2. Assign tasks to team members.
   3. Record member responsibilities.
   4. Ensure that assigned tasks are completed.
2. Ensure Contamination Control

a. Limit scene access to people directly involved in scene processing.
   1. Identify essential personnel.
   2. Identify nonessential personnel.
   3. Remove nonessential personnel from the scene.

b. Follow established entry/exit pathways at the scene.
   1. Identify scene entry/exit pathway.
   2. Use established entry/exit pathway.
   3. Maintain established entry/exit pathway.

c. Consider collection of elimination samples.
   NOTE: See definition of elimination sample in the glossary.
   1. Identify first responders and involved parties.
   2. Consider the value of elimination samples.
   3. Collect elimination samples, as necessary (see section C5g).

   NOTE: Collect elimination samples of value from first responders and involved parties before they leave the scene.

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Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the knowledge of contamination control issues at a crime scene.
d. **Designate a secure area for trash and equipment.**
   1. Identify area(s) away from potential evidence.
   2. Establish separate area(s) for trash generated in the course of the scene investigation.
   3. Establish area(s) as site for equipment.

e. **Use personal protective equipment (PPE) to prevent contamination of personnel and minimize scene contamination.**
   1. Assess potential hazards.
   2. Utilize relevant PPE.
   3. Dispose of PPE in biohazard receptacle.

f. **Clean/sanitize/dispose of tools/equipment between evidence collections.**
   1. Utilize *clean* or *single-use tools/equipment*.
   2. Dispose of single-use tools/equipment in biohazard or sharps containers after use (e.g., gloves, forceps, scalpels, pipets).
   3. Clean reusable equipment before collection of each new piece of evidence.
   4. Clean reusable equipment before storage.

g. **Use single-use equipment for direct collection of biological samples.**
   1. Identify biological evidence to be collected.
   2. Identify single-use collection material (e.g., swabs, swatches, other items that come in direct contact with evidence to be collected).

   **NOTE:** Ensure that there is ample packaging material so each item can be individually packaged to minimize *cross-contamination.*
3. Document the Scene

a. Determine the type of documentation necessary for the specific scene.
   1. Determine if photographs, videos, sketches, or measurements are needed.
   2. Determine if forms are needed to supplement note taking, (e.g., photo logs, checklists, evidence log, chain of custody forms).

b. Coordinate documentation of the scene.
   NOTE: Assign or prioritize documentation; ensure that all documentation ultimately bears the unique identifier(s) assigned to the case.
   1. Coordinate photographing of the scene.
   2. Coordinate videotaping of the scene.
   3. Coordinate sketching of the scene.
   4. Coordinate measurements of specific scene items.
   5. Coordinate notes.

c. Photograph the scene.
   NOTE: Ensure that photographs taken depict a fair and accurate representation of the scene/items photographed.
   1. Take overall scene photographs.
   2. Take medium-range scene photographs.

Performance Objective

Given a crime scene scenario, the student is expected to determine the type of documentation necessary for a specific scene. The student also is expected to write a full report based on his/her notes, photograph the scene, and draw sketches.
3. Take close-up scene photographs.
4. Photograph evidence with and without *measurement scales* and/or *evidence identifiers*.

NOTE: Instruct when to photograph with and without measurement scale and/or identifiers with appropriate evidence items.

5. Photograph victims, suspects, witnesses, crowds, and vehicles at the scene as relevant.
6. Photograph from various perspectives as relevant (e.g., aerial, witness’ view, area under body once body is removed).

d. **Videotape the scene as an optional supplement to photographs.**

NOTE: Consider switching audio off according to jurisdictional requirements.

1. Determine if videotaping is needed (e.g., at a homicide, a large scene, an officer-involved incident, or a large amount of evidence).
2. Ensure that new tape is used.
3. Break off write-protect tab after taping to prevent accidental overwrite.

e. **Prepare preliminary sketch(es) and take measurements.**

1. Measure the immediate area of the scene.
2. Indicate “North” on the sketch.
3. Indicate that the sketch is “not to scale.”
4. Measure the relative location of evidence for future correlation with evidence records.

NOTE: Instruct on particular measurement techniques (e.g., triangulation, coordination, use of a legend).

5. Measure the evidence prior to movement.
6. Measure rooms, furniture, and other objects relevant to the scene.
7. Measure the distance to adjacent buildings or other landmarks (e.g., mile markers, bridges, manhole covers, silos).
8. Consider additional sketches that may be useful to focus attention on a particular area or item.

f. **Generate notes at the scene (e.g., photo logs, checklists, evidence log, chain of custody forms, detailed condition of the item(s)).**

1. Document the scene location.
2. Document time of arrival at the scene.
3. Document time of departure from the scene.
5. Record *transient evidence* (e.g., smells, sounds, sights).
6. Record environmental conditions (e.g., weather, temperature).
7. Document circumstances that require departures from usual procedures (e.g., safety, environmental, traffic issues).
4. Prioritize Collection of Evidence

- a. Conduct a careful and methodical evaluation considering all physical evidence possibilities.

- b. Focus first on easily accessible areas in open view and proceed to out-of-view locations (e.g., biological, latent prints, trace evidence).

- c. Select a systematic search pattern for evidence collection.

- d. Select a progression of processing/collection methods.

- e. Continually assess environmental and other factors that may affect evidence.

- f. Be aware of multiple scenes.

- g. Recognize other methods that are available to locate, technically document, and collect evidence.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the ability to prioritize the collection of evidence.

4. Prioritize Collection of Evidence

- a. Conduct a careful and methodical evaluation considering all physical evidence possibilities.
  1. Identify present types of evidence (e.g., biological, latent prints, trace evidence).
  2. Consider potential evidence collected prior to this stage by EMTs, etc., which may have been moved or removed from the scene.

- b. Focus first on easily accessible areas in open view and proceed to out-of-view locations (e.g., biological, latent prints, trace evidence).
  1. Identify areas that need to be processed immediately (e.g., due to safety, weather, security, scene integrity, high-traffic areas).
  2. Identify areas that can be processed at a later time (e.g., vehicle, additional scene, areas protected from threats in (1) above).

- c. Select a systematic search pattern for evidence collection.
  1. Determine the size and location of the scene(s).
  2. Determine the number of personnel available.
  3. Select the best method for searching the scene (e.g., spiral, grid, zones).
d. Select a progression of processing/collection methods.
   1. Identify which items need to be collected as evidence.
   2. Identify the most transient evidence and prioritize processing.
   3. Prioritize processing/collection methods so initial techniques do not compromise subsequent processing/collection methods (e.g., collection of biological or trace evidence should be performed prior to use of powder or chemical enhancement techniques).

e. Continually assess environmental and other factors that may affect evidence.
   1. Monitor environmental and other factors that may affect evidence.
   2. Reprioritize collection, if warranted, based on conditions.

f. Be aware of multiple scenes.
   1. In case of multiple scenes, prioritize the response (e.g., victims, suspects, vehicles, locations).

g. Recognize other methods that are available to locate, technically document, and collect evidence.

   NOTE: Consider consulting with forensic/laboratory personnel for additional technical advice.
   1. Assess the scene to determine if other methods are needed to aid in the prioritization of scene processing (e.g., alternate light source, enhancement, blood pattern documentation, projectile trajectory analysis).
   2. Determine availability of needed techniques.
   3. Prioritize collection methods based on availability of additional resources.
5. Collect, Preserve, Inventory, Package, Transport, and Submit Evidence

a. Maintain scene security throughout processing and until the scene is released.

b. Document the location, date, and who collected the evidence.

c. Collect items identified as evidence (see glossary).

d. Establish chain of custody.

e. Obtain standard/reference samples from the scene.

f. Obtain control samples from the scene.

g. Obtain elimination samples (as necessary).

h. Secure electronically recorded evidence from the vicinity of the scene (immediately).

i. Identify and secure evidence in proper containers.

j. Document the description and condition of firearms/weapons (prior to rendering them safe).

k. Avoid excessive handling of evidence after it is collected.

l. Maintain evidence at the scene in a manner designed to diminish degradation/loss.

m. Transport and submit evidence for secure storage.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate all aspects of scene processing, including the collection, preservation, inventory, packaging, transportation, and submission of physical evidence. The student also is expected to take notes; collect various types of evidence, including latent prints, footwear or tire impression(s), biological fluids/stains, trace evidence, firearms evidence, questioned documents, volatiles, and drugs; establish chain of custody; and write a report. The student also is expected to distinguish the difference between control, standard/reference, and elimination samples.
3. Ensure that the identity of the individual making the collection is documented.
4. Ensure that the description of item(s) to be collected is documented.

NOTE: The following examples of evidence collection techniques are meant to be illustrative and are not meant to be exhaustive or exclusive.

c. **Collect items identified as evidence (see glossary).**
   1. Impression evidence collection.
   2. Latent print evidence collection.
   5. Trace evidence collection.
   7. Reconstruction evidence collection.
   8. Controlled substances/chemicals evidence collection.
   9. Other types of evidence.

   **c1. Impression evidence collection.**
   
   NOTE: Consider the different types of impression evidence, such as macroscopic (those that are visible with the naked eye, e.g., footwear and tire), and microscopic (those that may need magnification, e.g., latent prints, toolmarks, cartridge cases, weapons, bullets, bitemarks, fingernails).

   a. **Locate** by using visual observation techniques (NOTE: When collecting firearms or other weapons, refer to section C5j); lighting techniques (e.g., oblique, alternate light source); or chemical enhancement techniques (e.g., powder, super glue, dyes, luminol).

   b. **Develop** by using photography (e.g., using filters along with an alternate light source) or chemical enhancement.

   c. **Collect** by using photography, physical lifters (e.g., gel lifters, dental stone, electrostatic lifters, molding materials, lifting tape), or by taking the actual item.

   d. **Consider** collection of elimination samples (see section C5g).

   e. **Ensure** proper packaging of individual items of evidence (see section C5i, k-m), that the location of evidence at the scene is documented, that the date of collection is documented (see section C3), that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

   **c2. Latent print evidence collection.**
   
   (e.g., fingerprints, palmprints, footprints.)

   a. **Locate** by using visual observation techniques, lighting techniques (e.g., oblique, alternate light source), chemical enhancement techniques (e.g., super glue, dyes, luminol, powders).

   b. **Develop** by using photography (e.g., using filters along with an alternate light source), chemical enhancement techniques, or powder enhancement techniques.
c. **Collect** by using photography, physical lifters (e.g., electrostatic lifters, lifting tape/adhesive, silicon casting material), or by taking the actual item.

d. **Consider** collection of elimination samples (see section C5g).

e. **Ensure** proper packaging of individual items of evidence (see section C5i, k-m), that the location of evidence at the scene is documented (see section C3), that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

c3. **Biological evidence collection.**

(e.g., blood, semen, saliva (bitemarks), urine, perspiration, sexual assault evidence, tissue, bone, teeth, hair, fingernails.)

a. **Locate** by using visual observation techniques, lighting techniques (e.g., oblique, alternate light source), or chemical enhancement techniques (e.g., by use of luminol, **presumptive tests**).

b. **Collect** the stained portion by using single-use equipment (e.g., swabs, threads, gauze patches) and by taking the actual item (e.g., scrape with scalpel, cut out portion of substrate).

c. **Collect** the whole item (e.g., stained door, clothing) or a representative sample (e.g., portion of blood trail, pooling of blood, by pattern(s)).

d. **Collect** control/blank samples (as necessary, see section C5f).

e. **Ensure** proper packaging of individual items of evidence (see section C5i, k-m), that the location of evidence at the scene is documented (see section C3), that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

c4. **Arson/explosive/bomb evidence collection.**

**NOTE:** Following an explosion, investigators should be aware of the possibility of secondary explosive device(s).

a. **Request** subject-matter experts to respond to the scene.

**NOTE:** If the following types of evidence are present, specialized personnel with protective equipment and training (e.g., arson investigators, accelerant detection canine team) are expected to collect: accelerants, burn patterns, explosive residue, bombs, explosives, etc. When it is not possible for a specialized team to conduct the investigation, the following steps can be taken. (However, only bomb disposal personnel should investigate unexploded bombs or handle live explosives.)

b. **Locate** by using visual observation techniques and smell.

c. **Document** by photography, videography, written notes, and sketches/diagrams.

d. **Collect** by scooping ignitable liquid residues with a noncontaminated shovel, taking and packaging exploded bomb components, and taking sources of ignitable liquid residues.

**NOTE:** Handle with gloves to avoid leaving fingerprints on the evidence.

e. **Consider** collection of control/blank samples (see section C5f).

**NOTE:** In arson, in addition to control/blank samples, also take a burned sample from an area removed from the point of origin of the fire.
f. **Ensure** proper packaging of individual items of evidence (see sections C5i, k-m), that containers prevent loss of volatile evidence by using **nonporous containers**, that the location of evidence at the scene is documented (see section C3), that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

c5. **Trace evidence collection.**
(e.g., hairs, fibers, glass, paint, gunshot residue (gsr), entomological evidence, botany, soil, cosmetics, oils/plastics.)

a. **Locate** by using visual observation techniques, lighting techniques (e.g., oblique, alternate light source), and taping techniques.

b. **Collect** by using manual methods (e.g., tweezers, forceps, gloved hand), taping techniques, scraping techniques, vacuum techniques (NOTE: Use this method of collection as a last resort), and by taking the whole item on which the trace evidence is located (e.g., rock with hair, bumper with paint, carpeting).

c. **Consider** collection of control/blank and standard/reference samples (see sections C5e-f).

d. **Ensure** proper packaging of individual items of evidence (see sections C5i, k-m), that the location of evidence at the scene is documented (see section C3), that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

c6. **Questioned documents/electronic evidence collection.**

NOTE: Documents may be significant for the substance of what is stated (e.g., ransom notes, suicide notes, forged documents) and/or the nature of the physical evidence found in the document (e.g., ink, handwriting, paper). Standard/reference samples should be collected for comparison purposes. Potential electronic evidence may include computers, answering machine tapes, videotapes, pagers, etc. Follow jurisdictional laws regarding search and seizure of electronic evidence.

a. **Consider** consulting with electronic evidence experts for proper method(s) of collection.

NOTE: Personnel specifically trained in electronic crime investigation may be needed, since unplugging or disconnecting electronic devices could result in the loss of electronically stored data/evidence.

b. **Locate** evidence by using visual observation techniques, lighting techniques.

c. **Collect** by taking the whole item.

d. **Collect** standard/reference samples (see section C5e).

e. **Ensure** proper packaging of individual items of evidence (see section C5i, k-m), that the location of evidence at the scene is documented, that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

c7. **Reconstruction evidence collection.**

a. **Determine** usefulness of reconstructive techniques.

NOTE: Reconstructive techniques can be helpful to demonstrate a sequence of events, location of the parties involved, characteristics of the parties involved, or to corroborate or disprove statements.
b. **Recognize** the significance of blood spatter interpretation, the significance of projectile trajectory reconstruction (e.g., glass fracture, laser, bullet path, stringing techniques), the significance of accident reconstruction, the significance of excavated human remains, the significance of a burial site and the surrounding area and the value of each as a separate crime scene, the significance of skeletal remains, and the significance of preserving evidence that specialists may use for reconstructive techniques (e.g., facial reconstruction, post mortem interval (time of death) determination, detection of administered chemicals/poisons, and forensic odontology for bitemark identification or identification of human remains).

c. **Locate** by applicable methods (e.g., visual observation, lighting, lasers, chemical enhancement).

d. **Document** by applicable methods (e.g., photographic, videographic, sketch with measurement).

c8. **Controlled substances/chemicals evidence collection.**

NOTE: If dangerous substances, such as clandestine laboratory evidence, chemicals/poisons, industrial waste, or acids are present, specialized personnel with protective equipment and training should collect them. When it is not possible for a specialized team to conduct the investigation, the following steps can be taken.

a. **Re-evaluate** safety issues (see section A2a for discussion of safety concerns to be re-addressed).

b. **Locate** evidence by using visual observation (e.g., paraphernalia, pipes, glassine packets), alternate light sources, drug detecting animals, field testing techniques (NOTE: Presumptive test to indicate the presence of a controlled substance), and by being aware of and noting odors that could indicate the presence of chemicals and/or reaction mixtures.

c. **Collect** by sampling of clandestine laboratory chemicals and by taking item(s) of evidence.

d. **Ensure** proper packaging of individual items of evidence (see sections Ci, j-m), that the location of evidence at the scene is documented, that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

c9. **Other types of evidence.**

NOTE: All other evidence related to the crime that may not fit into one of the above categories (e.g., car parts, botanical evidence, physical matching evidence, toxicological evidence, poisons).

a. **Locate** unique types of evidence.

b. **Collect** unique types of evidence

c. **Consider** collection of control/blank, standard/reference, and elimination samples (see sections C5e-g).

d. **Ensure** proper packaging of individual items of evidence (see sections C5i, j-m), that the location of evidence at the scene is documented (see section C3), that the date of collection is documented, that the identity of the individual making the collection is documented, and that the description of item(s) to be collected is documented.

d. **Establish chain of custody.**

1. Initiate documentation of custody of evidence.

NOTE: This can be accomplished with evidence identifiers, chain of custody forms, direct marking of the evidence item(s), etc.
e. **Obtain standard/reference samples from the scene.**

   NOTE: If collected, standard/reference samples should be collected at the same time as the evidence. This timeframe may not apply to the collection of blood standards or hair exemplars from the victim(s)/suspect(s).

   1. Determine if standard/reference samples are needed.
   2. Identify standard/reference samples.
   4. Package samples individually.

f. **Obtain control samples from the scene.**

   1. Determine if control samples are needed.
   NOTE: If collected, control samples should be collected at the same time as evidence.

   2. Identify control samples.
   3. Collect control samples.
   4. Package samples individually.

g. **Obtain elimination samples.**

   1. Determine if elimination samples are needed.

   2. Identify and collect elimination samples.

   3. Package samples individually.

h. **Secure electronically recorded evidence from the vicinity of the scene (immediately).**

   NOTE: e.g., answering machine tapes/voice mail, surveillance camera videotapes (including those of neighboring businesses), computers, cell phones, pagers, caller id, fax machines, e-mail, and peripherals.

   1. Determine if electronic evidence is present.

   NOTE: Determine whether personnel specifically trained in electronic crime investigation are required to collect the evidence, since unplugging or disconnecting electronic devices could result in the loss of electronically stored data/evidence.

   2. Collect electronic evidence.

   NOTE: Follow jurisdictional laws regarding search and seizure of electronic evidence.

i. **Identify and secure evidence in proper containers.**

   1. Identify characteristics of evidence to be packaged.

   2. Select a proper container based on the characteristics of the evidence (e.g., nonporous (liquids or volatile substances, powdered controlled substances), **porous** (dried biological evidence, trace evidence), crushproof (glass fragments, sharps, pills/capsules)).

   3. Ensure evidence is in proper condition for packaging.
NOTE: If biological or organic evidence is not completely dry, prior to packaging and sealing, package it in a temporary container until a suitable location is reached to dry it.

4. Place evidence in container.

NOTE: Determine whether individual items should be packaged separately to minimize cross-contamination and/or contamination. If items are wet, double or triple bag. However, if items are found already in contact with one another, package them together (e.g., clothing, trash, weapons w/blood or hair, bedding).

5. Label, date, initial, and seal evidence container(s).

NOTE: When packaged items are wet, prevent packages from coming in contact with one another to prevent cross-contamination.

6. Ensure that an inventory list of items of evidence collected/to be collected is begun and maintained.

7. Use a secure area for storage of evidence while scene processing proceeds and retain packaged evidence in the designated secure area until transport to the appropriate facility (see section B1i).

NOTE: Ensure step-by-step packaging for items when needed (e.g., paint sample—porous first, then crushproof; drugs—plastic bags or crushproof; blood—porous; trace—porous/crushproof).

j. Document the description and condition of firearms/weapons prior to rendering them safe.

NOTE: Refer to section C5c1 for collection and packaging of impression evidence.

1. Use additional close-up photography to document any evidence that may be on or near the weapon.

2. Record the physical condition of the weapon.

NOTE: For firearms, record whether cocked, cocked and locked, and whether there is a magazine in the weapon. For all weapons, record whether any biological or trace evidence, etc., is adhering to the weapon.

3. Determine and record the best method for rendering the weapon safe.

NOTE: For firearms, e.g., put safety on; unload; if found in water maintain immersed in water; place in gun box, etc. For sharps, package in puncture-proof container, etc. Record the location of any spent or live shell cases under the hammer or any cartridge or cartridge cases (live or spent rounds) in firearms.

4. Identify the weapon.

NOTE: For firearms, record the make, model, caliber, and serial number, if readily observable. For all weapons, record the physical description, including markings.

k. Avoid excessive handling of evidence after it is collected.

NOTE: Include information on all persons having custody of the evidence as evidence is transferred from person to person or place to place.

1. Avoid reopening sealed evidence once it is packaged.

2. Limit the number of people in the chain of custody.
I. Maintain evidence at the scene in a manner designed to diminish degradation/loss.
   1. Utilize the secure area for temporary storage of evidence.
   2. Ensure that temporarily maintained evidence is kept in a cool, dry environment, protected from temperature extremes and other environmental insults (e.g., air conditioned vehicle/building, cooler).

m. Transport and submit evidence for secure storage.
   1. Check inventory of evidence prior to transport and ensure all evidence collected is accounted for.
   2. Maintain the integrity of individual items of evidence so as to avoid compromising evidence yet to be processed (e.g., latent prints on a physical item).
   3. Determine whether specialized equipment is needed to transport unusual items of evidence.
   4. Ensure transport to appropriate facility as soon as possible.

NOTE: When it is not possible to transport evidence quickly due to weather or other delays, ensure that the chain of custody is maintained and the integrity of evidence is not compromised.
Section D
Completing and Recording the Crime Scene Investigation

1. Establish Crime Scene Debriefing Team
2. Perform Final Survey of the Crime Scene
3. Documentation of the Crime Scene

At the conclusion of this training section, the student is expected to demonstrate the ability to complete and document the processing of a crime scene. This includes knowing how to facilitate a crime scene debriefing with appropriate personnel prior to release of the scene and how to prioritize forensic testing options and the proper sequence of potential forensic testing to maximize the utility of all evidence collected. It also includes knowing how to compile the documentation of the crime scene. The student is expected to demonstrate competence in each of the topic areas through testing—either written, practical, or both.
1. Establish Crime Scene Debriefing Team

a. Determine person(s) who may participate in the crime scene debriefing.

b. Determine what evidence was collected.

c. Discuss preliminary scene findings.

d. Discuss potential forensic evidence testing and sequencing/prioritizing of tests/examinations.

e. Initiate any action(s) identified in the debriefing to complete the crime scene investigation.

f. Brief person(s) in charge upon completion of assigned crime scene tasks.

g. Establish post-scene responsibilities.

Performance Objective

Given a crime scene scenario, the student is expected to demonstrate the ability to conduct a crime scene debriefing with appropriate personnel prior to release of the scene. The debriefing is expected to include a discussion of observations made, evidence collected, forensic testing, and other actions necessary to complete the crime scene investigation, including the ability to recognize and prioritize forensic testing options and the proper sequence of potential forensic testing to maximize the utility of all evidence collected and post-scene responsibilities.

1. Establish Crime Scene Debriefing Team

NOTE: The investigator(s) in charge should be responsible for the crime scene debriefing.

a. **Determine person(s) who may participate in the crime scene debriefing.**

   NOTE: Composition of the team is scene dependent and may consist of only one officer.

   1. *Initial responding officer(s).*
   
   2. Additional police personnel (e.g., other investigators, canvassing officer, perimeter security, dispatcher, interviewing officer(s), officer(s) controlling and/or assisting victim(s), witness(es), and suspect(s)).
   
   3. Evidence collection personnel (e.g., photographer(s), evidence technician(s), latent print personnel, specialized personnel).
   
   4. Emergency services personnel (e.g., fire, medical, search and rescue).
   
   5. Prosecuting attorney (when appropriate).

b. **Determine what evidence was collected.**

   1. Review evidence documentation (e.g., inventories, tags, notes).
   
   2. Communicate with evidence collection personnel and additional police personnel who may have collected evidence.
c. **Discuss preliminary scene findings.**
   NOTE: Discussion should be topic specific depending on the personnel to whom the investigator(s) in charge is speaking.
   1. Communicate with personnel regarding what they observed.
   2. Communicate with personnel regarding what they were told.
   3. Communicate with personnel regarding what actions they performed.

d. **Discuss potential forensic evidence testing and sequencing/prioritizing of tests/examinations.**
   NOTE: Discussion should be topic specific depending on the personnel to whom the investigator(s) in charge is speaking.
   1. Communicate with evidence collection personnel.
   2. Communicate with other specialized personnel.
   3. Communicate with prosecuting attorney (when appropriate).
   NOTE: In some jurisdictions, depending on the evidence in question and the nature of the crime, investigators in charge should communicate with the prosecuting attorney’s office before making decisions that potentially may compromise the evidence.

e. **Initiate any action(s) identified in the debriefing to complete the crime scene investigation.**
   1. Identify actions necessary to complete the processing of the crime scene.
      NOTE: Consider areas that may not have been searched/processed and confirm that all assigned tasks have been completed.
   2. Identify actions necessary to protect the crime scene(s).
   3. Assign responsibilities to appropriate personnel.
      NOTE: This may include personnel not present at the scene or debriefing.

f. **Brief person(s) in charge upon completion of assigned crime scene tasks.**
   1. Communicate with team members.
   2. Communicate with the prosecuting attorney (when appropriate).
   3. Communicate with and elicit advice and instruction for crime scene evaluation from superiors, when appropriate.

g. **Establish post-scene responsibilities.**
   1. Assign tasks to law enforcement personnel.
   2. Assign tasks to other responders (see glossary).
      NOTE: Avoid unnecessary communication with individuals not directly involved in the investigation. Investigators in charge should use caution in releasing any information that may compromise the investigation or potential prosecution.
2. Perform Final Survey of the Crime Scene

a. Perform visual inspection of each area of the crime scene(s).
   1. Determine the need for personal protective equipment (PPE) (appropriate for scene re-entry).
   2. Conduct a walk-through (with individuals responsible for processing the scene, if available).
   3. Visually inspect for evidence not previously collected.
   4. Visually inspect for equipment and materials generated by the investigation.
   5. Visually inspect for dangerous materials or conditions.

b. Collect any evidence remaining at the scene(s).
   NOTE: This may require personnel not present at the scene or debriefing.
   1. Assign appropriate personnel to collect evidence identified during the debriefing.
   2. Assign appropriate personnel to collect evidence identified during the walk-through.

c. Remove all equipment and materials used or generated during the investigation.
   1. Assign appropriate personnel to remove equipment and materials identified during the debriefing.
   2. Assign appropriate personnel to remove equipment and materials identified during the walk-through.

d. Secure any dangerous materials or conditions remaining at the scene.
   1. Report any dangerous materials or conditions remaining at the scene to appropriate individuals or agencies for corrective action.
   2. Notify individuals who may be exposed to dangerous conditions remaining at the scene.
   NOTE: The extent of notification depends on the level of danger.
3. Take preventive measures to minimize the danger to others (e.g., before leaving a building, lock doors and windows to prevent unauthorized access).

e. **Release the crime scene.**
   1. Observe jurisdictional requirements for release.
   2. Notify person(s) involved with the investigation that the scene has been released.
   3. Remove crime scene barriers (e.g., crime scene tape, cones).
3. Documentation of the Crime

a. Generate the crime scene(s) case file.

b. Ensure preservation of case file documentation.

Performance Objective Given a crime scene scenario, the student is expected to demonstrate an ability to compile a case file and secure it pursuant to appropriate departmental guidelines/policies and procedures. The student also is expected to ensure that all necessary documentation that constitutes the record of all actions and evidence collected at the scene(s) is placed in the crime scene case file such that it may be accessed for independent review.

3. Documentation of the Crime Scene

a. Generate the crime scene(s) case file.

   NOTE: The following elements should not be considered a comprehensive list of the documentation compiled in an investigative case file, but is limited to crime scene documentation.

   1. Initial responding officer(s’) documentation.
   2. Emergency services personnel documentation.
   3. Entry/exit documentation.
   4. Photographs/video(s).
   5. Crime scene sketches/diagrams.
   7. Other responder(s’) report(s).
   8. Record of consent form(s) or search warrant(s).
   9. Other reports, such as forensic/technical reports (as they become available).

b. Ensure preservation of case file documentation.

   NOTE: It should be recognized that a proper recordkeeping policy is an essential element of sound law enforcement.

   1. Review guidelines/policies and procedures.

   NOTE: It is recognized that some departments do not have written policies. While not encouraged, in such cases the routine practices of the department in maintaining records is in essence a policy.

   2. Adhere to departmental guidelines/policy and procedures.
Section E

Crime Scene Equipment

1. Initial Responding Officer(s)

2. Crime Scene Investigator/
   Evidence Technician

3. Evidence Collection Kits (Examples)
## 1. Initial Responding Officer(s)

**Essential***
- Consent/search forms.
- Crime scene barricade tape.
- First-aid kit.
- Flares.
- Flashlight and extra batteries.
- Paper bags.
- Personal protective equipment (PPE).

* These items should be in police vehicles or readily available to initial responding officer(s).

**Optional**
- Audiotape recorder.
- Camera with flash and extra film.
- Chalk.
- Directional marker/compass.
- Disinfectant.
- Maps.
- Plastic bags.
- Pocket knife.
- Reflective vest.
- Tape measure.
- Tarps to protect evidence from the weather.
- Traffic cones
- Waterless hand wash (towelette with germicide).
- Wireless phone.

## 2. Crime Scene Investigator/Evidence Technician

**Essential***
- Bindle paper.
- Biohazard bags.
- Body fluid collection kit.
- Camera (35 mm) with flash/film/tripod.
- Casting materials.
- Consent/search forms.
- Crime scene barricade tape.
- Cutting instruments (knives, box cutter, scalpel, scissors).
- Directional marker/compass.
- Disinfectant.
- Evidence collection containers.
- Evidence identifiers.
- Evidence seals/tape.

**Optional**
- First-aid kit.
- Flashlight and extra batteries.
- High-intensity lights.
- Latent print kit.
- Magnifying glass.
- Measuring devices.
- Permanent markers.
- Personal protective equipment (PPE).
- Photographic scale (ruler).
- Presumptive blood test supplies.
- Sketch paper.
- Tool kit.
- Tweezers/forceps.

* These items should be in police vehicles or readily available to initial responding officer(s).
Optional

Audiotape recorder.
Bloodstain pattern examination kit.
Business cards.
Chalk.
Chemical enhancement supplies.
Entomology (insect) collection kit.
Extension cords.
Flares.
Forensic light source (alternate light source, UV lamp/laser, goggles).
Generator.
Gunshot residue kit.
Laser trajectory kit.
Maps.
Marking paint/snow wax.
Metal detector.
Mirror.

3. Evidence Collection Kits [Examples]

Blood Collection

Bindle.
Coin envelopes.
Disposable scalpels.
Distilled water.
Ethanol.
Evidence identifiers.
Latex gloves.
Photographic ruler (**ABFO scales**).
Presumptive chemicals.
Sterile gauze.
Sterile swabs.
Test tubes/test tube rack.

Bloodstain Pattern Documentation

ABFO scales.
Calculator.
Laser pointer.
Permanent markers.
Protractor.
String.
Tape.

Excavation

Cones/markers.
Evidence identifiers.
Metal detectors.
Paintbrushes.
Shovels/trowels.
Sifting screens.
String.
Weights.
Wooden/metal stakes.

**Fingerprint**
- Black and white film.
- Brushes.
- Chemical enhancement supplies.
- Cyanoacrylate (super glue) wand/packets.
- Flashlight.
- Forensic light source.
- Lift cards.
- Lift tape.
- Measurement scales.
- One-to-one camera
- Powders.

**Impression**
- Bowls/mixing containers.
- Boxes.
- Dental stone (die stone).
- Evidence identifiers.
- Measurement scales.
- Permanent markers.
- Snow print wax.
- Water.

**Pattern Print Lifter**
- Chemical enhancement supplies.
- Electrostatic dust lifter.
- Gel lifter
- Wide format lift tape

**Toolmarks**
- Casting materials.

**Trace Evidence Collection**
- Acetate sheet protectors.
- Bindle paper.
- Clear tape/adhesive lift.
- Flashlight (oblique lighting).
- Forceps/tweezers.
- Glass vials.
- Slides and slide mailers.
- Trace evidence vacuum with disposable collection filters.

**Trajectory**
- Calculator.
- Canned smoke.
- Dummy.
- Laser.
- Mirror.
- Protractor.
- String.
- Trajectory rods.
The definitions contained herein apply to terms as used in this document.

**ABFO scales:** (American Board of Forensic Odontology scales). An L-shaped piece of plastic used in photography that is marked with circles, black and white bars, and 18-percent gray bars to assist in distortion compensation and provide exposure determination. For measurement, the plastic piece is marked in millimeters.

**Alternate light source:** Equipment used to produce visible and invisible light at various wavelengths to enhance or visualize potential items of evidence (fluids, fingerprints, clothing fibers, etc.).

**Bindle paper:** Clean paper folded to use to contain trace evidence, sometimes included as part of the packaging for collecting trace evidence.

**Biohazard bag:** A container for materials that have been exposed to blood or other biological fluids and have the potential to be contaminated with hepatitis, AIDS, or other viruses.

**Biological fluids:** Fluids that have human or animal origin, most commonly encountered at crime scenes (e.g., blood, mucus, perspiration, saliva, semen, vaginal fluid, urine).

**Biological weapon:** Biological agents used to threaten human life (e.g., anthrax, smallpox, or any infectious disease).

**Bloodborne pathogen:** Infectious, disease-causing microorganisms that may be found or transported in biological fluids.

**Boundaries:** The perimeter or border surrounding potential physical evidence related to the crime.

**Case file:** The collection of documents comprising information concerning a particular investigation. (This collection may be kept in case jackets, file folders, ring binders, boxes, file drawers, file cabinets, or rooms. Subfiles are often used within case files to segregate and group interviews, media coverage, laboratory requests and reports, evidence documentation, photographs, videotapes, audiotapes, and other documents.)

**Case identifiers:** The alphabetic and/or numeric characters assigned to identify a particular case.

**Chain of custody:** A process used to maintain and document the chronological history of the evidence. (Documents should include name or initials of the individual collecting the evidence, each person or entity subsequently having custody of it, dates the items were collected or transferred, agency and case number, victim or suspect’s name, and a brief description of the item.)

**Chemical enhancement:** The use of chemicals that react with specific types of evidence (e.g., blood, semen, lead, fingerprints) in order to aid in the detection and/or documentation of evidence that may be difficult to see.

**Chemical threat:** Compounds that may pose bodily harm if touched, ingested, inhaled, or ignited. These compounds may be encountered at a clandestine laboratory, or through a homemade bomb or tankard leakage (e.g., ether, alcohol, nitroglycerin, ammonium sulfate, red phosphorous, cleaning supplies, gasoline, or unlabeled chemicals).

**Clean/sanitize:** The process of removing biological and/or chemical contaminants from tools and/or equipment (e.g., using a mixture of 10-percent household bleach and water).
Collect/collection: The process of detecting, documenting, or retaining physical evidence.

Comparison samples: A generic term used to describe physical material/evidence discovered at crime scenes that may be compared with samples from persons, tools, and physical locations.

Comparison samples may be from either an unknown/questioned or a known source.

Samples whose source is unknown/questioned are of three basic types:

1. Recovered crime scene samples whose source is in question (e.g., evidence left by suspects, victims).
2. Questioned evidence that may have been transferred to an offender during the commission of the crime and taken away by him or her. Such questioned evidence can be compared with evidence of a known source and can thereby be associated/linked to a person/vehicle/tool of a crime.
3. Evidence of an unknown/questioned source recovered from several crime scenes may also be used to associate multiple offenses that were committed by the same person and/or with the same tool or weapon.

Samples whose source is known are of three basic types:

1. A standard/reference sample is material of a verifiable/documented source which, when compared with evidence of an unknown source, shows an association or linkage between an offender, crime scene, and/or victim (e.g., a carpet cutting taken from a location suspected as the point of transfer for comparison with the fibers recovered from the suspect’s shoes, a sample of paint removed from a suspect vehicle to be compared with paint found on a victim’s vehicle following an accident, or a sample of the suspect’s and/or victim’s blood submitted for comparison with a bloodstained shirt recovered as evidence).
2. A control/blank sample is material of a known source that presumably was uncontaminated during the commission of the crime (e.g., a sample to be used in laboratory testing to ensure that the surface on which the sample is deposited does not interfere with testing. For example, when a bloodstain is collected from a carpet, a segment of unstained carpet must be collected for use as a blank or elimination sample).
3. An elimination sample is one of known source taken from a person who had lawful access to the scene (e.g., fingerprints from occupants, tire tread impressions from police vehicles, footwear impressions from emergency medical personnel) to be used for comparison with evidence of the same type.

Contamination: The unwanted transfer of material from another source to a piece of physical evidence.

Control/blank sample: See comparison samples.

Cross-contamination: The unwanted transfer of material between two or more sources of physical evidence.

Documentation: Written notes, audio/videotapes, printed forms, sketches and/or photographs that form a detailed record of the scene, evidence recovered, and actions taken during the search of the crime scene.

Dying declaration: Statements made by a person who believes he or she is about to die, concerning the cause or circumstance surrounding his or her impending death.

Elimination sample: See comparison samples.

Evidence identifiers: Tape, labels, containers, and string tags used to identify the evidence, the person
collecting the evidence, the date the evidence was gathered, basic criminal offense information, and a brief description of the pertinent evidence.

First responder(s): The initial responding law enforcement officer(s) and/or other public safety official(s) or service provider(s) arriving at the scene prior to the arrival of the investigator(s) in charge.

Impression evidence: Objects or materials that have retained the characteristics of other objects that have been physically pressed against them.

Initial responding officer(s): The first law enforcement officer(s) to arrive at the scene.

Investigator(s) in charge: The official(s) responsible for the crime scene investigation.

Known: See comparison samples.

Latent print: A print impression not readily visible, made by contact of the hands or feet with a surface resulting in the transfer of materials from the skin to that surface.

Measurement scale: An object showing standard units of length (e.g., ruler) used in photographic documentation of an item of evidence.

Multiple scenes: Two or more physical locations of evidence associated with a crime (e.g., in a crime of personal violence, evidence may be found at the location of the assault and also on the person and clothing of the victim/assailant, the victim’s/assailant’s vehicle, and locations the victim/assailant frequents and resides).

Nonporous container: Packaging through which liquids or vapors cannot pass (e.g., glass jars or metal cans).

Other responders: Individuals who are involved in an aspect of the crime scene, such as perimeter security, traffic control, media management, scene processing, and technical support, as well as prosecutors, medical personnel, medical examiners, coroners, forensic examiners, evidence technicians, and fire and rescue officers.

Personal protective equipment (PPE): Articles such as disposable gloves, masks, and eye protection that are used to provide a barrier to keep biological or chemical hazards from contacting the skin, eyes, and mucous membranes and to avoid contamination of the crime scene.

Porous container: Packaging through which liquids or vapors may pass (e.g., paper bags, cloth bags).

Presumptive test: A nonconfirmatory test used to screen for the presence of a substance.

Projectile trajectory analysis: The method for determining the path of a high-speed object through space (e.g., a bullet emanating from a firearm).

Radiological threat: The pending exposure to radiation energy. (This energy can be produced by short-wave x-rays or through unstable isotopes.)

Single-use equipment: Items that will be used only once to collect evidence, such as biological samples, then discarded to minimize contamination (e.g., tweezers, scalpel blades, droppers).

Standard/reference sample: See comparison samples.

Team members: Individuals who are called to the scene to assist in investigation or processing of the scene (e.g., scientific personnel from the crime laboratory or medical examiner’s office, other forensic specialists, photographers, mass disaster specialists, experts in the identification of human remains, arson and explosives investigators, clandestine drug laboratory investigators, as well as other experts).

Trace evidence: Physical evidence that results from the transfer of small quantities of materials (e.g., hair, textile fibers, paint chips, glass fragments, gunshot residue particles).
**Transient evidence:** Evidence which by its very nature or the conditions at the scene will lose its evidentiary value if not preserved and protected (e.g., blood in the rain).

**Unknown/questioned:** See comparison samples.

**Walk-through:** An initial assessment conducted by carefully walking through the scene to evaluate the situation, recognize potential evidence, and determine resources required. Also, a final survey conducted to ensure the scene has been effectively and completely processed.
About the National Institute of Justice

NIJ is the research, development, and evaluation agency of the U.S. Department of Justice. The Institute provides objective, independent, evidence-based knowledge and tools to enhance the administration of justice and public safety. NIJ's principal authorities are derived from the Omnibus Crime Control and Safe Streets Act of 1968, as amended (see 42 U.S.C. §§ 3721–3723).

The NIJ Director is appointed by the President and confirmed by the Senate. The Director establishes the Institute's objectives, guided by the priorities of the Office of Justice Programs, the U.S. Department of Justice, and the needs of the field. The Institute actively solicits the views of criminal justice and other professionals and researchers to inform its search for the knowledge and tools to guide policy and practice.

Strategic Goals

NIJ has seven strategic goals grouped into three categories:

Creating relevant knowledge and tools

1. Partner with State and local practitioners and policymakers to identify social science research and technology needs.
2. Create scientific, relevant, and reliable knowledge—with a particular emphasis on terrorism, violent crime, drugs and crime, cost-effectiveness, and community-based efforts—to enhance the administration of justice and public safety.
3. Develop affordable and effective tools and technologies to enhance the administration of justice and public safety.

Dissemination

4. Disseminate relevant knowledge and information to practitioners and policymakers in an understandable, timely, and concise manner.
5. Act as an honest broker to identify the information, tools, and technologies that respond to the needs of stakeholders.

Agency management

6. Practice fairness and openness in the research and development process.
7. Ensure professionalism, excellence, accountability, cost-effectiveness, and integrity in the management and conduct of NIJ activities and programs.

Program Areas

In addressing these strategic challenges, the Institute is involved in the following program areas: crime control and prevention, including policing; drugs and crime; justice systems and offender behavior, including corrections; violence and victimization; communications and information technologies; critical incident response; investigative and forensic sciences, including DNA; less-than-lethal technologies; officer protection; education and training technologies; testing and standards; technology assistance to law enforcement and corrections agencies; field testing of promising programs; and international crime control.

In addition to sponsoring research and development and technology assistance, NIJ evaluates programs, policies, and technologies. NIJ communicates its research and evaluation findings through conferences and print and electronic media.
THE KENTUCKY STATE POLICE FORENSIC LABORATORY HEREBY GRANTS PERMISSION TO PRINT COPIES OF THIS DOCUMENT FOR REFERENCE PURPOSES ONLY. ALL PRINTED COPIES SHALL BE CONSIDERED UNCONTROLLED.
PREFACE

This manual has been prepared as an aid in the collection and preservation of evidence prior to its submission to a laboratory for analysis. Nothing printed in this manual is meant to preempt using common sense in applying this information to field applications. All other previous versions of this document are now considered null and void.

This manual is divided into sections concerning different types of evidence. Each type is discussed in terms of its value as evidence, the information that can be determined from it, the collection of the evidence and how to ship the evidence. It is important to note that the section concerning collection is a “how to” section and can be used as a field guide.

Even though the Kentucky State Police Forensic Laboratory does not have evidence collection personnel who are sent to crime scenes, technical assistance and advice to any agency is always available. If you need this assistance, please call 502-564-5230 between the hours of 8 AM and 4:30 PM Monday through Friday at Frankfort. You will be directed to the appropriate individual for information.

Laboratory reports containing results and/or conclusions of examination are available on the world-wide-web (the internet) through a secured portal with a username and password available to requesting agencies from the Laboratory System Director. Reports are not mailed on a regular basis. Faxed reports can be sent upon request if you do not have access to the internet at the time of request, or have not set up your username and password for report retrieval. Reports will only be distributed to authorized individuals.
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 INTRODUCTION

The Kentucky State Police Forensic Laboratory has been established to serve a vital need in the criminal justice system. Their purpose is to scientifically analyze physical evidence from criminal activities and to deliver that information to the submitting agency to aid in its investigation and to the judicial system in the event of a trial.

In order to handle the thousands of cases involving physical evidence, the Kentucky State Police has developed a forensic laboratory system that has six (6) locations in Frankfort, Madisonville, Ashland, Louisville, London, and Cold Springs, Kentucky. Please review Appendix A for addresses, phone numbers, and a list of services offered at each location.

In addition to laboratory analysis, technical assistance at crime scenes is also available through advice over the telephone.

Expert testimony by the examiner, who performs the analysis and whose opinions and/or results are stated on the report, is also available when the case goes to trial; however, in order to maximize the amount of time an examiner has for analysis, the following are requested when expert testimony is required:

1. That it is ascertained whether or not the expert is a necessary witness.
2. That the analyst be advised when and where the trial is to be held as far in advance as possible in order to avoid conflicts with other commitments.
3. That the analyst be advised regarding the expected duration of the trial and the exact date on which the expert will be needed.

All of these services are available, free of charge, to all state, federal, county, and municipal law enforcement agencies and to the Public Defender's Office in connection with official investigations in criminal cases. Normally, no examination will be made if the same or similar evidence in an individual case has been subjected previously to a technical examination in the same scientific field. This limitation is necessary in the interest of economy as well as for the proper administration of justice. Requests for re-examination decisions are at the discretion of the Laboratory Director or the Court System. If there is any question concerning laboratory services, please contact any of the forensic laboratory locations.

Other services are available by the Kentucky State Police, but are not a part of the Forensic Laboratory

Latent print
Automated Fingerprint Identification Section (AFIS)
1266 Louisville Road
Frankfort, KY 40601
(502) 782-9821
**Polygraph Office (Central)**
1250 Louisville Road  
Frankfort KY 40601  
(502) 782-2025

Polygraph offices are also located in the Western, Northern, Eastern, and Southeast Laboratories.

Other services available through organizations outside of the Kentucky State Police:

**Medical Examiners Office**  — *Executive Director*
Central Laboratory Facility  
100 Sower Blvd, Suite 202  
Frankfort, KY 40601  
Tel: (502) 564-4545  
Fax: (502) 564-1699

**Questioned Documents**
Federal Bureau of Investigation  
Federal Bureau of Investigation Laboratory Division  
Attention: Evidence Control Unit  
2501 Investigation Parkway  
Quantico, VA 22135  
(703) 632-8444
NATURE AND VALUE OF PHYSICAL EVIDENCE

Evidence can be defined as something legally submitted to a court of law as a means of determining the truth. Physical evidence deals with material objects. It may be material left or taken from the scene of a crime by the suspect or victim, or it might be an impression left in some material. It includes not only fingerprints and footprints, but also hair, fibers, blood, flammable (ignitable) liquids, glass, or almost anything that can be deposited and collected. Unlike oral testimony, it is not influenced by the stress of the moment; it does not forget. Physical evidence can aid in solving the case by developing modi operandi (M.O.'s), by developing suspects, by proving or disproving alibis, by eliminating suspects or connecting suspects to the crime, by identifying the source of stolen materials, and by providing investigative leads. Physical evidence is often necessary to prove that a crime had been committed. For instance, the presence of ignitable liquids at a fire scene indicates arson, and the presence of heroin constitutes a crime if connected to a suspect.

The amount of consideration given to physical evidence depends on whether the evidence has individual or class characteristics. Evidence with individual characteristics can definitely be identified with a person or source if sufficient microscopic or accidental markings are present. Some examples include fingerprints, firearms, bullets, tool marks, shoe prints, and pieces of glass in cases in which broken edges can be matched.

Since all forensic laboratory locations have more case work than analytical time, the submitting officer can aid the examiner by fully relaying the facts of the case. Information given to the laboratory will establish the direction of the analysis and may help to determine the worthiness of the evidence. Many laboratory examinations are lengthy and expensive. The efficiency of the laboratory is directly related to keeping the analyst well informed as to the facts of the case, submitting relevant evidence, and not overloading the system.
COLLECTION OF PHYSICAL EVIDENCE

While the specifics of collection of different types of evidence will be discussed later under the individual categories of evidence, certain general rules must be kept in mind.

1. All evidence must be collected legally--either with a warrant, with the consent of the owner or incidental to an arrest.

2. All evidence must be safely collected, packaged, sealed with evidence tape and initialed, stored, and transferred. This is of special concern with respect to bloodborne pathogens. Exposure to HIV (the AIDS virus) and to the hepatitis B virus is of much concern in collecting any evidence that has blood or other body fluids present in either the liquid or dry state. This includes garments, and other types of evidence involved in murders, rapes, assaults, burglaries, and drug offenses. Please consult your agency’s exposure control plan for bloodborne pathogens. In general, at least disposable gloves should be used in handling such evidence, and safety glasses, surgical masks, and other safety garments should be available if necessary. A 10% solution of household bleach and water is a good disinfectant for cleaning items or areas contaminated by such materials. Do not, however, use this solution on the evidence itself unless instructed to do so by the laboratory, since it could destroy some of the evidence that should be analyzed. Do not use a bleach solution in conjunction with a clandestine laboratory. Chemicals associated with a clandestine lab can produce lethal gases upon mixture with bleach.

3. The evidence must be described in notes. Where it was located, the circumstances, and how it was obtained should be recorded along with the date.

4. The evidence must be marked for later identification. Initials and date, with proper notes, are usually sufficient. The use of a case number and exhibit number is highly recommended. Markings on the wrapping or tags need to be placed with the evidence (do not mark the evidence itself); however, in cases of liquids, powders, small fragments, etc., the containers need to be marked, sealed and initialed. The recommended places on specific types of evidence will be discussed under each particular type of evidence.

5. All evidence needs to be stored in a secure place with restricted access. The chain of custody needs to be documented. Valuable evidence such as money, drugs and weapons needs to be secured separately within the storage locker.

6. All evidence needs to be properly sealed and initialed for submission to the Forensic Laboratory. An evidence package is defined as properly sealed when the contents cannot readily escape and if entering the container will result in obvious damage or alteration to the container or seal. Tape needs to be used to seal the openings of evidence containers. Initials or likewise identification of the person placing the seal should be marked across the tape so that the writing falls on both the tape and the container. Heat seals or manufactured self sealing
“evidence bags” may be used and should have the same markings placed along the seal. Stapling is not an appropriate seal. Evidence that is improperly sealed when received at the laboratory shall be properly sealed at that time. This shall be accomplished by having the submitting officer place an appropriate seal on the evidence and initial. If the submitting officer is not present, the receiving analyst shall properly seal and initial package.

**Packaging**

Select suitable containers such as round pillboxes, glass or plastic vials, envelopes, paper bags, strong cardboard boxes, etc., for packaging evidence. Each piece of evidence needs to be individually packaged to avoid any possibility of cross contamination. Special care must be taken not to package wet stains until they are dry. Wet items should NEVER be packaged in PLASTIC. Please see the “Blood and Other Body Fluids” section for more specifics for this type of evidence. The package needs to be sealed with evidence tape and initialed. Eliminate the use of staples since they can tear disposable gloves, skin tissue, and be a source of infection. Keep the chain of custody as small as possible. Keep the sealed evidence under lock and deliver it as soon as possible to the nearest laboratory providing the services needed.

Packages containing ANY evidence that is a possible source of infection, especially from bloodborne pathogens (e.g., HIV or Hepatitis B virus), must be packaged in a safe manner and properly marked identifying the contents as a BIOHAZARD. Such evidence includes garments with stains of blood and other body fluids, syringes, razor blades, knives, and contraband from body cavity searches. Sharps (e.g., razor blades, knives, or broken glass) must be packaged in puncture-resistant containers with biohazard labeling. *Syringes submitted for Drug Analysis are not accepted for analysis unless accompanied by a letter from the prosecutor.* Any piece of evidence that is likely to spill due to breakage, such as a tube of blood, must be double packed to prevent spillage. For instance, blood alcohol kits have zip-lock plastic bags for containing any blood spilled from broken blood sample tubes.

**Bloodstain Pattern Case Acceptance Policy**

I. Service

A. Bloodstain Pattern Analysis will only be performed for the agencies served by the Kentucky State Police Division of Forensic Services (i.e., KSP, local PD’s and Sheriffs’ offices, prosecutors, and public defenders).

B. Bloodstain Pattern Analysis is generally limited to murder, death investigations, or assaults. Not every case of these types is suitable for this type of analysis. Contact the Kentucky State Police Laboratory in the appropriate region prior to submission. An in-person consultation may be necessary prior to the submission of evidence, if requested by an analyst.

II. Suitability

A. The investigating officer should contact the Kentucky State Police Laboratory prior to submitting scene photographs (i.e. scene overview, areas of staining, stains, and close-up stains with scale) and/or items that may be submitted for this type of analysis.
B. The investigating officer should request bloodstain pattern analysis at the time of submission, prior to other analysis, if particular items (i.e., clothing) are to be considered for this type of analysis.

C. The investigating office may request the assistance of an analyst for examination at scenes of bloodshed with approval by the Laboratory Manager or their designee(s) and through other proper channels.

D. The investigating officer should provide witness and/or suspect statements, autopsy reports, scene diagrams, etc. as requested.

**Serology Case Acceptance**

I. Service
   A. Serology analysis will only be performed for the agencies served by the Kentucky State Police Division of Forensic Services (i.e., KSP, local PD’s and Sherriff’s offices, prosecutors, and public defenders).

II. Priority
   A. Priority will be given to current cases involving a violent crime (i.e., murder, sexual assault, assault, or robbery).
   B. The next priority will be given to current cases involving a property crime (i.e., arson, burglary, or other property crimes).
   C. Cold cases will be given last priority.
   D. Cases will typically be worked based on the case type and order in which the cases were received into the Forensic Biology Casework section of the Kentucky State Police Laboratory system.

III. Samples
   A. Although many items of evidence may be collected throughout an investigation, only the most probative items should be submitted to the laboratory for analysis. Information provided prior to and/or at the time of submission should be written on the KSP 26 or added to the narrative in the BEAST LIMS (i.e. specific additional case history for a relevant item, the name of the owner/wearer of an item and if the item was collected from or belonged to an individual, the collection location of an item). If additional items of evidence are available, an inventory of such may be submitted with the initial submission. Serological analysis will be conducted in the absence of reference standards; however, the case shall not be forwarded for DNA analysis until the appropriate DNA reference standards are submitted. Cases for which there is no suspect, when a suspect has fled, or when an investigating officer has attempted, but cannot obtain a warrant for the collection of a suspect’s standard may be exempt from this requirement. Reference standards are not included in the total item counts below.

B. Murder/Death Investigation Cases
   1. Initial submission
      a. One (1) to ten (10) items may be submitted; the investigating officer should indicate the order of importance for the items being submitted.
      b. With analyst discretion, additional items may be submitted on a case by case basis if specific information regarding the
circumstances for those items (i.e., multiple persons directly involved and/or bleeding) is provided by the investigating officer at the time of submission. The additional items request may also need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

2. Subsequent submission(s)
   a. Communication between the analyst(s) working the case and the investigating officer/prosecutor should provide information as to the reason additional items may need to be submitted. The additional analysis request may need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

C. Sexual Assault Cases
   1. Initial submission
      a. Sexual Assault Evidence Collection Kit(s)
      b. Panties/underwear worn during/after the offense that were collected but not included in the kit should be submitted.
      c. Other clothing and/or bed linens should not normally be submitted during the initial submission.
      d. With analyst discretion, additional items may be submitted for cases involving victims who may be incapable of providing information about their assault (i.e., young children, mentally disabled, or elderly); however, the investigating officer should notify the analyst of this circumstance at the time of submission. The additional items request may also need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).
      e. Additional items may be submitted on a case by case basis if specific information regarding the circumstances for those items (i.e., multiple suspects, no kit(s) was collected, or known ejaculation on a particular item) is provided by the investigating officer at the time of submission.

   2. Subsequent submission(s)
      a. Clothing and/or bed linens may be submitted after the initial analysis is completed if there is no probative evidence from the initial submission.
      b. Communication between the analyst and the investigating officer/prosecutor should provide information as to the reason any other additional items may need to be submitted. The additional analysis request may need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

D. Assault/Robery/Arson/Burglary Cases
   1. Initial submission
a. One (1) to five (5) items may be submitted; the investigating officer should indicate the order of importance for the items being submitted.

b. With analyst discretion, additional items may be submitted on a case by case basis if specific information about those items (i.e., multiple persons directly involved and/or bleeding) is provided by the investigating officer at the time of submission. The additional items request may also need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

2. Subsequent submission(s)

a. Communication between the analyst and the investigating officer/prosecutor should provide information as to the reason additional items may need to be submitted. The additional analysis request may need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

E. Other case types

1. The investigating officer should consult with a forensic biology analyst prior to submitting items to the Kentucky State Police Laboratory. The request may also need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

2. If the case is considered an acceptable case, reference Assault/Robbery/Arson/Burglary Cases submission guidelines.

IV. Incomplete Submissions from Serology Cases

A. Communication with the investigating officer to obtain the appropriate known DNA reference standards and Combined DNA Index System (CODIS) eligibility information (if not previously provided) for evidence samples shall be attempted and noted in the case file and/or narrative by the serology analyst working the case; however if the appropriate standards have not been received into the laboratory system prior to completion of the serological analysis report, the analyst shall report a statement similar to the following: “If DNA analysis is necessary, please resubmit Items X and Y, along with a blood or buccal standard from NAME.”

B. Incomplete serology submissions will not be forwarded for DNA analysis.

C. If the appropriate known DNA reference standards are submitted to the laboratory prior to the release of the evidence to the investigating agency, those items may be forwarded for DNA analysis and should be noted in the case file and/or narrative without the need for an additional laboratory report or corrections to the previously issued report.

Suitability

1. Stains which need to be determined as blood, semen, and/or saliva should be submitted to the appropriate laboratory for that region before being forwarded for DNA analysis.
II. A hair screen, and if applicable a hair comparison, should be completed prior to DNA analysis on hair(s) and shall follow the Hair Comparison Acceptance Policy of the TR-QAM 14.3. Exceptions may need to be approved by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s). DNA analysis of hair may result in consumption of the item.
   A. **Head hair, pubic hair, and/or facial hair (as applicable) standards from victims and/or suspects should be collected as close to the offense date as possible and submitted if trace analysis may be requested (recommended for autopsies).**
III. DNA analysis will generally be limited to suitable stains, hair, and reference standards.
IV. Touch DNA items are those where contact, which may be limited, between a person and an object could result in the transfer of cells to an object. These items will generally be analyzed only if other items have not provided probative information.
   A. Articles of clothing with other suitable stains or hair that provide an association to the offense may be submitted to determine the owner/wearer and are not considered touch DNA.
   B. Items utilized as a weapon in violent offense cases may be submitted and are not necessarily considered touch DNA. Suitable stains, hair, or analysis by another section in the laboratory may be required to make an association to the offense before being considered for analysis. Items collected from an individual/location to determine the owner (i.e. controlled substance, manufacturing controlled substance, and possession of a firearm) are generally not accepted.
   C. Articles of clothing submitted to determine the owner/wearer which do not have other suitable stains or hair that provide an association to the offense will be considered for analysis on a case by case basis and are not considered touch DNA. Information as to the item’s direct association to the scene is required when being considered for CODIS (i.e., witness statements, videotape, or photographs).
   D. Items for which fingerprinting is also requested will be considered for analysis on a case by case basis. The request for both analyses should be noted on the KSP 26. Consultation with AFIS may be appropriate.
V. Items collected from common areas (i.e. door knobs/push plates/handles, and countertops) and paper items which do not have other suitable stains or hair are considered touch DNA and should not be submitted.
VI. Analysis of a sample is contingent upon the size, quality, and probative value of that sample. Samples that do not meet these criteria will be returned unexamined.

**Reference Standards**

I. The appropriate DNA reference standards are required prior to the starting of DNA analysis, generally from both victim(s) and suspect(s). Cases for which there is no suspect, when a suspect has fled, or when an investigating officer has attempted, but cannot obtain a warrant for the collection of a suspect’s standard may be exempt from this
requirement. This information should be provided by the investigating officer at the time of submission. If this status changes, the investigating officer should notify the laboratory and submit any attainable standards. Known reference standards are utilized for comparison and elimination purposes. If the appropriate standards have not been submitted, an analyst or designee shall attempt to contact the submitting agency to request such. Incomplete submissions will be returned unexamined unless there was approval by the Laboratory Manager, Forensic Biology Casework Supervisor, or their designee(s).

II. Known reference standards may be a blood standard (drawn by medical personnel) and submitted in either dried (preferred) or liquid form or a buccal standard (swabbing from the inside of the cheek) collected from an individual.

III. Known reference standards for additional elimination purposes (i.e., spouse, companion, owners, or relatives) may also be requested. Elimination standards are often required for cases involving Touch DNA. If not previously submitted, these samples should be requested by an analyst or designee, as appropriate, prior to being forwarded for DNA analysis.

IV. Cases with touch DNA samples require the submission of a known DNA reference standards for elimination purposes from individual(s) who collected the evidence prior to DNA analysis on touch samples. DNA profiles obtained from these standards will be maintained in the staff database for quality assurance purposes. These samples will not be considered evidence unless requested by the submitting agency. The collector name(s) for touch samples should be provided at submission.

V. Pseudo-standards may only be submitted if an agency does not have enough probable cause to obtain a known DNA reference standard. Acceptable pseudo-standards are limited to the following: empty cup, can, or bottle, or a cigarette butt collected from a controlled environment (i.e. interview). Information pertaining to the collection of these types of samples must be provided to the laboratory when submitted. Exceptions to the aforementioned pseudo-standards must be approved in advance of submission by a DNA analyst. Pseudo-standards will not reference a named individual on the report. If probable cause is later established, a known reference standard should be collected and submitted to the laboratory for analysis and comparison to the evidence in the case for confirmation. An unconfirmed pseudo-standard should not solely be utilized for elimination purposes of a named person.

VI. Comparison to known DNA reference standards for which analysis has been completed may be requested by an agency, these are considered paper comparisons.

A. Paper comparisons to evidence items submitted from the same agency that requested the analysis for the reference standard should submit a KSP 26 referencing the agency case number or laboratory number for comparison.

B. Paper comparisons to evidence items submitted by an agency different than that which requested the analysis for the reference standard should submit a KSP 26 referencing the agency name/case number/item and laboratory number for the comparison of interest. In addition, the
prosecuting attorney for the jurisdiction maintaining the evidence items should submit a letter authorizing the use of the reference standard maintained by the other agency for comparison and acknowledging that there are no issues with the original chain of custody for the reference standard. Submissions of a KSP 26 for this purpose may be done so in person, via fax, or via email.

VII. An offender sample collected and submitted to the DNA Database Section of the Kentucky State Police Laboratory pursuant to (KRS 17.170) is not considered a suitable known DNA reference standard for casework purposes.

VIII. In the event that offender information is supplied as an investigative lead from a CODIS entry, a known DNA reference standard should be submitted for comparison to the evidence in the case.

IX. Known DNA reference standards collected for casework purposes are not eligible for entry in CODIS.

X. Unidentified human remains, missing person samples, or samples from relatives of missing persons may be submitted for analysis and entry into the Missing Person Index.

**DNA Case Acceptance Policy**

I. Service

A. DNA analysis will only be performed for the agencies served by the Kentucky State Police Division of Forensic Services (i.e., KSP, local PD’s and Sherriff’s offices, prosecutors, and public defenders).

B. DNA analyses that are not offered by the Kentucky State Police Laboratory will be forwarded to a vendor laboratory for analysis, as appropriate. Costs for this analysis will generally be the responsibility of the agency and/or attorney submitting the evidence to the laboratory. A Responsibility for Cost form should be completed and the appropriate billing information provided to the laboratory prior to the evidence being forwarded to a vendor laboratory for analysis. Fees associated with testimony (i.e., witness and travel) from the vendor laboratory are the responsibility of the agency and/or attorney submitting the evidence to the laboratory.

C. Cases requiring hair analysis may take an extended period of time for analysis. At the discretion of the Kentucky State Police Laboratories, these types of cases may be sent to the FBI for analysis at no cost to the submitting agency.

II. Priority

A. Priority will be given to current cases involving a violent crime (i.e., murder, sexual assault, assault, or robbery).

B. The next priority will be given to current cases involving a property crime (i.e., arson, burglary, or other property crimes).

C. Touch DNA and cold cases will be given last priority.

D. DNA Cases will typically be worked based on the case type and order in which the cases were received into Forensic Biology Casework section of the Kentucky State Police Laboratory system.
E. Y-STR (male specific) DNA Analysis cases may be submitted to the Kentucky State Police Laboratories on a case by case basis. Analysts should forward cases for Y-STR DNA Analysis, as applicable.

F. Relationship testing (i.e. paternity, maternity) cases may be submitted to the Kentucky State Police Laboratories. Known DNA reference standards will generally be analyzed in-house, but product of conception or other unique evidence will be forwarded to a vendor laboratory for analysis. The following should be provided to the laboratory at the time of submission; however all required items should be received before any in-house analysis or submission to a vendor laboratory will be undertaken. Case scenarios requiring exceptions should be approved in advance.
   i. *Known DNA reference standards from the mother/alleged mother
   ii. *Known DNA reference standards from the alleged father
   iii. *Product of conception or known DNA reference standard from the child
   iv. Other family Known DNA reference standards, as applicable
   v. *A letter from the prosecutor with explanation of the intent to prosecute (i.e. rape, incest)
   vi. *The following information is necessary for relationship testing statistical analysis:
       1. the race of each individual
       2. if there is any known relatedness between the victim and suspect
   vii. The following information should be provided:
       1. if any of the individuals have received a blood transfusion in the last three(3) months
       2. if any of the individuals have had a hematopoietic progenitor cell transplant (i.e. bone marrow transplant)

G. Post-conviction cases may be submitted to the Kentucky State Police Laboratories for analysis (KRS 422.285).

III. Samples

A. Although many items of evidence may be collected throughout an investigation, only the most probative items should be submitted to the laboratory for analysis. Information provided prior to and/or at the time of submission should be written on the KSP 26 or added to the narrative in the BEAST LIMS (i.e. specific additional case history for a relevant item, the name of the owner/wearer of an item and if the item was collected from or belonged to an individual, the collection location of an item). If additional items of evidence are available, an inventory of such may be submitted with the initial submission. All appropriate reference standards should be submitted and are not included in the total item counts below. The number of samples for DNA analysis will differ depending upon serology results, previous DNA results, information provided by the investigating officer, and/or if multiple persons were directly involved and/or bleeding. **Not necessarily all samples submitted for DNA analysis will be analyzed.**

B. Murder/Death Investigation Cases
   1. One (1) to ten (10) items
C. Sexual Assault Cases
   1. One (1) to three (3) items

D. Assault/Robbery/Arson/Burglary/Other/Touch DNA Cases
   i. One (1) to three (3) items

IV. Consumption (KRS 524.140)
A. Unknown Suspect – If consumption of an item is deemed necessary to continue its analysis, the laboratory will request in writing that the investigating officer/attorney provide, at a minimum*, a letter advising that no suspect has been determined for the associated case, and authorizing consumption of the item. Analysis will not proceed until such a letter has been received by the laboratory. *Case specific scenarios may warrant utilizing the known suspect authorization requirements.
B. Known Suspect – If the consumption of an item is deemed necessary to continue its analysis, the laboratory will request in writing that both the prosecutor and defense provide a letter authorizing the consumption, or that a judge provide an order compelling the analysis to continue. Analysis will not proceed until such a letter/order has been received by the laboratory.

V. Combined DNA Index System (CODIS)
A. Profiles eligible for CODIS will be entered at the time of analysis based upon the information provided by the agency prior to the completion of the DNA report.
B. The investigating officer should contact the analyst regarding CODIS pending profiles.
C. An item does not have to be eligible for CODIS to be analyzed; however, if a sample is not eligible for CODIS, the required known DNA reference standards must be submitted prior to DNA analysis.

VI. Incomplete Submissions from DNA Analysis Only Cases
A. Cases requiring DNA analysis only should not be submitted to the laboratory without the appropriate known DNA reference standards.
B. If a submission is received, communication with the investigating officer to obtain the appropriate known DNA reference standards and CODIS eligibility information (if not previously provided) shall be attempted by a forensic biology analyst or their designee (at the laboratory where the evidence was received) and noted in the case file and/or narrative; however if the appropriate standards have not been received into the laboratory system the assigned analyst shall report a statement similar to the following: “If DNA analysis is necessary, please resubmit Items X and Y, along with a blood or buccal standard from NAME.”
C. If the appropriate known DNA reference standards are submitted to the laboratory prior to the release of the evidence to the investigating agency, those items may be forwarded for DNA analysis and should be noted in the case file without the need for an additional laboratory report or corrections to the previously issued report.
D. Incomplete DNA only submissions will not be forwarded for DNA analysis.
Evidence should be submitted to the laboratory promptly and once adequate information has been obtained.

If a case no longer requires analysis (i.e. adjudicated), the submitting agency should notify the laboratory as soon as possible to ensure that cases are not unnecessarily worked.
Forensic Biology Case Acceptance Policies – Quick Reference Guide

Serology

Murder/Death Investigation Cases
1. Initial submission
   One (1) to ten (10) items, should indicate the order of importance for the items being submitted; additional items may be submitted on a case by case basis (i.e., multiple persons directly involved and/or bleeding)
2. Subsequent submission(s)
   Additional items may be submitted after communication between the analyst and the investigating officer/prosecutor

Sexual Assault Cases
1. Initial submission
   Sexual Assault Evidence Collection Kit(s) along with panties/underwear worn during/after the offense that were collected but not included in the kit; other clothing and/or bed linens should not normally be submitted during the initial submission; case by case exceptions – victims who may be incapable of providing information about their assault or cases with multiple suspects, no kit(s), or specific information about the item
2. Subsequent submission(s)
   Clothing and/or bed linens may be submitted after the initial analysis is completed if there is no probative evidence from the initial submission; additional items may be submitted after communication between the analyst and the investigating officer/prosecutor

Assault/Robbery/Arson/Burglary Cases
1. Initial submission
   One (1) to five (5) items, should indicate the order of importance for the items being submitted; additional items may be submitted on a case by case basis (i.e., multiple persons directly involved and/or bleeding)
2. Subsequent submission(s)
   Additional items may be submitted after communication between the analyst and the investigating officer/prosecutor

Other case types
1. The investigating officer should consult with a forensic biology analyst prior to submitting items, if the case is considered an acceptable case, reference Assault/Robbery/Arson/Burglary Cases submission guidelines.

Bloodstain Pattern Interpretation

Please contact the laboratory.

DNA

All appropriate reference standards should be submitted and are not included in the total item counts below. The number of samples for DNA analysis will differ depending upon serology results, previous DNA results, information provided by the investigating officer, if multiple persons were directly involved and/or bleeding. Not necessarily all samples submitted for DNA analysis will be analyzed.

Murder/Death Investigation Cases
One (1) to ten (10) items

Sexual Assault/Assault/Robbery/Arson/Burglary/Other/Touch DNA Cases
One (1) to three (3) items

If a case no longer requires analysis (i.e. adjudicated), the submitting agency should notify the laboratory as soon as possible to ensure that cases are not unnecessarily worked.
DELIVERING EVIDENCE TO THE LABORATORY

The evidence should be sent to the laboratory as soon as possible. Use Appendix A for determining the nearest laboratory providing the desired services. The analyst receiving the evidence shall begin an internal chain of custody for the case and evidence acceptance.

All evidence brought to the Forensic Laboratory by evidence contributors shall be accepted for analysis when meeting the following criteria:

1. Evidence needs to be submitted to the laboratory either in person, by the United States Postal Service, or by commercial carriers (Federal Express, United Parcel Service, etc.). Qualified Forensic Laboratory personnel shall receive the evidence or when appropriate provide secure drop boxes. Parcel post and regular mail can not be traced and are not recommended due to chain of custody issues, which may arise in court. When evidence is mailed to the lab, mark the package to the attention of whatever section (Controlled Substances, Forensic Biology, Firearms, etc.) to which it would be assigned. Unmarked packages arriving at the lab may not be recognized as evidence, resulting in a receptionist signing for the package. Before mailing firearms and live ammunition, please refer to page 29.

2. Evidence requiring latent print/fingerprint analysis should only be sent to the AFIS Section which is housed within the KSP Criminal Identification & Records Section. See Appendix A for AFIS contact information and mailing address.

3. A Forensic Laboratory Request for Examination (KSP 26 or pre-log) or an Evidence Collection Kit Information Form should accompany all evidence. The form is available at all laboratory locations, KSP posts and the KSP website. Submitting officers will be asked to sign this form at the time it is received in the laboratory. If evidence received by the U.S. Postal Service or a commercial carrier does not contain a Forensic Laboratory Request for Examination (KSP 26 or pre-log) or Evidence Collection Kit Information Form, the analyst accepting the evidence will notify the submitting officer/agency and request a completed Forensic Laboratory Request for Examination (KSP 26 or pre-log). If the form is not received within 7 calendar days, then evidence will be returned unexamined.

4. All evidence needs to be properly sealed with evidence tape, heat sealed, or sealed using self-seal adhesive “evidence bags”. Heat sealed, or self-seal “evidence bags” containing adhesive should be initialed along the seal. All other packages should be initialed across package and tape so that the writing falls on both the tape and the container. All initials should be legible. If evidence has been received at the laboratory that is not properly sealed and the submitting/property officer is not present, then it shall be sealed and documented by the receiving analyst.

5. The receiving analyst shall legibly sign the Forensic Laboratory Request for Examination (KSP-26 or pre-log) or Evidence Collection Kit Information Form with their name (or initials), date, time, what items/packages were received, how the
items/packages were received, from whom they were received, and condition of the evidence (i.e. improperly sealed).

6. The information from the Forensic Laboratory Request for Examination (KSP-26 or pre-log) or Evidence Collection Kit Information Form shall be used to log into the Forensic Laboratory Information System and obtain a unique laboratory number. This number will be used to track the evidence from receipt to release.

7. An identifying mark, such as the case number, submitting officer or victim/suspect name, must be present on both the evidence and the KSP Forensic Laboratory Examination Request Form (KSP-26 or pre-log).

8. Trained Forensic Laboratory personnel may forward evidence for further testing when the Forensic Laboratory does not provide necessary services requested.
BEAST LIMS (Laboratory Information Management Systems)

The Kentucky State Police Forensic Laboratory utilizes the laboratory information system called “Beast” to maintain chain of custody, maintain electronic case records, generate laboratory reports and provide authorized individuals remote access to completed laboratory reports, case status, and pre-log capabilities.

Permission to access the secured website must be made by a law enforcement agency or authorizing individual within the judicial system for a username, password, and internet address. Inquiries can be sent to:

Laboratory System Director  
Kentucky State Police-Central Forensic Laboratory  
100 Sower Blvd., Suite 102  
Frankfort, KY 40601  
Attn: Beast Access Request  
502-564-5230

Laboratory reports will not be mailed on a regular basis to reduce paper and postage usage. Contact the laboratory in your region if you have a question about the progress of a case.
PHOTOGRAPHY

The law enforcement community must constantly review its mission to determine the appropriate use of the photographic medium. This review necessarily demands that a variety of possible areas be explored, because photographic duties and goals will differ in given instances.

Value

An extremely important application of photography in law enforcement involves the pictorial documentation of crime scene locations. Because a complete visual recording of the scene is needed to insure a thorough investigation and subsequent prosecution, there are theoretical, legal and technical problems, which are to be studied prior to the on-site photography. A series of poorly planned, executed, and displayed photographs have the potential to adversely affect the success of other efforts of the crime scene investigation. Therefore, crime scene photography is an integral facet of the entire investigation process.

Information Determined

The obvious purpose of crime scene photography is to set forth a visual record of the crime scene and all its pertinent features. However, the best example of the role of photography is the presentation of a logical “story” as told by the scene in visual form.

Collection

Before a systematic depiction of the scene can be made with photography, the purpose and basic initial rules are to be discussed as background for a comprehensive approach. The first idea to be considered is that the scene must be undisturbed, to the extent reasonably possible, prior to the taking of photographs. This will assist in the establishment that the conditions as portrayed in the pictures truly illustrate the original and uncontaminated features of the scene. Also, numerous pictures should be taken with the idea that the cost of film does not override the immense value of completeness. When in doubt, take the photograph. Hindsight will not be a comfort when a part of the scene, which appeared to have no significance, was not photographed and becomes of immense importance at a later date.

A sequence of photographs showing all pertinent locations in an organized manner must be compiled. As a basic guideline, the subject matter should be represented by a progression of “general to specific,” in essence, from three major vantage points: 1) long-range, 2) mid-range, and 3) close-up. In addition, each state of the commission of the crime must be treated and photographed separately. A jury in the courtroom could be logically presented, for example, with a compilation of pictures illustrating the subject's approach to the scene, entrance into the scene, commission of the crime, and departure from the scene.

A measurement scale must be used when photographing elements of the crime scene for size and distance relationships. Whenever practical, measuring devices should appear in the photographs. However, the subject matter should first be photographed in an “as is” condition prior to added markers.
Follow-up photographs represent an outgrowth of the crime scene investigation. Autopsy photographs and photographs of a live victim or suspect to show bruises or wounds are prime examples of this category. An integration of the information recorded at the actual scene and in follow-up areas will reveal a greater depth of understanding of the realities of the crime scene. Most importantly, photographing the physical evidence at the scene will be a major component in establishing the chain of custody of items introduced in the courtroom.

Because of the number and types of photographs, which are normally taken at a thorough crime scene search, a photographic log should be kept. The following information should be included:

1. Identity of photographer
2. Date and time
3. Specific location of crime
4. Orientation and description of photographic scene
5. Type of camera
6. Type of film (or digital image)
7. Light source
8. Distance from camera to subject
9. Environmental conditions
10. Focal length of lens
11. Shutter speed
12. Lens aperture

This information will assist the photographer in establishing the details of the crime scene in a detailed and professional manner in the courtroom. Additionally, the log will assist in the chemical development of the negatives (or archiving the electronic file) and photographs. Added to the log at a later date should be information concerning where the film was processed and printed. Security of the negatives (or electronic file) should also be established.

No matter how extensive the photographic efforts at the crime scene, photographs must stand the test of legal admissibility. The general standards used to review the credibility of the photographs are:

1. Accurate representations
2. Free of distortion
3. Material and relevant
4. Unbiased

If a photograph is deemed to depict only the gruesome nature of the scene to excite the emotions of the viewer, then its potential to prejudice the viewer may outweigh its value as a purveyor of truth. Additionally, the distortion represented in the photograph may be so prominent that the accuracy and reliability of the photograph is severely questioned. To contend with the issue of distortion in photographs, the best situation is to have the person who actually took the photograph testify concerning the inherent accuracy of the photographs.
Even a person who possesses a detailed level of photographic expertise is not necessarily qualified to be a crime scene photographer. Photographing a scene involves an understanding of all aspects of difficulties which can exist. If these aspects are not thoroughly examined and understood, the photographic product of a crime scene can actually harm the prosecution of a case. The person holding the camera must be aware of the theory of crime scene photography, which will then be combined with the practical and equipment operation segments of the task.
FIREARM IDENTIFICATION

The Firearms Identification Section, often mistakenly referred to as “Ballistics”, is responsible for the examination of firearms, bullets, fired cartridge cases, ammunition components, victim clothing (powder patterns) and any other firearm related item. Associations between some of these items as well as other determinations can be made based on microscopic comparisons and analytical observations. The Central, Eastern and Jefferson Laboratory locations currently have firearms sections.

Examinations for biological evidence or latent fingerprints MUST be done prior to submission to the Firearms Identification Section. Biological and latent fingerprint evidence WILL BE DESTROYED during the examinations conducted by the Firearms Identification Section. Firearms identification concerns itself primarily with the comparison of bullets and cartridge cases in an attempt to identify the individual firearm from which they were fired. Other examinations conducted under the discipline of firearms identification include muzzle to target distance tests, functional tests to determine if a firearm functions properly and comparisons of bullets and cartridge cases from unsolved murders.

Value

The examination of evidence collected from shooting scenes can assist the investigation by providing conclusive information as to the source or potential source of fired components and to support or contradict statements made by witnesses and suspects. Trajectory analysis and muzzle to target determinations can assist with the crime scene reconstruction. Some examples of information that can be provided by Firearm Section examinations include some of the following:

Information Determined

Firearms

- Determine if the item is a functional firearm.
- Determine if all safety aspects of the item are operating properly.
- Documentation of the condition of the item as received for future reference as the investigation progresses or during court proceedings.
- Measure the force needed to operate the trigger.
- Other appropriate miscellaneous examinations that may be necessary.

Bullets

- Through microscopic comparisons of the markings engraved on the item during the firing process, positive identifications can be made to a particular suspect firearm.
• If no firearm has been recovered, multiple bullets can be associated as having been fired from a single source and a list of possible firearms can be generated based on the rifling characteristics.
• The manufacturer, caliber and likely source cartridge designation of the item can be determined.
• Detailed documentation of the item’s condition as received as well as other aspects for future reference as the investigation progresses or during court proceedings.
• Any other miscellaneous requested examination.
• Bullets typically cannot be conclusively associated with fired cartridge cases.

**Cartridges and Cartridge Cases (including Shot shells)**

• Through microscopic comparisons of the markings impressed or engraved into the items during the cycling and/or firing process, positive identifications can be made to a particular suspect firearm.
• If no suspect firearm has been recovered, expended cartridge cases can be identified as having been fired in the same firearm and a possible make of that firearm may be determined.
• Markings made during the manufacturing process can be used to associate unfired cartridges or fired cases with each other. These types of associations are of varying significance depending on cartridge type and brand.
• Cartridge cases typically cannot be conclusively associated with the bullets once fired.

**Shot and, Wadding**

• The size and type of shot recovered can be determined.
• The manufacture and gauge of the wadding can be determined.
• Associations of recovered components to evidence ammunition can be made based on similarities in manufacture, size, materials and configuration. These are class associations only and are not individual identifications.
• In some instances plastic wad components can be associated to a firearm based on microscopic comparison of the markings left by the barrel of a shotgun. Typically these types of comparisons are possible whenever the barrel has been shortened using crude techniques.

**Shot Patterns**

The distance from which a shotgun was fired can be determined by comparing the pellet pattern on an evidence item to test patterns made at known distances using the suspect shotgun and evidence or similar ammunition. These examinations require submission of recovered ammunition and a complete evidence pellet pattern along with the suspect firearm.

**Muzzle to Target Distance Determinations Gunpowder Patterns**
These types of examinations are typically performed on victim’s clothing; often mistakenly referred to as “Gunshot Residue Exam” and thus confused with the Gunshot Residue Analysis conducted by the Trace Evidence Section. The primary difference is the goal of this examination is not to conclusively detect the presence of gunshot residues but to visually examine and chemically treat the area around a bullet hole to develop a pattern that can be compared or interpreted.

Whenever a firearm is discharged, material including lead, copper, burned and unburned gunpowder is expelled from the muzzle along with the bullet. This material can be deposited on articles, depending on the range from the muzzle, forming a pattern. Discharges from contact range will exhibit certain characteristic physical effects in addition to possible material from the muzzle. Once examined and visualized through chemical development, the evidence pattern can be compared to test patterns made at known distances. Test patterns must be made using the suspect firearm and evidence or similar ammunition. If a comparable evidence pattern is developed, a bracketed distance estimate may be reported.

The following circumstances may prevent a pattern from being observed:
- The discharge occurred beyond the maximum distance that residues would be deposited by a particular firearm/ammunition combination.
- Atmospheric conditions may wash away or dissolve any muzzle residue present.
- Excessive bleeding could dissolve and/or wash away any muzzle residue present.
- Excessive or rough handling of the garment could dislodge many of the particles making up the pattern.
- An intervening object such as a pillow or car window may have been present and blocked the particles from reaching the victim’s clothing.

**Collection and packaging**

When handling and packaging firearms, extreme caution should be observed following standard firearm safety practices. As with any submission to the Laboratory all evidence items must be inside a properly sealed container. Use the following steps as a guide when submitting firearms evidence.

**Firearms**

- Loaded firearms should **NEVER** be routinely submitted to the Forensic Laboratory. There are certain circumstances which require submission of a loaded firearm; **ALWAYS** speak with a Firearms Examiner to receive approval and arrange for them to be present before bringing a loaded evidence firearm to the Laboratory.
- When submitting revolvers, if possible, indicate the position of the cylinder as well as the chamber from which each cartridge or cartridge case was unloaded. This can be done by marking the cylinder on each side of the top strap (that part of the frame directly above the cylinder) and numbering each cartridge or cartridge case as it is removed. A diagram indicating cartridge/cartridge case positions can be made and submitted with the firearm.
Diagram to be made by officer recovering revolver:

```
| Chamber under hammer |

Note: Mark cartridge or cartridge case under firing pin \( \#1 \) and rotate clockwise.
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Facing rear of cylinder

- Mark the containers for all cartridges and cases with initials, date and exhibit / item numbers to correspond with the numbered chambers in the diagram.
- The same procedure should be followed with ammunition recovered from auto loading firearms, indicating on the container which cartridge was recovered from the chamber and the position of each cartridge in the magazine. Place live ammunition in a container separating it from the firearm.
- Mark on the outside of the container appropriate information regarding the firearm; if necessary attach any evidence tags to the trigger guard.
- If it is desired to place an object within the action for visual unloaded verification, it is strongly recommended to use a non-metallic object which should never be placed in or through the barrel. Attach an evidence tag to the trigger guard of each firearm and mark with appropriate information.
- If mailing the firearm, package it in a rigid container and realize that FEDERAL LAW PROHIBITS SENDING LIVE AMMUNITION THROUGH THE U.S. MAIL.
- When DNA, trace or latent fingerprint analysis is requested, these should be conducted PRIOR to the item being submitted to the Firearms Identification Section.

## Bullets

The portion of the cartridge that is propelled down range, sometimes referred to as projectiles or more correctly as bullets; they may be fragmented upon recovery.

- During collection no metal tools should be used to extract the bullets as these could disturb the rifling markings that will be used for comparison.
- After collection it is recommended that bullets be dry before packaging.
- Once dry, wrap each in an individual package; the outer package should be a rigid container of some type.
- Appropriate identifying markings should be placed on each individual package.
• It is not absolutely necessary to mark an evidence bullet but, if desired, mark the bullet on the nose or the base, NEVER on the cylindrical portion or sides.
• When DNA, trace or latent fingerprint analysis is requested, these should be conducted PRIOR to the item being submitted to the Firearms Identification Section.

**Cartridges and Cartridge Cases (including Shotshells)**

Cartridges are unfired rounds of ammunition, which contain components including a bullet, primer, powder, and cartridge case. A cartridge casing is the remaining component either in the firearm or at the shooter's general location after the cartridge is fired.

• After collection it is recommended that each cartridge or cartridge case is dry before being packaged.
• Once dry, an unfired cartridge case should be wrapped in clean tissue paper and placed in a suitable container.
• Appropriate identifying markings should be placed on each container.
• When applicable, any unfired ammunition recovered at a scene should be submitted to the laboratory.
• It is not absolutely necessary to mark an evidence cartridge or casing but, if desired, DO NOT mark the item on the head, primer or near the rim; instead mark near the mouth of the casing taking care not to disturb any other markings present.
• When DNA, trace or latent fingerprint analysis is requested, these should be conducted PRIOR to the item being submitted to the Firearms Identification Section.

**Shot and Wadding**

• Recover as much of the shot material as possible.
• Do not damage the shot when recovering.
• Recover all wadding.
• It is recommended items be dry before being packaged.
• Once dry, place pellets and wads from different locations in separate containers.
• Appropriate identifying marks should be placed on the containers. DO NOT mark pellets or wads.

**Shot Patterns**

• If a shot pattern is present at the crime scene which cannot be submitted to the laboratory, such as a wall, car, house, etc., scaled photographs should be taken before removal of the shot material.

**Muzzle to Target Distance Determinations**
• If articles of clothing are to be forwarded to the laboratory for a muzzle to target distance determination, make sure it has been air dried before packaging.
• Place cardboard or paper inside the garment (see diagram A below) and when applicable, close the front of the garment.
• Position the garment inside two pieces of cardboard so as to fix the position of the garment inside (B).
• If the item must be folded, fold only twice as shown by broken line (C). Fold arms over outside of cardboard or paper; one in front and one in back.
• Package each article individually in paper. DO NOT use plastic bags.

**Shipment**

Live ammunition CANNOT be sent by U.S. mail. Firearms, and then only if unloaded (i.e. with no live ammunition) can be sent only via U.S. registered mail. Live ammunition should be hand-carried to laboratory. In special circumstances, UPS may be the only legal way to ship ammunition when other means are not possible. For UPS shipments the package must be marked “ORM-D” and “CARTRIDGES, SMALL ARMS” on all sides. If any clothing is to be sent that is stained with blood or other body fluids, the package must be marked “BIOHAZARD” or possess a biohazard label. Bloody clothing must be dried prior to shipment.
GUNSHOT RESIDUE ANALYSIS-by ICP-MS

As of June 1, 2013, the Kentucky State Police Central Forensic Laboratory no longer conducts gunshot residue analysis on hand swab kits (white envelopes). Please use the new GSR-SEM kits (white boxes) for the collection of gunshot residue. See information in the Gunshot Residue Analysis – by SEM/EDS section below.

GUNSHOT RESIDUE ANALYSIS-by SEM/EDS

Gunshot residue is formed by the ignition of the primer mixture when a firearm is discharged. This results in the formation of microscopic particles that are blown out of various openings in the firearm.

Gunshot residue particles usually have a spheroidal and noncrystalline morphology. Particles characteristic of gunshot residue are typically composed of antimony, barium, and lead. Particles consistent with gunshot residue can have a combination of two of the three elements listed above. These particles are consistent with gunshot residue, but may also originate from other sources. The composition of gunshot residue can have other elemental compositions not listed here depending on the type of ammunition and firearm involved.

Gunshot residue can be deposited on the hands by: firing a weapon, handling a weapon, being in the proximity of a discharging weapon or coming into contact with an object with gunshot residue on it. The examination itself cannot determine the relative likelihood of these listed actions.

The morphology and elemental composition of particles on the adhesive lifts are determined by scanning electron microscopy/energy-dispersive x-ray spectrometry (SEM/EDS) at the Central Forensic Laboratory.

The Kentucky State Police Forensic Laboratory provides Gunshot Residue Adhesive Lifter Kits (GSR-SEM/KY [Q]) consisting of the following:
1. Instruction sheet
2. Gunshot Residue Analysis Information Form
3. One pair of gloves
4. Two (2) adhesive lifters (right hand and left hand)
5. Police Evidence seal
Collection of Sample Guidelines

Gunshot Residue from the Hands:

Follow the specific instructions included in the KSP (adhesive lift) GSR-SEM kits. Always sample the hands of a suspect as soon as possible. Collect gunshot residue samples at the scene whenever possible. If collection at the scene is not possible, then bag the hands of the suspect before transporting in a police vehicle.

If possible, always wash your hands before collecting the samples. Always wear the gloves included in the kit. Do not substitute with other gloves.

Avoid touching the surface to be sampled. Avoid wet or bloody areas.

Gunshot residue particles are continually lost from the hands due to normal activity. The optimal window of opportunity for sampling the hands of a living individual is up to 4 hours after the shooting incident. The Kentucky State Police will not analyze gunshot residue adhesive lifts collected from the hands of a living individual if 4 hours have passed since the shooting incident. Please refer to the case acceptance policy section.

Gunshot Residue from Clothing:

Sample collection depends on the item(s) to be sampled such as: size, condition, and prior handling. Additional factors can influence the number of samples collected and where to sample, such as: preservation of other evidence (DNA, other trace evidence), known case circumstances, requirements of the investigation, and retention of GSR.

The most likely areas to sample include, but are not limited to:

- Right and left cuffs and wrists of long sleeved shirts or jackets
- Right and left shoulders if a long gun is used
- Pockets – if it is known the subject placed his or her hands in pockets
- Back waistband – if it is believed that is where the gun was carried
- Gloves (sample like hands)

It is preferred that clothing be sent to the laboratory for the collection of possible gunshot residue. However, if clothing cannot be removed immediately from the subject (before placing in a police vehicle), then the clothing should be sampled at the scene to minimize contamination and the loss of GSR.

If clothing is removed from the subject for submission to the laboratory, it is recommended that the subject remove the item himself/herself and place it into a large paper evidence bag. Properly seal the paper evidence bag for submission to the Central Forensic
Laboratory. Never store any GSR evidence near a firearm, firearm components or any surface that may have been exposed to firearms.

Use the Gunshot Residue Adhesive Lifter Kit (GSR-SEM/KY [Q]) to sample the area(s) of interest. Simply strike out “right hand” and/or “left hand” and write in the area being sampled.

**Collection:**

1. If possible, wash your hands before collecting sample(s). Put on the gloves included in the kit. Do not substitute with other gloves.

2. Carefully remove the cap from the vial labeled with the area to be sampled.

3. Depending on the type of firearm used by the subject, while holding the vial cap, press the adhesive lifter to the appropriate area(s) of the clothing. This is repeated until the adhesive lifter is no longer sticky.

4. Put the cap back on the labeled vial after sampling the area. These steps can be repeated, as needed, with a new adhesive lifter for other areas of the same piece of clothing. Make sure each adhesive lifter is labeled with the area that was sampled.

5. A new GSR-SEM adhesive lifter kit is used for each piece of clothing.

6. After each area of the item is sampled, the adhesive lifter is sealed. Place lift(s) back into the GSR-SEM kit. Fill out the Gunshot Residue Analysis Information form and return to the kit box. Place the Police Evidence seal on the box, then initial seal. Mail or hand deliver the sealed kit, along with a KSP 26, to the Central Forensic Laboratory.

Do not submit clothing from any subject that has sustained a gunshot wound. Only submit clothing (outer garments) that may have been exposed to gunshot residue. Please refer to the case acceptance policy section.

Analysis of gunshot residue particles collected from clothing can be problematic. There is no way to determine how long gunshot residue may remain on clothing. Studies have shown that clothing may retain some gunshot residue particles after washing.

**NOTE:** Clothing from any subject that has a bullet hole may be submitted to the Firearms section for distance determination. Please refer to the Firearm Identification section of this guide. The GSR-SEM kits cannot be used for muzzle-to-target distance determination.

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**Gunshot Residue from Vehicles:**
If a vehicle is suspected to have been used in a drive-by shooting, used by the shooter to leave the scene of a crime, or shots were fired inside a vehicle, samples can be collected for gunshot residue analysis.

If a vehicle is suspected to have been used in a drive-by shooting, samples can be taken from the exterior and interior surfaces around the window. However, smooth surfaces and areas exposed to the wind from an open window are less likely to retain gunshot residue particles.

If the shooter uses a vehicle to leave the scene of a crime, contact areas within the vehicle, such as the steering wheel, gearshift lever, and door handles are good areas to sample.

If the weapon is discharged inside a vehicle, GSR is usually found on most surfaces inside the vehicle. However, areas exposed to the wind from an open window are less likely to retain gunshot residue particles.

Precautions should be taken before collecting samples from vehicles. If the vehicle is also to be sampled for other evidence (fingerprints, DNA, other trace) a strategy of sampling for each type of evidence has to be established to prevent possible contamination and loss of ALL evidence.

If samples from exterior surfaces of the vehicle are required, they should be sampled as soon as possible at the scene.

Use the Gunshot Residue Adhesive Lifter Kit (GSR-SEM/KY [Q]) to sample the area(s) of interest. Simply strike out “right hand” and/or “left hand” and write in the area being sampled.

Collection:

1. If possible, wash your hands before collecting sample(s). Put on the gloves included in the kit. Do not substitute with other gloves.

2. Carefully remove the cap from the vial labeled with the area to be sampled.

3. Depending on the circumstances, while holding the vial cap, press the adhesive lifter to the appropriate area(s) of the vehicle. This is repeated until the adhesive lifter is no longer sticky.

4. Put the cap back on the labeled vial after sampling the area. These steps can be repeated, as needed, with a new adhesive lifter for other areas of the vehicle. Make sure each adhesive lifter is labeled with the area that was sampled.

6. After each area of the vehicle is sampled, the adhesive lifter is sealed. Place lift(s) back into the GSR-SEM kit. Fill out the Gunshot Residue Analysis Information form and return to the kit box. Place the Police Evidence seal on the box, then initial seal. Mail or hand deliver the sealed kit, along with a KSP 26, to the Central Forensic Laboratory.
It is not necessary to submit multiple kits from a single vehicle since it is not possible to determine the position where the shooter was firing from by gunshot residue analysis.

Submission Reminders:

Fill out the Gunshot Residue Analysis Information form as completely as possible and return with the kit.

Fill out a KSP 26 when submitting the evidence to the laboratory.

The kits may be mailed or hand delivered to the Central Forensic Laboratory.

If rush results are needed, please contact the Central Forensic Laboratory in Frankfort. Reports will be available on the BEAST website when completed.

NOTE: GSR-SEM adhesive lifter kits should be taken on victims of shootings. However, they should not be submitted to the laboratory for analysis. Please see the case acceptance policy below.

Case Acceptance Policy: GSR-SEM

The information below is the case acceptance policy for the GSR-SEM adhesive lift kits for gunshot residue analysis. This information is to assist an agency in the submission of evidence for gunshot residue analysis.

In some circumstances, the analysis of samples for GSR will provide NO additional investigative information. The following evidence will NOT routinely be analyzed for GSR.

1. GSR kits collected from ALL victims (including suicides).*
2. GSR kits collected from live subjects after 4 hours have passed since the shooting incident.
3. GSR kits collected from subjects that are known to have washed their hands prior to samples being taken.
4. GSR kits collected from subjects apprehended in the possession of a firearm.
5. Clothing worn at the time a subject is shot.
6. GSR kits collected from clothing of subjects that have sustained a gunshot wound.

NOTE: When adhesive lifts from the hands and clothing from the same subject are submitted for gunshot residue analysis, the clothing will only be analyzed if the adhesive lifts from the hands test negative for GSR.

*Written or electronic communication between the analyst and the prosecutor should provide information as to the reason any victim kits should be submitted. A victim kit may be analyzed if the case information indicates the victim was shot through a barrier (i.e. door, wall, car door) or if the distance between the victim and the shooter was sixty (60) feet or greater. These are instances when a victim’s hands may be relatively free of
gunshot residue if they have not recently discharged a firearm or handled an object with gunshot residue on it.

GSR analysis may be completed if the detailed case information presented explains the investigative value gained from GSR analysis.

Evidence that is received and not analyzed for any of the above reasons will be reported as not analyzed.
TOOLMARK IDENTIFICATION

Toolmark examinations are forensic comparisons to determine whether or not a particular tool can be associated with a mark left at a scene. Generally, when any two objects come in contact with sufficient force, the softer of the two will be characteristically marked, i.e., damaged, by the harder. These markings may be class in nature or individualized enough for an examiner to identify a suspect tool to a toolmark found at a scene of a crime.

The Firearm Identification Section conducts Toolmark Identification Analysis.

If submitted, tools are to be processed for biological or trace evidence or latent fingerprints, these examinations MUST be done PRIOR to submission to the Firearms Section.

Value

Toolmark evidence can possibly link the suspect in possession of a tool to the scene of a crime. Assuming the conditions for collection and preservation have been met, an examiner can possibly identify a particular tool as having made the evidence mark. Do not submit tools found at the scene of a crime if you cannot associate a suspect to the evidence tool.

Information Determined

An examination of a toolmark can possibly determine the type of tool used and if the mark is of value for comparative purposes. Most tools become individualized through use and or abuse and have the potential to leave marks of comparative value. Common toolmarks found at scenes include:

- Impressions produced by a perpendicular force acting against an object. Examples of tools that can make impressions include punches, hammers, and some gripping tools.
- Scrape marks that are made by moving the tool laterally across the object. Examples of such tools include flat bladed tools such as crowbars, pry bars and screwdrivers.
- Shearing or pinching marks that occur when the object is caught between opposing blades. Examples include bolt cutters, wire cutters, scissors and tin snips.

Generally, multi-toothed cutting blades such as saws, when used to completely cut through an object do not leave comparable marks; however, circumstances in which an incomplete cut is present may be of value.

Collection of Evidence

Whenever possible, the actual evidence toolmark should be submitted to the lab. This may mean having to cut part of a doorway or window sill. Photographs depicting the mark as
found are often helpful for the examination as this allows the examiner to orient the action of the tool.

When collecting cut wire ends or other material that must be removed, ALWAYS indicate which end is the evidence cut and which was cut by the investigator.

If collection of the evidence bearing the actual mark is not practical, please perform the following steps:

- Photograph overall and close ups using oblique lighting
- Make moulage casts of each mark using forensic casting material such as Mikrosil or Forensic-Sil. These materials are non-destructive, providing the opportunity for multiple casting attempts. Do not use modeling clay or other materials that will not retain the necessary detail for comparison.
- Ensure no air bubbles are in the cast once removed; repeat the process if air bubbles are present.
- Do not package in plastic as the casts tend to sweat and degrade when sealed in plastic. Use small boxes or paper envelopes. Mark the packaging for later identification.

When collecting the suspect tool, make sure to wrap or package the working end of the tool to protect and retain any trace evidence that may be present. This could further link the tool to the toolmark. Always package the tool and the toolmark separately and never touch the suspect tool to the evidence.

**Shipment**

Toolmark evidence can be mailed to the laboratory by registered mail if rigid containers are used. Please mark the evidence "Attention Firearms" and include the proper submission paperwork. In situations where large items of evidence are to be submitted, it may be necessary to hand carry them to the laboratory.
SERIAL NUMBER RESTORATION

The serial numbers on firearms are often removed or altered in an attempt to prevent the identification of the original owner. The serial number can sometimes be restored depending on the degree of obliteration or alteration.

All modern firearms manufactured post 1968 are required by federal law to be stamped with a unique serial number. Many firearms, particularly shotguns and rifles made prior to the Gun Control Act of 1968 are not serialized so the absence of a serial number does not necessarily indicate an altered firearm.

When a number is stamped into a metal object, the properties of the metal are changed. Although the visible number may have been removed, often the altered metal has not. Several techniques exist that react with this altered metal revealing the original stamped number. This is commonly referred to as “raising the serial number”, but the restored visible digits are not always permanent.

Value

Restoration of an obliterated or altered serial number can possibly provide the information needed to trace the item back to its original owner or link a suspect to a crime scene.

Submission

Many restoration kits are available for purchase; however, the process is destructive and not repeatable. If a restoration attempt has been made before submission to the laboratory, no further restoration can be done.

Forward any object to the laboratory properly marked and packaged for later identification. Contact the lab in your area if the evidence is too large to transport to the lab. Arrangements can possibly be made for an examiner to come to the evidence.

The laboratory does not routinely trace firearms through the Bureau of Alcohol, Tobacco, Firearms and Explosives using the restored serial number; this is the responsibility of the investigating officer once the restored number has been reported.
SHOE PRINT and TIRE TREAD EVIDENCE

Shoeprint or tire tread impressions are routinely left at crime scenes. These impressions can be found on various surfaces in two-dimensional and three-dimensional forms. Almost all impressions, including partial impressions, have potential value for forensic comparisons. The examination of detailed shoeprint and tire tread impressions can possibly result in the identification of the suspect’s shoes or tires from the suspect’s vehicle.

Shoeprint and tire tread comparisons are conducted by the Firearm Identification Section.

Photography and Collection of Evidence

Whenever possible, the item bearing the original print should be submitted for comparison; however, proper documentation of the print should always be conducted prior to collection. Most collection techniques are destructive in nature so it is critical photographs be taken prior to any collection attempt.

Photography

General crime scene photographs should be taken to relate the impression to the crime scene. Examination-quality photographs must be taken to obtain maximum detail for forensic examination. All impressions should be photographed using both methods.

- **General crime scene photographs** of shoeprint or tire tread impressions should include close-range and long-range photographs. These photographs should show the relationship of the impressions to the surrounding area.
- **Examination-quality photographs** should be taken using a tripod and oblique lighting. A scale must be in every photograph. The purpose of these photographs is to produce a natural size enlargement that can be used for forensic examination. The following steps should be followed to produce examination-quality photographs:
  - Place a linear scale next to and on the same plane as the impression.
  - Place a label in the picture to correlate the impression within the crime scene.
  - The camera should be mounted on a tripod and positioned 90 degrees to the impression.
  - Adjust the height of the camera or the zoom lens to fill the frame with the impression and scale.
  - The camera back must always be in the same plane as the impression.
  - A detachable flash with extension cable should be used, if available, to flash across the print at a very low angle. A bright flashlight may be used as well. Block out bright ambient light to increase the contrast from the flash or flash light.
  - Focus on the bottom of the impression not on the scale.
  - Take several images with lighting from various angles and bracket the exposure.
    - For low light conditions, exposure times may be long, so care should be taken to not shake or jar the camera during the exposure.
  - Photographs of impressions in snow are difficult to take due to the lack of contrast. Snow print wax can be used to lightly coat the impression to provide contrast.

Photographs of impressions in snow are difficult to take due to the lack of contrast. Snow print wax can be used to lightly coat the impression to provide contrast.
When applying the wax, the can must be held far enough away and sprayed at an angle so as not to disturb the print. Light should be directed toward the print or impression from the side to prevent the detail from being washed out.

**Collection of Evidence**

Submit the evidence bearing the original impression if possible. If the evidence cannot be submitted, use one of the following appropriate techniques to recover the impression after taking photographs.

- **Casting three-dimensional impressions** should be done using a hard dental stone material rather than the relatively soft plaster of paris or other modeling plasters. Mix the material according to the included instructions, typically to the consistency of pancake batter. Begin pouring the mixture just outside of the actual impression and allow the material to flow down into the impression. Continue pouring onto the accumulating casting material, moving across the impression evenly. Never pour directly onto the impression as this will cause damage. Allow the cast to harden before removing and then allow to dry for an additional 48 hours to cure; do not package in plastic. A shallow box such as a pizza box can be used as packaging to protect the cast.

- **Lifting three-dimensional impressions** transfers a residue or dust impression to a lifting film, allowing the impression to be transported for photography and examination. Several techniques are readily available. Some of the more common are listed here:
  - **Electrostatic lifts** are made using a Mylar film and a power source to lift dry dust or residue prints from porous and non-porous surfaces. This technique can only be used on dry origin prints and will not work if the impression were made when wet or were to become wet. Once lifted, the print on the film is fragile and easily damaged. The film itself contains a residual static-electrical charge and should be properly stored as soon as practical. The film should not be rolled or folded; it can be taped inside a new clean file folder. Used or old file folders or other low grade materials such as cardboard boxes should not be used as the charged film will pull the dust from these materials, contaminating the print.
  - **Gelatin lifters** can be used to lift impressions from porous and non-porous surfaces. Black gelatin lifters work well for lifting light-colored dry or wet impressions. White gelatin lifters can be used to lift impressions developed with fingerprint powders or impressions dark enough to contrast with the white background. Transparent gelatin lifters can be used to lift impressions developed with fluorescent powders and should not be used on original non-enhanced prints.
  - **Adhesive lifters** can only be used to lift impressions from smooth surfaces. Transparent tapes, palm print lifters or specific shoe print lifters can be used to lift powdered impressions, provided they are transferred to a contrasting colored card.

**Chemical Enhancement of Prints**

Numerous techniques for the enhancement of shoeprints are available, particularly those made in blood. These techniques are analogous to those used for fingerprint
enhancement/development. The impressions should always be documented with photographs first before utilizing any enhancement techniques. ALWAYS collect any blood evidence prior to any enhancement attempts.

**Shoeprint and Tire Tread Database**

The laboratory does not maintain a searchable database of shoe sole pattern designs and is typically limited to comparisons of suspect footwear to recovered impressions.

Published references, although not inclusive, are available for possible determination of tire tread patterns.

**Shipment**

Due to the general fragile nature of shoeprint / tire tread evidence, shipping is not recommended.
BIOLOGICAL EVIDENCE: BLOOD AND OTHER BODY FLUIDS

Evidence in this category includes blood of human or animal origin, semen, and saliva submitted for body fluid identification. It does not include samples of blood or urine submitted for the determination of the presence of drugs, alcohol, or poisons. See the section on Toxicology for such evidence.

When blood or other body fluid stains have been identified, further characterization can be performed through DNA analysis. DNA analysis is based on the understanding that no two persons, except identical siblings, have the same DNA. DNA profiles from forensic case samples are routinely entered into a computer database. These profiles are routinely searched at our state and/or national level against other forensic case and offender samples.

**Blood Evidence**

**Value**

Blood evidence can be of value in crimes such as murder, rape, assault, robbery, burglary, hit-and-run accidents, and game law violations. Blood evidence may aid an investigation by locating the crime scene, by identifying the weapon used, by proving or disproving a suspect's alibi, or by eliminating suspects. It can also be used for the identification of bodies when samples specified as being from relatives of the missing person are available for comparison.

**Information Determined**

1. Analysis must be performed on a stain to determine that it is blood, since the appearance of blood varies greatly depending on the age and condition of the stain.

2. If the sample is blood, the species origin may then be determined. Usually, it is necessary to determine if the blood is presumptive for human. In certain cases, however, it may be necessary to determine from what animal a bloodstain originated. This can be done, but in most cases, only to the level of the taxonomic family used in animal classification.

3. Blood may be further characterized through DNA analysis. Different individuals have a different type due to the genes they received from their parents. The Central Forensic Laboratory uses current technology to examine numerous sites within an individual’s DNA. At each site there are several different types. Each of these types has a certain frequency of occurrence in the population. By multiplying together this frequency of occurrence at each site, a statistical estimation can be made as to how often a particular profile would be observed in the general population.
4. The sex of the person from whom the sample originated can be determined by DNA analysis.

5. DNA analysis of blood and other body fluids is regularly performed when necessary.

6. Private laboratories perform other types of DNA analyses not offered by the KSP lab. These services may require an additional cost, and will be addressed at the time of request.

7. Generally, DNA analysis will be limited; see case acceptance policy and quick reference guide.

8. Additional information may be obtained from the size, shape, and distribution of bloodstains at the scene. This information may be used to reconstruct the events that occurred during the bloodshed. This examination may be performed at the crime scene. Detailed photographs taken at the scene showing measurements of the bloodstains can greatly aid the analysis. Blood spattered clothing and other items can be evaluated at the laboratory. Contact the nearest laboratory when this type of analysis is desired.

**Other Body Fluids of Significant Value**

**Value**

Depending on circumstances of the case, it is sometimes helpful to identify seminal stains, or saliva. DNA analysis is performed on seminal stains in order to determine if the unknown sample matches the DNA profile of a suspect’s standard. A differential extraction technique is used on seminal stains to separate sperm cells from the cells of vaginal secretions and therefore may aid in separating DNA profiles from the male and female portions of the stain.

There are no specific tests to identify feces; therefore, it should not be submitted for identification. Some cells containing DNA may be present in human feces. However, it is very difficult to obtain a DNA profile from feces.

**Information Determined**

1. Seminal stains. A suspected seminal stain may be identified by testing for the presence of prostatic acid phosphatase, spermatozoa or prostate specific antigen (p30). Semen may be further characterized by DNA analysis.

2. Saliva stains. The presence of amylase is presumptive for saliva. Saliva may be further characterized by DNA analysis.
3. Urine. The laboratory no longer has a test to characterize urine. However, some cells containing DNA may be present in a urine sample/stain. Depending on the quantity of these cells, it may be possible to obtain a DNA profile.

4. Other. It is sometimes possible to perform DNA analysis on samples that cannot be identified through serological means. These include but are not limited to sweat, skin cells, muscle tissue, teeth, bone, and hair roots.

**Collection of Sample and Standards**

Since blood and other body fluid evidence is biological and is rapidly decomposed by bacteria and mold, it is absolutely essential that such evidence is handled properly. Please follow these instructions carefully for each type of situation in which stains of blood or other body fluids are found. **IF YOU HAVE ANY QUESTIONS, PLEASE CALL THE LABORATORY.** Remember safety measures for biological hazards. Always wear disposable gloves when handling material stained with blood or other body fluids. To prevent cross contamination of samples, these gloves should be changed before collecting each exhibit. Disposable utensils would be preferred, however at a minimum, utensils used to collect evidence should be cleaned with 10% bleach between each item collected. A mask or other protective clothing may be advisable in some cases. Please check with your agency's safety protocols for biological hazards.

**Stains on Garments or Fabrics**

1. Make sure that all stains and clothing are **DRY!** If the stain is **wet,** it must be air dried **away** from heat and sunlight, preferably in a secure, ventilated room. The victim's items should be separated from those of the suspect during drying.

2. Package each item separately to avoid contamination and in paper to avoid further decomposition. Paper bags are recommended. **DO NOT USE PLASTIC** since plastic does not “breathe” and holds in moisture, permitting bacterial and fungal growth.

3. Avoid unnecessary handling of garments with blood or seminal stains.

**Stains on Surfaces**

1. If there are items that need to be examined for both body fluids and fingerprints, consult with the Forensic Biology unit before submitting for fingerprints.

2. Whenever possible, submit the bloodstained item itself for analysis. If this is impractical, photograph the stain while on the item, then detach or cut out the part with the stain for submission. Carefully package to avoid contamination or loss. Do not put any tape directly on the stain.

3. Bloodstains can be swabbed off items that are too large for submission. These blood stains should be photographed before being removed. Swab the blood
generously onto a sterile cotton-tipped applicator that has been slightly dampened with distilled water. Swab in a manner which will distribute concentrated blood over the entire swab, if possible. For a control swab, moisten a separate swab with the water used for collecting the blood stain. Do not swab an unstained surface for a control. Air-dry and package the stain and control swabs separately in paper.

4. If the stain is moist, let it air dry first, or swab it onto a cotton tipped applicator and then air dry.

5. A control sample of any liquid used during the collection process should also be collected. If using distilled water, moisten a cotton tipped applicator, allow to air-dry and label as “Control.”

6. Collect generous portions of the samples to be analyzed.

**Standard samples for comparison**

If DNA analysis is necessary on evidence samples, blood or buccal standards are required from the victim, the suspect, and from anyone else who may have been a contributor to the biological stain in question. If blood standards are to be collected, they should be drawn in purple-capped tubes (i.e., tubes with EDTA as the preservative), or stained on a DNA blot card. If buccal standards are to be collected, use four sterile cotton-tipped applicators and have the individual rub the applicators firmly on the inside cheeks. Allow the swabs or DNA blot card to air-dry before packaging. The standard should then be submitted to the lab as soon as possible, along with the rest of the evidence. Blood tube samples should be stored in an evidence refrigerator until transported to the lab.

**Shipment**

Deliver biological evidence to the laboratory as soon as possible. Check Appendix A for the closest laboratory performing serological analysis. It is best to deliver the evidence in person; however, if this is impossible the evidence should be kept as cool and dry as possible; then forwarded by way of registered mail or commercial carrier to the appropriate laboratory. Do not use staples to seal packaging since they easily puncture disposable gloves and skin and are a possible source of infection. The outer package should be marked to the attention of the Forensic Biology Section. An envelope containing the laboratory request form (KSP 26 or pre-log form) needs to be taped to the outside of the package. When submitting evidence, it is important that the request for analysis form (KSP 26 or pre-log form) be included. Please provide all information requested, as this will expedite the process of analysis. Each item submitted should be listed along with the specific examinations desired. The package should be marked with a biohazard label.

**Rape Evidence**
Evidence collected in rape or sodomy cases includes a variety of unknown and known samples, which are relatively constant from case to case. This hair, fiber, and biological evidence is covered in separate sections in this manual, but a separate section was considered necessary to explain rape evidence.

**Value**

Evidence in rape cases is likely to link the suspect to the victim or the individuals to some location. Body fluids, hair or foreign fibers may be transferred during a sexual assault. While the specifics of each type of evidence are discussed in the sections on serology and hairs and fibers, this section will deal with these types of evidence as they relate to rape cases. The Kentucky State Police Forensic Laboratory has sexual assault evidence collection kits available free of charge. One is for the victim (female or male) and one for the suspect. This evidence is essential for effective forensic analysis.

**The Sexual Assault Evidence Collection Kit for Female or Male Victim**

This victim’s kit consists of labeled packages for properly collecting and storing evidence, a set of instructions, and a Victim’s Medical History and Assault Information Form. Although trained medical personnel collect these items, each item is discussed below so the investigator can understand why this sample is requested. All envelopes should be sealed with tape, initialed over the tape, and properly labeled.

1. **Pubic hair combings.** A paper towel, a comb, and an envelope are provided to collect any loose hair and fibers from the pubic region. This sample will be used to determine if any foreign hair similar to the suspect is present, or if any fibers are present that may be used to link the suspect or the scene to the victim. This process should be gentle so that attached hairs are not unnecessarily pulled from the subject.

2. **Pulled pubic hairs.** An envelope for at least 30 pubic hairs pulled from various pubic locations is provided. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled, but pain can be reduced by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.

3. **Pulled head hairs.** An envelope for at least 30 head hairs pulled from various locations from the head is also provided. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled, but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.

4. **Blood sample.** Blood should be drawn into an EDTA tube, then placed on the filter paper cards provided. This is used as a standard.

5. **Buccal sample.** Four cheek swabs are requested. These are sometimes used as a back-up DNA standard.
6. **Vaginal or Penile swabs**. Four vaginal or penile swabs are requested. These are necessary to detect semen and to determine the DNA profiles present. These must be air dried and placed in the provided white envelope.

7. **Other evidence swabs**. There are three envelopes containing four swabs each to be used for other specimens relevant to the case. There is a check off area on the envelope for marking whether the swabs are anal swabs (for cases involving anal sodomy), oral swabs (for cases involving oral sodomy), external genital swabs, or dried secretion swabs. If more than one sample is required, please be sure the samples are separated from each other and properly marked as to the type of sample and/or where it was collected.

8. **Underpants**. Collect any underwear worn by the victim after the assault.

It is recommended that you contact your forensic biology unit before submitting any clothing (besides underwear) or bedding material to the laboratory. If clothing items or bedding are submitted, package them individually in paper bags.

**The Suspect Sexual Assault Evidence or Biological Reference Collection Kit**

The kit for suspects consists of labeled packages for evidence, instructions, and a Request for Examination form. Although these items are usually collected by trained medical personnel, each item is discussed so the investigator can understand why this sample is requested. All envelopes should be sealed with tape, initialed over the tape, and properly labeled.

1. **Penile swabs**. This sample consists of four swabs dampened with water and then used to swab the outer surface of the penis. This sample may contain vaginal secretions from the victim. These must be air dried and placed in the provided envelope.

2. **Pubic hair combing**. A paper towel, comb, and envelope are provided to collect any loose hair and fibers in the pubic region. This sample is used to determine if any foreign hairs similar to the victim are present, or if any fibers are present that may be used to link the victim or the scene to the suspect. This process should be gentle so that attached hairs are not unnecessarily pulled from the subject.

3. **Pulled pubic hairs**. This sample consists of at least 30 pulled pubic hairs from various pubic locations. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled, but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.
4. **Pulled head hairs.** This sample consists of at least 30 pulled head hairs from various regions of the scalp. A minimum of 30 hairs is necessary because of the range and variability of hair. Several hairs must be forcibly pulled but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.

5. **Blood sample.** Blood should be drawn into an EDTA tube, then placed on the filter paper cards provided. This is used as a standard.

6. **Buccal sample.** Four cheek swabs are requested. These are sometimes used as a back-up DNA standard.

7. **Control swabs.** If swabs were moistened with water or saline in any step, moisten the two control swabs with the same fluid, and then allow them to air dry and place in the provided white envelope.

8. **Other evidence swabs.** There is an envelope containing four swabs to be used for other specimens relevant to the case. There is a check off area on the envelope for listing whether the swabs are dried secretion swabs or other swabs. If more than one sample is required, please be sure to separate each type of swab from the other and to properly mark the samples as to what type of sample and/or where they are collected from.

It is sometimes appropriate for the suspect’s underwear or other clothing to be submitted. Each item of clothing should be packaged separately in a paper bag.

Please note that swabs are provided in the kits. If there are no medical personnel available, suspect samples, except the blood sample, can be collected by an investigator or by the suspect himself under supervision.

**General Collection Information**

1. Blood or buccal standards are necessary from any individual who may have contributed to a stain in order for complete analysis to be performed.

2. Hair analysis cannot be performed without an adequate standard sample for comparison.

3. NEVER lick the seal of the envelopes containing biological samples. Use tape and not staples to seal packages. The collector’s initials should be written across the tape in indelible ink.

4. Try to minimize the amount of bulk evidence that is submitted. This particularly applies to clothing and bedding.
5. Be sure all envelopes and bags are properly identified with the description of the item, where and/or from whom the item was collected, the collector of the evidence, and the date and time of collection.

6. Do not cross contaminate evidence by packaging two items in the same package.

7. Provide detailed facts to the analyst. The request form should bear the names of all victims and suspects, sex, age, case history, and types of analysis requested.

8. Remember to use disposable powderless gloves in handling evidence and use any other protective equipment as directed by your agency. All packaged evidence containing blood or other body fluids should also be marked as “BIOHAZARD.”

9. All items should be packaged in paper.

10. Please contact the Forensic Biology Unit if there are questions regarding the collection, preservation, and submission of biological evidence.

11. For shipping information, see shipment paragraph under Biological Evidence (this section).
DNA DATABASE

All forensic unknowns collected from crime scenes will be considered for entry into the DNA database; therefore, an independent request for database entry is not required. It is required that the location where an item was located be provided to the laboratory. This information is vital for determining eligibility for database entry. The DNA database, which houses DNA profiles, has two major indices used in forensic cases:

- Forensic Unknown- contains crime scene sample profiles believed to be from the alleged suspect.
- Convicted Offender- contains profiles from certain offenders, or those adjudicated delinquent, who are required by law to provide a sample.

The DNA database also has the capacity to store profiles from unidentified human remains and profiles involved in missing person investigations. Information on submitting samples involved in a missing persons investigation follows in the next section. If you have questions, please contact the laboratory about submission of such samples.

The KSP laboratory participates in the Combined DNA Index System (CODIS) which is maintained by the FBI. This allows for searching of qualifying samples within the State DNA Index System (SDIS), as well as across the nation via the National DNA Index System (NDIS). These databases allow the searching of forensic samples against each other in an attempt to link cases. Forensic samples are also searched against offender’s samples in an attempt to link an offender to a crime. When cases are linked to each other or to an offender, this is termed a “hit”. Hits will be reported to the investigating officer(s) as an investigative lead.

In the event of an offender hit the submitting agency will be contacted to determine if the case is unsolved. A prompt reply to this inquiry will facilitate rapid verification of the offender information. Once an offender hit is verified the officer will be notified via a hit notification letter. If the officer determines that the individual is a viable suspect in the crime, the officer should obtain a blood or buccal standard from the suspect and submit it to the Forensic Biology unit at the Central Laboratory for analysis. A KSP-26 or pre-log form referencing the DNA database hit should accompany the submission of the suspect’s standard. Offender samples maintained in the database are not intended for court purposes but only for searching and supplying investigative leads; therefore, a confirmation sample from the suspect is always required in the event of a hit that will be pursued legally. The suspect’s standard will be compared to the crime scene evidence and a statistical evaluation will be reported to the officer in a KSP-35.

When submitting a case with a known suspect, who is in the offender database, it is still required that a blood or buccal standard is obtained. It is preferable that the standard be submitted with the evidence. Since offender samples are not intended for court there is no advantage to submitting a case with a known suspect simply for comparison to the offender database.

Our participation in NDIS requires that we follow stringent guidelines in determining sample eligibility for entry into the databases. A sample from a victim, even if left at a crime scene,
is not allowed in the forensic unknown database. Also, if state statute does not allow the databasing of suspect’s standards (blood or buccal sample) submitted for comparison in an investigation, then those samples are not allowed in the database. At this time Kentucky law does not allow the maintenance of these samples for purposes of searching. Mixtures are extremely problematic for database searches and some mixtures are of no value for searching and cannot be entered into the database. DNA analysts are trained in the interpretation of DNA profiles for entry into the database and will make the determination on allowable samples. If a sample is deemed allowable for database entry, this may be reported in the KSP 35.

Qualifying forensic unknowns collected from crime scenes that are believed to be from an alleged suspect may be entered into the database(s). This includes both cases with unknown suspects (unsolved) and cases where a matching suspect’s standard (solved) was provided. The presence of a DNA match to a suspect does not prevent the sample from being added to the database, as this sample may prove useful in the investigation of other unsolved cases.

Name searches may be requested to determine if a sample is present in the DNA database. The search should be requested only if the individual in question is a person of interest in an active investigation, and there is no probable cause or the person cannot be located to obtain a standard. Requests must be in writing on forms which can be obtained by contacting the DNA Database Section. Information provided will be for informational purposes only and is not intended for use in criminal proceedings.

**Missing Persons Investigations**

The Missing Persons Database is a central repository for all information pertaining to missing persons. It is part of the DNA Database Section housed in the Central Forensic Laboratory in Frankfort, KY. The database personnel will provide assistance in filing a missing person’s report, advise on collecting family reference sample(s) as well as provide DNA sample collection kits and profile entry into NamUS. NamUS is a federally funded website that has been created to help solve missing person and unidentified human remains cases. The testing and collection kits are offered at no cost to the agency or the reporting party.

The collection of all missing person’s data is important in the creation of a missing person's file. A complete file is essential to solving a missing persons case. Often, files are incomplete and are not useful to medical examiners, DNA personnel, and law enforcement. The following procedures will help streamline the data collection and make the creation of a missing persons file easier and more useful to all agencies involved.

**Filing a Missing Persons Report**

**It is essential to gather all data pertaining to a missing person as soon as possible after the person is reported missing.**

A. Personal Identifiers:
• Name and aliases (also the reporting party’s relationship to missing person)
• Address (from missing person and from the reporting party)
• Date of birth
• Social security number
• Date of last contact
• Potential whereabouts
• Clothing/jewelry worn when last seen

B. Biological Identifiers:
• sex
• race
• height
• weight
• hair color
• tattoos
• DNA sample from personal belongings and family members
• Eye color

C. Medical Identifiers:
• Dental records
• X-rays from any physical injury
• List of broken bones
• List of physical abnormalities (one foot shorter than the other, amputations, etc.)
• Scars

Submission of Information:
Information can be submitted via a copy of the KSP-26 or pre-log form or by utilizing the missing persons report form provided by the DNA Database Section.

All information needs to be sent to the Missing Persons Database at the Kentucky State Police Central Forensic Laboratory, 100 Sower Blvd. Suite 102, Frankfort, KY 40601. The information can be submitted electronically via email to database personnel. Information will be entered into the missing person’s database of NamUs. After 30 days, the reporting agency will be notified that a DNA sample(s) should be submitted and the missing persons report needs to be completed, if not done previously. A kit will be provided for the collection of DNA samples from family members who are willing to submit. The kit and testing are provided free of charge. The sample will be entered into the DNA database and used for missing person purposes only.

Once uploaded to NamUs, the missing person file will be monitored and updated as new information is made available. This website will be viewed by both the public and law enforcement. Case sensitive information will only be viewable by law enforcement. Because NamUs houses information from both missing person and unidentified human remains, it will be easier to cross reference remains with those reported missing.

The missing person’s information should also be submitted and entered into NCIC. The reporting agency will be responsible for both submission into NCIC and NamUs.
missing persons database will work with NCIC to make sure that all information is in both systems.

Please keep in mind that it is crucial that medical records, dental records and DNA samples are collected in the early stages of the missing person report. Please contact the laboratory, if you have questions.
TRACE EVIDENCE

Trace analysis is only conducted at the Central Forensic Laboratory. The trace analysis section is that section of the laboratory that examines evidence that does not conveniently fit into the other classifications. Paint, glass, tape, hair, and fibers are the most common types of trace evidence. If you have any questions about the types of analysis the Trace Section can do in an investigation, please contact the Central Forensic Laboratory at (502) 564-5230. As can be concluded from the title, trace evidence refers to the size and quantities of evidence that can be collected. Paint chips, a few bits of glass, and single fibers are examples. Because of the small size and quantity of many types of trace evidence, it is important to completely seal each item’s packaging in order to prevent the loss or cross-contamination of evidence. Many times, trace evidence that is too small to be seen without the aid of a microscope can be transferred. For this reason, submission of items that may have transferred material is encouraged.

The Kentucky State Police Laboratory has Trace Evidence Kits available to help in the collection and preservation of trace evidence. These kits contain zip-lock plastic bags for samples like soil, round metal “pillboxes” for small particles such as paint and glass, paper envelopes with folded paper packets, a scalpel, and evidence seals.

The Laboratory also has Trace Evidence Tape Kits available to help in the collection and preservation of certain types of trace evidence, especially hairs and fibers. Once any visible hairs and fibers are collected using the Trace Evidence Kit, the Tape Kit can be used to collect hard-to-see hairs and fibers and other very small pieces of evidence. The Tape Kits contain tape pads and plastic sheets to put the tape on. DO NOT use the Tape Kits to collect paint evidence, as the adhesive on the tape may interfere with analysis of the paint. DO NOT use the Tape Kits to collect hair and fiber evidence from accident reconstruction scenes, as loose hairs and fibers from the scene would be difficult to differentiate from impacted hairs and fibers from the accident.

Hair

Hair is a common type of evidence found in a variety of different types of criminal cases. The identification, examination, and comparison of hair evidence is performed in the Trace analysis section.

Value

Hair evidence can be of particular value in the investigation and prosecution of a variety of criminal cases. These commonly include crimes such as accident investigations, homicide, rapes, assaults, robberies, and game law violations. Hair identifications and examinations provide important information in an investigation. Microscopic comparisons cannot limit the source to a single individual, but with DNA analysis, further testing and additional results are now available.

Information determined
1. The analyst can determine whether the sample is of human or animal origin.
2. If the hair is of animal origin, microscopic examinations may allow the analyst to identify the species from which it came, if required by the investigation.
3. If the hair is human, the possible race of the person, as well as the area of the body from which it originated, may be determined.
4. Hair damage or treatment can also be determined. Indications of hair being burned, crushed, cut, bleached, dyed, or artificially waved are often exhibited on individual hairs. Examination of the root may show whether the hair has been pulled out (forcibly removed) or has fallen out naturally.
5. Hair comparisons with a hair standard can be made. Such comparisons can yield the following results: (a) that the hairs are different, (b) that the hairs are similar with respect to microscopic characteristics and originated either from the same person or from another whose hairs exhibit the same microscopic characteristics, or (c) that no conclusion can be reached.
6. If a microscopic comparison has been done, additional DNA analysis may be performed.
7. In a homicide or rape in which the suspect is unknown and no probative DNA results identifying the suspect have been obtained, the examination of hairs on a victim’s clothing (and/or bedding, if applicable) may be used as an investigative tool in conjunction with DNA and the CODIS system. The victim’s hair standards need to be submitted for this type of analysis.

Evidence Collection

1. Since hair evidence is generally small in nature, care should be taken to protect evidence from loss or contamination. Unknown hair(s) should be placed in a piece of paper which is folded up before being placed in an envelope.
2. Visual searches and searches with additional magnification can be used in the detection of hair evidence.
3. Recovery of evidence should be the most direct but least intrusive technique practical. For hair evidence, this could include picking or taping. If the item of interest is something that can be packaged, i.e., bedding or clothing, package the item for analysis and allow the analyst to collect the hairs.
4. If the location of a foreign hair is important, it should be collected and packaged separately.
5. Package clothing or evidence items separately. Before submitting clothing that is wet or bloody, air-dry over a clean sheet of paper, and then place each garment in a separate bag. Include the paper with the evidence.
6. If a hair comparison is requested, it is absolutely necessary that an adequate known sample be submitted. This consists of at least thirty (30) pulled hairs from the head and/or pubic region of the body. Collect the hairs from all areas of the region: for head hair standards, for example, collect from the front, back, top, and both sides of the head. Because of their limited features, microscopic comparisons cannot be performed on arm, leg, chest, or underarm hair. Do not collect known samples from these parts of the body.
7. In some circumstances, facial hair comparisons can be performed. If the suspect and/or victim have facial hairs of at least one-half inch long, collect a standard of thirty (30) hairs for comparison.

8. A minimum of 30 hairs is necessary because of the range and variability of hair.

9. Several hairs must be forcibly pulled, but pain can be reduced for the subject by gently tugging on large tufts of hair so that some loosely attached hairs are also pulled.

10. **In homicide cases, the head and pubic hair standards of the victim need to be collected at autopsy.**

11. Known DNA samples will also be necessary if DNA analysis is to be performed on a hair sample.

12. Label the sample containers with the case number, exhibit number, and exhibit description. Seal the containers with evidence tape and initial over the tape.

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**Fibers and Fabric**

Fiber and fabric comparisons and identifications can be encountered in a variety of criminal cases. A trace analyst performs this analysis.

**Value**

Fiber identification can be of great value in many types of investigations. Cases involving rape, homicide, accident investigation, robbery, kidnapping, and assault can have fiber evidence. A fiber or fabric comparison can tell us if an unknown fiber could have come from a known piece of fabric.

**Information Determined**

1. The fiber type can be determined by microscopic or instrumental examination when found individually or as part of a fabric. Polyester, nylon, acrylic and spandex are examples of synthetic fibers. Wool, mink, and silk are examples of fibers from animal sources. Cotton, linen, hemp fibers, and jute are examples of plant fibers. The fibers in paper are generally woody in origin. Asbestos is a mineral fiber.

2. Comparisons of fibers include the analysis and comparison of fiber type, color, dyes, optical properties, fiber diameter, cross-sectional shape, and if a piece of fabric, its weave or knit pattern. Unknown fibers can be compared to a known fabric. Unknown fabric can be compared to a known fabric.

3. Sometimes a physical match can be made between two fabrics. A physical match means that two pieces that are now separate were one piece at an earlier time.

4. Ropes and cords can be analyzed.

5. Fabric impressions may be found in a number of situations. The impression of a suspect’s or victim's garment may remain on a surface of a vehicle in an accident investigation. Often, fibers will be impacted into the impression.

6. A fabric can be examined to determine if it was cut or torn.
Collection of Evidence

1. Since fiber evidence is generally small in nature, care should be taken to prevent loss or contamination. Small samples should be placed into one of the metal pillboxes provided in the Trace Evidence Kits.
2. Visual searches and searches with additional magnification can be used for the location of fiber evidence.
3. Recovery of evidence should be the most direct but least intrusive technique that is practical. This could include picking up with forceps or tape lifts. Individual fibers usually cannot be seen with the naked eye. Tape lifts are therefore recommended on areas where contact might have occurred.
4. If the item of interest is something that can be packaged, i.e., bedding or clothing, package the items for analysis separately and allow the analyst to collect the fibers. Before submitting clothing that is wet or bloody, air-dry over a clean sheet of paper, and then place each garment in a separate bag. Include the paper with the evidence.
5. If fabric or fiber impressions are desired from an accident reconstruction scene, do not use tape to collect the evidence. It is best to collect the entire item (i.e., visor, glove compartment) and allow the analyst to collect the impacted fibers.
6. Known samples need to be submitted for comparison purposes.
7. Label the sample containers with the case number, and exhibit number. Seal the containers with evidence tape and initial over the tape.

Paint

Value

Paint chips and paint smears can be transferred from one automobile to another in a car crash. They may also be left on the clothing of a pedestrian who has been the victim of a hit-and-run. Paint from a house or business may be on the tools of a burglar. Criminal mischief cases can include paint evidence.

Information Determined

Two types of analysis are available: comparison and identification. A comparison is between a known sample and an unknown sample. A paint comparison can tell us if an unknown paint could have come from a known paint. Identification can give the make, model, and approximate year of manufacture of original-finish paint using the Paint Data Query.

Collection of Paint Evidence

1. All samples from painted surfaces should be collected so that all the layers of paint are present. In other words, the paint should be sampled down into the unpainted surface. Put the chips into one of the metal “pillboxes” provided in the
Trace Evidence Kits. Do not use envelopes to package paint chips. Do not use tape to transfer or pick up paint samples.

2. When a foreign smear is collected, the underlying paint should also be collected, down to the unpainted surface.

3. Known samples (including all paint layers) need to be submitted when a paint comparison is requested. Known samples should be taken as close to the damaged area as possible.

4. Sometimes it is better to submit a small or easily removed item (trim or molding from a vehicle) as-is and let the laboratory remove any foreign paint.

5. Before submitting clothing for trace paint analysis, air-dry over a clean sheet of paper and then place each garment in a separate bag. Include the paper with the evidence.

6. If submitting a tool such as a crowbar for paint analysis, wrap the tool in plastic or place it in one of the plastic bags in the Trace Evidence Kit.

6. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

Glass

Value

Glass is found in many types of cases including burglaries and homicides. Glass fragments can be found on shoes, clothing, in hair, on a baseball bat and many other places. A glass comparison can tell us if an unknown piece of glass could have come from a known piece of glass. Physical matches can be made with glass. A physical match means that two pieces that are now separate were one piece at an earlier time.

Information Determined

1. Most glass analysis consists of comparing the morphological characteristics, refractive indices, elemental compositions, and densities of two or more samples.

2. Sometimes a fractured glass object, such as a headlight lens, can be reconstructed. Reconstruction can be used to find the direction of breakage, to determine the original shape and size of the object, and to make a physical match.

3. The direction of force used in breaking certain types of window panes can be determined by characteristics left on the glass due to the breakage. (See figures on page 61).

4. When a window is broken by a bullet firing through it, it is possible to determine the bullet's direction due to the characteristics left on the glass by the bullet. This applies to specific types of window glass. (See figures on next page.)
5. A determination of the sequence of bullet holes can be made by examination of the characteristics left on the glass due to the bullets passing through. This applies to specific types of window glass. (See figures on next page.)
GLASS BREAKAGE

Radial Fracture
Concentric Fracture

Perpendicular Side
Rib Mark

Direction of Force
Radial Fracture
Concentric Fracture

Path of the Bullet in the Direction of the Arrow

Sequence of Bullet Holes

θ₁
θ₂
θ₃
**Collection of glass evidence**

1. When collecting glass samples, it is best to make sure that a representative sample of known glass is collected. Collecting the four corners of a broken window does this best. When this is not the case or when the glass broken is not a window, collect all the glass that is available.

2. If more than one type of glass is broken, collect representative samples of each different type and package separately.

3. The round pillboxes are the best containers for small glass samples. If the glass pieces are extremely small, use the Tape Kit to collect the glass.

4. Breaking glass can fly back and lodge in the hair and clothing. If clothing is to be submitted, allow it to air-dry over a clean sheet of paper and then place each garment in a separate bag. Include the paper with the evidence.

5. The soles of shoes frequently pick up glass fragments, as do the cuffs of jeans. If the item of interest is something that can be packaged (i.e., clothing, shoes, or a tool), package each item separately and allow the analyst to collect the glass.

6. For the reconstruction of glass, lenses, or panes, collect all the glass possible and carefully package to prevent further breakage.

7. Direction of force is best determined at the scene from pieces of glass still in the frame. The lab cannot make such a determination from one isolated piece. If such material is to be submitted, be sure to remove as much glass as possible from the frame and mark the pieces to indicate the inside or outside.

8. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

**Physical Matches**

**Value**

Physical matches can be made with most hard and some soft items. Examples of “hard” items would include glass, ceramic, hard plastic, brick, large paint chips, wood, and metal. Examples of “soft” items include cloth, matches from a matchbook, and paper. A physical match means that two pieces that are now separate were one piece at an earlier time. Some “soft” items such as cloth can stretch and a physical match between two soft items would be less specific.

**Information Determined**
Physical matches are made based upon the visible characteristics of the pieces, their unique points of weakness, and the unique force applied that created the pieces. Plastic vehicle pieces from a hit-and-run would be one example. The stereomicroscope is usually used to examine each piece for common features.

**Collection of evidence for physical matches**

1. Collect all the material possible and carefully package to prevent loss and further breakage.

2. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

**Lamp Filament Examination for On/Off Determination**

**Value**

Lamp filaments can be used to determine whether or not a lamp was incandescent (on) at a time of impact. This is usually performed on automobile lamps. Any lamp on the outside of a vehicle can be examined. This includes the headlamps, tail lamps, brake lights, turn signal lights, and running lights.

**Information Determined**

Light is generated when a filament is very hot (4000 degrees F). This also causes the filament to be ductile (soft). When a great force is applied to a soft filament it will deform. If the glass bulb around the filament is broken when the filament is very hot, oxidation will occur. Oxidation colors are then created.

Filaments are examined using a stereomicroscope. We look at the color, shape and broken/melted ends. We look for glass that may be fused to the filament. We may also examine the glass bulb that contains the filament.

Sometimes an analyst cannot determine whether a filament was incandescent or not at a time of impact. The filament may not have the features needed to make a determination. This may mean that the filament was off or that the force applied was not great enough to cause damage to the filament. Another reason for an inconclusive result is that most of the filament may have been lost in the crash and there is not enough left to observe the necessary features.

**Collection of filaments**

1. At the scene the officer should NOT test the filaments by turning the lights on or off. Once the bulbs are removed, the officer may check the position of the switches.
2. It is best to remove the entire fixture, or as much as possible, all in one piece.

3. Any loose pieces of filament should be collected.

4. The Styrofoam cup method for packaging glass is diagramed below.

5. The packaging should be such that the filaments and bulbs are protected from further breakage and loss.

6. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

- Cut a small hole in the bottom of the cup
- Place the bulb-end inside the cup and secure
- Use tissues or other soft material to pack around the bulb
- Place another cup under the first cup
- Cover the cup top to retain any pieces that may become loose
- Secure with tape to prevent any loss or contamination

**Unknown Substance and Product Tampering**

**Value**

This topic encompasses a wide variety of substances. Some examples include:
 Submission of possible standards is very valuable in determining the source of product contamination. If ingesting a substance has physically harmed a victim, they should be taken to a hospital. Any information that the doctor can provide indicating the source of harm would be very helpful.

**Information Determined**

A wide variety of tests and instrumentation is available to identify an unknown substance or contaminant. Sometimes we cannot determine the identity of a substance; this may be due to sample size or the fact that some analyses are not within our testing abilities. In product tampering cases, it is highly recommended that the officer get a toxicology/poison screening for the victim done at a medical facility to help ascertain what the material may be. Biological materials such as mold or anthrax are not tested at the Forensic Lab.

**Collection of evidence**

1. Obtain as much sample as practical.

2. Package the sample to reduce possibility of contamination or loss. For example, meat tainted with antifreeze should be placed in a zip-lock bag or airtight container and placed in the freezer. **Any non-liquid food product with suspected contamination should be immediately frozen in an air-tight container to preserve the evidence.** Any liquid food product with suspected contamination should be immediately refrigerated in an air-tight container to preserve the evidence.

3. If you are not sure how to package the evidence, call the Trace section at 502-564-5230 to find out the proper packaging.

4. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

**Soil**

**Value**

Soil is frequently found on clothing, shoes, tools, and on vehicles.
Information Determined

Most soil analysis consists of comparing two or more samples by their color, mineral content, and density. The presence of pesticides and herbicides has also been used in soil comparison.

Collection of soil evidence

1. Clothing or shoes should be dried over a clean sheet of paper and then placed in individual paper bags with the paper.

2. Known soil samples should be collected as follows:
   a. one sample at the point of suspected origin;
   b. three samples (in a triangle pattern) approximately ten feet away from the point of suspected origin

3. These samples should be taken from approximately the same depth as the questioned sample. If a shoe print is one quarter of an inch deep, do not sample an inch or more in depth.

4. The zip-lock plastic bags in the trace kit are convenient for such samples. One bag about half-full (1/4 of a cup) of soil would provide an adequate sample

5. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

Tapes and Adhesives

Value

Tape, such as duct or electrical, may be found in cases involving homicide, robbery, kidnapping, and assault. Adhesives by themselves, such as glues, may be found in a variety of cases as well.

Information Determined

A comparison between a known sample and an unknown sample may be made. This can tell us if a piece of tape could have come from a certain roll, or an adhesive could have come from a certain container. Sometimes, a physical match can be made between the ends of a known and unknown tape. A physical match means that two pieces that are now separate were one piece at an earlier time. Tape can also be examined for other trace evidence, such as hairs and fibers, and torn ends that may have DNA from saliva on them. In some circumstances, the originating source of an unusual tape may be determined because of its unique characteristics.
Collection of tape and adhesive evidence

1. Use non-stick aluminum foil to package the tape. Plastic may interfere with DNA analysis and will stick to the tape.

2. Avoid wadding or balling the tape up.

3. Known samples should be submitted for comparison purposes.

4. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

Miscellaneous Trace Evidence

Value

Trace evidence also includes a "Miscellaneous" section. This would include safe insulation, plastics (including garbage bags), cosmetics, lubricants, rubber, ink, dyes, wood, herbicides, pesticides, plaster, concrete, building materials, petroleum products, acids, alkalis, other corrosive materials, etc.

Information Determined

The information determined is dependent upon the substance to be analyzed. Often a comparison is performed and a known sample would be submitted.

Collection of miscellaneous evidence

1. In collecting such evidence, use a container that will protect the items from breakage and loss. If you are not sure how to package the evidence, call the Trace section at 502-564-5230 to find out the proper packaging.

2. Label the sample containers with the case number and exhibit number. Seal the containers with evidence tape and initial over the tape.

3. If you have any questions about whether the Trace Evidence Section can do a certain type of analysis, contact the lab at 502-564-5230.
FIRE DEBRIS

Fire Debris analysis is a difficult field, both for the investigator and the chemist analyzing the material. During a fire involving an ignitable liquid, the ignitable liquid (e.g., gasoline, kerosene, mineral spirits, etc.) will undergo change. The more volatile components will be lost to a much greater extent than the components of lower volatility, and that which remains has been absorbed into wood and carpeting of the structure or soil underneath. There are situations in which one sample will show ignitable liquids and another will not, even though the samples were taken from areas quite close together.

Value

The presence of an ignitable liquid, i.e., a material used to spread or increase the rate of burning, will be indicative of arson if there is no good, legitimate reason for its presence.

Information Determined

Laboratory analysis can determine if an ignitable liquid is present in the sample. The volatility range and general chemical composition can also be determined. If an alcohol or other highly volatile product is suspected, please let the analyst know by putting the information on the KSP-26 or pre-log (lab request form) or by letting the analyst know when the evidence is brought into the lab.

Collection of Samples and Standards

1. An ignitable fluid can be a liquid or a gas. Normally, liquids are used. If a suspected flammable liquid is found near the site or in the possession of a suspect, estimate its volume and pour a sample into a jar for submission to the lab. The forensic laboratory provides such jars and one is provided in the standard issue Arson Evidence Collection Kit.

2. For evidence at the fire scene, collect samples with a porous nature near the point or points of the suspected origin. In some instances, the most useful evidence will consist of material that has been relatively protected from intense heat, such as from beneath furniture or in a crawl space. Examples of materials commonly submitted are charred wood, rags, paper, insulation, soil and clothing.

3. Since ignitable liquids are volatile, evidence must be stored in air-tight containers. The laboratory provides “paint” cans for this purpose. One can should be used for each suspicious location or object. **Do not use plastic bags since ignitable liquids will pass out through the plastic, and never use paper bags or envelopes.**
4. The evidence should be of sufficient quantity. In most cases, the one-gallon cans should be one-half to three-quarters full or have an air space of two (2) inches at the top of the can.

5. After placing the evidence in the can, the lid should be secured in place by hammering or by stepping on and around the lid. If the object is too large for the one gallon can, it is perfectly acceptable to chop, cut or saw the evidence to make it fit inside of the air-tight container. (DO NOT USE GASOLINE POWERED TOOLS).

6. Fill in the information requested on the label on the lid. Do not forget to seal with evidence tape, and put your initials and date on the tape.

7. Store the evidence at as low a temperature as possible until it can be brought to the lab. If the fire debris consists of soil and/or dirt, put the evidence in the paint can(s) and freeze the can(s) as soon as possible. If the can(s) cannot be placed in the freezer before submitting to the Central Laboratory, submit the evidence as soon as possible.

8. List all evidence to be submitted on a laboratory Request for Examination form (KSP-26 or pre-log) and fill in all other information requested.

9. If DNA is requested for bloody clothing from an arson/homicide scene as well as ignitable liquid analysis, please put the evidence in the paint cans and **FREEZE THE CAN AS SOON AS POSSIBLE.** If the can(s) cannot be placed in the freezer before submitting to the Central Laboratory, submit the evidence as soon as possible.

For advice and/or assistance, contact a Kentucky State Police Arson Investigator through a nearby State Police post or contact the Central Forensic Laboratory (502-564-5230).

**Shipment**

Currently, only the Central Forensic Laboratory provides Fire Debris Analysis. Postal regulations prohibit the mailing of flammable liquids. This does not include fire debris, which can be mailed. (Via certified mail). If flammable liquids are requested for analysis, please use Federal Express or United Parcel Service and clearly mark the container as evidence with flammable contents.

Please arrange for pickup of evidence as soon as possible after receiving the laboratory reports.

**Explosives**

**Shipment**
For explosive devices, follow the instructions of the explosive expert for disposal and evidence collection. For blast scenes, package debris in plastic bags or arson cans if possible. Call the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) lab for advice on exploded material, blasting caps, and other detonating material. Analysis of explosives is currently being handled by the ATF.
SOLID DOSAGE DRUG IDENTIFICATION

The solid dosage drug section is responsible for the analysis of exhibits suspected of containing controlled substances. This evidence includes plant material, pharmaceutical preparations, illicit tablets/capsules, powder/solid, paraphernalia, residues and liquids. This evidence does not include identification of controlled substances in biological specimens; refer to the Toxicology Section. Solid dosage identification is available at all six (6) laboratory locations in the state and provides this service for local, state, and federal law enforcement agencies.

Information Determined

1. An identification of any and all controlled substances present in an exhibit.
2. Identification of precursors in a clandestine laboratory can be determined if present.
3. A net weight, volume, or count of the material tested will be obtained. If the exhibit’s weight includes the packaging it will be noted on the report as a gross weight.

Requirements of Submission

1. All evidence submitted to the laboratory must be accompanied by a legible request for examination form. This form should, ideally, be completed before arriving at the laboratory and filled out properly. It should include exhibit number designation along with a brief description of the item being submitted for testing.
2. All evidence of this nature should be brought to the laboratory in a properly sealed package. Evidence can be submitted in a plastic evidence bag, envelope, brown paper bag, and/or cardboard box. Please do not submit evidence in zip-lock bags, zipper plastic bags or sandwich plastic bags as the outermost packaging. (These bags as interior packaging are fine).
3. The agency’s name and a unique identifier (case number, citation number and/or suspect’s name) should be visible on the outside package. Inner packages should bear the item (exhibit) number and associated subject’s name, if applicable.

Collection of Samples

Only submit items that need analysis. For example, items such as rolling papers, paraphernalia not containing controlled substances, and/or personal belongings do not need to be submitted with items that require testing. If omission of these items is not possible, separately package drug exhibits.

Do not place any suspected drug evidence directly into a manila envelope, brown paper bag (exception: wet marijuana), or any package that has seams or holes in which the evidence can readily escape. Place all items in a secure package (e.g. taped plastic bag, ziplock bag, closed knotted plastic bag, etc.) prior to placement in outer package to prevent loss or cross-contamination. Label all inner bags with a minimum of an item number, or any information needed in association with that item (i.e. location found, subject’s name). The inner package can be the original packaging. The inner package
need not be sealed but should be securely closed to prevent cross contamination between exhibits.

In cases dealing with unusually large quantities of evidence, the officer is encouraged to call the laboratory for assistance in packaging and receiving. By calling ahead, the officer allows the laboratory to prepare for the evidence arrival and the officer can be advised if he/she is needed to stay until evidence has been weighed and sampled.

**Tablets and Capsules**

*illicit and pharmaceutical preparations*

1. Tablets and capsules should be counted and/or weighed. This count and/or weight should be noted on the request for examination form.
2. Generally speaking it is best to submit the entire exhibit, as more than one tablet or capsule may be needed for the extraction and identification of the active ingredient. However, in cases where there are large amounts of tablets and/or capsules, it is encouraged that an officer submit a representative sample.
3. It is discouraged for an officer to submit tablets and/or capsules merely to be counted.

**Powder/Solid**

1. Powder/Solid should be packaged in a manner that prevents leakage and cross contamination between exhibits. If the original container has holes of any sort, the officer should place this bag inside of a secure package.
2. Unless otherwise advised by the laboratory, all illicit powder/solid substances should be submitted for testing. This allows for an accurate weight and representative sampling. An accurate weight is beneficial to the officer as well as the prosecuting attorney for sentencing guidelines.

**Liquids**

*non clandestine*

1. Place in a secure container to prevent spillage; it is encouraged that this container be placed inside of a zip-lock or zipper plastic bag inside of the outer most package in the event the container bursts during transportation. This will help prevent cross contamination of other cases and allow for the safety of individuals who may come in contact with the package.

**Plant Material**

*marijuana, peyote cactus, opium poppy, various species of psilocyn/psilocybin mushrooms, khat, etc.*

1. Fresh/wet plant material should NOT be placed in a plastic bag. This will lead to degradation of the sample due to mold and mildew, possibly
leading to fungal growth that can cause serious respiratory complications and the exhibit to be insufficient for analysis.

2. Unless otherwise advised by the laboratory, all plant material should be submitted for testing. This allows for an accurate weight and representative sampling. An accurate weight is beneficial to the officer as well as the prosecuting attorney for sentencing guidelines.

3. In cases involving the cultivation of marijuana where there are five (5) or more plants, it is recommended that a sample be taken from five to ten plants and placed in individual envelopes. A good sample would consist of a handful of leaves. If the plants are mature, some of the flowering top should be included in the sample. Before samples are taken and sent to the laboratory, it is a good idea for the officer to take photos of the plants for his/her own records. An officer should also take a total count of the plants and measurements of the area of cultivation should be recorded. A note should be made on the request for examination form that the material submitted is from a cultivation case. It is encouraged in large cultivation cases that the officer call the laboratory for proper sampling techniques due to the varying sizes of cultivation cases and sentencing guidelines.

4. In non cultivation cases where the plants are small enough but mature, the officer may submit the entire plant. Immature plants often do not have the chemical constituents present for the identification of marijuana; a plant must have more than the seed leaves to be identified. The officer should try to remove as much soil from the root system as possible without destroying it. If the plants are large, the officer should refer to the above paragraph on how to submit the evidence.

5. In cultivation cases involving mushroom spores, please call the laboratory for assistance in evidence retrieval and submission. These cases vary in size and growth apparatuses.

6. If a plant is suspected as being Khat, the officer should store the plant material in a cold storage unit such as a freezer until it is submitted to the laboratory. This particular plant material is heat sensitive and the controlled substance breaks down quickly over time.

7. Peyote Cactus should be submitted in a rigid container such as a bucket to preserve the plant material

**Clandestine Laboratories**

Probably no other area of law enforcement requires as much chemical knowledge as does the investigation of clandestine drug laboratories. A clandestine laboratory is an illegal preparation of illicit substances such as, but not limited to, methamphetamine. These laboratories may contain chemicals that are hazardous to the individuals working in or around them. It is important to make sure there are individuals on site that are adequately trained in dismantling these operations and disposing of the chemicals properly. Keep in mind these chemicals may be flammable, explosive, toxic and/or carcinogenic and the fire department or other appropriately trained emergency personnel may be required.
1. Methamphetamine Clandestine Laboratory Collection Kits are recommended. These kits can be found at any of the state police post and DESI branches. These kits are typically not distributed at the laboratories. These kits contain instructions on how to collect evidence, vials for collecting liquids, and smaller vials for collecting residual evidence, zip-lock bags, and swabs. Before submitting the kit to the laboratory, the officer should discard any container from the kit that is not used in collecting evidence.

2. If an officer suspects an operational clandestine laboratory is producing something other than methamphetamine, he/she should contact the laboratory for instructions on collection of evidence and safety issues. Please keep in mind everyday products are used in the preparation of illicit drugs and may be valuable in the identification process.

**Residues**

Generally speaking if a residue can not be seen, it can not be identified. If a substance is removed from the original package, this package does not need to be submitted to the laboratory for testing. If this package is pertinent to the officer’s case, he/she should package it in a separate container and indicate its importance on the request for examination form.

**Syringes**

1. Syringes are a serious hazard due to the possibility of transmissions of diseases such as hepatitis, HIV, and AIDS. At the time of printing, syringes will not be analyzed, unless visible signs of residue are present on the syringe and the individual evidence is accompanied by a written and signed request (true copy) from the prosecutor indicating sufficient justification for the examination (on a case-by-case basis). In addition, syringes will not be given priority over other exhibits in the same case, even if accompanied with a prosecutor’s letter. This ensures that the analysis is needed and promotes the safety of the chemist, the investigating officer, and any individuals who handle the package in transportation. If a syringe is accepted for testing, it must be packaged properly by placing the syringe in a sharps container or some other puncture resistant container. It is also important for the officer to label the packaging and the Request for Examination form (KSP-26 or pre-log) as a BIOHAZARD.

**Sharp Objects**

(broken glass, razors, knives, etc.)

1. These items should be placed in a sharps container or some other puncture resistant container. Do not wrap the items in tape to preserve the sample. It is very dangerous for an examiner to remove the tape and it may destroy the evidence.

**Biohazards**
Periodically drugs are hidden by suspects in their body cavities (vagina, mouth, anus, etc.) For the safety of the officer, laboratory personnel, and court personnel, the evidence and request form must be labeled with a BIOHAZARD sticker. This evidence should be placed inside of a package within the outer most package. This will prevent contamination of the packaging and will ensure the safety of the individuals handling the evidence. It is also very important to note in the history of the case where the item was found.

**Shipment**

First determine which laboratory the evidence should be submitted to by either contacting the laboratory, the evidence custodian within the officer’s agency, or the KSP Post in the area. The evidence can be directly delivered to the lab or mailed. If the evidence is to be mailed, postal regulations require the evidence to be sent via Registered Mail. Registered Mail requires a signature upon receipt and this receipt is returned to the sender via the Post Office. Please do not send evidence through regular mail, as there is no way to track the evidence and it could get lost. Also, make sure the package being sent is sealed. It is recommended that the evidence be placed inside of a sealed package within the mailing envelope. On the outside of the mailing envelope, the officer should put “ATTENTION: CS or IDCS” (controlled substance or identification controlled substance), so that the contents will not be so obviously marked for others but still adequate for the laboratory to know which section should sign for the evidence.
BLOOD ALCOHOLS & TOXICOLOGY

Blood and urine can be analyzed to determine alcohol and drug concentrations (not syringes). Urine samples will not be examined for drugs if a suitable blood sample is received, unless the case type is a sexual assault, murder, or homicide. Each Kentucky State Police Forensic Laboratory location has the ability to determine the alcohol content of blood and provide expert testimony as to these findings. The Central Laboratory in Frankfort also has the capability to do toxicological analysis of biological specimens for the presence of drugs.

Blood Alcohol and Intoxicants

Value

The alcohol, inhaled solvents, and drug levels of samples (blood, urine, and suspected volatiles only), can assist in the determination of the level of intoxication of a person while operating a motor vehicle.

Information Determined

Toxicological evidence submitted from subjects for screening will usually be limited to blood and urine. Blood and urine specimens are sufficient to screen for drugs of abuse and are generally adequate in all DUI cases. Each of these specimens can be the evidence of choice, depending upon the request.

The submission of whole blood specimens in a Blood/Urine Collection Kit is sufficient for the determination of alcohol content. Blood alcohol or other volatile analysis will be performed as requested.

Drug analysis will follow standard operating procedures for the Toxicology section. Drugs of interest should be specifically requested.

Collection and Shipment

The Forensic Laboratory makes available kits for the collection of blood and urine for DUI cases. These kits are obtainable free of charge from each of the laboratory location. These kits have a pre-paid mailer attached and can be forwarded to the laboratory servicing your area for blood alcohol by placing the sealed kit in the mail. Following the blood alcohol determination, the sample will be forwarded by the laboratory system to the Central Forensic Laboratory for the drug screen, if required.

Even though the sample containers have preservatives, be sure to avoid extreme heat, such as a car dash or a trunk in summer.
If a kit has expired, replace the blood tubes provided with gray/lavender vacutainer hospital tubes.
A copy of the Investigating Officer's Report, listed below, can be found on the Styrofoam container of each kit. Instructions for use of the KSP Blood/Urine Collection Kit are included on the following pages. These instructions are included with each kit.

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<tr>
<th>INVESTIGATING OFFICER’S REPORT</th>
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<tr>
<td>NAME OF SUBJECT________________</td>
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<td>OFFENSE_______________________</td>
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<td>DATE OF INCIDENT ___________ TIME_____________ AM-PM</td>
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| FACILITY WHERE DRAWN_________
| BLOOD DRAWN BY______________|
| CASE OR CITATION NO._________|
| LAB NO._____________________|
| WAS SUBJECT GIVEN BREATH ALCOHOL □ YES □ NO |
| IF YES, RESULTS:_____________|

CHECK APPROPRIATE BLOCKS

☐ ALCOHOL
☐ DRUG SCREEN IF BAC IS BELOW .10% (IN DUI CASES)
☐ DRUG SCREEN (SPECIFY)_________________________

CHAIN OF POSSESSION

RECEIVED FROM ________________________________
BY ________________________________
DATE _______________ TIME_____________ AM-PM
FORENSIC LABORATORIES
KENTUCKY STATE POLICE
BLOOD/URINE COLLECTION KIT
For Alcohol and or Drug Determination

Purpose

This kit is designed to contain blood and urine specimens obtained from DUI, criminal and death investigations in which only an alcohol and/or general drug screen is needed. **This kit is not sufficient for a full toxicological study.**

CONTENTS OF KIT

One (1) 10-mL blood tube containing sodium fluoride and potassium oxalate.
Two (2) 7-mL blood tubes containing EDTA
One (1) 60-mL plastic screw-cap container
One (1) direction sheet
Two (2) police evidence seals for resealing kit box after collection of evidence
One (1) zip-lock bag

DIRECTIONS FOR HANDLING SPECIMENS

Instructions to the investigating officer:
1. Fill in the “Investigating Officer’s Report” completely and legibly.
2. Witness the collection of samples.
   a. For alcohol/drug analysis: Fill all collection tubes/containers provided.
3. Return filled blood tubes to Styrofoam holder.
4. Place Styrofoam holder and filled plastic urine bottles in zip-lock bag and return zip-lock bag to kit box.
5. Reassemble kit box and affix red evidence seals where indicated on box top.
6. Submit to Forensic laboratory or refrigerate until sample can be transported. (DO NOT FREEZE).

Instructions to physician or technician drawing sample
1. Clean skin with non-alcohol disinfectant
2. To insure proper mixing of the anticoagulants, slowly invert the tubes completely at least five times. (Do not shake vigorously.)
3. “Facility where drawn” refers to the hospital, office etc.

If necessary to replace kit vials, do so using hospital vials appropriate for collection of whole blood, preferably containing the same types of anticoagulants/preservatives found in the kits.
BREATH ALCOHOL MAINTENANCE PROGRAM

The Breath Alcohol Maintenance Program is established by the Kentucky State Police to ensure proper calibration and maintenance for evidential breath alcohol measuring devices located throughout the state. Field service technicians for this program are assigned to the Central, Western, Northern, Eastern and Southeastern Laboratory Branches, and the program is administered through an office located at the Central Laboratory Branch.

**Value**

All state evidential breath alcohol measuring devices are assigned to the Breath Alcohol Maintenance Program. Field technicians maintain and ensure proper calibration of instrumentation and provide expert testimony in court regarding service activities and maintenance documentation.

Evidentiary breath alcohol instruments used in the Commonwealth includes the Kentucky Model Intoxilyzer ® 5000EN, the Kentucky Model Intoxilyzer ®8000. The Breath Alcohol Maintenance Program also provides calibration services for portable breath testing devices for any law enforcement agency within the commonwealth.
APPENDIX A: LABORATORY CONTACT INFORMATION

The following is a list of the laboratories, and a list of services offered at each laboratory. Submissions may be made in person or by registered or certified mail to the nearest regional laboratory or to the Central Laboratory. The KSP Automated Fingerprint Identification System (AFIS) Section located at 1266 Louisville Road, Frankfort, KY 40601 provides latent print capabilities. The telephone number is (502) 782-9821.

CENTRAL FORENSIC LABORATORY BRANCH
Phone: (502) 564-5230
FAX: (502) 564-4821
Kentucky State Police
Central Forensic Laboratory
100 Sower Blvd., Suite 102
Frankfort, Kentucky 40601-8272

Services offered:
Toxicology and Drug Analysis
  Blood Alcohol/Toxicology
  Drug and Other Unknown Controlled Substance Identification

Trace Analysis
  Paint, Plastics, and Tape
  Glass and Headlamps
  Soil
  Arson
  Hair Identification and Comparisons
  Fiber Comparisons and Fabric Impressions
  Gunshot Residue
  Oils and Lubricants
  Physical Match Comparisons
  Pesticides and Herbicides
  Unknown Substances (other than Controlled Substances)
  Product Tampering and Lachrymators (Pepper Sprays)
  Miscellaneous Analyses

Forensic Biology
  Body fluid Identification
  Bloodstain Pattern Analysis
  DNA Analysis

DNA Database

Firearms Identification
  Identification of Firearms, Bullets, and Cartridge Case
  Determination of Muzzle-to-Target Distance
Identification and Comparison of Inked Impressions
Identification and Comparison of Plaster Casts
Tool Mark Identification
Related Firearms and Comparative Microscopy
Open Case Search
Serial Number Restoration

Breath Alcohol Maintenance Program
Maintaining breath alcohol measuring device
Ensuring calibration of such devices

WESTERN FORENSIC LABORATORY BRANCH
Phone: (270) 824-7540
FAX: (270) 824-7029

Kentucky State Police
Western Forensic Laboratory
4415 Hanson Road
Madisonville, KY  42431

Services offered:
Blood Alcohol
  Blood Alcohol

Drug Analysis
  Drug and Other Unknown Controlled Substance Identification

Forensic Biology
  Body fluid Identification

Breath Alcohol Maintenance Program
  Maintaining breath alcohol measuring devices
  Ensuring calibration of such devices

JEFFERSON FORENSIC LABORATORY BRANCH
Phone: (502) 426-8240
Fax:  (502) 426-4531

Kentucky State Police
Jefferson Forensic Laboratory
3600 Chamberlain Lane, Suite 410
Louisville, Kentucky 40241

Services offered:
Blood Alcohol
  Blood Alcohol
Drug Analysis
Drug and Other Unknown Controlled Substance Identification

Forensic Biology
Body fluid Identification
Bloodstain Pattern Analysis

Firearms Identification
Identification of Firearms, Bullets, and Cartridge Case
Determination of Muzzle-to-Target Distance
Identification and Comparison of Inked Impressions
Identification and Comparison of Plaster Casts
Tool Mark Identification
Related Firearms and Comparative Microscopy
Open Case Search
Serial Number Restoration

NORTHERN FORENSIC LABORATORY BRANCH
Phone: (859) 441-2220
FAX: (859) 441-0848

Kentucky State Police
Northern Forensic Laboratory
5690 East Alexandria Pike
Cold Spring, KY 41076

Services offered:
Drug Analysis
Drug and Other Unknown Controlled Substance Identification

Blood Alcohol
Blood Alcohol

Forensic Biology
Body fluid Identification
Bloodstain Pattern Analysis

Breath Alcohol Maintenance Program
Maintaining breath alcohol measuring device
Ensuring calibration of such devices

EASTERN FORENSIC LABORATORY BRANCH
Phone: (606) 929-9142
FAX: (606) 929-9364

Kentucky State Police
Eastern Forensic Laboratory
1550 Wolohan Drive Suite 2  
Ashland, Kentucky  41102

**Services offered:**  
*Blood Alcohol*  
Blood Alcohol

**Drug Analysis**  
Drug and Other Unknown Controlled Substance Identification

**Firearms Identification**  
Identification of Firearms, Bullets, and Cartridge Case  
Determination of Muzzle-to-Target Distance  
Identification and Comparison of Inked Impressions  
Identification and Comparison of Plaster Casts  
Tool Mark Identification  
Related Firearms and Comparative Microscopy  
Open Case Search  
Serial Number Restoration

**Breath Alcohol Maintenance Program**  
Maintaining breath alcohol measuring device  
Ensuring calibration of such devices

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**SOUTHEASTERN FORENSIC LABORATORY BRANCH**  
Phone:  (606) 877-1464  
FAX:   (606) 878-0643

Kentucky State Police  
Southeastern Regional Laboratory  
1001 West 5th Street  
London, Kentucky  40741

**Services offered:**  
*Blood Alcohol*  
Blood Alcohol/Toxicology

**Drug Analysis**  
Drug and Other Unknown Controlled Substance Identification

**Breath Alcohol Maintenance Program**  
Maintaining breath alcohol measuring device  
Ensuring calibration of such devices
APPENDIX B: THE FOLDED PAPER PACKET

1. Obtain a square piece of paper or cut one in a square of the approximate size needed to hold the material in question.
2. Make a diagonal fold (A).
3. Then fold B and C together.
4. Then fold at D
5. Open and place the sample in the center of the square and refold in the same manner.
6. Tuck triangle E into the slot formed by the folds of B and C.
7. Initial and date the packet formed.
Chapter 4

Crime Scene Sketch

The crime scene sketch is an invaluable aid in recording investigative data. It is a permanent record that provides supplemental information that is not easily accomplished with the exclusive use of crime scene photographs and notes. A crime scene sketch depicts the overall layout of a location and the relationship of evidentiary items to the surroundings. It can show the path a suspect or victim took and the distances involved. It can be used when questioning suspects and witnesses. During trial, the crime scene diagram correlates the testimony of witnesses and serves as a tool for relaying reference and orientation points to the prosecutor, judge and jury.

I. Sketching the Crime Scene

Before beginning a sketch, obtain a comprehensive view of the scene. Determine the sketch limits – decide what to include and what to exclude. If the scene is complicated, a number of sketches may be necessary for adequate documentation.

Types of Sketches

A. Overview sketch – consists of a bird's-eye-view or floor plan sketch of the scene. This is the most common type of sketch and consists of items on the horizontal plane (see Figure 4-1).

B. Elevation sketch – portrays a vertical plane rather than a horizontal plane. Examples include bloodstain patterns on vertical surfaces such as walls or cabinetry and bullet holes through windows (see Figure 4-2).

C. Exploded view or cross-projection sketch – consists of a combination of the first two sketches. It is similar to a floor plan except the walls have been laid out flat and objects on them have been shown in their relative positions (see Figure 4-3).

D. Perspective sketch – depicts the scene or item of interest in three dimensions. It is the most difficult sketch to create and requires some artistic skill (see Figures 4-4 and 4-5).
Fig. 4-1
Overview sketch of an exterior crime scene.

Fig. 4-2
Elevation sketch illustrating a blood trail.
Fig. 4-3
Exploded view sketch of a bathroom.

Fig. 4-4
Perspective sketch of the passenger side of a vehicle.
To Scale or Not to Scale
A. “Drawn to Scale” diagrams
   1. To avoid a distorted view of the scene, measurements must be reduced in proportion so that they bear correct relationship to each other.
   2. Select the scale of the diagram by fitting the longest dimension in the scene to the area of the paper being used.
   3. Graph paper should be used when creating this type of sketch. Each block represents a specified length of measurement. Use convenient units for the scale (one block = 1 foot).

B. “Not to Scale” diagrams
   1. Sketch can be accomplished more quickly than a scaled diagram.
   2. Items are placed in the diagram based on approximation. This type of diagram may provide a distorted view of the scene. Correct proportions and relationships between objects may not be maintained.
   3. Measurements are recorded on the sketch or in a chart.
   4. This rough sketch may be used to complete a scaled diagram later.
   5. These diagrams should be clearly marked Not to Scale.

Equipment
A. Supply of writing implements – pencils may be used for the overall sketch. A sketcher may choose to use red pencils to denote
bloodstains, and highlighters or other colored pencils to mark different types of evidence on the sketch. A sketch created in pencil will need to be preserved in some permanent manner as soon as possible. A good method of doing this is to photocopy the finished sketch and include the photocopy with the original.

B. Blank paper – graph paper, while not essential, simplifies scale drawing.

C. Drawing surface such as a clipboard.

D. Measuring devices – tape measures are the most common tool used and should be at least 50 to 100 feet long. Other measuring devices may include a surveyor’s wheel, a laser rangefinder, or a Total Station. GPS coordinates may be useful in locating an outdoor scene.

E. Ruler for drawing straight lines, drawing to scale, and making very short measurements.

F. Magnetic compass to determine true north.

Creating the Sketch

A. If the scene is large, make a very rough sketch of the area while obtaining an over-all view of the scene. This initial rough sketch serves as a reference when making more complete sketches. Enlarged sections of this rough sketch can be made as separate drawings in order to bring out greater detail.

B. Begin taking measurements and laying out a rough sketch.
   1. Lay down a baseline. This usually consists of the longest uninterrupted side of a room or, if outdoors, the curb line, building line, or even an imaginary line between two fixed points.
   2. Take other measurements of the periphery of the scene and add them to the baseline.
   3. Having established the outer boundaries of the sketch, add various objects in their proper positions.

C. Measurements – write them down!
   1. Measurements can be recorded directly on the sketch or in a chart.
   2. Long distances may be measured with the odometer on an automobile.
   3. Critical measurements should be checked by two people.
Locating Objects on a Sketch

All points require two measurements for a two-dimensional sketch. Three measurements are required for a perspective (3-D) sketch.

A. Rectangular coordinates – an object (item 1, see Figure 4-6) is located by making a measurement at right angles from each of two walls. Works well for indoor measurements.

B. Transecting baseline – particularly useful in large, irregularly shaped outdoor areas.
   1. Transect the crime scene by laying down a tape measure along some convenient line so it crosses the entire area (blue line, see Figure 4-7).
   2. Locate this line in the diagram from fixed points at the scene.
   3. Locate objects in the crime scene by measuring their distance from this established baseline. Measurements must be taken at right angles to the tape.
   4. Record how far along the baseline the distance out to the object was measured. This provides the two measurements needed to locate the object.
Fig. 4-7
Transecting Baseline. The blue transecting baseline AB is between two trees (trees can be marked with orange paint for later identification). The two measurements needed for each point are (1) how far each item is from the baseline (green lines north and south) and (2) how far east on the blue baseline from point A the objects are (distance to where the green lines intersect the blue). (This is for illustration. Additional measurements would be collected for the body and the dock.)

C. Triangulation – measurements are taken from two fixed points at the scene to the object you desire to locate. For example, item 1 in Figure 4-8 is located by taking measurements (length of the green lines) from two corners of the building. **Note: Make sure to measure the distance between the two fixed points.**

Fig. 4-8
Triangulation. Item 1 is located using triangulation from the two corners of the building.
Illustrating the Sketch
A. Do not attempt to draw an object as it appears. Use symbols instead.
B. Use lettered or numbered squares, circles, figures, or points to represent various objects in the sketch. Explain in the diagram key what these objects represent.
C. If photography markers are used, ensure they correspond to same objects in the sketch. For example, if photo marker #5 is used to mark a handgun, make sure the handgun in the sketch is labeled #5.
D. Label all doors and windows. Show with a curved line which way the door swings.
E. Use an arrow to show the direction of the stairway.
F. Unnecessary height or length may be cut off with jagged lines.

Labeling the Sketch
The following should be recorded on the sketch:
A. Address or location of scene.
B. Case number.
C. Date sketch was made and by whom.
D. A key to identify the different objects in the sketch.
E. An arrow to show the direction of north.
F. Scale used for the sketch or the statement “Not to Scale”.

II. Computer Based Programs

Several CAD based programs are commercially available that can be used to create a professional and accurate crime scene diagram. With laptops becoming more common, these types of programs can be used at the scene to record measurements and generate sketches. These diagrams can also be generated back at the office using rough sketch(es) created at the scene.
III. Latest Technology

Portable devices now exist that can perform a 360° scan of a crime scene in as little as 20 minutes, capturing millions of measurements of all objects visible to the scanner. Dozens of high-resolution images are captured automatically. The device requires only the space needed by a standard photographer’s tripod. The data generated can be used to find the distance between any two points in the scene, to view the scene from any vantage point (including directly overhead), and to create a full-color, 3D model for investigative and courtroom purposes.
Fig. 4-11
Diagrams created using the DeltaSphere-3000 3D Laser Scanner and SceneVision-3D Software* Used with permission from 3rd Tech, Inc.
*Note: The Crime Laboratory does not endorse any one software program or device over another. These diagrams are provided only as a representative example of the products available.
A Simplified Guide To Crime Scene Photography
Introduction

Anyone who has seen the movie MY COUSIN VINNY (1992) knows how a snapshot can save the day. In the film, inexperienced New York lawyer Vincent LaGuardia "Vinny" Gambini travels to a small southern town with his fiancée, Mona Lisa Vito, to represent his cousin in a murder case. Mona Lisa's incessant picture taking with a cheap pocket camera causes frustration throughout the film, but eventually produces a photograph that holds the key to the case.

Photography of everything from landscapes to historical events has preserved and illustrated history for the past 200 years. When a photograph of a forged document was presented and allowed as courtroom evidence in 1851[1], photography as a forensic tool was born and soon became a boon to cases of identification and scene analysis. Crime scene photography became cutting edge in the 1870s and new technologies have expanded its use ever since.

In this discussion, photographs are not evidence in and of themselves, but provide visual documentation of the scene and locations of evidence within the scene. Photographs taken at a crime scene allow investigators to recreate that scene for later analysis, or for use in the courtroom. If the crime scene photography does not thoroughly and accurately document the entire scene, it could be detrimental to the investigation and potentially damaging during a criminal trial.

Principles of Crime Scene Photography

There is no prescribed length of time it takes to photographically document a crime scene. The amount of time spent depends on the size and

[1] Luco vs U.S., 64 U.S (23 How.) 515, 162, L. Ed 545 (1859)
complication in the crime scene, how much there is to document and environmental factors like weather or danger to the investigative team. It can consist of thousands of photographs and hours of work.

Crime scene photography should not just focus on the obvious. The purpose of crime scene photography is to document what is there and where it is in relationship to the scene, whether it is obviously connected to the crime or not. For example, a photographer in Florida shot the inside of every cabinet and the refrigerator at a homicide scene in a home, just as a matter of procedure. It was later discovered that the victim had a receipt for a six-pack of beer, matching the beer shown in the photograph of the refrigerator. Relatives noted that the victim did not drink beer. Further investigation led the team to the convenience store where the beer was purchased and the surveillance tape showed the victim with an unknown person purchasing the beer. It turns out that the victim had picked up a hitchhiker, purchased beer for that person and come back to the house. The photograph of the refrigerator contents had created the link enabling the investigators to find the suspect.

Capturing the Scene
Photography, or “writing or drawing with light”, is defined as the process or art of producing images of objects on sensitized surfaces by the chemical action of light or of other forms of radiant energy, such as X-rays, gamma rays or cosmic rays. Fixing an image permanently has been possible since the 1820s in a variety of ways from the daguerreotype, to silver plates, to film and now digitally.

Some may consider photography more of an art than a science, but well-taken crime scene photographs can aid scientists, investigators and members of the court in their search for the truth. This makes photography a critical first responder skill. Larger agencies may have specially trained and certified crime scene photographers with high-end cameras and lighting to document crime scenes and evidence, but more often the first responder needs to do what they can with equipment assigned to them. That said, many of today’s digital point-and-shoot cameras have a variety of settings that, with some basic operator training, allow for proper documentation.

Controlling the Light
Photographers use several means to tell the camera how to capture the image including aperture, shutter speed, depth of field and white balance. Aperture refers to the size of the opening that lets light into the camera and shutter speed is how long that opening, or shutter, remains open. Depth of field is the amount of area in front of (foreground) and behind (background) an object that remains in focus. Lastly, white balance allows the camera to
record the proper temperature of light, resulting in an accurate representation of the color tones of objects in the photograph.

**Brightening the Darkness**

Experienced photographers often use a technique called “painting with light” to expose image details in dark or near-dark conditions. In this technique, the shutter is held open for seconds or minutes and the photographer walks through the scene adding light from sources such as a flashlight or detached camera flash.

![Crime scene at night & after using the painting with light technique. (Courtesy of Scott Campbell)](image)

However the photographer chooses to capture the image, the main reason for crime scene photography is to thoroughly document the entire scene, the evidence, and any areas of special significance to the investigation.

**Why and when is crime scene photography used?**

Photography should be used as part of the documentation for all physical crime scenes, including traffic collisions, burglaries, homicides, or any number of crimes against people or property. Photographs, however, can be misleading and confusing to the viewer. Therefore, crime scene photographers must ensure their work is both ethical and honest while capturing as much accurate information and detail as possible. Documenting all elements of a crime scene is a major stepping stone when trying to piece together what happened, how it happened and who did it.

Crime scenes are typically full of activity and often unpredictable, with first responders assisting victims and investigators beginning their work. Even in
the most ideal situation, capturing photographic evidence can be challenging. An experienced photographer will know to take photos at all stages of the investigation and that it is better to have too many than not enough images.

The following steps are taken to ensure proper photographic documentation:

1. **Secure the scene:** In all forensic investigations, the first step is to secure the crime scene.

2. **Evaluate conditions:** Next, the photographer should evaluate the available light and weather conditions and adjust camera settings appropriately. Crime scenes can be indoors, outside or both; they can be vehicles, include multiple rooms, or any combination of locations, therefore no single camera setting will work for all crime scenes.

3. **Shoot the scene:** The photographer should take photographs before anything is disturbed, progressively working through the scene from outside to close-up pictures. Many shots should be taken, from the entire scene, to medium shots to show the relationship of evidence to the overall scene.

   Just like a television program will show the viewer the outside of a building to establish where the characters are going, the crime scene photographer should capture the whole scene first using wide-angle shots covering the entire scene from the approach and through every area. Close-up images of evidence can be taken out of context, so establishing the scene first with wide and medium shots is critical.
In addition, photographs should be taken looking up from the scene to capture evidence or environmental factors that may be above the scene.

4. **Photograph the victims:** The next series of shots should include victims (if present) to show locations, injuries and condition.

5. **Photograph the evidence:** Then each piece of evidence should be photographed to illustrate where it was found. This establishes the relationships of the evidence to the victim, the victim to the room and so on. These photographs should be taken from straight above or straight on at right angles, eliminating potential distance distortions. Each piece of evidence should be photographed with a scale to indicate size and without a scale.

6. **Evidence markers:** Photographs should be taken before evidence markers are placed, then again after. These initial shots are important to prove that no one has tampered with the crime scene.

7. **Re-shoot for new evidence:** If investigators mark new evidence, the whole series of shots should be repeated, including all evidence shots. These photos should include the entire piece of evidence and a scale to indicate size.

*(Courtesy of Daniel Nichols, NFSTC)*
Special imaging techniques and lighting should be used to capture things like fingerprints, indentations, shoe and tire track impressions, vehicle identification numbers (VIN) and very small pieces of evidence. Techniques may include:

- **Alternate light sources (ALS)** – such as lasers, blue or green lights and colored filters that help detect processed latent fingerprints or other hidden evidence and illuminate for photographing

*Green light used to illuminate a latent fingerprint. (Courtesy of Scott Campbell)*
• **Oblique angle lighting** - using a flashlight, camera flash or ALS at a very low angle to cast shadows that allow an imprint or impression to be photographed.

![](image1)

*Oblique light used to add contrast to a footprint. (Courtesy of Scott Campbell)*

• **Macro lenses** - can take very close-up images (1:1 or 1:2) of small items such as tool marks or trace evidence.

![](image2)

*Cartridge case details captured with macro lens. (Courtesy of Scott Campbell)*
Photographs should accurately document the lighting conditions at the scene. After those photos are taken, if necessary, a photographer will add artificial light, like a flash, to compensate for a camera’s limitations in capturing the visible range of light under certain conditions.

8. **Shoot fast:** Sometimes environmental factors such as rain, snow or traffic can make conditions difficult for photography. The photographer must work quickly to capture as much visual documentation as possible from a deteriorating scene.

9. **Photograph the victim later:** If a victim must be moved or requires treatment, the photographer can go back to document the victim's injuries. Various techniques using special lighting and colored filters can highlight injuries (bruising, scarring) and healing status.

**How It’s Done**

**Who Conducts the Photographic Analysis and Enhancements**

Once working copies of all the photographs have been created, investigators can select images for analysis and enhancement. This is normally done by the photographer or, if available, within the audio/visual department in the laboratory. As with all evidence, detailed records should be kept regarding who accesses or works with the files and what techniques were used to enhance or otherwise modify the files.

The International Association for Identification (IAI) has a Certified Forensic Photographer (CFPH) ([http://www.theiai.org/certifications/imaging/index.php](http://www.theiai.org/certifications/imaging/index.php)) program, established in 2001. The CFPH process is accredited by the Forensic Specialties Accreditation Board. This program requires specific training or coursework and testing that includes both written and practical assessments. Evidence Photographers International Council (EPIC) ([http://www.evidencephotographers.com/](http://www.evidencephotographers.com/)) formerly provided specific certification for evidence photographers.

Many times, the images are taken by a member of the investigative team that is responsible for many crime scene duties that also incorporates photography. Depending on the size of the agency and support from their local laboratory, more experienced photographers may be available for major cases.
How and Where Evidence Photographs are Processed

All photographs taken are saved as originally captured, entered into evidence inventory and tracked. Selected photographs of particular evidence or parts of a scene may need additional enhancement. This can be done within the department if the appropriate software is available or may be sent to a regional specialist. The most common enhancements include cropping, brightness and contrast adjustments and color processing.

Potential photographic enhancements follow the same rules as news journalism. An image may be lightened and darkened, cropped or the color enhanced. The white balance can be adjusted, but adding or removing information is unacceptable. When submitted for courtroom use, the original photograph must be available for comparison and the technician or examiner must be able to show and describe any enhancements that were done, and why.

When images are presented, they must be clearly identified as a working and/or enhanced version. The original camera sequential numbering system should be retained to show that images are in order and none have been removed. The working images should not be renamed until identified or selected for use, and original files should not be renamed at all.

Type of Equipment Used

Investigators and technicians photographing a crime scene should have access to a good quality camera that is capable of manual override and has interchangeable lenses, off-camera flash, cable release, and a tripod mount. With these tools and a widely attainable level of training and practice, good quality photographs can be taken in a broad range of scenarios including low light, highly reflective surfaces and tight spaces.

That said, many first responders are equipped with basic, consumer-level point-and-shoot cameras. Since they may be in the best position to capture important evidence, basic knowledge of how to capture an image and use the camera they have is very important. Even with simple equipment, a first responder with introductory photography training can produce images of sufficient quality to support an investigation.

Cell phones and other personal electronic devices with integrated cameras are not recommended unless their use is an operational necessity. An example would be if a muddy shoe print is found near a crime scene but it is raining. The shoe print may disappear quickly, so if a cell phone camera is the only camera available, then it would be operationally necessary to use it.
FAQs

What are the limitations of crime scene photography?
The majority of evidence photography is now done using digital cameras and equipment. Limitations in photography are twofold: limitation of the camera in general and lack of experience or training of the photographer.

Cameras cannot produce the same view that the human eye sees; it is the photographer’s use of the camera settings that can affect what can or cannot be seen in a photograph. A trained photographer will recognize difficult lighting situations and adjust the camera settings accordingly. Often, more than one photo will be taken of the same view, in order to properly expose for widely varying conditions in a single view.

The use of digital cameras allows a crime scene photographer to instantly review their photos and make changes to the camera settings if needed to capture the best possible image while still on the scene. Critical thinking skills and analysis are constantly applied during the scene documentation process. An inexperienced photographer will often forgo the review process, relying on their camera to “make the right decisions” for settings.

How is quality control and assurance performed?
To ensure the most accurate capture, processing and analysis of crime scene photographs, the management of criminal justice agencies and forensic laboratories puts in place policies and procedures that govern facilities and equipment, methods and procedures, and personnel qualifications and training. These Standard Operating Procedures (SOPs) are intended to maintain and demonstrate the integrity of the images and information captured at a crime scene and its admissibility in court. Crime scene photography SOPs ensure uniform processes are used by photographers and the information represented in the images accurately represents objects and conditions at the scene as they are found.

The Scientific Working Group on Imaging Technology (SWGIT) works to set quality guidelines for the capture, storage, processing, analysis, transmission, output and archiving of images. These guidelines provide good general practice standards for crime scene photographers and other individuals performing photography within the criminal justice system. SWGIT guidelines are available (https://www.swgit.org/documents).
Is there anything else about crime scene photography that would be important to the non-scientist, or any common misconceptions regarding this topic?

A common misconception is that digital images can be changed more easily than film prints and done to mislead the court. Photographs created in a darkroom from film can also be altered by a skilled photographer using a wide variety of techniques, so they are not necessarily more accurate than digital images. While digital software exists that can make drastic changes to a digital image, a comparison of the altered image with the original makes any changes obvious. This is why proper chain-of-custody procedure and workflow is necessary.

According to the SWGIT guidelines: “Documenting image enhancement steps should be sufficient to permit a comparably trained person to understand the steps taken, the techniques used, and to extract comparable information from the image.”

Similar to scientific research being documented to allow other scientists to perform the same steps and get the same results, image enhancement documentation should be specific and in order. The SWGIT guidelines include examples of documentation and draft SOPs [PDF download] for agencies to customize.

Another misconception may be reinforced by television crime dramas, and that is the idea that every crime scene unit and/or investigator has high-end camera equipment and is thoroughly trained in crime scene photography. Though many are, it should be clarified that equipment, training and procedures vary widely among agencies.

**Common Terms**

Terminology in photography has changed slightly since the rise of professional digital cameras to include information on digital equipment such as light sensors, as well as techniques for using computer software to enhance images. The definitions below represent common terms used in general and crime scene photography. For additional glossary terms see the SWGDE and SWGIT Digital & Multimedia Evidence Glossary or the All Things Photography website.
**Ambient Light** - Light already existing in an indoor or outdoor setting that is not caused by any illumination supplied by the photographer.

**Aperture** - opening in the camera that lets in the light.

**Aspect Ratio** - The ratio of width to height in photographic prints; a ratio of 2:3 in 35 mm pictures produces photographs most commonly measuring 3.5 × 5 inches or 4 × 6 inches.

**Camera Angles** - Various positions of the camera (high, medium, or low; and left, right, or straight on) with respect to the subject, each giving a different viewpoint, perspective or visual effect.

**Capture** - The process of recording data, such as an image, video sequence, or audio stream.

**Color Correction** - To correct or enhance the colors within an image.

**Contrast** - The difference in darkness or density between one tone or another.

**Cropping** - Removing portions of an image that are outside the area of interest.

**Depth of Field** - The area between the nearest and farthest points from the camera that are acceptably sharp in the focused image.

**Evidence Quality Photos** - Images of sufficient size and quality to allow comparison and examination by a qualified forensic expert.

**Exposure** - The quantity of light allowed to act on photographic material; a product of the intensity (controlled by the lens opening) and the duration (controlled by the shutter speed) of light striking the film or sensor.

**F-stop** - Lens setting number indicating the size of the aperture that allows light into the camera. It is an inversely proportionate number, so that f/1.8 indicates a larger opening than f/5.6.

**Filter** - A colored piece of glass or other transparent material used over the lens to emphasize, eliminate, or change the color or density of the entire scene or certain areas within a scene.

**ISO Speed** - The sensitivity of a given film or sensor to light, indicated by a number such as ISO 200. The higher the number, the more sensitive or faster the film or sensor.

**Lens Speed** - The largest lens opening at which a lens can be set. A fast lens transmits more light and has a larger opening than a slow lens. For example,
f/1.8 would set a larger opening than f/5.6 and would, therefore, be a faster lens.

**Raw File** - The data captured by a digital camera sensor before it is converted into an image file by software, either inside the camera or on a stand-alone computer.

**Resolution** - In a digital photograph, the number of pixels which make up the image.

**Scale** - The relative size of an object as compared to other objects in general proximity. Also refers to a measuring device or set of marks to indicate object size in a photograph.

**Shutter** - Blades, a curtain, plate, or some other movable cover in a camera that controls the time during which light reaches the film.

**Working Copy** - A copy or duplicate of a recording or data that can be used for subsequent processing and/or analysis.

**Additional Resources**
You can learn more about this topic at the websites and publications listed below.

**Resources**
Evidence Photographers International Council (EPIC)  
http://www.evidencephotographers.com/

Scientific Working Group on Imaging Technology (SWGIT)  
http://www.swgit.org

Professional Photographers Association (PPA)  
http://www.ppa.com

Stanford University Depth of Field  
(http://graphics.stanford.edu/courses/cs178-10/applets/dof.html)

Stanford University Variables That Affect Exposure  
(http://graphics.stanford.edu/courses/cs178-11/applets/exposure.html)

Crime Scene Resources Crime Scene and Evidence Photography  
(http://www.crime-scene-investigator.net/csi-photo.html)
References


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Forensic Evidence Admissibility and Expert Witnesses

How or why some scientific evidence or expert witnesses are allowed to be presented in court and some are not can be confusing to the casual observer or a layperson reading about a case in the media. However, there is significant precedent that guides the way these decisions are made. Our discussion here will briefly outline the three major sources that currently guide evidence and testimony admissibility.

The Frye Standard – Scientific Evidence and the Principle of General Acceptance

In 1923, in *Frye v. United States*,[1] the District of Columbia Court rejected the scientific validity of the lie detector (polygraph) because the technology did not have significant general acceptance at that time. The court gave a guideline for determining the admissibility of scientific examinations:

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while the courts will go a long way in admitting experimental testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

Essentially, to apply the “Frye Standard” a court had to decide if the procedure, technique or principles in question were generally accepted by a meaningful proportion of the relevant scientific community. This standard prevailed in the federal courts and some states for many years.

Federal Rules of Evidence, Rule 702

In 1975, more than a half-century after *Frye* was decided, the Federal Rules of Evidence were adopted for litigation in federal courts. They included rules on expert testimony. Their alternative to the *Frye Standard* came to be used more broadly because it did not strictly require general acceptance and was seen to be more flexible.

[1] 293 Fed. 1013 (1923)
The first version of Federal Rule of Evidence 702 provided that a witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

a. the expert’s scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

b. the testimony is based on sufficient facts or data;

c. the testimony is the product of reliable principles and methods; and

d. the expert has reliably applied the principles and methods to the facts of the case.

While the states are allowed to adopt their own rules, most have adopted or modified the Federal rules, including those covering expert testimony.

In a 1993 case, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the United States Supreme Court held that the Federal Rules of Evidence, and in particular Fed. R. Evid. 702, superseded Frye’s "general acceptance" test.

### The Daubert Standard – Court Acceptance of Expert Testimony

In *Daubert* and later cases[2], the Court explained that the federal standard includes general acceptance, but also looks at the science and its application. Trial judges are the final arbiter or “gatekeeper” on admissibility of evidence and acceptance of a witness as an expert within their own courtrooms.

In deciding if the science and the expert in question should be permitted, the judge should consider:

- What is the basic theory and has it been tested?
- Are there standards controlling the technique?
- Has the theory or technique been subjected to peer review and publication?
- What is the known or potential error rate?
- Is there general acceptance of the theory?
- Has the expert adequately accounted for alternative explanations?
- Has the expert unjustifiably extrapolated from an accepted premise to an unfounded conclusion?

The *Daubert* Court also observed that concerns over shaky evidence could be handled through vigorous cross-examination, presentation of contrary evidence and careful instruction on the burden of proof.

[2] The “Daubert Trilogy” of cases is: **DAUBERT v. MERRELL DOW PHARMACEUTICALS, GENERAL ELECTRIC CO. v. JOINER** and **KUMHO TIRE CO. v. CARMICHAEL**.
In many states, scientific expert testimony is now subject to this Daubert standard. But some states still use a modification of the Frye standard.

Who can serve as an expert forensic science witness at court?

Over the years, evidence presented at trial has grown increasingly difficult for the average juror to understand. By calling on an expert witness who can discuss complex evidence or testing in an easy-to-understand manner, trial lawyers can better present their cases and jurors can be better equipped to weigh the evidence. But this brings up additional difficult questions. How does the court define whether a person is an expert? What qualifications must they meet to provide their opinion in a court of law?

These questions, too, are addressed in Fed. R. Evid. 702. It only allows experts “qualified ... by knowledge, skill, experience, training, or education.” To be considered a true expert in any field generally requires a significant level of training and experience. The various forensic disciplines follow different training plans, but most include in-house training, assessments and practical exams, and continuing education. Oral presentation practice, including moot court experience (simulated courtroom proceeding), is very helpful in preparing examiners for questioning in a trial.

Normally, the individual that issued the laboratory report would serve as the expert at court. By issuing a report, that individual takes responsibility for the analysis. This person could be a supervisor or technical leader, but doesn’t necessarily need to be the one who did the analysis. The opposition may also call in experts to refute this testimony, and both witnesses are subject to the standard in use by that court (Frye, Daubert, Fed. R. Evid 702) regarding their expertise.

Each court can accept any person as an expert, and there have been instances where individuals who lack proper training and background have been declared experts. When necessary, the opponent can question potential witnesses in an attempt to show that they do not have applicable expertise and are not qualified to testify on the topic. The admissibility decision is left to the judge.

Additional Resources

Publications:

McClure, David. Report: Focus Group on Scientific and Forensic Evidence in the Courtroom (online), 2007,
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