U.S. Department of Justice
Federal Bureau of Investigation

HANDBOOK of FORENSIC SERVICES

Introduction

The purpose of the Handbook of Forensic Services is to provide guidance and procedures for safe and efficient methods of collecting and preserving evidence and to describe the forensic examinations performed by the FBI Laboratory.

FBI Laboratory Services

The successful investigation and prosecution of crimes requires, in most cases, the collection, preservation, and forensic analysis of evidence. Forensic analysis of evidence is often crucial to demonstrations of guilt or innocence.

The FBI Laboratory is one of the largest and most comprehensive forensic laboratories in the world. Services of the Laboratory are available to

- FBI Field Offices and Legal Attachés;
- U.S. Attorneys, military tribunals, and other federal agencies for civil and criminal matters; and
- All state, county, and municipal law enforcement agencies in the United States and territorial possessions for criminal matters.

All Laboratory services, including expert witness testimonies, are rendered free of cost, but the following limitations apply:

- No examination will be conducted on evidence that has been previously subjected to the same type of examination. Exceptions may be granted when there are reasons for a reexamination. These reasons should be explained in separate letters from the director of the laboratory that

conducted the original examination, the prosecuting attorney, and the investigating agency.

- No request for an examination will be accepted from laboratories having the capability of conducting the examination. Exceptions may be made upon approval of the FBI Laboratory's Assistant Director or his designee.

- No testimony will be furnished if testimony on the same subject and in the same case is provided for the prosecution by another expert.

- No request for an examination will be accepted from a nonfederal law enforcement agency in civil matters.

Violent Crime Versus Property Crime

The FBI Laboratory accepts evidence related to all crimes under investigation by FBI Field Offices. The FBI Laboratory accepts only evidence related to violent crime investigations from state and local law enforcement agencies. The Laboratory does not routinely accept evidence in cases involving property crimes from state and local law enforcement agencies unless there was personal injury or intent to cause personal injury. These guidelines help to ensure that the FBI Laboratory continues to provide timely forensic assistance to law enforcement agencies investigating crimes of violence or threatened violence. Additional restrictions may be imposed on case acceptance to achieve this goal.

At the discretion of the FBI Laboratory's Assistant Director or his designee, the Laboratory may accept evidence from property crime cases. Such exceptions will be considered on a case-by-case basis and should not be regarded as setting a precedent for future case acceptance. All accepted cases will be afforded the full range of forensic services provided by the FBI Laboratory.

The following are examples of property crimes that are not routinely accepted for examinations:

- Arson of unoccupied residential and commercial buildings and property;

- Explosive incidents and hoaxes targeting unoccupied residential and commercial buildings and property;

- Vandalism and malicious mischief directed toward residential or commercial buildings and property;

- Nonfatal traffic accidents involving speedometer and headlight examinations except in cases involving law enforcement and government officials;
- Hit-and-run automobile accidents not involving personal injury;
- Auto theft except auto theft rings or carjackings;
- Breaking and entering;
- Burglary;
- Minor theft (under $100,000); and
- Minor fraud (under $100,000).

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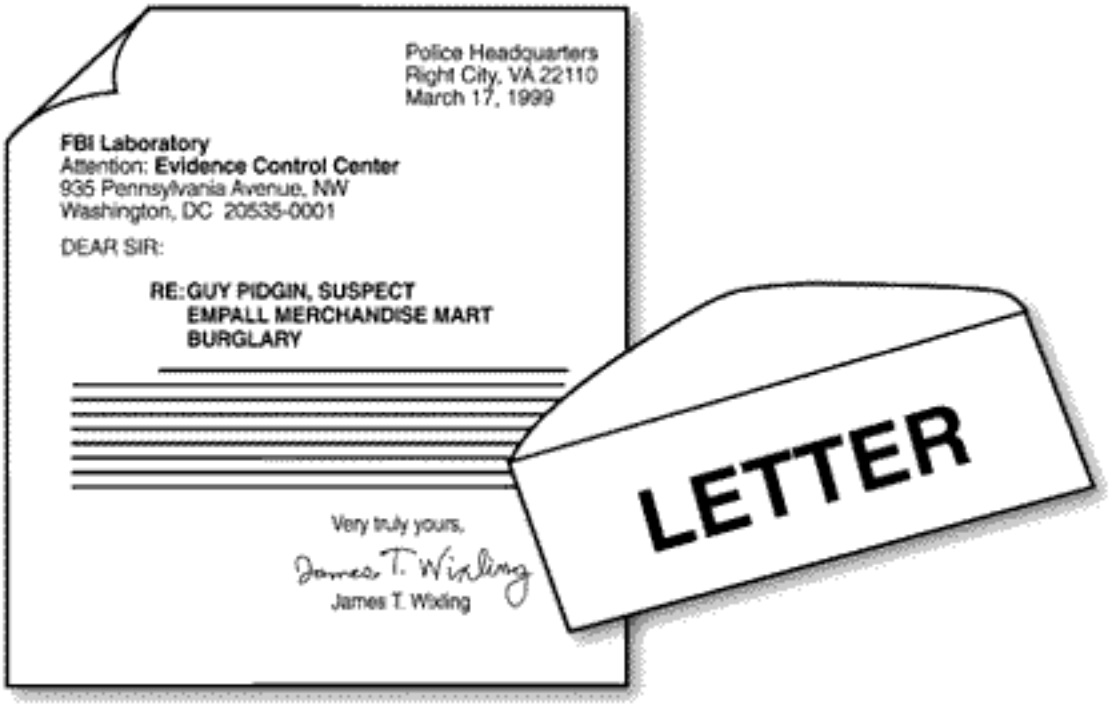
Evidence Submission

Requesting Evidence Examinations

For guidelines for how to package and ship evidence, see **Packaging and Shipping Evidence**.

All requests for evidence examinations should be in writing, addressed to the FBI Laboratory Evidence Control Center, and contain the following information:



- The submitting contact person's name, agency, address, and telephone number;

- Previous case identification numbers, evidence submissions, and communications relating to the case;

- Description of the nature and the basic facts concerning the case as they pertain to the Laboratory examinations;

- The name or names of and descriptive data about the individual or individuals involved (subject, suspect, victim, or a combination of those categories) and the agency-assigned case identification number; and

- A list of the evidence being submitted herewith (enclosed) or under separate cover.

    - *Herewith* is limited to small items of evidence that are not endangered by transmitting in an envelope. Write on the envelope before placing evidence inside to avoid damaging or altering the evidence. The written communication should state: **Submitted herewith are the following items of evidence.**

    - *Separate cover* is used to ship numerous or bulky items of evidence or both. Include a copy of the communication requesting the examinations. The written communication should state: **Submitted under separate cover by (list the method of shipment) are the following items of evidence**.

- State what types of examinations are requested.

- State where the evidence should be returned and where the Laboratory report should be sent.

- Attach a statement as to whether the evidence was examined by another expert in the same field, whether there is local controversy, or whether other law enforcement agencies have an interest in the case.

- State the need and reason or reasons for an expeditious examination. Do not request an expeditious examination routinely.

- Submit a separate communication for multiple cases.

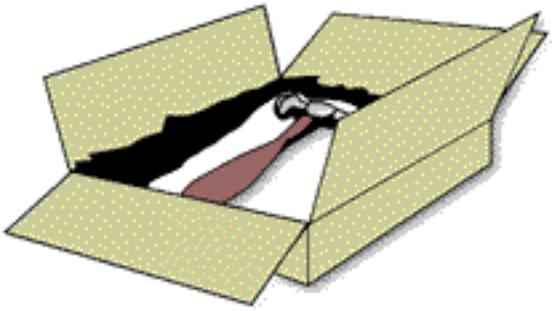
Packaging and Shipping Evidence

1. Prior to packaging and shipping evidence, call the pertinent unit of the Laboratory for specific instructions.

2. Take precautions to preserve the evidence.

3. When requesting latent print examinations, place nonporous evidence in individual protective coverings such as thick transparent envelopes or suspend in a container so that there is minimal surface contact. Place porous evidence in individual protective coverings such as paper envelopes. Stabilize the evidence to avoid movement or friction during shipment.

4. Wrap and seal each item of evidence separately to avoid contamination.

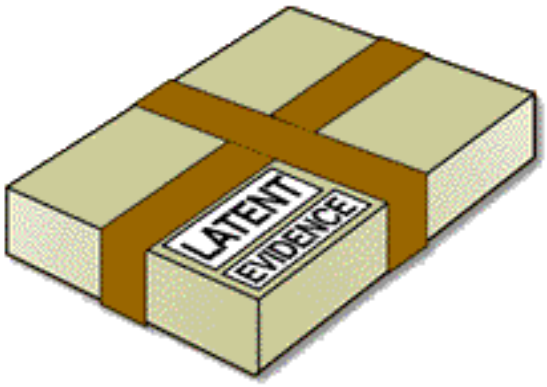


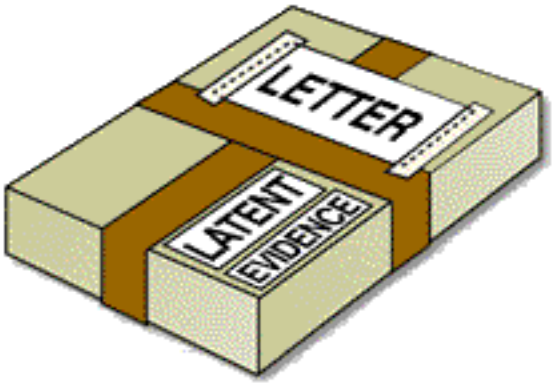
5. Place the evidence in a clean, dry, and previously unused inner container.

6. Seal the inner container with tamper-evident or filament tape.

7. Affix **EVIDENCE** and appropriate **BIOHAZARD** or **HAZARDOUS MATERIALS** labels to the inner container. To view other hazardous materials labels, click here.

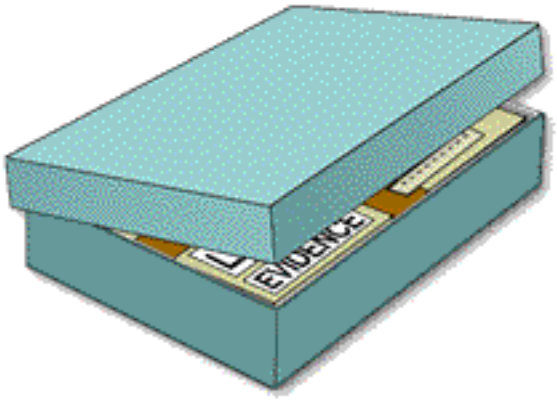
8. If any of the evidence needs to be examined for latent prints, label **LATENT** on the inner container.





9. Affix the evidence examination request and all case information between the inner and outer containers.

10. Place the sealed inner container in a clean, dry, and previously unused outer container with clean packing materials. Do not use loose Styrofoam™.



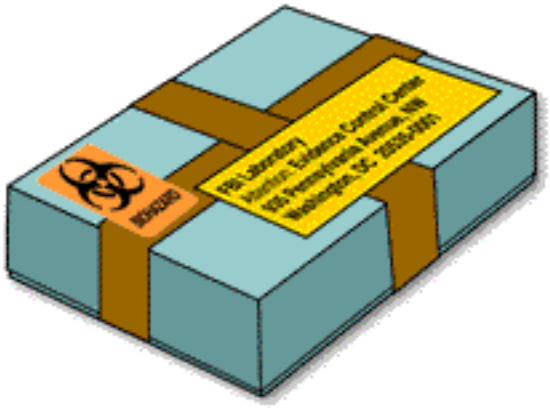
11. Completely seal the outer container so that opening of the container would be evident.

12. Label the outer container with appropriate **BIOHAZARD** or **HAZARDOUS MATERIALS** labels.

13. Address the outer container as follows:

FBI LABORATORY
ATTENTION: EVIDENCE CONTROL CENTER
935 PENNSYLVANIA AVENUE NW
WASHINGTON DC 20535-0001

14. Ship evidence via U.S. Postal Service Registered Mail, United Parcel Service, or Federal Express. Record the method of shipment and the tracking number or numbers on the chain-of-custody form.



15. Rendered-safe explosive devices must be shipped via United Parcel Service.

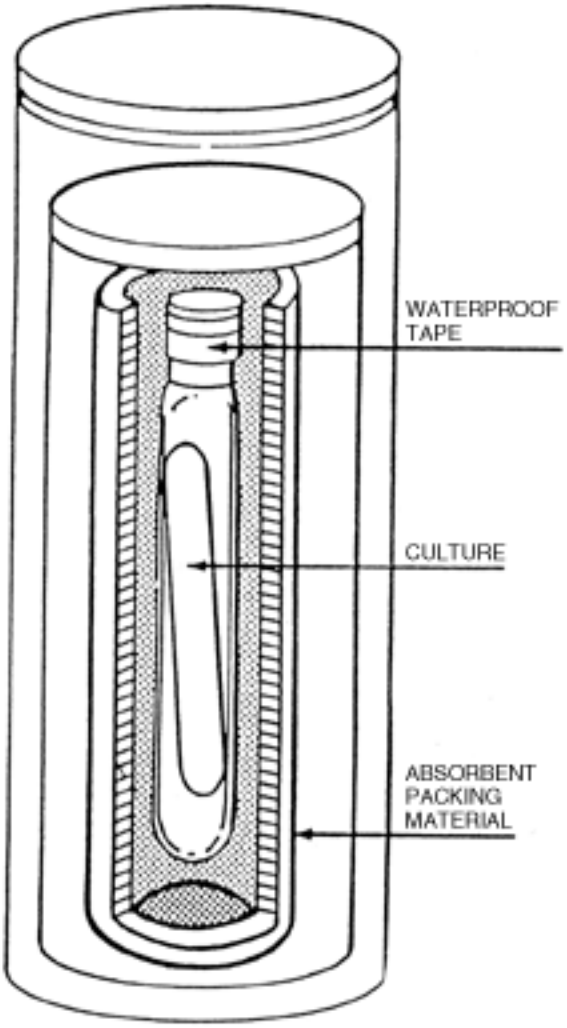
16. Live ammunition must be shipped via Federal Express. The following guidelines must be followed to comply with U.S. Department of Transportation regulations:

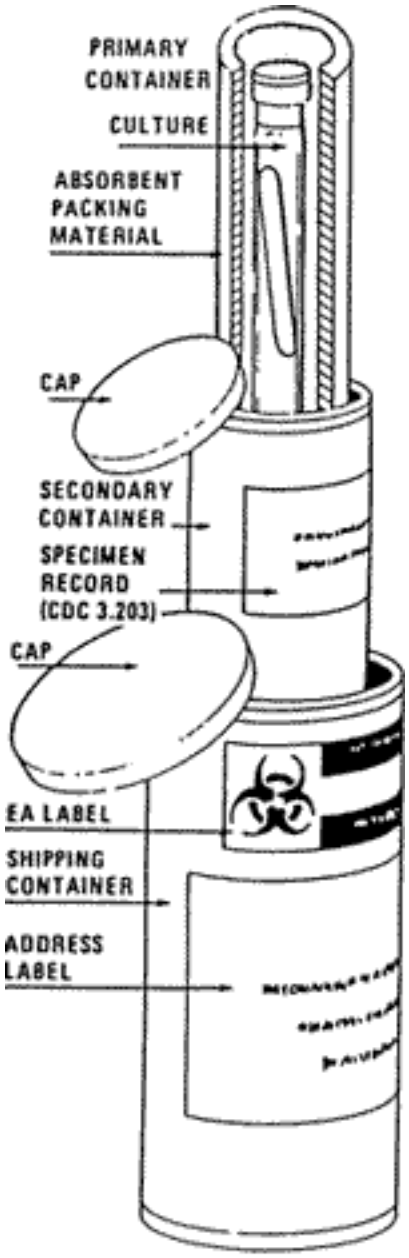
- Live ammunition must be packaged and shipped separately from firearms.
- Pack ammunition in a cardboard container.
- Label invoices **FEDERAL EXPRESS**.
- The shipper's certification for restricted articles must be included.
- The outside of the container must be labeled **ORM-D AIR, CARTRIDGES SMALL ARMS**.
- The shipping papers must also include the weight in grams.

17. *The Interstate Shipment of Etiologic Agents* (42 CFR Part 72) provides packaging and labeling requirements for etiologic agents (viable microorganisms or toxins that cause or may cause human disease) shipped in interstate traffic. For additional information, contact the Centers for Disease Control and Prevention in Atlanta, Georgia, at **(404) 633-5313** or visit their Web site at

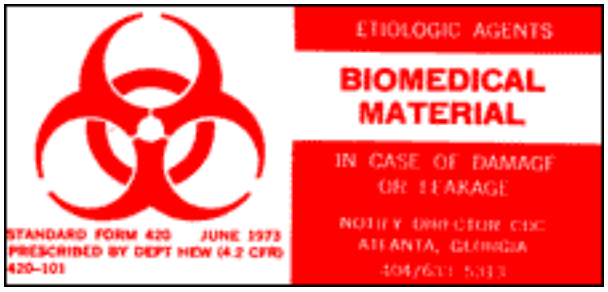
www.cdc.gov/od/ohs/biosfty/shipregs.htm

Package and label etiologic agents in volumes of less than 50 mL in glass tubes sealed with waterproof tape as shown in the drawings to the right and below.





Place each tube containing a culture inside a capped container packed with absorbent materials. Package this primary container within a secondary capped container that is labeled with the specimen record (CDC 3.203). Surround the secondary container with dry ice and seal it within a capped shipping container marked with the destination address and the appropriate infectious substance or etiological agent label.



Affix this regulation label to all shipments of etiologic agents.

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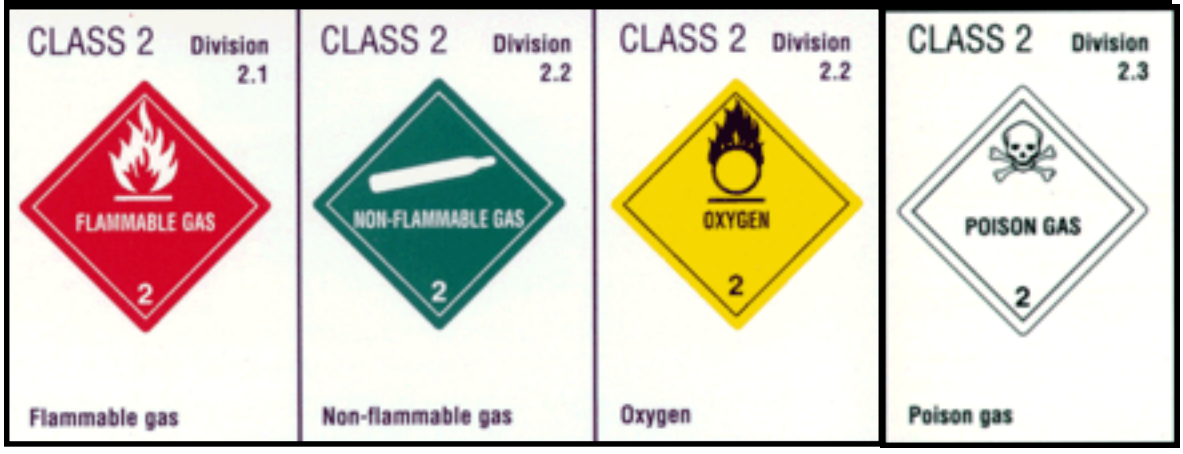
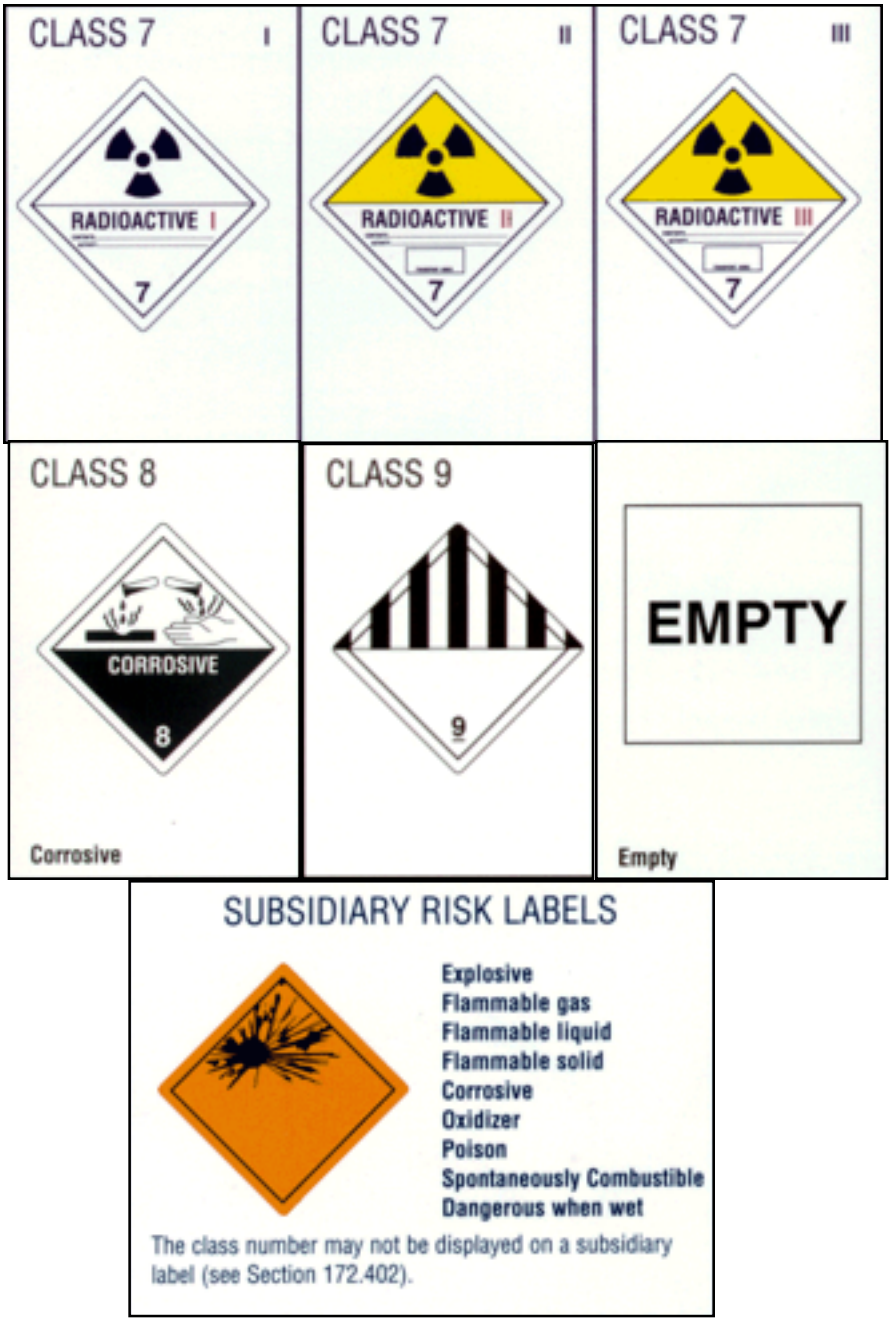
Hazardous Materials Labels




CLASS 3
FLAMMABLE LIQUID
3
Flammable liquid
CLASS 4 Division 4.1
FLAMMABLE SOLID
4
Flammable solid
CLASS 4 Division 4.2
SPONTANEOUSLY
COMBUSTIBLE
4
Spontaneously Combustible
CLASS 4 Division 4.3
DANGEROUS WHEN WET
4
Dangerous when wet
CLASS 5 Division 5.1
OXIDIZER
5.1
Oxidizer
CLASS 5 Division 5.2
ORGANIC PEROXIDE
5.2
Organic peroxide
CLASS 6 Division 6.1
POISON
6
Poison-Packing Group I and II
CLASS 6 Division 6.1
HARMFUL
STOW AWAY
FROM
FOODSTUFFS
6
Poison-Packing III
CLASS 6 Division 6.2
INFECTIOUS SUBSTANCE
6
Infectious substance
ETIOLOGIC AGENTS
BIOMEDICAL
MATERIAL
IN CASE OF DAMAGE
OR LEAKAGE
42 CFR 72.3 Etiological agent label may apply.



(Source: U.S. Department of Transportation at www.dot.gov)

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Evidence Examinations

Use the following links for examinations guidelines:

Abrasives Examinations

Examinations can determine what type of abrasive material was used to sabotage engines or machinery.

Submitting Abrasives Evidence

Questions concerning abrasives evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Employ personnel familiar with engine and machinery operations and mechanics to recover abrasives.
- Abrasives settle in oil and fuel. Submit the oil and fuel from the engine sump and/or filters.
- Abrasives embed in bearings and other parts. Submit the bearings and other parts.
- Submit abrasives in heat-sealed or resealable plastic bags or paint cans. Avoid using paper or glass containers.

Anthropology and Odontology Examinations

Anthropological examinations can determine whether skeletal remains are human or animal. Race, sex, approximate height and stature, and approximate age at death can be determined from human skeletal remains.

Personal identifications can be made by comparing teeth with dental records and X-rays.

Submitting Anthropology and Odontology Evidence

Questions concerning anthropology and odontology evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Clean and air dry bones and teeth. Pack in paper bags.
- Collect insect samples found on the remains. Submit insects in leakproof containers such as film canisters or plastic pill bottles.
- Submit medical and dental records, if possible.

Recovered human remains compared with a plaster cast.

Arson Examinations

Arson examinations can determine the presence of accelerants introduced to a fire scene. Examinations of debris recovered from scenes can identify gasoline, fuel oils, and speciality solvents. Examinations generally cannot identify specific brands.

Search for the following at questioned arson scenes: candles, cigarettes, matchbooks, Molotov cocktails, fused chemical masses, or any electronic or mechanical devices that may have been used to assist the arsonist. Also search for cloth or paper burn trails, burn trails on carpeted or hardwood floors, and the removal of personal property or commercial inventory.

Submitting Arson Evidence

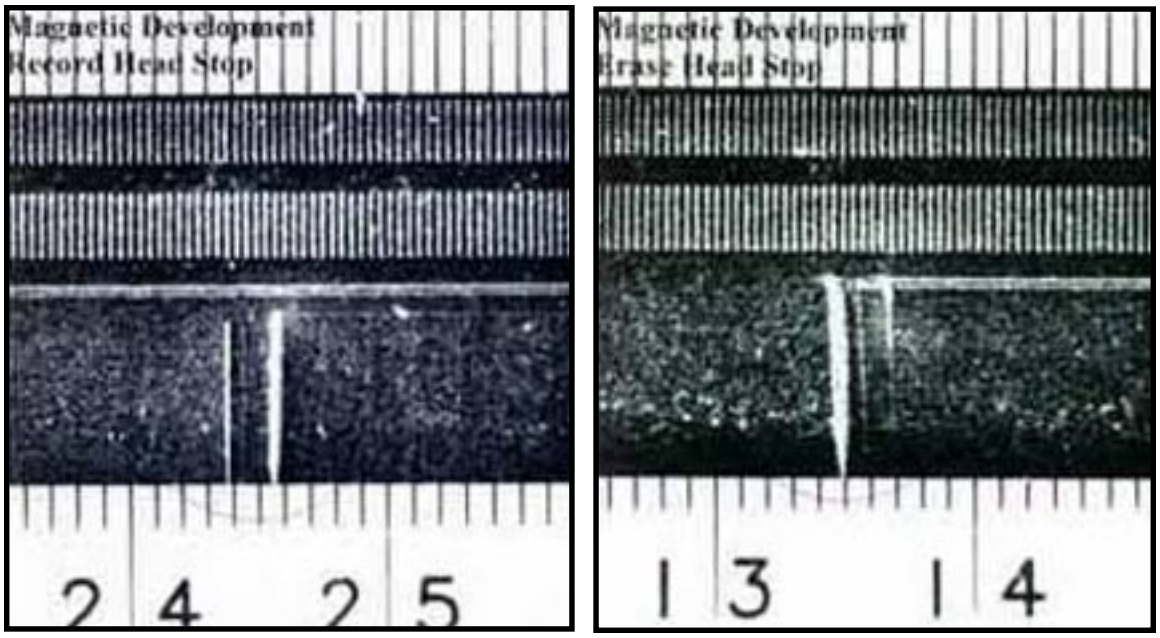
Questions concerning arson evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Flammable liquids are volatile and easily lost through evaporation. Preserve evidence in airtight containers such as metal cans, glass jars, or heat-sealed or resealable plastic bags. Do not fill the containers to the top. Pack to prevent breakage.

Audio Examinations

Authenticity

Authenticity examinations are conducted to determine whether audio recordings are original, continuous, unaltered, and consistent with the stated operation of the tape recorder.



Audio analog tape recordings.

Enhancement

Enhancement examinations are conducted to selectively reduce interfering noise on audio recordings to improve the intelligibility and the understanding of the recordings.

Voice Comparisons

Signal Analysis

Signal analysis examinations are conducted to identify, compare, and interpret signals such as gunshots and telephone touch tones.

Damaged Media Repair

Audio recordings can be repaired, restored, or retrieved for playback and examination, if damage is not too extensive.

Submitting Audio Evidence

Questions concerning evidence should be directed to **703-632-6191** or **703-632-6222**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

Audio formats.

- Submit original audio recordings.
- Identify known and questioned voice samples.
- Label the outer container **FRAGILE, SENSITIVE ELECTRONIC EQUIPMENT** or **FRAGILE, SENSITIVE AUDIO/VIDEO MEDIA** and **KEEP AWAY FROM MAGNETS OR MAGNETIC FIELDS**.
- Address the outer container as follows:

FEDERAL BUREAU OF INVESTIGATION
ENGINEERING RESEARCH FACILITY
ATTENTION: FORENSIC PROGRAM
BUILDING 27958A
QUANTICO VA 22135

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Bank Security Dyes Examinations

Specific dyes and chemicals used in bank security devices can be identified. Items such as clothing and money can be analyzed for the presence of these dyes and chemicals.

Submitting Bank Security Dyes Evidence

Questions concerning bank security dyes evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Do not submit evidence without visible stains.
- Do not submit large stained evidence. Cut a small sample of the stained area and submit in a heat-sealed or resealable plastic bag. Collect an unstained control sample, package separately, and submit it with the dye-stained evidence.
- Transfer questioned stains by rubbing with a clean (dry or wet with alcohol) cotton swab. Use an unstained swab as a control. Air dry the swab and pack in a heat-sealed or resealable plastic bag.

Building Materials Examinations

Examinations can compare building materials such as brick, mortar, plaster, stucco, cement, and concrete.

Submitting Building Materials Evidence

Questions concerning building materials evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- When building materials are penetrated or damaged, debris can adhere to persons, clothing, tools, bags, and loot and can transfer to vehicles. If possible, submit the evidence to the Laboratory for examiners to remove the debris. Package each item of evidence in separate paper bags. Do not process tools for latent prints.
- Collect known samples from the penetrated or damaged areas.
- Submit known and questioned debris in separate leakproof containers such as film canisters or plastic pill bottles. Avoid using paper or glass containers. Pack to keep lumps intact.

Computer Examinations

Content

Examinations can determine what type of data files are in a computer.

Comparison

Examinations can compare data files to known documents and data files.

Transaction

Examinations can determine the time and sequence that data files were created.

Extraction

Data files can be extracted from the computer.

Deleted Data Files

Deleted data files can be recovered from the computer.

Format Conversion

Data files can be converted from one format to another.

Keyword Searching

Data files can be searched for a word or phrase and all occurrences recorded.

Passwords

Passwords can be recovered and decrypted.

Limited Source Code

Source code can be analyzed and compared.

Storage Media

Storage media used with stand-alone word processors (typewriters) can be examined.

Requesting a Search or Field Examination

Submit requests for a search or field examination at least one week in advance.

Obtain as much of the following information as possible prior to submitting a request.

- Determine the type of computers and operating systems.
- If applicable, determine the type of network software, the location of the network servers, and the number of computers on the network.
- Determine whether encryption and/or password protection is used.
- Specify whether a seizure of computers and media or an on-site examination is required.

Submitting Computer Evidence

Questions concerning computer evidence should be directed to **202-324-9307**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- For most examinations, submit only the central processing units and the internal and external storage media.

- Use a sturdy cardboard container when shipping computer components. If possible, use the original packing case with the fitted padding. Use large, plastic bubble wrap or foam rubber pads as packing. Do not use loose Styrofoam™ because it lodges inside computers and/or components and creates static charges that can cause data loss or damage to circuit boards. Seal the container with a strong packing tape.

- Pack and ship central processing units in the upright position. Label the outside container **THIS END UP**.

- Disks, cartridges, tapes, and hard drives should be packed to avoid movement during shipping.

- Label the outer container **FRAGILE, SENSITIVE ELECTRONIC EQUIPMENT** and **KEEP AWAY FROM MAGNETS OR MAGNETIC FIELDS**.

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Controlled Substances Examinations

Controlled substances examinations can establish trace drug presence, identity, and quantity.

Black tar heroin.

Submitting Controlled Substances Evidence

Questions concerning controlled substances evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Submit evidence in separate heat-sealed or resealable plastic bags.
- Fold clothing to preserve trace evidence.
- Do not submit used drug field test kits with evidence.

DNA Examinations

Deoxyribonucleic acid (DNA) is analyzed in body fluids, stains, and other biological tissues recovered from evidence. The results of DNA analysis of questioned biological samples are compared with the results of DNA analysis of known samples. This analysis can associate victim(s) and/or suspect(s) with each other or with a crime scene.

Use the following links for guidelines for collecting and submitting DNA evidence:

Blood Examinations

Collecting Known Samples
- **Blood**
- **Saliva**

Documenting, Collecting, Packaging, and Preserving DNA Evidence

Submitting DNA Evidence
- **Blood on a Person**
- **Blood on Surfaces or in Snow or Water**
- **Bloodstains**
- **Blood Examination Request Letter**
- **Semen and Semen Stains**
- **Seminal Evidence From Sexual Assault Victim(s)**
- **Saliva and Urine**
- **Hair**
- **Tissues, Bones, and Teeth**

Blood Examinations

Examinations can determine the presence or absence of blood in stains. Examinations can also determine whether blood is human or nonhuman and can determine the animal species. Blood examinations cannot determine the age or the race of a person. Conventional serological techniques are not adequately informative to positively identify a person as the source of a stain.

Collecting Known Samples

Blood

- Only qualified medical personnel should collect blood samples from a person.
- Collect at least two 5-mL tubes of blood in purple-top tubes with EDTA as an anticoagulant for DNA analysis. Collect drug or alcohol testing samples in gray-top tubes with NaF (sodium fluoride).
- Identify each tube with the date, time, subject's name, location, collector's name, case number, and evidence number.
- Refrigerate, do not freeze blood samples. Use cold packs, not dry ice during shipping.
- Pack liquid blood tubes individually in Styrofoam™ or cylindrical tube containers with absorbent material surrounding the tubes.
- Label the outer container **KEEP IN A COOL DRY PLACE, REFRIGERATE UPON ARRIVAL**, and **BIOHAZARD**. To view hazardous materials labels, click here.
- Submit to the Laboratory as soon as possible.

Saliva

- Use clean cotton swabs to collect saliva samples. Rub the inside surfaces of the cheeks and gums thoroughly. Air dry the swabs and place in clean paper or an envelope with sealed corners. Do not use plastic containers.

- Identify each sample with the date, time, subject's name, location, collector's name, case number, and evidence number.
- Saliva samples do not need to be refrigerated.
- Submit to the Laboratory as soon as possible.

Documenting, Collecting, Packaging, and Preserving DNA Evidence

If DNA evidence is not properly documented, collected, packaged, and preserved, it will not meet the legal and scientific requirements for admissibility in a court of law.

- If DNA evidence is not properly documented, its origin can be questioned.
- If it is not properly collected, biological activity can be lost.
- If it is not properly packaged, contamination can occur.
- If it is not properly preserved, decomposition and deterioration can occur.

When DNA evidence is transferred by direct or secondary (indirect) means, it remains on surfaces by absorption or adherence. In general, liquid biological evidence is absorbed into surfaces, and solid biological evidence adheres to surfaces. Collecting, packaging, and preserving DNA evidence depends on the liquid or solid state and the condition of the evidence.

The more that evidence retains its original integrity until it reaches the Laboratory, the greater the possibility of conducting useful examinations. It may be necessary to use a variety of techniques to collect suspected body fluid evidence.

Submitting DNA Evidence

Questions concerning DNA evidence should be directed to **202-324-5436** or **202-324-4354**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

Blood on a Person

- Absorb suspected **liquid blood** onto a clean cotton cloth or swab. Leave a portion of the cloth or swab unstained as a control. Air dry the cloth or swab and pack in clean paper or an envelope with sealed corners. Do not use plastic containers.

- Absorb suspected **dried blood** onto a clean cotton cloth or swab moistened with distilled water. Leave a portion of the cloth or swab unstained as a control. Air dry the cloth or swab and pack in clean paper or an envelope with sealed corners. Do not use plastic containers.

Blood on Surfaces or in Snow or Water

- Absorb suspected **liquid blood** or **blood clots** onto a clean cotton cloth or swab. Leave a portion of the cloth or swab unstained as a control. Air dry the cloth or swab and pack in clean paper or an envelope with sealed corners. Do not use plastic containers.

- Collect suspected **blood in snow or water** immediately to avoid further dilution. Eliminate as much snow as possible. Place in a clean airtight container. Freeze the evidence and submit as soon as possible to the Laboratory.

Bloodstains

- Air dry suspected **wet bloodstained garments**. Wrap suspected **dried bloodstained garments** in clean paper. Do not place wet or dried garments in plastic or airtight containers. Place all debris or residue from the garments in clean paper or an envelope with sealed corners.

- Air dry small suspected **wet bloodstained objects** and submit the objects to the Laboratory. Preserve bloodstain patterns. Avoid creating additional stain patterns during drying and packaging. Pack to prevent stain removal by abrasive action or packaging materials during shipping. Pack in clean paper. Do not use plastic containers.

- When possible, cut a large sample of suspected **bloodstains from immovable objects** with a clean sharp instrument. Collect an unstained control sample. Pack to prevent stain removal by abrasive action or packaging materials during shipping. Pack in clean paper. Do not use plastic containers.

- Absorb suspected **dried bloodstains on immovable objects** onto a clean cotton cloth or swab moistened with distilled water. Leave a portion of the cloth or swab unstained as a control. Air dry the cloth or swab and pack in clean paper or an envelope with sealed corners. Do not use plastic containers.

Blood Examination Request Letter

A blood examination request letter should contain the following information:

- A brief statement of facts relating to the case.
- Claims made by the suspect(s) regarding the source of the blood.
- Whether animal blood is present.
- Whether the stains were laundered or diluted with other body fluids.
- Information regarding the victim(s)' and suspect(s)' health, such as AIDS, hepatitis, or tuberculosis.

Semen and Semen Stains

- Absorb suspected **liquid semen** onto a clean cotton cloth or swab. Leave a portion of the cloth or swab unstained as a control. Air dry the cloth or swab and pack in clean paper or an envelope with sealed corners. Do not use plastic containers.
- Submit small suspected **dry semen-stained objects** to the Laboratory. Pack to prevent stain removal by abrasive action or packaging materials during shipping. Pack in clean paper. Do not use plastic containers.
- When possible, cut a large sample of suspected **semen stains from immovable objects** with a clean sharp instrument. Collect an unstained control sample. Pack to prevent stain removal by abrasive action or packaging materials during shipping. Pack in clean paper. Do not use plastic containers.
- Absorb suspected **dried semen stains on immovable objects** onto a clean cotton cloth or swab moistened with distilled water. Leave a portion of the cloth or swab unstained as a control. Air dry the swab or cloth and

place in clean paper or an envelope with sealed corners. Do not use plastic containers.

Seminal Evidence From Sexual Assault Victim(s)

- Sexual assault victim(s) should be medically examined in a hospital or a physician's office using a standard sexual assault evidence kit to collect vaginal, oral, and anal evidence.

- Refrigerate and submit the evidence as soon as possible to the Laboratory.

Saliva and Urine

- Absorb suspected **liquid saliva or urine** onto a clean cotton cloth or swab. Leave a portion of the cloth unstained as a control. Air dry the cloth or swab and pack in clean paper or an envelope with sealed corners. Do not use plastic containers.

- Submit suspected small, **dry saliva- or urine-stained objects** to the Laboratory. Pack to prevent stain removal by abrasive action or packaging materials during shipping. Pack in clean paper or an envelope with sealed corners. Do not use plastic containers.

- When possible, cut a large sample of suspected **saliva or urine stains from immovable objects** with a clean sharp instrument. Collect an unstained control sample. Pack to prevent stain removal by abrasive action or packaging materials during shipping. Pack in clean paper. Do not use plastic containers.

- Pick up **cigarette butts** with gloved hands or clean forceps. Do not submit ashes. Air dry and place the cigarette butts from the same location (ashtray) in clean paper or an envelope with sealed corners. Do not submit the ashtray unless latent print examination is requested. Package the ashtray separately. Do not use plastic containers.

- Pick up **chewing gum** with gloved hands or clean forceps. Air dry and place in clean paper or an envelope with sealed corners. Do not use plastic containers.

- Pick up **envelopes and stamps** with gloved hands or clean forceps and place in a clean envelope. Do not use plastic containers.

Hair

- Pick up hair carefully with clean forceps to prevent damaging the root tissue.
- Air dry hair mixed with suspected body fluids.
- Package each group of hair separately in clean paper or an envelope with sealed corners. Do not use plastic containers.
- Refrigerate and submit as soon as possible to the Laboratory.

Tissues, Bones, and Teeth

- Call the Laboratory at **202-324-5436** or **202-324-4354** prior to submitting suspected tissues, bones, or teeth to ensure that the evidence will be accepted by the Laboratory. The communication accompanying the evidence must reference the telephone conversation accepting the evidence.
- Pick up suspected tissues, bones, and teeth with gloved hands or clean forceps.
- Collect 1-2 cubic inches of red skeletal muscle.
- Collect 3-5 inches of long bone such as the fibula or femur.
- Collect teeth in the following order:

    1. nonrestored molar
    2. nonrestored premolar
    3. nonrestored canine
    4. nonrestored front tooth
    5. restored molar
    6. restored premolar

7. restored canine

8. restored front tooth

- Place tissue samples in a clean, airtight plastic container without formalin or formaldehyde. Place teeth and bone samples in clean paper or an envelope with sealed corners.

- Freeze the evidence, place in Styrofoam™ containers, and ship overnight on dry ice.

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Electronic Devices Examinations

Personal Digital Assistants

Examinations of personal digital assistants (PDA) provide printouts of user-entered information. In some cases, it is necessary to disassemble the PDAs during examination.

Interception of Communication Devices

Interception of communication (IOC) devices are used to unlawfully intercept oral or wire communications. IOC devices consist of radio frequency transmitters and receivers. IOC examinations are conducted to identify operating characteristics. In some cases, it is necessary to disassemble the IOC devices during examination.

Personal digital assistants.

Other Electronic Devices

Examinations are conducted on devices containing electronic circuitry such as cellular telephones, pagers, bomb detonators, and stun guns. The examinations can identify operating characteristics and modifications. In some cases, it is necessary to disassemble the devices during examination.

Submitting Personal Digital Assistants, Interception of Communication Devices, and Other Electronic Devices Evidence

Questions concerning evidence should be directed to **703-632-6191** or **703-632-6200**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Label the outer container **FRAGILE, SENSITIVE ELECTRONIC EQUIPMENT** and **KEEP AWAY FROM MAGNETS OR MAGNETIC FIELDS**.

- Address the outer container as follows:

  FEDERAL BUREAU OF INVESTIGATION
  ENGINEERING RESEARCH FACILITY
  ATTENTION: FORENSIC PROGRAM
  BUILDING 27958A
  QUANTICO VA 22135

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Elemental Analysis Examinations

Elemental analysis examinations can identify and compare the chemical elemental composition of evidence, including firearm projectile lead, bullet jacket alloys, other metals, and unknown substances.

Firearm Projectile Lead

Elemental analysis of the lead component of a firearm projectile is valuable when the projectile is too mutilated or lacks sufficient microscopic marks for identification with a firearm, when no firearm is recovered, or when the firearm cannot be associated with the suspect or suspects.

The concentrations of selected elements in the lead portion of bullets, shot pellets, and other firearm projectiles can chemically characterize the source of the lead. Some chemical elements present in leads are intentionally specified and/or added by the ammunition manufacturer. Other chemical elements found in leads are unspecified contaminants. Differences in the concentrations of manufacturer-controlled elements and uncontrolled trace elements provide a means of differentiating among the leads of manufacturers, among the leads in individual manufacturer's production lines, and among specific batches of lead in the same production line of a manufacturer.

Bullet Jacket (Copper/Zinc) Alloys

Elemental analysis of the jacket component of firearm projectiles is valuable when the projectile has fragmented so that jacket fragments cannot physically be associated with specific bullets. This analysis is helpful in situations when there are multiple shooters and multiple types of jacketed ammunition are fired. The concentrations of copper and zinc comprising the bullet jacket serve to characterize the alloy class of the metal. Although there are a limited number of copper/zinc alloys used in the manufacture of bullet jackets, alloy classification can provide a means of differentiating among bullet jacket alloys of different manufacturers and among the bullet jacket alloys in an individual manufacturer's production lines.

Other Metals

Elemental analysis and comparison of metals such as copper wire, steel, and aluminum can determine whether two metals or metallic objects came from the same source or from each other. The concentrations of selected elements in objects made of these metals can chemically characterize the source of the metal. The concentrations of several elements are controlled by the manufacturers to impart specific end-use properties to products. These manufacturer-controlled elements help to chemically characterize a metal object by placing it in an alloy class. The concentrations of trace elements are generally not controlled by the manufacturers. Differences in the concentrations of manufacturer-controlled elements and uncontrolled trace elements provide a means of differentiating among metals made by different manufacturers, among metals from different product lines of a single manufacturer, and among specific production runs of the metal from a single manufacturer.

Gunshot Residue

When a firearm is discharged, vaporous and particulate materials called gunshot residue (GSR) are expelled. Collecting GSR from a suspect shooter's hands and analyzing it for the presence of barium, antimony, and lead, which are major elemental components of most cartridge primer mixtures, provides data to associate a suspect with the recent discharge of a firearm or the handling of a contaminated firearm or ammunition component.

The FBI Laboratory does not currently provide GSR examinations; however, a revised program is being field-tested. Contributors will be advised when GSR examinations are available.

Submitting Elemental Analysis Evidence

Questions concerning elemental analysis evidence should be directed to **202-324-4341**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Ammunition components such as bullets, cartridge cases, and shotshell casings can be sent via registered mail through the U. S. Postal Service. Evidence should be packaged separately and identified by date, time, location, collector's name, case number, and evidence number.

- Live ammunition must be shipped via Federal Express. The following guidelines must be followed to comply with U.S. Department of Transportation regulations. Pack ammunition in a cardboard container. Label invoices **FEDERAL EXPRESS**. The shipper's certification for restricted articles must be included. The outside of the container must be labeled **ORM-D AIR, CARTRIDGES SMALL ARMS**. The shipping papers must also include the weight in grams.

- Do not mark bullets, cartridges and cartridge cases, and shotshells and shotshell casings. The date, time, location, collector's name, case number, and evidence number should be on the container.

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Explosives Examinations

Remains of improvised explosive devices, improvised incendiary devices, and hoax bombs are examined to identify the main charge and components such as switches, batteries, detonators, tapes, wires, and timing mechanisms. Fabrication techniques, unconsumed explosives, and the construction of bombs are also identified. Examinations can determine whether the device functioned as designed.

Submitting Explosives Evidence

Explosives are hazardous materials and should only be handled by qualified police or bomb disposal personnel. Special packaging is required, and the amount to be shipped is regulated. An **FD-861** form is required for shipping bomb components. **Call the Laboratory each time an explosive device or a related explosive item needs to be shipped.** Questions concerning explosives evidence should be directed to **202-324-4341**.

Explosives Residue Examinations

Instrumental analyses of explosives residue can determine whether substances are high explosive, low explosive, or explosive or incendiary mixtures; whether the composition of the substances is consistent with known explosive's products; and the type of explosives. Explosives residue can be deposited on metal, plastic, wood, paper, or glass. Residue may be deposited after handling, storing, or initiating an explosive.

Submitting Explosives Residue Evidence

Questions concerning explosives residue evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Some explosives residue is water soluble and must be protected from moisture. Other residue evaporates quickly and must be collected as soon as possible in airtight containers such as metal cans, glass jars, or heat-sealed or resealable plastic bags. Do not fill the containers to the top. Pack to prevent breakage.
- Collect and preserve control samples from the blast site.
- Extreme care should taken to avoid contamination of explosives residue evidence.

FBI Disaster Squad

- Prints the deceased at disaster scenes.
- Assists in identifying the deceased.
- Requires consent from the ranking law enforcement official at the scene or from a representative of the National Transportation Safety Board or Federal Aviation Administration, a coroner or medical examiner, or other ranking official such as a mayor or governor. Requests from other sources submitted through official channels and from the U.S. Department of State are also considered.
- Requests for assistance should be made through the nearest FBI Field Office.

See **Latent Print Examinations**

Firearms Examinations

Use the following links for guidelines for specific firearms examinations:

Firearms

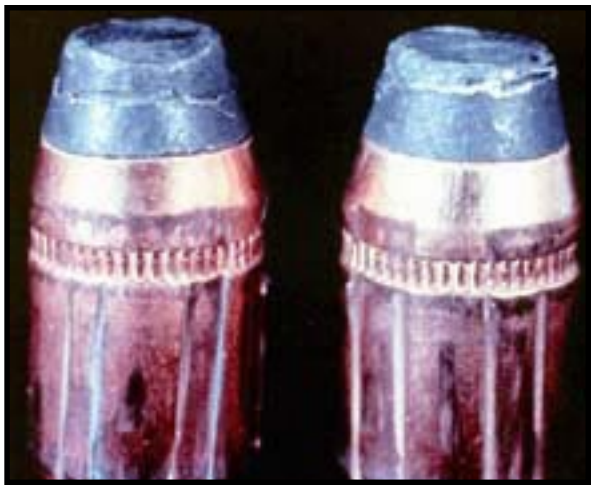
Firearms examinations can determine the general condition of a firearm and whether the firearm is mechanically functional. Trigger-pull examinations can determine the amount of pressure necessary to release the hammer or firing pin of a firearm. Examinations can determine whether a firearm was altered to fire in the full-automatic mode. Obliterated and/or altered firearm serial numbers can sometimes be restored. Firearms can be test fired to obtain known specimens for comparison to evidence ammunition components such as bullets, cartridge cases, and shotshell casings.

Bullets

Fired bullets can be examined to determine the general rifling characteristics such as caliber and physical features of the rifling impressions and the manufacturer of the bullets. The microscopic characteristics on evidence bullets can be compared to test-fired bullets from a suspect firearm to determine whether the evidence bullet was fired from that firearm.

Cartridge Cases or Shotshell Casings

Cartridge cases or shotshell casings examinations can determine the caliber or gauge, the manufacturer, and whether there are marks of value for comparison. The images of questioned cartridge cases and shotshell casings can be scanned into *DRUGFIRE* to compare with evidence from other shooting incidents. The microscopic characteristics of evidence cartridge cases and shotshell casings can be examined to determine whether they were fired in a specific firearm.



Rifling characteristics on fired bullets.

Shot Pellets, Buckshot, or Slugs

Examinations of shot pellets, buckshot, or slugs can determine the size of the shot, the gauge of the slug, and the manufacturer.

Wadding

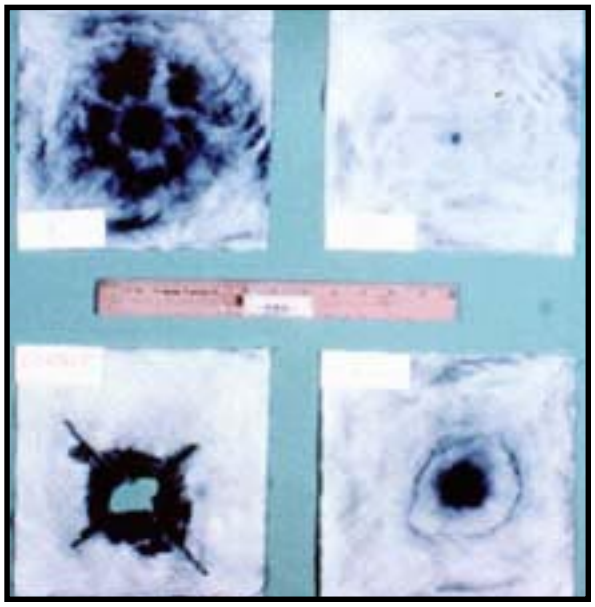
Examinations of wadding components can determine the gauge and the manufacturer.

Unfired Cartridges or Shotshells

Examinations of unfired cartridges or shotshells can determine the caliber or gauge and whether there are marks of value for comparison. Examinations can also determine whether the ammunition was loaded into and extracted from a specific firearm. Unfired and fired cartridges or shotshells can be associated through manufacturing marks.

Gunshot Residue

The deposition of gunshot residue on evidence such as clothing varies with the distance from the muzzle of the firearm to the target. Patterns of gunshot residue can be duplicated using a questioned firearm and ammunition combination fired into test materials at known distances. These patterns serve as a basis for estimating muzzle-to-garment distances.



Gunshot residue patterns.

Shot Pattern

Shot pattern examinations can determine the approximate distance at which a shotgun was fired by testing a specific firearm and ammunition combination at known distances.

Silencers

Muzzle attachments can reduce the noise of a firearm by suppressing sound during firing. Testing can determine whether a muzzle attachment can be classified as a silencer based upon a measurable sound-reduction capability.

Gun Parts

Gun parts examinations can determine the caliber and model of gun from which the parts originated.

Submitting Firearms Evidence

Questions concerning firearms evidence should be directed to **202-324-4378**. Follow the **Evidence Submission** directions including **Requesting Evidence**

Examinations and **Packaging and Shipping Evidence**.

- Firearms must be packaged and shipped separately from live ammunition. All firearms must be unloaded.

- The firearm should be submitted. If the firearm cannot be submitted, call **202-324-4378** for instructions.

- The firearm should be minimally handled to avoid loss or destruction of evidence. Do not allow objects to enter or contact the firearm's barrel, chamber, or other operating surface.

- Firearms and ammunition components such as bullets, cartridge cases, and shotshell casings can be sent via registered mail through the U.S. Postal Service. Evidence must be packaged separately and identified by date, time, location, collector's name, case number, and evidence number.

- Live ammunition must be shipped via Federal Express. The following guidelines must be followed to comply with U.S. Department of Transportation regulations. Pack ammunition in a cardboard container. Label invoices **FEDERAL EXPRESS**. The shipper's certification for restricted articles must be included. The outside of the container must be labeled **ORM-D AIR**, **CARTRIDGES SMALL ARMS**. The shipping papers must also include the weight in grams.

- Do not mark the firearm. Firearms should be identified with a tag containing the caliber, make, model, and serial number. The date, time, owner(s)' name(s), location, collector's name, case number, and evidence number should be on the container.

- Do not mark bullets, cartridges and cartridge cases, shotshells and shotshell casings, and other firearms-related evidence. The date, time, location, collector's name, case number, and evidence number should be on the container.

- Clothing submitted for gunshot residue examination should be carefully handled, air dried, and wrapped separately in paper. Clothing with blood must be air dried and labeled **BIOHAZARD** on the inner and outer

containers. The date, time, location, collector's name, case number, and evidence number should be on the container. To view hazardous materials labels, click here.

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Glass Examinations

Glass comparison examinations can determine whether particles of glass originated from a broken source of glass. Glass fracture examinations can determine the direction and type of the breaking force and the sequencing of shots.

Submitting Glass Evidence

Questions concerning glass evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

Glass Comparison Examinations

- Submit samples of glass from each broken window or source in leakproof containers such as film canisters or plastic pill bottles. Avoid using paper or glass containers.
- Submit samples of laminated glass (such as a windshield) from each side of the laminate. Label the samples **INSIDE** and **OUTSIDE** and package separately in leakproof containers such as film canisters or plastic pill bottles. Avoid using paper or glass containers.
- Submit the victim(s)' and suspect(s)' air-dried clothing. Each clothing item should be packaged separately in a paper bag.
- Search for particles in the victim(s)' and suspect(s)' hair, skin, and wounds. Submit particles in leakproof containers such as film canisters or plastic pill bottles. Avoid using paper or glass containers.
- Search for particles in vehicles by vacuuming each section of the vehicle separately. Do not use tape for recovering glass particles. Submit vacuum sweepings in leakproof containers. Avoid using paper or glass containers.
- Do not process evidence for latent prints.

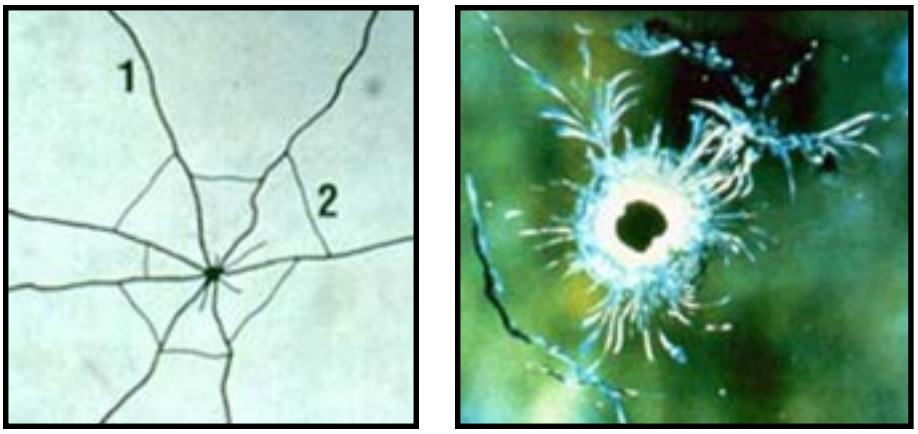
Glass Fracture Examinations

- Label the sides of the glass in the frame **INSIDE** and **OUTSIDE**. Label the glass where it was removed in the frame such as **TOP**, **BOTTOM**, **LEFT**, and **RIGHT**.

- Submit all glass pieces so that the pieces can be fitted together to identify the radial cracks near and at the point(s) of impact and to increase the probability of matching edges. Pack all glass separately and securely to avoid shifting and breaking during transport.

- Submit the entire piece of laminated glass, if possible. Secure the glass between plywood or sturdy cardboard. Do not place any objects into the impact area.

- Do not process evidence for latent prints.



Glass fractures produced by a low-speed impact such as a rock (left; 1 = radial crack, 2 = concentric crack) and by a high-speed projectile such as a bullet (right).

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Hairs and Fibers Examinations

Hair examinations can determine whether hairs are animal or human. Race, body area, method of removal, damage, and alteration (that is, bleaching or dyeing) can be determined from human hair analysis. Examinations can associate a hair to a person on the basis of microscopic characteristics in the hair but cannot provide absolute personal identification. The animal species and family can be determined from hair analysis.

Hairs indicating forced (left) and natural (right) removal.

Microscopic images of wool fibers.

Fiber examinations can identify the type of fiber such as animal (wool), vegetable (cotton), mineral (glass), and synthetic (manufactured). Questioned fibers can be compared to fibers from victim(s)' and suspect(s)' clothing, carpeting, and other textiles. A questioned piece of fabric can be physically matched to known fabric. Fabric composition, construction, and color can be compared, and impressions on fabric and from fabric can be examined. Clothing manufacturers' information can be determined by label searches.

Submitting Hairs and Fibers Evidence

Questions concerning hairs and fibers evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

Polarizing microscope image of a nylon fiber.

- Collect at least 25 known hairs from different parts of the head and/or pubic region. Comb and pull out the hairs. Submit hairs in clean paper or an envelope with sealed corners.

- When possible, submit the entire garment or textile. Submit fibers in clean paper or an envelope with sealed corners.

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Ink Examinations

Examinations can compare the formulation of known and questioned ink including typewriter ribbon ink and stamp pad ink. When ink formulations are the same, it is not possible to determine whether the ink originated from the same source to the exclusion of others. Examinations cannot determine how long ink has been on a document.

Submitting Ink Evidence

Questions concerning ink evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Pack ink evidence separately from any document or surface with ink marks.

Latent Print Examinations

Developing Latent Prints at Crime Scenes

The Laboratory is the best place to develop latent prints; however, it is sometimes necessary to develop latent prints at crime scenes.

Fluorescence examination with a filter.

- Caution should be taken to prevent destroying latent prints.
- Examine all evidence for visible latent prints before using any latent print development processes.
- Photograph visible latent prints first.
- Examine evidence with a laser or an alternate light source to find latent prints.
- When using latent print development processes, refer to the manufacturer's instructions and the safety data sheets. Use protective equipment.
- Caution should be taken when using cyanoacrylate processes. Cyanoacrylate glue fumes should not be applied to wet surfaces.

Preparing specimens for cyanoacrylate processing.

- Use print powders to develop prints. Use black and gray powders because other colors are difficult to photograph. Use black powders on evidence with a light background. Use gray powders on dark or reflective evidence. Do not apply powders to greasy, bloody, dusty, or putty-covered evidence. Allow wet evidence to dry before applying powders.

Photographing and Lifting Latent Prints

Accelerating a chemically developed print.

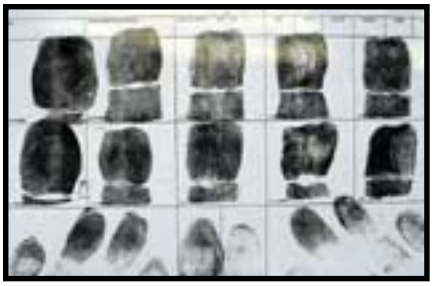
- Photograph latent prints separately.
- Photograph latent prints developed with fingerprint powders before lifting.
- Use transparent, black, or white rubber lifting tape to lift latent prints. When transparent tape is used, the color of the backing card should contrast with the color of the powders.
- Use a medium-format camera with adaptability to one-to-one photography.
- Photograph prints with a scale and an identification label that includes the reference number, date, collector's initials, and the location of prints. The scale and label should be placed on the same plane as the prints.

Photograph of a latent-bearing surface.

- Fill the frame completely.
- Photograph latent prints close to each other in one frame.
- Use T-Max 400™ film. Set the f-stop to f/8. Adjust the shutter speed setting until the green light appears. Take exposures of each latent print by bracketing. Take three exposures.
    - Original exposure.
    - Underexposed image.
    - Overexposed image.
- Maintain a photographic log that includes the reference number, date, collector's initials, the location of prints, and other pertinent information.

Submitting Latent Print Evidence

Questions concerning latent print evidence should be directed to **202-324-2163**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.



Fingerprint card.

- Place nonporous evidence in separate protective coverings such as thick transparent envelopes or suspend in a container so that there is minimal surface contact. Place porous evidence in separate protective coverings such as paper envelopes. Stabilize the evidence to avoid movement or friction during shipment.

- Submit the fingerprints and palm prints of all personnel who handled the evidence and of all individuals who are suspects in the investigation with the evidence. All fingerprint cards must include pertinent information.

- Palm prints should be taken on a separate card, not on the reverse side of a fingerprint card.

- When fingerprint cards or major case prints are submitted for comparisons with evidence, the criminal/suspect or noncriminal/elimination nature of the prints should be stated in the communication.

- When inked prints are submitted separately, a communication should be sent with the prints referencing previous communications and pertinent numbers.

- Fingerprints from decomposed bodies are often not classifiable, which precludes a search of the FBI's fingerprint files. An individual fingerprint may, however, be suitable for identification purposes. If less than ten legible fingerprints are obtained, submit the available fingerprints and a complete physical description of the unknown deceased.

- Legible, unknown deceased, ten-print fingerprint cards should be submitted for identification purposes to the FBI's Criminal Justice Information Services Division at the following address:

FEDERAL BUREAU OF INVESTIGATION
CRIMINAL JUSTICE INFORMATION SERVICES DIVISION
1000 CUSTER HOLLOW ROAD
CLARKSBURG WV 26306

Questions concerning ten-print fingerprint card submissions should be directed to **304-625-2360**.

- When printing the deceased, obtain inked fingerprints and palm prints for comparison with latent prints. If legible prints are not obtainable, amputate the hands or the fingers with authority from a coroner or a medical examiner and submit the evidence to the Laboratory.
- Pack each finger in a separate container, labeled **RIGHT THUMB**, **RIGHT INDEX**, and so on. Pack the hands or fingers in unbreakable, watertight, and airtight containers with a 70 percent solution of alcohol. All human remains will be returned to the contributor.

Deceased finger preparation.

See FBI Disaster Squad

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Metallurgy Examinations

Use the following links for guidelines for specific metallurgy examinations:

Comparison

Comparison examinations can determine whether two metals or metallic objects came from the same source or from each other. Metal comparisons can identify surface and microstructural characteristics such as fractured areas and accidental, damage, and fabrication marks to determine whether the object was cast, forged, hot- or cold-rolled, extruded, drawn, swaged, milled, spun, or blanked. Examinations can determine mechanical properties such as the response of a metal to an applied force or load. Examinations can also determine chemical composition including alloying and trace elements.

Broken or Mechanically Damaged Metal

The causes of failure or damage such as stress exceeding the strength or yield limit of the metal, a material or manufacturing defect, corrosion, cracking, or excessive service usage (fatigue) can be determined. The magnitude of the force or load that caused the failure, how the force or load was transmitted to the metal, and the direction it was transmitted can also be determined.

Burned, Heated, or Melted Metal

Examinations can determine the temperature at which a metal was exposed, the nature of the heat source, and whether a metal was in an electrical short-circuit situation.

Thermally damaged box springs.

Cut or Severed Metal

Examinations can determine the method by which a metal was severed, such as sawing, shearing, milling, turning, arc cutting, or flame cutting. The skill of the person who made the cut and the length of time it took to make the cut can also be determined.

Metal Fragments

Examinations can determine how fragments were formed. If fragments were formed by high-velocity forces, it can be determined whether an explosive was detonated and the magnitude of the detonation velocity. The identification of the object that was the source of the fragments can also be determined.

Watches, Clocks, and Timers

The conditions causing a watch, clock, timer, or other mechanism to stop or malfunction, and whether the time displayed represents a.m. or p.m. (calendar-type timing mechanisms only) can be determined.

Lamp Bulbs

Examinations can determine whether a lamp bulb was incandescent at the time the glass was broken and whether an unbroken lamp bulb was incandescent at the time it was subjected to an impact force such as a vehicular collision.

Objects Unidentified as to Use or Source

Examinations can determine the possible use for which an object was designed, formed, or manufactured on the basis of the construction and the type of metal.

The possible identification of the manufacturer and specific fabricating equipment used to form the object can be determined. Identification of the source of the object if an unusual metal or alloy is involved can be determined.

Objects With Questioned Internal Components

X-ray radiography can nondestructively reveal the interior construction and the presence or absence of defects, cavities, or foreign materials.

Radiograph of cog made of cocaine-containing polymer.

Submitting Metallurgy Evidence

Questions concerning metallurgy evidence should be directed to **202-324-4341**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Different metals and alloys require specific methods of restoration. Objects can be too large or heavy to submit. Call the Laboratory for specific instructions.
- Submit information about environmental conditions when the metal was recovered.

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Paints, Polymers, and Adhesives Examinations

The color, year, make, and model of an automobile can be determined by comparing questioned paint with known sources.

Paint on safes, vaults, window sills, and door frames can be transferred to and from tools. A comparison can be made between the paint on an object and the paint on a tool.

The source, use, or manufacturer of plastic evidence usually cannot be identified by composition analysis.

Automobile trim can be compared with plastic remaining on the property struck in a hit-and-run case. The year, make, and model of an automobile can be determined if a manufacturer's part number is on the trim.

Plastics in wire insulation and miscellaneous plastics such as buttons can be compared with known sources.

Identifications can be made with the torn or cut end of tape and a roll of suspect tape. Tape composition, construction, and color can be compared with known sources.

Caulks, sealants, and adhesives can be compared by color and composition with known sources.

Submitting Paints, Polymers, and Adhesives Evidence

Questions concerning paints, polymers, and adhesives evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Chip paint from the surface to the foundation or substrate rather than scrape it off. When paint is chipped, its layer structure remains intact. Each layer can be a point of comparison.

- Search the accident or crime scene and the victim(s)' personal effects to locate paint fragments. Paint fragments are often found in the clothing of a hit-and-run victim(s). Submit the clothing. Paints can be transferred from one car to another, from car to object, or from object to car during an accident or a crime. Submit an entire component such as a fender or bumper if paint transfer is minimal. Car or car parts dealers may have appropriate containers to ship car components.

- Pack particles in leakproof containers such as pillboxes or envelopes with sealed corners. Do not stick particles on adhesive tape. Do not put particles in cotton.

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Pharmaceutical Examinations

Pharmaceutical examinations can identify constituents, active ingredients, quantity, and weight.

Submitting Pharmaceutical Evidence

Questions concerning pharmaceutical evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- List the names of the pharmaceuticals and data on use.
- If possible, submit pharmaceuticals in original containers.

Photographic Examinations

Use the following links for guidelines for specific photographic examinations:

Bank Robbery and Other Surveillance Films and Videotapes

(See **Photographic Comparisons** and **Photogrammetry**)

Photographic Comparisons

Examinations of bank surveillance films, videotapes, and photographs involve comparisons of subject(s) depicted in the surveillance images with known photographs of suspect(s). Similar comparisons can be conducted between the subject(s)' clothing and clothing seized from suspect(s). Comparisons can also be conducted of firearms, vehicles, and other objects depicted in surveillance images.

Unique characteristics such as tattoos can be used to identify suspects. On the top left is an image from a surveillance videotape depicting an unknown individual's left arm. An enlargement of the unknown individual's arm is shown at lower left. A confirmed photograph of the suspect is shown on the top right, with an enlargement of that arm shown right bottom.

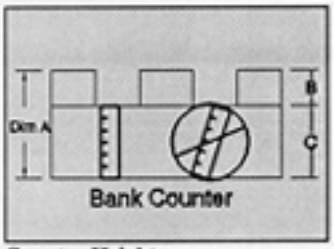
Photogrammetry

Dimensions can be derived from photographic images through the use of geometric formulae or on-site comparison. Examples of photogrammetry include determining the height of bank robbery subject(s) and the length of the weapon(s) used by the subject(s) depicted in the surveillance films. The form used to collect information needed to perform a photogrammetric examination is shown on the next page. For more information about FBI Laboratory photogrammetry, contact the Special Photographic Unit, **202-324-4483**.

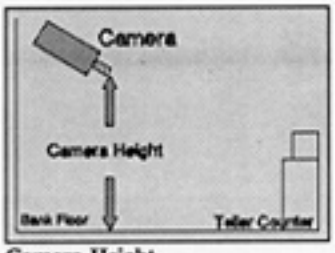
Field Office Instructions

The purpose of this form is to record measurements obtained from inside a bank. These measurements will be used by the Special Photographic Unit, Laboratory Division, FBIHQ, [Room 3449, Extension 4483] when conducting a Photogrammetric Examination.

Each measurement should be to the nearest one-eighth inch, i.e., 32 $^{1}/_{4}$ in., 45 $^{1}/_{2}$ in., or 38 $^{7}/_{8}$ in. avoiding any measurements to the sixteenth of an inch.



Counter Height



Camera Height

Focal Length

When making measurements insure the measuring device is vertical.

Bank Counter: Dimension A _____ Dimension B _____ Dimension C _____

Camera Height: Measure from the floor to the center of the camera lens _____.

Focal Length: Examples of the focal length are 24mm, 28mm, 30mm, or 35mm. The focal length, found on the lens barrel, should be represented in units of millimeters (mm) _____.

Additional Measurements (if applicable):

Height of door inside bank that may be near the teller windows and in the view of the surveillance camera (measure from floor to top of door facing) _____.

Height of Island Counter that is in view of surveillance camera _____.

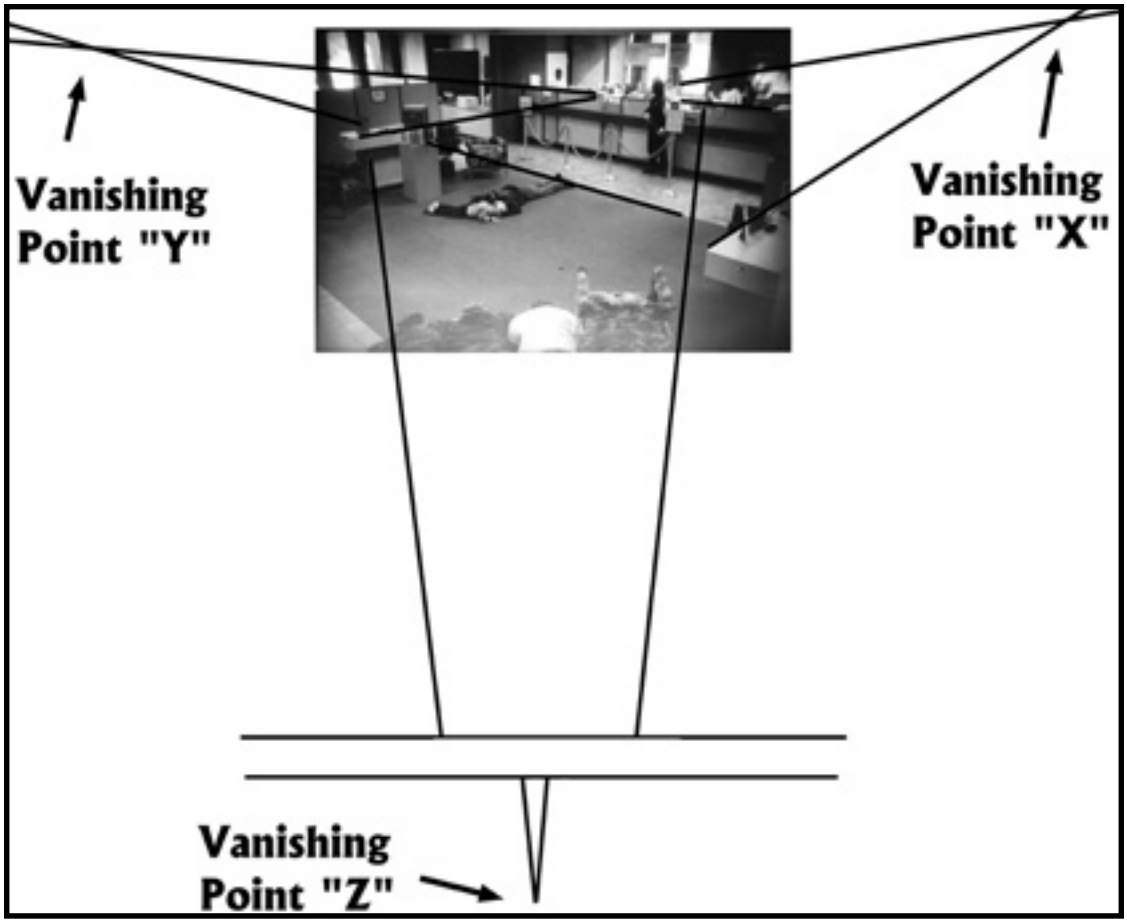
Height of Exit Door measuring from floor to top of door facing _____.

If available, record these measurements on a photo taken by the bank surveillance camera that depicts the bank robbery. The dimensions should be placed on the photo in the same location where measured. Finally, place this form and photo in a 1A envelope and submit to the SPU, FBI Laboratory, with surveillance film .

SPU use only

Lab Number: _____
Examiner: _____
Date received: _____
Date of exam: _____

Agent/Person making measurements _____
Agent's telephone number _____
Field Office _____
Field file number _____
Name of bank (abbr.) _____
Date of measurements _____



Photogrammetric analysis (height determination) of a bank robber can be conducted analytically using vanishing points.

Location, Time, and Date

Examinations of photographic evidence can determine the location, time, and date that an image was taken.

Authenticity

Photographic evidence, including film, video, and digital images, can be examined to determine whether the image is the result of a composite, an alteration, or a copy.

Source and Age

Photographic products, including film and prints, can be dated, and the source can be established by examining manufacturing characteristics. This can establish the time frame during which a photograph was taken.

Cameras

Cameras can be examined and compared with negatives to determine whether a specific camera exposed a specific image.

Videos

Black-and-white and color photographic images can be produced from video images for enlargement and used in courtroom presentations.

Automobile Make and Model Identification

Vehicles depicted in surveillance images can be compared with the National Automotive Image File to determine make and model.

Child Pornography Examinations

The seized images of child pornography can be compared against images in the Child Exploitation and Obscenity Reference File to identify the original source of the images.

Submitting Photographic Evidence

Questions concerning photographic evidence should be directed to **202-324-4483**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Submit original evidence (film or videotape) whenever possible because they contain the greatest level of detail. If the originals are unavailable, submit first generation photographic prints or videotapes.

- Process all film, including bank surveillance film, prior to submission.

- When requesting forensic examinations based on video images, queue the original videotape to the approximate time of the questioned sequence. State in a communication the date and time of the relevant sequence and use the date-time stamp on the images or the counter indicator (set from the beginning of the tape at 000). If prints from the relevant frames are available, submit them to the Laboratory.

- Always remove the record tab on the back edge of the videocassette. Never use the pause operation when viewing original videotapes. If a videotape must be viewed, use a copy.

- Arrest or known photographs of suspect(s) for comparison with questioned images should depict the suspect(s) from many angles, specifically angles similar to the questioned images. If a facial comparison is requested, ensure that the suspect(s)' face/head fills more than half of the frame. If questioned images show tattoos or marks on a suspect(s)' body, include photographs depicting tattoos or marks on the known body.

- When taking known photographs for comparison with questioned images, use 35-mm black-and-white film. If color film is used, include a color chart in the photographs.

- When submitting clothing, firearms, or other items for comparison, do not mark the exteriors of the items or parts that may be visible in the questioned images.

- If photogrammetry is requested, include the dimensions of the scene to the nearest 1/8 inch and include a diagram or print from the surveillance film indicating the location of the measurements. Include one diagram or print for every angle used in the scene. Do not touch or move surveillance cameras except to remove the film.

- Submissions for comparison with the Child Exploitation and Obscenity Reference File should be limited to no more than 30 images. Call **202-324-4483** for specific instructions.

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Polygraph Examinations

The Polygraph Unit (PU) conducts polygraph examinations in all areas of FBI investigative responsibility including criminal and personnel matters. The PU coordinates and manages all FBI polygraph activities including the selection, training, certification, and supervision of FBI Field Office examiners, the procurement and maintenance of equipment, test standardization, and case assignments.

Questions concerning polygraph examinations should be directed to **202-324-2985**.

Questioned Documents Examinations

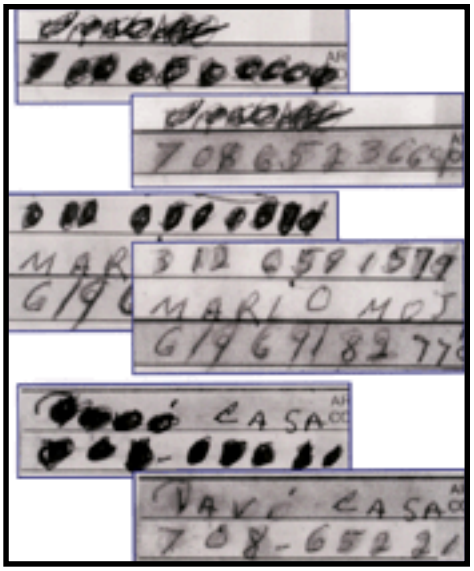
Use the following links for guidelines for specific questioned documents examinations:

Handwriting and Hand Printing

Although not all handwriting is identifiable to a specific writer, the examination of handwriting characteristics can sometimes determine the origin or authenticity of questioned writing. Traits such as age, sex, personality, or intent cannot be determined from handwriting examinations. Some reasons for inconclusive results include the following:

- Limited questioned and/or known writing.
- Lack of contemporaneous writing or lapse of time between execution of questioned and known writing.

- Distortion or disguise in the questioned and/or known writing.
- Lack of sufficient identifying characteristics.
- Submission of photocopied evidence instead of original evidence.



Various handwriting and hand printing analysis techniques are used to examine different forms of obliterated writing.

Procedures for Obtaining Known Writing Exemplars

- The text, size of paper, space available for writing, writing instrument, and writing style (handwriting or hand printing) should be as close to the original writing as possible.
- Give verbal or typewritten instructions concerning the text to be written. Do not give instructions in spelling, punctuation, or arrangement of writing.
- All exemplars should be on separate pieces of paper.
- The writer and witness should initial and date each page of writing.
- Do not allow the writer to see the previous exemplars or the questioned writing. Remove exemplars from the writer's sight as soon as completed.
- Obtain exemplars from dictation until normal writing has been produced. Normal handwriting is assessed by determining whether the writing is too quickly or slowly executed and whether the handwriting is consistent.
- Obtain exemplars from the right and left hands.
- Obtain hand printing exemplars in uppercase and lowercase letters.
- Obtain exemplars written rapidly, slowly, and at varied slants.
- Obtain a sufficient quantity of exemplars to account for natural variation in the writing.

- Obtain undictated writing such as business records, personal correspondence, and canceled checks.

Common Types of Nongenuine Signatures

- Traced signatures are prepared by using a genuine signature as a template or pattern.
- Simulated signatures are prepared by copying or drawing a genuine signature.
- Freehand signatures are written in the forger's normal handwriting with no attempt to copy another's writing style.

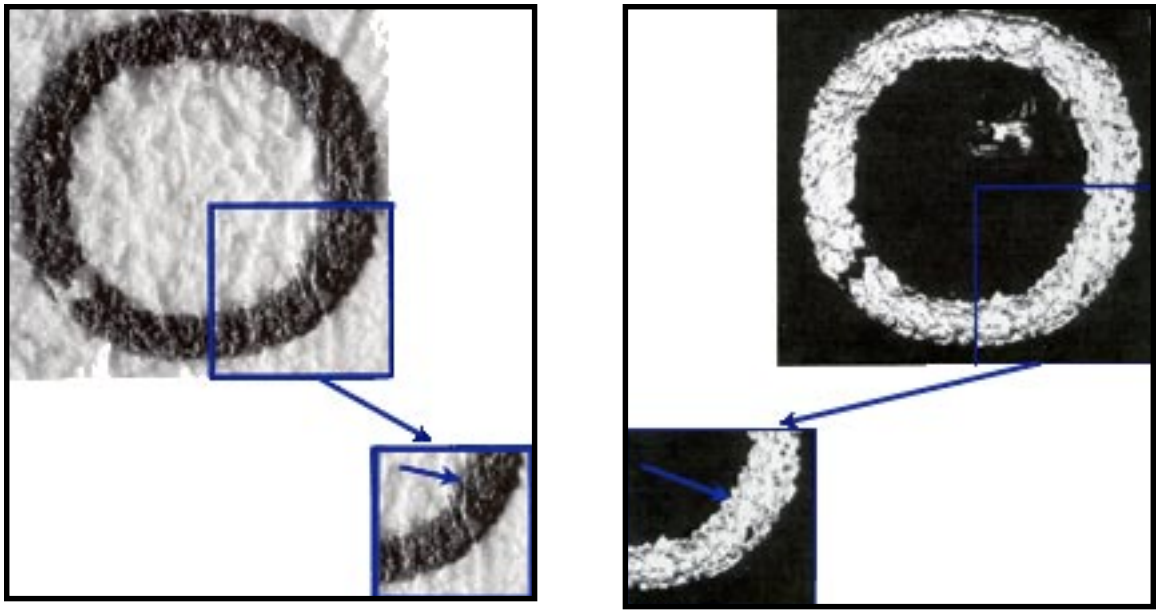
Typewriting

Questioned typewriting can occasionally be identified with the typewriter that produced it. This is most common when the typewriter is a typebar machine. The identification can sometimes be based on individual characteristics that develop during the manufacturing process and through use and abuse of the typewriter.

Typewriters with interchangeable elements (ball, printwheel, or thimble) are less likely to be associated with questioned typewriting. However, these elements and carbon film or correction ribbons can sometimes be associated with specific texts by examining individual characteristics of the elements and by correlating the text and ribbons.

Comparison of questioned typewriting with reference standards can sometimes determine a possible make and model of the typewriter and/or the typewriter elements.

Carbon film typewriter ribbons can sometimes be read for content or specific wording of questioned material. Carbon film ribbons can sometimes be identified with questioned typewritten impressions. Fabric ribbons cannot be read.



Paper is composed of numerous fibers. The randomness of the paper fibers is an identifying characteristic that makes fiber designs unique to a paper sample. The transfer of fiber designs can link a typewriter ribbon to typed text, which enables examiners to positively link a ribbon to text on a document. In the examples above, carbon was transferred (left) when the typeface struck the ribbon to the paper. A reverse transfer of the paper fiber design (right) is made on the plastic ribbon from the pressure exerted by the typeface.

Procedures for Obtaining Known Typewriting Exemplars

- If the typewriter has a carbon film ribbon, remove it from the typewriter and submit it to the Laboratory. Also submit the correction tape. Insert a new ribbon in the typewriter prior to obtaining exemplars.

- If the typewriter has a fabric ribbon, remove it from the typewriter and put the typewriter in the stencil position. Place a sheet of carbon paper over a sheet of blank paper and insert both into the typewriter. Allow the typeface to strike the carbon paper. Submit the fabric ribbon strike and the carbon paper strike exemplars to the Laboratory.

- Obtain two full word-for-word texts of the questioned text and type the entire keyboard (all symbols, numbers, and upper- and lowercase letters) two times.

- Record the make, model, and serial number of the typewriter on the exemplars. Also record the date the exemplars were obtained and the name of the person who directed the exemplars.

- Obtain the typewriter service and/or repair history.

- It is not normally necessary to send the typewriter to the Laboratory; however, in some cases, the examiner will request the typewriter. It should be packed securely to prevent damage during shipment. Typewriter elements (ball, printwheel, or thimble) should also be submitted to the Laboratory.

Photocopies

Photocopies can sometimes be identified with the machine producing them if the exemplars and questioned copies are relatively contemporaneous. The possible make and model of the photocopy machine can sometimes be determined by comparison with the reference file.

Procedures for Obtaining Known Photocopy Exemplars

- Obtain at least ten exemplars with no document on the glass plate, with the cover down.
- Obtain at least ten exemplars with no document on the glass plate, with the cover up.
- Obtain at least ten exemplars with a document on the glass plate, with the cover down.
- Record on each exemplar the date the exemplars were obtained, the name of the person who directed the exemplars, and the conditions under which the exemplars were made.
- Record the make, model, and serial number of the photocopy machine, information about the toner supplies and components, whether the paper supply is sheet or roll fed, and options such as color, reduction, enlargement, zoom, mask, trim, or editor board.
- Do not store or ship photocopies in plastic envelopes.

Graphic Arts (Printing)

Printed documents can sometimes be associated as originating from a common source or identified with known printing paraphernalia such as art work, negatives, and plates.

Altered or Obliterated Writing

The presence of alterations or obliterated writing can sometimes be determined, and the writing can sometimes be deciphered.

Paper

Torn edges can sometimes be positively matched. The manufacturer can sometimes be determined if a watermark is present. Paper can be examined for indented writing. Do not rub the indentations with a pencil. Do not add indentations by writing on top of the evidence.

Burned or Charred Paper

Information on burned or charred documents can sometimes be deciphered. The document should be minimally handled. The document should be shipped in the container in which it was burned, in polyester film encapsulation, or between layers of cotton in a rigid container.

Age of a Document

The earliest date a document could have been prepared can sometimes be determined by examining watermarks, indented writing, printing, and typewriting.

Carbon Paper or Carbon Film Ribbon

Examination of used carbon paper or carbon film ribbon can sometimes disclose the content of the text.

Checkwriters

A checkwriter impression can sometimes be identified with the checkwriter that produced it. Examination of a checkwriter impression can sometimes determine the brand of the checkwriter.

Embossings and Seals

An embossed or seal impression can sometimes be identified with the instrument that produced it.

Rubber Stamps

A rubber stamp impression can sometimes be identified with the rubber stamp that produced it. Submit the rubber stamp to the Laboratory uncleaned.

Submitting Questioned Documents Evidence

Questions concerning documentary evidence should be directed to **202-324-4454**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Documentary evidence should be preserved in the condition in which it was found. It should not be folded, torn, marked, soiled, stamped, written on, or handled unnecessarily. Protect the evidence from inadvertent indented writing. Mark documents unobtrusively by writing the collector's initials, date, and other information with a pencil.

- Whenever possible, submit the original evidence to the Laboratory. The lack of detail in photocopies makes examinations difficult. Copies are sufficient for reference file searches.

- Flash paper is a hazardous material. Do not store flash paper near combustible materials. Seal flash paper in polyethylene envelopes and refrigerate. Questions concerning flash paper should be directed to **202-324-4454**.

- Do not store or ship photocopies in plastic envelopes.

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Racketeering Records Examinations

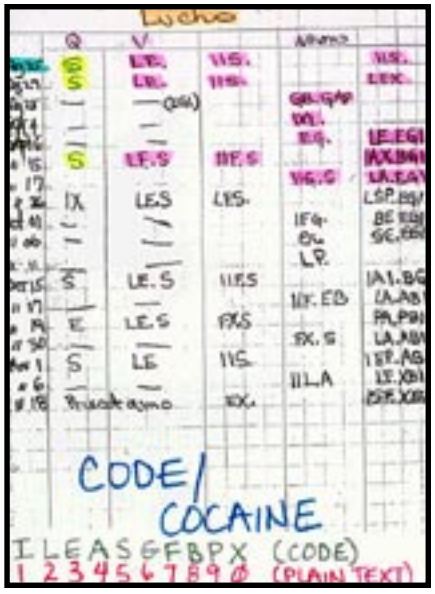
Use the following links for guidelines for specific racketeering records examinations:

Cryptanalysis

Cryptanalysis examinations involve the analysis of encrypted clandestine drug and racketeering documents.

Drug Records

Drug records are examined to determine the overall scope of the businesses, including the hierarchy, type of drugs distributed, gross sales, gross or net weights or quantities, price structures, and other pertinent information.



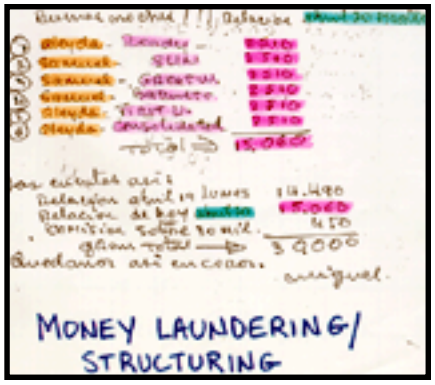
Cocaine sales records.

Gambling

Gambling examinations include the interpretation of records from sports and horse bookmaking businesses, numbers or lottery operations, and other gambling businesses.

Loansharking

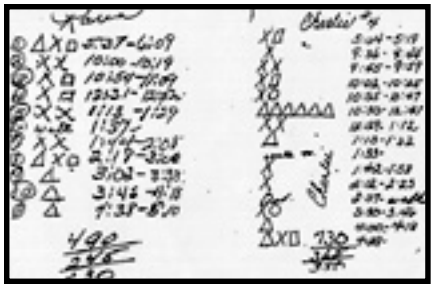
Loansharking records are examined to determine the amounts of the loans, amounts paid in interest and principal, number of loans, and interest rates.



Money laundering records.

Money Laundering

Money laundering records are examined to determine the scope of the operations, the amounts laundered, how the funds were laundered, and any other illegal activities.



Prostitution records.

Prostitution

Prostitution records are examined to determine the scope of the businesses, including the number of employees, their roles, gross and net revenues, and other financial and organizational information.

Racketeering

Racketeering records are examined to determine the roles of the suspect(s); their salaries, commissions, or shares of the operation's profit; the dates and amounts of wagers, loans, and percentage rates; and income from video gambling operations.

Submitting Racketeering Records Evidence

Questions concerning racketeering records evidence should be directed to **202-324-2500**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

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

handled unnecessarily. Documents should be marked unobtrusively by placing the collector's initials, date, and other information with a pencil.

- Flash paper is a hazardous material. Do not store flash paper near combustible materials. Seal flash paper in polyethylene envelopes and refrigerate. Questions concerning flash paper should be directed to **202-324-4454**.

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Ropes and Cords Examinations

A piece of rope or cord can be compared with a questioned rope or cord. The composition, construction, color, and diameter can be determined. If a tracer is present, the manufacturer can be determined.

Submitting Ropes and Cords Evidence

Questions concerning ropes and cords evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Submit the entire rope or cord. If the rope or cord must be cut, specify which end was cut during evidence collection.
- Label the known and questioned samples.
- Handle the sections of rope or cord carefully to prevent loss of trace material or contamination.
- Submit in heat-sealed or resealable plastic or paper bags.

Safe Insulation Examinations

Safe insulation can be compared to a known source. Examinations of safe insulation can sometimes determine the manufacturer.

Submitting Safe Insulation Evidence

Questions concerning safe insulation evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

Safe insulation exposed by peeling a safe door.

- Collect safe insulation samples from damaged areas.
- Safe insulation can adhere to persons, clothing, tools, bags, and loot and can transfer to vehicles. If possible, submit the evidence to the Laboratory for examiners to remove the debris. Package each item of evidence in separate paper bags. Do not process tools for latent prints.
- Submit known and questioned debris in leakproof containers such as film canisters or plastic pill bottles. Avoid using paper or glass containers. Pack to keep lumps intact.

Serial Number Examinations

Obliterated serial or identification numbers are often restorable, including markings on metal, wood, plastic, and fiberglass.

Casting Stamped Numbers

- Make a cast before number restoration. Use an acrylic surface replica cast kit. Different formulas are used in different temperatures. If possible, move the evidence to a warm area.
- Casts will duplicate foreign material in the stamped characters. Clean the area before proceeding. Remove paint and dirt with a solvent such as acetone, gasoline, or paint remover. Use a soft brush. Do not use a wire brush. Use Naval Jelly™ to remove rust.
- Build a dam around the stamped characters to retain the acrylic liquid while it hardens. The dam material should be soft and pliable such as modeling clay. Ensure there are no voids in the dam.
- Following instructions in the kit, mix the liquid and powder for one minute and pour it into the dam.
- The acrylic liquid will take thirty minutes to harden. Remove the cast when it is hard. If paint and rust are on the cast, make additional casts and submit the cleanest cast to the Laboratory.

Preparation for casting stamped numbers.

Submitting Serial Number Evidence

Questions concerning serial number evidence should be directed to **202-324-4374**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- If possible, remove the piece of frame rail containing the serial number, indicate where on the vehicle the cut was taken, and submit it to the Laboratory.

- Indicate where on the vehicle the cast was taken. Pack the cast to prevent breakage.

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Shoeprint and Tire Tread Examinations

Shoeprint or tire tread impressions are routinely left at crime scenes. These impressions are retained on surfaces in two-dimensional and three-dimensional forms. Almost all impressions, including partial impressions, have value for forensic comparisons. The examination of detailed shoeprint and tire tread impressions often results in the positive identification of the suspect(s)' shoe(s) or tire(s) from the suspect(s)' vehicle(s).

Use the following links for guidelines for collecting and submitting shoeprint and tire tread evidence:

Photographing Shoeprint and Tire Tread Impressions

General crime scene photographs should be taken to relate the impressions to the crime scene. Examination-quality photographs should then be taken to obtain maximum detail for forensic examination. All impressions should be photographed using both methods.

General Crime Scene Photographs

General crime scene photographs of shoeprint or tire tread impressions should include close-range and long-range photographs. ISO 400 color film should be used. The photographs should show the relationship of the impressions to the surrounding area. General crime scene photographs are not suitable for footwear or tire examinations.

Examination-Quality Photographs

Examination-quality photographs should be taken directly over the impressions using a tripod and lighting. A scale should be in every photograph. The purpose of these photographs is to produce a detailed negative that can be enlarged to natural size. These photographs should be taken as follows:

1. Place a linear scale such as a ruler next to and on the same plane as the impression. Place a label in the picture to correlate the impression with crime scene notes and general photographs.

2. Images should be taken using a 35-mm or medium-format film camera. Low cost digital cameras do not provide sufficient image detail for examination-quality photographs. Use a manual focus camera and black-and-white film with an ISO 400 or less.

3. Place the camera on a tripod and position it directly over the impression. Adjust the height of the camera or adjust the zoom lens so the frame is filled with the impression and scale. Position the camera so the film plane is parallel to the impression.

4. Set the f-stop on f/16 or f/22 for a greater depth of field.

5. Attach an electronic flash with a long extension cord to the camera.

6. Block out bright ambient light with a sunscreen to maximize the light from the flash.

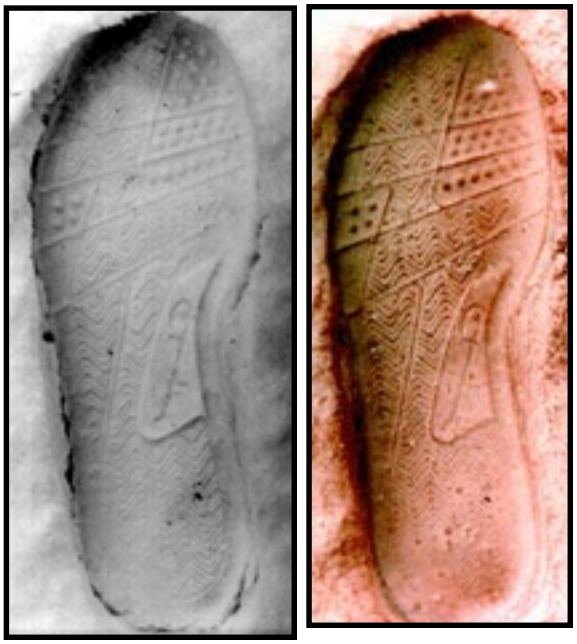
7. Focus on the bottom of the impression, not on the scale. Take an existing or reflected light photograph.

8. Position the flash at a very low angle (10 to 15 degrees) to the impression. This will enhance the detail of the impression. For consistent exposure, hold the flash at least five to seven feet from the impression. Shoot several exposures, bracketing toward overexposure to obtain maximum image detail.

9. Take the exposures, move the light to another position, adjust the sun screen, and repeat Steps 7 and 8.

Photographing Impressions in Snow

Impressions in snow are difficult to photograph because of lack of contrast. To increase the contrast, snow impressions can be lightly sprayed with Snow Print Wax™, a material used for casting snow impressions, or with other colored spray paint. The spray can should be held at least two to three feet from the impression so the force of the aerosol does not damage the impression. A light application of spray should be directed at an angle of about 30 to 45 degrees so the colored paint only strikes the high points of the impression. Highlighted impressions will absorb heat from the sun and should be shielded until photographed and cast to prevent melting.



Shoe impressions in snow: Shoeprint examiners have difficulty analyzing low-contrast photographs such as the one on the left. The shoeprint on the right has been sprayed with colored paint to increase contrast, which produces a more detailed photograph.

Recovering the Original Evidence

Submit the evidence bearing the original impression to the Laboratory, if possible. If the evidence cannot be submitted to the Laboratory, use the following techniques to recover the evidence.

Casting Three-Dimensional Impressions

Casting a three-dimensional impression in soil, sand, or snow is necessary to capture detail for examination. Dental stone, with a compressive strength of 8,000 psi or greater, should be used for casting all impressions. The compressive strength is listed on the container along with the proper ratio of powder to water used for mixing. Dental stone is available through local dental supply houses. Colored dental stone is preferred.

Shoeprint cast in dental stone.

Plaster of paris, modeling plasters, and dental plasters are not sufficiently hard, do not resist abrasion when cleaned, and should not be used.

Mixing Dental Stone in a Bag

Store dental stone in resealable plastic bags. An eight-by-twelve-inch resealable plastic bag can store two pounds of dental stone powder. With premeasured bags, casting impressions at the crime scene involves only adding water. The bag containing the dental stone powder can be used to mix and pour the dental stone.

To make a cast, add the appropriate amount of water to the bag and close the top. Mix the casting material by vigorously massaging it for three to five minutes through the bag. Ensure that the material in the corners of the bag is also mixed. After mixing, the material should have the consistency of pancake batter.

Mixing Dental Stone in a Bucket or Bowl

If the impressions are numerous or large, it may be necessary to mix larger quantities of dental stone in a bucket or bowl. The dental stone should be slowly added to the water and continuously stirred for three to five minutes. After mixing, the material should have the consistency of pancake batter.

Pouring Dental Stone

Casting material has sufficient weight and volume to erode and destroy detail if it is poured directly on top of the impression. The casting material should be poured on the ground next to the impression, allowing it to flow into the impression. The impression should be filled with casting material until it has overflowed.

If the mixture is too viscous to flow into the impression, vibrate a finger or a small stick on the surface to cause the dental stone to flow into the impression. Do not put the stick or finger more than 1/4 inch below the surface of the casting material because it can damage the impression.

Before the cast completely hardens, write the date, the collector's initials, and other identifying information onto it. The cast should be left undisturbed for at least twenty to thirty minutes in warm weather. In cold weather, the cast should be left undisturbed longer. Casts have been destroyed or damaged when lifted too soon. If the cast is in sand or loose soil, it should lift easily. Casts in mud or clay may require careful treatment and excavation when being removed.

Allow the cast to air dry for at least forty-eight hours. Package the cast in paper, not in plastic. An examiner should clean the cast.

Lifting Two-Dimensional Impressions

Lifting an impression allows for the transfer of a two-dimensional residue or dust impression to a lifting film. It also allows the impression to be transported to the Laboratory for photography and examination.

Electrostatic Lifts

An electrostatic lifting device lifts footwear impressions from porous and nonporous surfaces without damaging the impressions. This device works on dry dust or residue impressions on clean surfaces but will not work if the impressions were wet or become wet. Electrostatic lifting devices have instructions regarding usage.

Shoeprint collected using an electrostatic lifting device.

Storage of Electrostatic Lifting Film

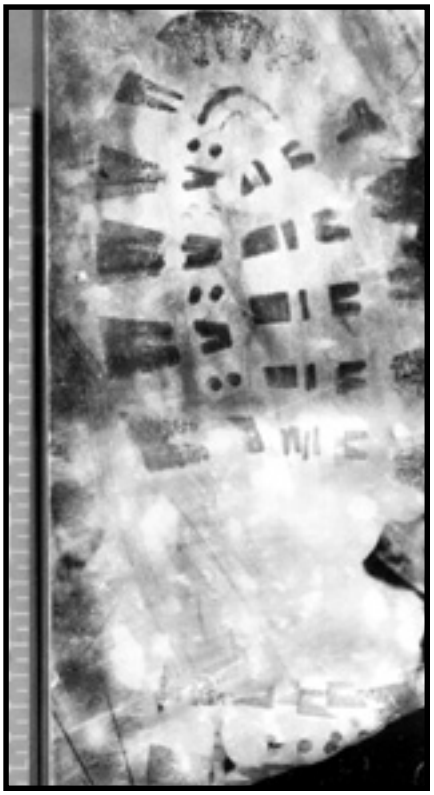
Lifted impressions are easily damaged if the film is not properly stored. The film has a residual charge that attracts dust and debris and causes the film to cling to another surface. To preserve and store the lifting film containing an impression, tape one edge of the film securely in a clean, smooth, quality paper folder or tape the edges securely in a shallow, photographic paper box. Low-grade cardboard boxes such as pizza boxes should not be used because the residual charge on the film will pull dust from the boxes and contaminate the impression.

Items that contain a dry residue footwear impression should not be wrapped or stored in plastic because a partial transfer of the impression to the plastic will occur.

Gelatin and Adhesive Lifts

Gelatin lifters can be used to lift impressions from porous and nonporous 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 a white background.

Adhesive lifters can only be used to lift impressions from smooth porous and nonporous surfaces. White adhesive lifters can be used to lift impressions developed with fingerprint powders. Transparent adhesive lifters can be used to lift impressions developed with fluorescent powders. Transparent tapes such as two-inch fingerprint lifting tape can also be used to lift powdered impressions if they are transferred to a white card.



Shoeprint collected using a gelatin lifter.

Lifting Materials

Lift or Technique	Nonporous Dry	Nonporous Wet	Porous Dry	Porous Wet	Comments
Electrostatic	Yes	No	Yes	No	Nondestructive Useful for searching for latent impressions
White Adhesive	Yes	Yes	No	No	Also used with chemical enhancement methods and dark fingerprint powder
Transparent Adhesive	Only with fluorescent powder	Only with fluorescent powder	No	No	Do not use on an original impression
White Gelatin	Yes, if it contrasts with an impression	Yes, if it contrasts with an impression	Yes, if it contrasts with an impression	Yes, if it contrasts with an impression	Also used with some chemical methods and with fluorescent powder
Black Gelatin	Yes	Yes	Yes	Yes	Offers good contrast with most residue

Shoeprint and Tire Tread Files

A file of shoe manufacturers' designs and a file of tire treads and other reference material can be searched to determine brand names and manufacturers.

Submitting Shoeprint and Tire Tread Evidence

Questions concerning shoeprint and tire tread evidence should be directed to **202-324-4492**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- For shoeprint and tire tread comparisons, submit original evidence whenever possible (shoes, tires, photographic negatives, casts, lifts).
- For shoeprint and tire tread file searches, submit quality photographs of the impressions. If photographs are not available, submit casts, lifts, or the original evidence. Detailed sketches or photocopies are acceptable.
- Unobtrusively write the collector's initials, dates, and other relevant information on the evidence.
- Air dry and package evidence separately in bubble wrap; clean, smooth quality paper or laminated folders; or paper bags.

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Soil Examinations

Soil is the natural accumulation of weathering rocks, minerals, and decomposing plants. Soil may contain manmade materials such as brick, roof shingle stones, concrete, glass, and paint.

Soil development is influenced by geologic parent material, relief, climate, biological activity, man, and time. Soil examinations can determine whether soils share a common origin by comparing color, texture, and composition.

Layers of soil exposed at a grave site. Each layer must be sampled.

Submitting Soil Evidence

Questions concerning soil evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Collect soil samples as soon as possible because the soil at the crime scene can change dramatically.
- Collect soil samples from the immediate crime scene area and from the logical access and/or escape route(s).
- Collect soil samples where there are noticeable changes in color, texture, and composition.
- Collect soil samples at a depth that is consistent with the depth from which the questioned soil may have originated.
- If possible, collect soil samples from alibi areas such as the yard or work area of the suspect(s).

- Submit a map identifying soil sample locations.
- Do not remove soil adhering to shoes, clothing, and tools. Do not process tools for latent prints. Air dry the soil and the clothing and package separately in paper bags.
- Carefully remove soil adhering to vehicles. Air dry the soil and package separately in paper bags.
- Submit known and questioned soil in separate leakproof containers such as film canisters or plastic pill bottles. Avoid using paper envelopes or glass containers. Pack to keep lumps intact.

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Toolmark Examinations

Toolmarks

Tools can bear unique microscopic characteristics because of manufacturing processes and use. These characteristics can be transferred to surfaces that contact the tools. Evidence toolmarks can be compared to recovered tools. In the absence of a questioned tool, toolmark examinations can determine the type of tool(s) that produced the toolmark and whether the toolmark is of value for comparison.

Microscopic toolmark comparison.

Fractures

Fracture examinations can determine whether evidence was joined together and subsequently broken apart.

Submitting Toolmark Evidence

Questions concerning toolmark evidence should be directed to **202-324-4378**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- If possible, submit the toolmarked evidence. The Laboratory will make a cast of the toolmark, if needed.
- If it is not possible to submit the toolmarked evidence, submit a cast of the toolmark. For details about producing casts, see the **Casting Three-Dimensional Impressions** section of **Shoeprint and Tire Tread Examinations**.
- Photographs locate toolmarks but are of no value for identification purposes.

- Obtain samples of any material deposited on the tools.
- To avoid contamination, do not place the tool against the toolmarked evidence.
- Submit the tool rather than making test cuts or impressions.
- Mark the ends of the evidence and specify which end was cut during evidence collection.

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Toxicology Examinations

Toxicology examinations can disclose the presence of drugs or poisons in biological specimens. The examinations can determine the circumstances surrounding drug- or poison-related homicides, suicides, or accidents.

Because of the large number of potentially toxic substances, it may be necessary to screen for classes of poisons. Examples are as follows:

- Volatile compounds (ethanol, methanol, isopropanol)
- Heavy metals (arsenic)
- Nonvolatile organic compounds (drugs of abuse, pharmaceuticals)
- Miscellaneous (strychnine, cyanide)

Chemist analyzes blood for drugs and poisons.

Submitting Toxicology Evidence

Questions concerning toxicology evidence should be directed to **202-324-4318**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- The quantity of biological specimens submitted depends on whether the identity of a toxic substance is known, the route of administration, the time after exposure that biological specimens are collected, and whether subjects(s) or victim(s) are living or deceased.
- Each biological specimen must be placed in separate, labeled, sealed glass tubes, plastic cups, or heat-sealed or resealable plastic bags. Affix **BIOHAZARD** labels to the inside and outside containers. To view hazardous materials labels, click here.

- To avoid deterioration, biological specimens must be refrigerated or frozen during storage and shipping. Pack so that no breakage, leakage, or contamination occurs.
- Submit a copy of the autopsy or incident report.
- Describe the symptoms of the suspect(s) or victim(s) at the time of the crime or prior to the death.
- List any known or questioned drugs consumed by or prescribed for the suspect(s) or victim(s).
- Describe any known or questioned environmental exposure to toxic substances by the suspect(s) or victim(s).

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Video Examinations

Authenticity

Authenticity examinations are conducted to determine whether analog video recordings are original, continuous, and unaltered.

Enhancement

Video processors and time-base correctors can be used to maximize the clarity of videotapes.

Video Image Processing

Enhanced prints can be produced from images depicted on videotapes.

Standards Conversion

Videotapes can be converted from one standard to another such as from PAL to NTSC or SECAM.

Format Conversion

Videotapes can be converted from one format to another such as from Beta to VHS.

Video formats.

Synchronization

Audio and video signals can be combined to produce one composite recording.

Special Effects

Special effects such as a mosaic can be added to videotapes to protect a person's identity.

Damaged Media Repair

Videotapes can be repaired, restored, or retrieved for playback and examination if damage is not too extensive.

Submitting Video Evidence

Questions concerning evidence should be directed to **703-632-6191** or **703-632-6222**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Submit original video recordings.
- Identify the location(s) of the image(s) on the video recordings and describe the image(s).
- Label the outer container **FRAGILE, SENSITIVE ELECTRONIC EQUIPMENT** or **FRAGILE, SENSITIVE AUDIO/VIDEO MEDIA** and **KEEP AWAY FROM MAGNETS OR MAGNETIC FIELDS**.
- Address the outer container as follows:

  FEDERAL BUREAU OF INVESTIGATION
  ENGINEERING RESEARCH FACILITY
  ATTENTION: FORENSIC PROGRAM
  BUILDING 27958A
  QUANTICO VA 22135

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Wood Examinations

Wood examinations can match sides, ends, and fractures; can determine wood species; and can compare wood particles found on clothing, vehicles, and other objects with wood from the crime scene.

Submitting Wood Evidence

Questions concerning wood evidence should be directed to **202-324-4344**. Follow the **Evidence Submission** directions including **Requesting Evidence Examinations** and **Packaging and Shipping Evidence**.

- Submit wood in heat-sealed or resealable plastic or paper bags.

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Crime Scene Safety

Use the following links for guidelines for crime scene safety:

Personnel have the ultimate responsibility to recognize chemical, biological, and physical hazards while processing a crime scene. However, it is the responsibility of the organization to develop policies and programs on health and safety practices and to provide training on the application of these principles.

This section will provide a familiarity of the hazards, safety precautions, safe work practices, and personal protective equipment (PPE) recommended for personnel processing routine crime scenes. Always consult local, state, and federal environmental and occupational health and safety laws when collecting and transporting forensic evidence.

Routes of Exposure

Among the inherent risks associated with crime scene investigations and evidence collection is exposure to potentially infectious human blood and body fluids, chemicals, and physical hazards such as hypodermic needles, broken glass, and other sharp objects. This section provides a brief discussion of the different routes of exposure by which a contaminant enters the body resulting in an injury or illness.[1]

Inhalation

Airborne contaminants at a crime scene can be in the form of a dust, aerosol, smoke, vapor, gas, or fume. Depending on the contaminant, immediate respiratory irritation or destruction might ensue upon inhalation. Some airborne contaminants can enter the bloodstream via the lungs when inhaled. Once in the bloodstream, the contaminant can circulate throughout the body and cause chronic damage to the liver, kidneys, central nervous system, heart, and blood-forming organs. Proper work practices along with adequate ventilation can minimize airborne contaminant inhalation. In extreme cases, respiratory protection is required.

Skin Contact

Skin contact is a frequent route of entry into the body that can result in localized or systemic health effects. Localized effects can result in irritation or damage to the tissues at the point of contact. These effects can include irritation, redness, swelling, or burning. The severity of the injury will depend on the concentration of the substance and the duration of contact. Systemic effects, such as dizziness, tremors, nausea, blurred vision, liver and kidney damage, shock, or collapse, can occur once the substances are absorbed through the skin and circulated throughout the body. Exposure can be prevented by the use of appropriate gloves, safety glasses, goggles, face shields, and protective clothing.

Ingestion

Ingestion is a less common route of exposure. Ingestion of a corrosive material can cause damage to the mouth, throat, and digestive tract. When swallowed, toxic chemicals can be absorbed by the body through the stomach and intestines. To prevent entry of chemicals or biological contaminants into the mouth, wash hands before eating, smoking, or applying cosmetics. Also, do not bring food, drink, or cigarettes into areas where contamination can occur.

Injection

Needle sticks and mechanical injuries from contaminated glass, metal, or other sharp objects can inject contaminants directly into the bloodstream. Extreme caution should be exercised when handling objects with sharp or jagged edges.

Safety

Bloodborne Pathogen Safety

On December 6, 1991, the Occupational Safety and Health Administration (OSHA) issued Title 29, part 1910.1030 of the Code of Federal Regulations (CFR)—*Occupational Exposure to Bloodborne Pathogens (BBP)*.[2] Those occupations at risk for exposure to bloodborne pathogens include law enforcement, emergency response, and forensic laboratory personnel.

Fundamental to the BBP standard is the concept of Universal Precautions. This concept is the primary mechanism for infection control. It requires employees to treat all human blood, body fluids, or other potentially infectious materials as if infected with bloodborne diseases such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). The following protective measures should be taken to avoid direct contact with these potentially infectious materials:

- Use barrier protection such as disposable gloves, coveralls, and shoe covers when handling potentially infectious materials. Gloves should be worn, especially if there are cuts, scratches, or other breaks in the skin. Change gloves when torn, punctured, or when their ability to function as a barrier is compromised.

- Wear appropriate eye and face protection to protect against splashes, sprays, and spatters of infectious materials. Similar precautions should be followed when collecting dried bloodstains.

- Place contaminated sharps in appropriate closable, leakproof, puncture-resistant containers when transported or discarded. Label the containers with a **BIOHAZARD** warning label. To view other hazardous materials labels, click here. Do not bend, recap, remove, or otherwise handle contaminated needles or other sharps.

- Prohibit eating, drinking, smoking, or applying cosmetics where human blood, body fluids, or other potentially infectious materials are present.

- Wash hands after removing gloves or other PPE. Remove gloves and other PPE in a manner that will not result in the contamination of unprotected skin or clothing.

- Decontaminate equipment after use with a solution of household bleach diluted 1:10, 70 percent isopropyl alcohol, or other disinfectant. Noncorrosive disinfectants are commercially available. Allow sufficient contact time to complete disinfection.

In addition to Universal Precautions, engineering controls and prudent work practices serve to reduce or eliminate exposure to potentially infectious materials. Engineering controls can reduce potential hazards by isolating or removing the hazard from the work environment. Some examples of engineering controls include puncture-resistant containers used for storage and disposal of sharps and paint stirrers and long-handled mirrors for use in locating and retrieving evidence in confined or hidden spaces.

Chemical Safety

Depending on the type of material encountered, a variety of health and safety hazards can exist. Some of those hazards are identified by the following categories.[1,3]

- Flammable or combustible materials, such as gasoline, acetone, and ether, ignite easily when exposed to air and an ignition source, such as a spark or flame.

- Over time, some explosive materials, such as nitroglycerine and nitroglycerine-based dynamite, deteriorate to become chemically unstable. In particular, ether will form peroxides around the mouth of the vessel in which it is stored. All explosive materials are sensitive to heat, shock, and friction, which are employed to initiate explosives.

- Pyrophoric materials, such as phosphorus, sodium, and barium, can be liquid or solid and can ignite in air temperatures less than 130 degrees Fahrenheit (540 degrees Celsius) without an external ignition source.

- Oxidizers, such as nitrates, hydrogen peroxide, and concentrated sulfuric acid, are a class of chemical compounds that readily yield oxygen to

promote combustion. Avoid storage with flammable and combustible materials or substances that could rapidly accelerate its decomposition.

- Corrosive materials can cause destruction to living tissue or objects such as wood and steel. The amount of damage is dependent upon the concentration and duration of contact.

Remember, when working with chemicals, be aware of hazardous properties, disposal techniques, personal protection, packaging and shipping procedures, and emergency preparedness. This awareness comes from the information contained in a Material Safety Data Sheet (MSDS) and appropriate training. The MSDS provides information on the hazards of a particular material, so that personnel can work safely and responsibly with hazardous materials.

Light Source Safety

When using ultraviolet (UV) lights, lasers, and other light sources,[4] the eyes must be protected from direct and indirect exposure. Prolonged exposure to the skin should also be avoided. Protective eyewear appropriate for the light source in use should be worn by all personnel in the vicinity of the light source.

Goggles must have sufficient protective material and fit snugly to prevent light from entering at any angle and be clearly labeled with the optical density and wavelength. Not all laser beams are visible, and irreversible eye damage can result from exposure to direct or indirect light from reflected beams. Laser protective eyewear must be approved by the American National Standards Institute (ANSI), and the optical density must be great enough to offer protection against the maximum operating wavelength of the laser source.

Confined Space Safety

A confined space is an enclosed area large enough for personnel to enter and work. It has limited or restricted means for entry or exit and is not designed for continuous occupancy (for example, open pits, tank cars, and vats). Confined spaces can expose personnel to hazards including toxic gases, explosive or oxygen-deficient atmospheres, electrical dangers, or materials that can engulf personnel entering.[5] Conditions in a confined space must be considered dangerous and must not be entered unless tested with a calibrated direct-reading instrument for oxygen content, flammable gases and vapors, and potentially toxic air contaminants.

Remember the following practices when working in a confined space:

- Never enter before all atmospheric, engulfment, and mechanical hazards have been identified, and procedures have been developed to abate those hazards.
- Always remove all unwanted energy sources or hazardous substances.
- Always provide forced-air ventilation. Ensure ventilation equipment does not interfere with entry, exit, and rescue procedures.
- Never introduce hazards such as welding or cleaning solvents without first making provisions for these hazards.
- Continuously monitor for oxygen, combustibles, and toxins even after initial testing confirms a safe atmosphere for entry. Remember, conditions can change at any time.
- Always provide barriers to warn unauthorized personnel and to keep entrants safe from external hazards.
- Always provide constant communication between the personnel entering the crime scene and outside personnel. Have back-up communication if using two-way radios.
- Always wear appropriate PPE, be familiar with the use and limitations of that equipment, and ensure its proper maintenance.
- Always use the buddy system when entering a confined space.
- Never attempt a rescue unless you are part of a designated rescue team and have the proper knowledge, training, skills, and equipment to perform a safe rescue.
- Use of safety belts and harnesses is mandatory.

For additional information, refer to the OSHA standard for *Permit-Required Confined Spaces*, 29 CFR 1910.146.[6]

Personal Protective Equipment

Hand Protection

Hand protection should be selected on the basis of the type of material being handled and the hazard or hazards associated with the material.[7,8] Detailed information can be obtained from the manufacturer. The following is general information about glove material types and their functions:

- *Nitrile* provides protection from acids, alkaline solutions, hydraulic fluid, photographic solutions, fuels, lubricants, aromatics, petroleum, and chlorinated solvents. It also offers some resistance to cuts and snags.
- *Neoprene* offers resistance to oil, grease, acids, solvents, alkalies, bases, and most refrigerants.
- *Polyvinyl chloride* (PVC) is resistant to alkalies, oils, and limited concentrations of nitric and chromic acids.
- *Latex* (natural rubber) resists mild acids, caustics, detergents, germicides, and ketonic solutions. Latex will swell and degrade if exposed to gasoline or kerosene. When exposed to prolonged, excessive heat or direct sunlight, latex gloves can start to degrade, causing the glove materials to lose their integrity.
- *Powder-free gloves* with reduced protein content will lower the risk of developing latex allergies. Personnel allergic to latex can usually wear nitrile or neoprene.

Guidelines for glove use:

- Prior to donning, inspect the gloves for holes, punctures, and tears. Remove rings or other sharp objects that can cause punctures.
- When working with heavily contaminated materials, it is prudent to wear a double layer of gloves.
- Change gloves when torn or punctured or when their ability to function as a barrier is compromised.

- To avoid contamination of unprotected skin or clothing, remove disposable gloves by grasping the cuffs and pulling them off inside out. Discard disposable gloves in designated containers. Do not reuse.

Eye Protection

Appropriate eye protection, such as safety glasses and goggles, should be worn when handling biological, chemical, and radioactive materials.[1,9] Face shields offer better protection to the face when there is a potential for splashing or flying debris. Face shields must be worn in combination with safety glasses or goggles because face shields alone are not considered appropriate eye protection.

Contact lens users should wear safety glasses or goggles to protect the eyes. In the event of a chemical splash into the eye, it can be difficult to remove the contact lens to irrigate the eye.

For personnel who wear prescription glasses, protective eyewear is available and should be worn over prescription glasses.

Foot Protection

Shoes that completely cover and protect the foot are essential.[7,10] Protective footwear should be used at crime scenes when there is a danger of foot injuries due to falling or rolling objects or to objects piercing the sole and when feet are exposed to electrical hazards. The standard recognized by OSHA for protective footwear is the American National Standard for Personal Protection—*Protective Footwear*, ANSI Z41-1991. In some situations, nonpermeable shoe covers can provide barrier protection to shoes and prevent contamination outside of the crime scene.

Respiratory Protection

Certain crime scenes, such as bombings and clandestine laboratories, can produce noxious fumes and other airborne contaminants that require respiratory protection.[1,7,11]

At a minimum, compliance with Title 29 CFR 1910.134[12] is mandatory whenever respirators are used by personnel. Critical elements for the safe use of respirators include a written program, training, medical evaluation, fit testing, and a respirator maintenance program. Without these elements, the wearer does not receive the degree of protection anticipated.

Head Protection

In certain crime scenes, such as bombings where structural damage can occur, protective helmets should be worn. The standard recognized by OSHA for protective helmets is ANSI's *Requirements for Industrial Head Protection*, Z89.1-1997.

Hazardous Materials Transportation

Title 49 of the Code of Federal Regulations codifies specific requirements that must be observed in preparing hazardous materials for shipment by air, highway, rail, or water. More specifically, the International Air Transport Association, in cooperation with the International Civil Aviation Organization, publishes the Dangerous Goods Regulations annually. All air transporters follow these regulations, which describe how to package and prepare hazardous materials for air shipment.

Title 49 CFR 172.101, provides a Hazardous Materials Table, which identifies items considered hazardous for the purpose of transportation, special provisions, hazardous materials communications, emergency response information, and training requirements. Training is required to properly package and ship hazardous materials employing any form of commercial transportation.

References

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7. *Laboratory Survival Manual*. Environmental Health and Safety Office, University of Virginia, Charlottesville, Virginia. Available: www.keats.admin.virginia.edu/lsm/home.html

8. Choose the Proper Gloves for Chemical Handling, *Best's Safety Directory 1990* (30th ed.). Pioneer Industrial Products, Willard, Ohio, 1990. Available: www.ambest.com/safety/about/index.html

9. *American National Standard Practice for Occupational and Educational Eye and Face Protection* (ANSI Z87.1-1989). American National Standards Institute, New York, New York, 1989.

10. *Title 29 CFR Section 1910.136, Foot Protection*. U.S. Department of Labor, Occupational Safety and Health Administration, Washington, DC, 1991.

11. *Hazardous Waste Handling Pocket Guide*. Ed., C. Gorman. Genium, Schenectady, New York, 1991.

12. *Title 29 CFR Section 1910.134, Respiratory Protection*. U.S. Department of Labor, Occupational Safety and Health Administration, Washington, DC, 1991.

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Crime Scene Search

A crime scene search is a planned, coordinated, and legal search by law enforcement officials to locate physical evidence.

Use the following links for guidelines for conducting a crime scene search:

Basic Premises

- The best search options are typically the most difficult and time-consuming.
- Physical evidence cannot be overdocumented.
- There is only one chance to search the scene properly.
- There are two search approaches:

- Conduct a cautious search of visible areas, avoiding evidence loss or contamination; and
- After the cautious search, conduct a vigorous search of concealed areas.

Preparation

- Obtain a search warrant, if necessary.
- Discuss the search with involved personnel before arrival at the scene, if possible.
- Establish a command headquarters for communication and decision making in major or complicated crime scene searches.
- Ensure that personnel are aware of the types of evidence usually encountered and the proper handling of the evidence.
- Make preliminary personnel assignments before arrival at the scene, if possible.
- Ensure that assignments are in keeping with the attitude, aptitude, training, and experience of personnel. Personnel may be assigned two or more responsibilities.
  - Person In Charge
    - scene security
    - administrative log
    - preliminary survey
    - narrative description
    - problem resolution
    - final decision making

- Photographer
  - photography and log
- Sketch Preparer
  - sketch and log
- Evidence Recorder
  - evidence custodian and log

- Establish communication between medical examiners, laboratory personnel, and prosecutive attorneys so that questions during the crime scene search can be resolved.
- Coordinate agreements with all agencies in multijurisdictional crime scene searches.
- Accumulate evidence collection and packaging materials and equipment.
- Prepare the paperwork to document the search.
- Provide protective clothing, communication, lighting, shelter, transportation, equipment, food, water, medical assistance, and security for personnel.
- In prolonged searches, use shifts of two or more teams. Transfer paperwork and responsibility in a preplanned manner from one team to the next.

Approach

- Be alert for evidence.
- Take extensive notes.
- Consider the safety of all personnel.

Secure and Protect

- Take control of the scene immediately.
- Determine the extent to which the scene has been protected. Obtain information from personnel who have knowledge of the original condition.
- Designate one person in charge for final decision making and problem resolution.
- Continue to take extensive notes.
- Keep out unauthorized personnel.
- Record who enters and leaves.

Preliminary Survey

The survey is an organizational stage to plan for the search.

- Cautiously walk through the scene.
- Maintain administrative and emotional control.
- Select a narrative technique such as written, audio, or video.
- Take preliminary photographs.
- Delineate the extent of the search area. Usually expand the initial perimeter.
- Organize methods and procedures.
- Recognize special problem areas.
- Identify and protect transient physical evidence.
- Determine personnel and equipment needs. Make specific assignments.
- Develop a general theory of the crime.

- Take extensive notes to document the scene, physical and environmental conditions, and personnel movements.

Evaluate Physical Evidence Possibilities

This evaluation begins upon arrival at the scene and becomes detailed in the preliminary survey stage.

- Ensure that the collection and packaging materials and equipment are sufficient.
- Focus first on evidence that could be lost. Leave the least transient evidence last.
- Ensure all personnel consider the variety of possible evidence, not only evidence within their specialties.
- Search the easily accessible areas and progress to out-of-view locations. Look for hidden items.
- Evaluate whether evidence appears to have been moved inadvertently.
- Evaluate if the scene appears contrived.

Narrative

The narrative is a running description of the crime scene.

- Use a systematic approach in the narrative.
- Nothing is insignificant to record if it catches one's attention.
- Under most circumstances, do not collect evidence during the narrative.
- Use photographs and sketches to supplement, not substitute for, the narrative.
- The narrative should include
    - Case identifier;

- Date, time, and location;
- Weather and lighting conditions;
- Identity and assignments of personnel; and
- Condition and position of evidence.

Photography

- Photograph the crime scene as soon as possible.
- Prepare a photographic log that records all photographs and a description and location of evidence.
- Establish a progression of overall, medium, and close-up views of the crime scene.
- Photograph from eye level to represent the normal view.
- Photograph the most fragile areas of the crime scene first.
- Photograph all stages of the crime scene investigation, including discoveries.
- Photograph the condition of evidence before recovery.
- Photograph the evidence in detail and include a scale, the photographer's initials, and the date.
- When a scale is used, first take a photograph without the scale.
- Photograph the interior crime scene in an overall and overlapping series using a wide-angle lens.
- Photograph the exterior crime scene, establishing the location of the scene by a series of overall photographs including a landmark. Photographs should have 360 degrees of coverage. Consider using aerial photography.

- Photograph entrances and exits.
- Photograph important evidence twice.
    - A medium-distance photograph that shows the evidence and its position to other evidence.
    - A close-up photograph that includes a scale and fills the frame.
- Acquire prior photographs, blueprints, or maps of the scene.

Sketch

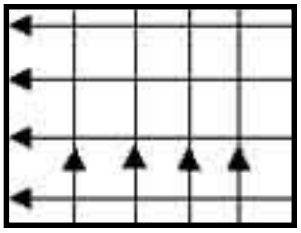
The sketch establishes a permanent record of items, conditions, and distance and size relationships.

- Sketches supplement photographs.
- Sketch number designations should coordinate with the evidence log number designations.
- Sketches are normally not drawn to scale. However, the sketch should have measurements and details for a drawn-to-scale diagram, if necessary.
- The sketch should include
    - Case identifier;
    - Date, time, and location;
    - Weather and lighting conditions;
    - Identity and assignments of personnel;
    - Dimensions of rooms, furniture, doors, and windows;
    - Distances between objects, persons, bodies, entrances, and exits;

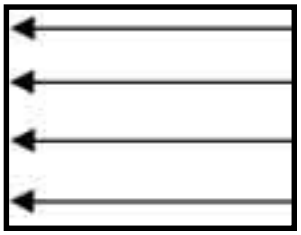
- Measurements showing the location of evidence. Each object should be located by two measurements from nonmovable items such as doors or walls; and
- Key, legend, compass orientation, scale, scale disclaimer, or a combination of these features.

Crime Scene Search, Record, and Physical Evidence Collection

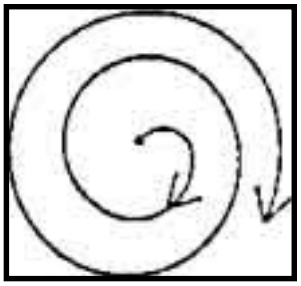
- Use a search pattern such as a grid, strip or lane, or spiral.
- Search from the general to the specific for evidence.
- Be alert for all evidence.
- Search entrances and exits.
- Photograph all items before collection and notate the photographic log.
- Mark evidence locations on the sketch.
- Complete the evidence log with notations for each item of evidence. If feasible, have one person serve as evidence custodian.
- Two persons should observe evidence in place, during recovery, and being marked for identification. If feasible, mark directly on the evidence.
- Wear gloves to avoid leaving fingerprints.
- Do not excessively handle the evidence after recovery.
- Seal all evidence packages at the crime scene.



Grid



Strip or Lane



Spiral

- Obtain known standards such as fiber samples from a known carpet.
- Make a complete evaluation of the crime scene.
- Constantly check paperwork, packaging, and other information for errors.

Final Survey

The final survey is a review of all aspects of the search.

- Discuss the search with all personnel.
- Ensure all documentation is correct and complete.
- Photograph the scene showing the final condition.
- Ensure all evidence is secured.
- Ensure all equipment is retrieved.
- Ensure hiding places or difficult access areas have not been overlooked.

Release

- Release the crime scene after the final survey.
- Crime scene release documentation should include the time and date of release, to whom released, and by whom released.
- Ensure that the evidence is collected according to legal requirements, documented, and marked for identification.
- Consider the need for specialists such as a blood-pattern analyst or a medical examiner to observe the scene before it is released.
- Once the scene has been released, reentry may require a warrant.
- The scene should be released only when all personnel are satisfied that the scene was searched correctly and completely.

- Only the person in charge should release the scene.

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