Appendixes I

Guides to the Collection of Physical Evidence—FBI

	Amount Desired		
Specimen	**Standard**	**Evidence**	**Send By**
Abrasives	Not less than one ounce.	All	Registered mail or equivalent
Ammunition (Live Cartridges)			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 ar-

		ticles must be included. The outside of the container must be labeled ORMD AIR, CARTRIDGES SMALL ARMS. The shipping papers must also include the weight in grams
Anonymous tion Letters, and Bank Robbery Notes	Documentary evidence 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	Registered mail or equivalent

	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.	
Bullets (projector without cartridge) (Live Cartridges)	All found.	Same as Ammunition
Cartridge Cases (shells only)	All	Same as Ammunition

Source: Courtesy of the Federal Bureau of Investigation, Washington, D.C.

Identification	**Wrapping and Packing**	**Remarks**
Outside container: type of material, date obtained, investigator's name or initials.	Submit abrasives in heat-sealed or resealable plastic bags or paint cans. Avoid using paper or glass containers.	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.
Same as above.	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.	Unless specific examination of the cartridge is essential, do not submit.
Initial and date each document, if advisable.	Use proper enclosure. Place in envelope and seal with "Evidence" tape or transparent cellophane tape. Flap side of envelope should show: (1) wording "Enclosure(s) to FBI from (name of submitting office)," (2)	Do not handle with bare hands. Advise if evidence should be treated for latent fingerprints. Whenever possible, submit the original evidence to the laboratory. The lack of detail in photocopies makes

	title of case, (3) brief description of contents, (4) file number, if known. Staple to original letter of transmittal.	examinations difficult. Copies are sufficient for reference file searches.
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.	Pack tightly in cotton or soft paper in pill, match, or powder box. Place in box. Label outside of box as to contents.	Unnecessary handling obliterates marks.
Same as above.	Same as above.	Spent cartridge cases.

	Amount Desired		
Specimen	**Standard**	**Evidence**	**Send By**
Casts (Dental or Die Stone Casts of Tire Treads and Shoe Prints)	Send in suspect's shoes and tires. Photographs and sample impressions are usually not suit-	All shoe prints and entire circumference of tires.	Registered mail or equivalent

	able for comparison.		
Checks (fraudulent)		See Anonymous Letter (p. 612)	Registered mail or equivalent
Check Protector, Rubber Stamp, and/or Date Stamp Known Standards (if possible, send actual device)	Obtain several copies in full word-for-word order of each questioned check-writer impression. If unable to forward rubber stamps, prepare numerous samples with different degrees of pressure.		Registered mail or equivalent
Clothing		All	Registered mail or equivalent
DNA Examinations (see pp. 624–626)			
Documents (charred or burned)		All	Registered mail or equivalent
Drugs:			

1. Liquids		All	Registered mail or equivalent
2.Powders, Pills, and Solids		All to 30 g.	Registered mail or equivalent
EXPLOSIVES: Detonators, Blasting Caps, Detonating Cord, Black Powder, Smokeless Powder, Explosives, and Accessories, call FBI Laboratory, for shipping instructions.			
Fibers	Entire garment or other cloth item.	All	Registered mail or equivalent
Firearms (unloaded weapons)		Firearms must be packaged and shipped separately from live ammunition. All firearms must be unloaded.	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.

Identification	**Wrapping and Packing**	**Remarks**
On back of cast before it hardens, write location and date taken, and investigator's name or initials.	Wrap in paper and cover with suitable packing material to prevent breakage Label "Fragile." Plaster of Paris is no longer recommended.	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.
See Anonymous Letters on p. 612.	See Anonymous Letters on p. 612.	Advise what parts are questioned or known. Furnish physical description of subject.
Place name or initials, date, name of make and model,	See Anonymous Letters on p. 612.	Do not disturb inking mechanisms on printing devices.

etc., on sample impressions.		
Mark directly on garment or use string tag indicating type of evidence, date obtained, nvestigator's name or initials.	Wrap each article individually. Place in strong container with identification written on outside of package.	Do not cut out stains, leave clothing whole. If wet, hang in room to dry before packing.
Outside container: indicate if fragile, date obtained, investigator's name or initials.	Pack in rigid container between layers of cotton.	If moisture is added use atomizer, otherwise, not recommended.
Affix label to bottle in which found, including date it was found and investigator's name or initials.	Make sure container does not leak. Seal with tape to prevent any loss.	Mark "Fragile." If possible, use heat-seal plastic bags.
Outside of pillbox: affix label with date found and investigator's name or initials.	Seal with tape to prevent any loss.	If powder, pills, or solids are found in paper bags, place them in plastic bags to prevent any loss. Do not submit used drug field test kits with evidence.
Outside container or on the object fibers are adhering, include date and investiga-	Use folder paper or pillbox. Seal edges and openings with tape.	Do not place loose in an envelope.

tor's name or initials.		
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.	Wrap in paper and identify contents of packages. Place in cardboard box or wooden box.	The firearm should be handled minimally to avoid loss or destruction of evidence. Do not allow objects to enter or contact the firearm's barrel, chamber, or other operating surface.

	Amount Desired		
Specimen	**Standard**	**Evidence**	**Send By**
Flash Paper	One sheet	All to 5 sheets.	Call FBI Laboratory.
Gasoline	10 ml	All to 10 ml	Call Chemistry-Toxicology Unit for instructions.
General Unknown:			
1. Solids (nonhazardous)	10 gm	All to 10 gm	Registered mail or equivalent

2. Liquids (non-hazardous)	10 ml	All to 10 ml	Registered mail or equivalent
Glass Fractures		All	Registered mail or equivalent
Glass Particles	Submit the victim(s)'and suspect's air-dried clothing. each item must 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. Do not use paper or glass containers	All	Registered mail or equivalent

	Search for particles in vehicles by vacuuming each section of the vehicle separately. Do not use tape for covering glass particles. Submit vacuum sweepings in leakproof containers. Do not use paper or glass containers.	

Identification	**Wrapping and Packing**	**Remarks**
Outside container: label indicating date and investigator's name or initials.	Flash paper is a hazardous material. Do not store flash paper near combustible materials. Seal flash paper in polyethylene envelopes and refrigerate.	
Outside container: label indicating type of material, date,	Use an all-metal container packed in wooden box.	An all-metal container should be used for its fireproof

and investigator's name or initials.		qualities.
Outside container: label indicating date and investigator's name or initials.	Same as Drugs (see p. 614).	Call Chemistry-Toxicology Unit for instructions.
Same as Liquid Drugs (see p. 614).	Same as Liquid Drugs (see p. 614).	Same as above.
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.	Wrap each piece separately in cotton. Pack in sturdy container to prevent shifting and breakage. Identify contents.	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.
Outside container: label indicating date and investigator's name or initials.	Place in film canister or plastic vial. Seal and protect against breakage.	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.

	Amount Desired		
Specimen	**Standard**	**Evidence**	**Send By**
Gunshot Residues			
The Laboratory provides gunshot residue examinations to assist FBI field office investigations only.		Usually gunshot residue examinations will only be performed when samples are collected from living person's hands. Gunshot residue evidence must be collected within five hours of exposure to the discharge of a firearm.	

On cloth only to determine weapon to target distance.		All	Clothing submitted for gunshot residue examination should be handled carefully, 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.
Hair	Twenty-five full-length hairs from different parts of head and/or pubic	All	Registered mail or equivalent

	region.		
Handwriting and Hand Printing Known Standards			Registered mail or equivalent
Insulation			
1. Glass Wool	1″ mass from each suspect area.	All	Registered mail or equivalent
2. Safe	Sample all damaged areas.	All	Registered mail or equivalent
Matches	One to two books of paper. One full box of wood.	All	Federal Express, UPS, or equivalent
Obliterated, Eradicated, or Indented Writing		Same as Anonymous Letters (see p. 612).	Registered mail or equivalent

Identification	**Wrapping and Packing**	**Remarks**

		Collecting gunshot residue samples requires five adhesive lifts suitable for scanning electron microscopic analysis. Dab the adhesive side of the stub against the surface (right palm, back of right hand, left palm, back of left hand). Use one stub per sampling surface. The remaining stub will be used as a control. Label each sampling surface stub (e.g., RIGHT PALM, BACK OF RIGHT HAND). Cap and seal the stubs in separate, resealable plastic bags.
Outside container: Indicate date, obtained from whom, description, name or initials.	Dry and package individually in **unused** brown wrapping paper or brown grocery bag.	The deposition of gunshot residue on evidence such as clothing varies with the distance from the muzzle of the firearm to the target. Pat-

		terns 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.
Outside container: Type of material, date, and investigator's name or initials.	Folded paper or pillbox. Seal edges and openings with tape.	Do not place loose in envelope.
Indicate from whom obtained, voluntary statement included in appropriate place, date obtained, and investigator's name or initials.	Same as Anonymous Letters (see p. 612).	Same as Anonymous Letters (see p. 612).
Outside container: type of material, date, name or initials.	Use pillbox or plastic vial. Seal to prevent any loss.	Submit known and questioned debris in leakproof containers such as film canisters or plastic pill bottles. Avoid using paper or glass con-

		tainers. Pack to keep lumps intact.
Same as above.	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 a separate paper bag. Do not process tools for latent prints.	
Outside container: label indicating type of material, date, and investigator's name or initials.	Pack in metal container and in larger package to prevent shifting. Pack matches in box or metal container to prevent friction between matches.	Keep and label: "Keep away from fire."
Same as Anonymous Letters (see p. 612).	Same as Anonymous Letters (see p. 612).	Advise whether bleaching or staining methods may be used. Avoid folding.

Specimen	Amount Desired: Standard	Amount Desired: Evidence	Send By
Organs of the Body		200 g of each organ.	Call Chemistry Toxicology Unit for instructions.
Paint:			
1. Liquid	Original unopened container up to 1/4 pint, if possible.	All to 1/4 pint.	Registered mail or equivalent
2. Solid (paint chips or scrapings)	At least 1/2 sq. in. of solid, with all layers represented.	Standard: Control paint chips must be collected from the suspected source of the evidentiary paint. Controls must be taken from an area close to, but not in, any damaged area. If no damage is obvious, controls	Registered mail or equivalent

		should be taken from several areas of the suspect substrate. Each layer can be a point of comparison. Controls must have all of the layers of paint to the substrate.	
Rope, Twine, and Cordage	One yard or amount available.	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	Registered mail or equivalent

		material or contamination.	
Saliva Samples	1.5″ diameter stain in center of filter paper.	All	Registered mail or equivalent
Shoe Print Lifts (impressions on hard surfaces)	Photograph before making lift of dust impression.	For shoeprint and tire tread comparisons, submit original evidence whenever possible (shoes, tires, photographic negatives, casts, lifts).	Registered mail or equivalent

Soils and Minerals	Samples from areas near pertinent spot.	Collect soil samples from the immediate crime scene area and from the logical access and/or escape route(s). Collect soil samples at a depth that is consistent with the depth from which the questioned soil may have originated. If possile, collect soil samples from alibi areas such as the yard or work area of the suspect(s).	Registered mail

Identification	**Wrapping and Packing**	**Remarks**

Each biological specimen must be placed in a separate, labeled, sealed glass tube, plastic cup, or heat-sealed or resealable plastic bag. Affix BIOHAZARD labels to the inside and outside containers.	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).
Outside container: Type of material, origin if known, date, investigator's name or initials.	Use friction-top paint can or large-mouth, screw-top jar. If glass, pack to prevent breakage. Use heavy corrugated paper or wooden box.	Protect spray can nozzles to keep them from going off. Avoid contact w/adhesive materials. Wrap to protect paint smears. Do not use envelopes, paper/plastic bags, or glass vials.
Same as above.	Package paint specimens in leakproof containers such as	Avoid contact with adhesive materials. Wrap so as to

	vials or pillboxes. Do not stick paint particles on adhesive tape. Do not use plastic bags, cotton, or envelopes to package paint specimens.	protect smear. If *small amount:* seal round pillbox, film cannister, or plastic vial to protect against leakage/breakage.
On tag or container: Type of material, date, investigator's name or initials.	Submit in heat-sealed or resealable plastic or paper bags.	
Outside envelope and on filter paper: Type of sample, name of donor, date of collection, and collector's initials or name.	Seal in envelope.	Stain should be circled in pencil for identification. Filter paper available from hospitals and drugstores. Allow to dry.
On lifting tape or paper attached to tape: date, investigator's name or initials.	Prints in dust are easily damaged. Fasten print or lift to bottom of box so that nothing will rub against it.	Always secure crime-scene area until shoe prints or tire treads are located and preserved.
Outside container: Type of material, date, investigator's name or initials.	Do not remove soil adhering to shoes, clothing, and tools. Do not process tools for latent prints. Air-dry the soil	Ship known and questioned debris separately to avoid contamination. Submit known and questioned 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.		in leakproof containers such as film canisters or plastic pill bottles. Do not use paper envelopes or glass containers. Pack to keep lumps intact.

	Amount Desired		
Specimen	**Standard**	**Evidence**	**Send By**
Tape (Adhesive Tape)	Recovered roll.	All	Registered mail or equivalent
Tools/Toolmarks	Send in the tool. If impractical, make several impressions on similar materials as evidence using entire marking area of tool.	If it is not possible to submit the tool-marked evidence, submit a cast of the toolmark.	Registered mail or equivalent
Typewriting, known standards	See Anonymous Letters (p. 612).		Registered mail or equivalent

Wire	3 ft. (Do not kink.)	All (Do not kink.)	Registered mail or equivalent
Wood	One foot or amount available.	All	Registered mail or equivalent

Identification	**Wrapping and Packing**	**Remarks**
Same as above.	Place on waxed paper, cellophane, or plastic.	Do not cut, wad, distort, or separate tapes that are stuck together.
On object or on tag attached to an opposite end from where toolmarks appear: date recovered and investigator's name or initials.	After marks have been protected with soft paper, wrap in strong wrapping paper, place in strong box, and pack to prevent shifting.	Photographs locate tool-marks 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.
On specimens: serial number, brand, model, etc., date recovered, and investigator's name or initials.	Same as Anonymous Letters (p. 612).	Examine ribbon for evidence of questioned message.
On label or tab: describe type of material, date, investigator's name or initials.	Wrap securely.	Do not kink wire.
Same as above.	Submit wood in heat-sealed or resealable plastic of paper bags.	

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.

There are two sources of DNA used in forensic analyses. Nuclear DNA (nDNA) is typically ana-

lyzed in evidence containing blood, semen, saliva, body tissues, and hairs that have tissue at their root ends. Mithochondrial DNA (mtDNA) is typically analyzed in evidence containing naturally shed hairs, hair fragments, bones, and teeth.

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 it 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.

Blood Examinations

Examinations can determine the presence or absence of blood in stains. Examinations can also determine whether blood is human or not. 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 tubes with absorbent material surrounding the tubes.
- Label the outer container KEEP IN A COOL DRY PLACE, REFRIGERATE ON ARRIVAL, and BIOHAZARD.
- Submit to the Laboratory as soon as possible.

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 **wet bloodstained garments.** Wrap **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 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 strain removal by abrasive action 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 must 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 during shipping. Pack in clean paper. Do not use plastic containers.
- When possible, cut a large sample of suspected **seman stains from immovable objects** with a clean, sharp instrument. Collect an unstained control sample. Pack to prevent stain removal by abrasive action 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) must 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.

Buccal (Oral) Swabs

- Use clean cotton swabs to collect buccal (oral) samples. Rub the inside surfaces of the cheeks 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.
- Buccal samples do not need to be refrigerated.

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 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 ob-**

jects with a clean, sharp instrument. Collect an unstained control sample. Pack to prevent stain removal by abrasive action 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 (e.g., ashtray) in clean paper or an envelope with sealed corners. Do not submit the ashtray unless a 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 **envelops 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

- 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.

Appendix II

Appendix III

Chromatographic and Spectrophotometric Parameters for Figures Contained in the Text

1. *Figures 5–6(a) and (b)*

   3′ × 1/4″ glass column; 3% OV-17 on Varaport 30, 80/100 mesh.

T(injection port) = 280°C, T(defector) = 280°C, T(column) = 200°C

Carrier Gas: Nitrogen at 50 ml/min

2. *Figure 5–7*

   8′ × 1/8″ stainless steel, 15% carbowax 20M, AW-DMCS treated 80/100 mesh chromosorb W plus 3′ × 1/8″ stainless steel, 10% silicone D.C. 200 in series.

   Temperature unknown

   Carrier Gas: Nitrogen

3. *Figure 5–10*

   Absorbent: Silica Gel G

   Development Solvent: Benzene

   Visualizer: Fast Blue B Salt

4. *Figure 5–11*

   Absorbent: Silica Gel G

   Developing Solvent: Chloroform-Diethylamine (9:1)

   Visualizer: Iodoplatinate

5. *Figure 5–18*

   Solvent: 0.1N HCL

6. *Figure 5–19(a)*

   Heroin hydrochloride in KBr

7. *Figure 5–19(b)*

   Secobartibal (free acid) in KBr

8. *Figure 8–21(a) and (b)*

   Same as Figure 5–7

9. *Figure 9–11*

   Solvent: 0.1 N HCL

10. *Figure 10–9*

    Ethanol in whole blood analyzed by “head space” technique.

    A porous polymer column was used.

    T(injection port) = 132°C, T(detector) = 132°C, T(column) = 132°C

    Carrier Gas: Helium (thermal conductivity detector was used).

11. *Figure 11–8*

    30 m × 0.75 mm I.D. glass capillary column, SPB-1, bonded phase with a 1.0 μm film thickness.

    Column over temperature program: 40°C for 3 min., 12°C/min. up to 250°C.

    FID temperature 280°C.

    Injection port temperature 250°C. Helium carrier and make-up gas.

12. *Figure 11–16*

    RDX in KBr

13. Figure 16–12

Absorbent: Silica Gel

Developing Solvent: Ethyl acetate, absolute ethanol, water (70:35:30)

Appendix IV

Chemical Formulas for Latent Fingerprint Development

Iodine Spray Reagent

1. Prepare the following stock solutions:

Solution A	***Solution B***
Dissolve gram of Iodine in 1 liter of Cyclohexane	Dissolve 5 grams of a-Naphthoflavone in 40 ml of Methylene Chloride (Dichloramethane)

2. Add 2 ml of Solution B to 100 ml of Solution A. Using a magnetic stirrer, mix thoroughly for 5 minutes.
3. Filter the solution through a facial tissue, paper towel, filter paper, etc., into a beaker. The solution should be lightly sprayed on the specimen using an aerosol spray unit or a mini spray gun powered with compressed air.
4. Lightly spray the suspect area with several applications until latent prints sufficiently develop.

Remarks

- Solution A may be stored at room temperature. Shelf life is in excess of 30 days.
- Solution B must be refrigerated. Shelf life is in excess of 30 days.
- The combined working solution (A and B) should be used within 24 hours after mixing.
- The Iodine Spray solution is effective on most surfaces (porous and nonporous).
- A fine spray mist is the most effective form of application.
- The Cyanocrylate (Super Glue) process cannot be used prior to the Iodine Spray Reagent Process. Cyanoacrylate may be used, however, after the Iodine Spray Reagent.
- On porous surfaces, DFO and/or Ninhydrin may be used after the Iodine Spray.
- Propanol may be used to remove the staining of the Iodine Spray Reagent.
- 1,1,2 Trichlorotrifluoroethane may be substituted for Cyclohexane.

1,8-Diazafluoren-9-one (DFO)

Step 1: Stock solution: Dissolve 1 gram DFO in 200 ml Methanol, 200 ml Ethyl Acetate, and 40 ml Acetic Acid.

Step 2: Working solution (make as needed): Start with stock solution and dilute to 2 liters with Petroleum Ether (40° to 60° boiling point fraction). Pentane can also be used. Solution should be clear.

Dip the paper document into the working solution and allow to dry. Dip again and allow to dry. When completely dry, apply heat (200° for 10 to 20 minutes). An oven, hair dryer, or dry iron can be used.

Visualize with an alternate light source at 450, 485, 525, and 530 nm and observe through

orange goggles. If the surface paper is yellow, such as legal paper, it may be necessary to visualize the paper at 570 nm and view it through red goggles.

1,2-indanedione

2.0 g 1,2-indanedione

70 ml ethyl acetate

930 ml HFE 7100 (3M Company)

Ninhydrin

20 grams Ninhydrin

3,300 ml Acetone

Shelf life is approximately one month

or

5 grams Ninhydrin

30 ml Methanol

40 ml 2-Propanol

930 ml Petroleum Ether

Shelf life is approximately one year

Dip the paper document in the working solution and allow to dry. Dip again and allow to dry. When completely dry, heat may be applied. A steam iron should be used on the steam setting. Do not touch the iron directly to the paper. Rather, hold the iron above the paper and allow the steam to heat it.

Zinc Chloride Solution (Post-Ninhydrin Treatment)

5 grams of Zinc Chloride crystals

2 ml of Glacial Acetic Acid

100 ml of Methyl Alcohol

Add 400 ml of 1,1,2 Trichlorotrifluoroethane to the mixture and stir.

Add 2 ml of 5 percent Sodium Hypochlorite solution (commercially available liquid bleach such as Clorox, Purex, and others).

Lightly spray the paper with the Zinc solution. Repeat the spraying as needed. Do not overdo the spraying.

The ninhydrin-developed prints treated with this solution may fluoresce at room temperature with an alternate light source. For maximum fluorescence, place the paper in a bath of liquid nitrogen and examine again with an alternate light source.

Physical Developer

When mixing and using these solutions, make sure the glassware, processing trays, stirring rods, and stirring magnets are absolutely clean. Do not use metal trays or tweezer.

Stock Detergent Solution: 3 grams of *N*-Dodecylamine Acetate are combined with 4 grams of Synperonic-*N* mixed in 1 liter of distilled water.

Silver Nitrate Solution: 20 grams of Silver Nitrate crystals are mixed in 100 milliliters of distilled water.

Redox Solution: 60 grams of Ferric Nitrate are mixed in 1,800 milliliters of distilled water. Af-

ter this solution is thoroughly mixed, add 160 grams of Ferrous Ammonium Sulfate, mix thoroughly and add 40 grams of Citric Acid, mix thoroughly.

Maleic Acid Solution: Put 50 grams of Maleic Acid into 2 liters of distilled water.

Physical Developer Working Solution: Begin with 2,125 milliliters of the Redox Solution and add 80 milliliters of the Stock Detergent Solution, mix well, then add 100 milliliters of the Silver Nitrate Solution and mix well. Appropriate divisions can be used if smaller amounts of the working solution are desired.

Immerse specimen in Maleic Acid Solution for 10 minutes

Incubate item in PD working solution for 15–20 minutes

Thoroughly rinse specimen in tap water for 20 minutes

Air-dry and photograph

Cyanoacrylate Fluorescent Enhancement Reagents

Rhodamine 6G

Stock Solution	**Working Solution**
100 mg Rhodamine 6G 100 ml Methanol (Stir until thoroughly dissolved.)	3 ml Rhodamine 6G Stock Solution 15 ml Acetone 10 ml Acetonitrile 15 ml Methanol

32 ml 2-Propanol

925 ml Petroleum Ether

(Combine in order listed.)

Ardrox

2 ml Ardrox P-133D

10 ml Acetone

25 ml Methanol

10 ml 2-Propanol

8 ml Acetonitrile

945 ml Petroleum Ether

MBD

7-(p-methoxybenzylaminol)-4-nitrobenz-2-oxa-1,3-diazole

Stock Solution	**Working Solution**
100 mg MBD	10 ml MBD Stock Solution
100 ml Acetone	30 ml Methanol
	10 ml 2-Propanol
	950 ml Petroleum Ether
	(Combine in order listed.)

Basic Yellow 40

2 grams Basic Yellow 40

1 liter Methanol

RAM Combination Enhancer

3 ml Rhodamine 6G Stock Solution

2 ml Ardrox P-133D

7 ml MBD Stock Solution

20 ml Methanol

10 ml 2-Propanol

8 ml Acetonitrile

950 ml Petroleum Ether

(Combine in order listed.)

RAY Combination Enhancer*

To 940 ml of either isopropyl alcohol or denatured ethyl alcohol add:

1.0 gram of Basic Yellow 40

0.1 gram of Rhodamine 6G

8 ml of Arodrox P-133D

50 ml of Acetonitrile (optional, but dye stain of prints will appear more brilliant)

MRM 10 Combination Enhancer

3 ml Rhodamine 6G Stock Solution

3 ml Basic Yellow 40 Stock Solution

7 ml MBD Stock Solution

20 ml Methanol

10 ml 2-Propanol

8 ml Acetonitrile

950 ml Petroleum Ether

(Combine in order listed.)

The above solutions are used on evidence that has been treated with cyanoacrylate (Super Glue) fumes. These solutions dye the cyanoacrylate residue adhering to the latent print residue. Wash the dye over the evidence. It may be necessary to rinse the surface with a solvent, such as Petroleum Ether, to remove the excess stain.

CAUTION: These solutions contain solvents that may be respiratory irritants, so they should be mixed and used in a fume hood or while wearing a full-face breathing apparatus. Also, these solvents may damage some plastics, cloth, wood, and painted surfaces.

Because of the respiratory irritation possible and the general inefficiency of spraying, it is *not* recommended to spray these solutions. To obtain the maximum benefit and coverage, it is recommended that evidence be soaked, submerged, or washed with these types of solutions.

Source of Chemicals

Ardrox P-133D, Basic Yellow 40, and Rhodamine 6G may be obtained from:

Lightning Powder Company, Inc.

Jacksonville, FL 32218

Telephone Number: 1-800-428-0586

MBD may be obtained from:

Sigma Chemical Company

P.O. Box 14508

St. Louis, MO 63178

Telephone Number: 1-800-325-3010

Appendix V

Chemical Formulas for Development of Footwear Impressions in Blood

Amido Black

Staining Solution:

0.2 g Napthalene 12B or Napthol Blue Black

10 ml Glacial Acetic Acid

90 ml Methanol

Rinsing Solution:

90 ml Methanol

10 ml Glacial Acetic Acid

Stain the impression by spraying or immersing the item in the staining solution for approximately one minute. Next, treat with the rinsing solution to remove stain from nonimpression area. Then rinse well with distilled water.

Coomassie Blue

Staining Solution: (Add in this order)

0.44 g Coomassie Brilliant Blue

200 ml Methanol

40 ml Glacial Acetic Acid

200 ml Distilled Water

Rinsing Solution:

40 ml Glacial Acetic Acid

200 ml Methanol

200 ml Distilled Water

Spray object with the staining solution, completely covering the area of interest. Then spray the object with rinsing solution, clearing the background. Then rinse with distilled water.

Crowle's Double Stain

Developer:

2.5 grams Crocein Scarlet 7B

150 mg Coomassie Brilliant Blue R

50 ml Glacial Acetic Acid

30 ml Trichloroacetic Acid

Combine the above ingredients, then dilute into one liter. Place the solution on a stirring device until all the Crocein Scarlet 7B and Coomassie Brillant Blue R are dissolved.

Rinse:

30 ml Glacial Acetic Acid

970 ml Distilled Water

Apply the developer to the item(s) by dipping. Completely cover the target area, leaving the developer on for approximately 30 to 90 seconds, then rinse. Finally, rinse well with distilled water.

Diaminobenzidine (DAB)

Solution A (Fixer solution):

20 g 5-Sulphosalicylic Acid

Dissolved in 1L Distilled Water

Solution B:

100 ml 1M Phosphate Buffer (pH 7.4)

800 ml Distilled Water

Solution C:

1 g Diaminobenzidine

Dissolved in 100 ml Distilled Water

Working Solution (Mix just prior to use):

900 ml solution B

100 ml solution C

5 ml 30% Hydrogen Peroxide

Immerse impression area in fixer solution A for approximately 4 minutes. Remove and rinse in distilled water. Immerse impression area for approximately 4 minutes in the working solution or until print is fully developed. Remove and rinse in distilled water.

Fuchsin Acid

20 g Sulfosalicylic Acid

2 g Fuchsin Acid

Dissolved in 1L Distilled Water

Stain the impression by spraying or immersing the item in the dye solution for approximately one minute. Rinse well with distilled water.

Hungarian Red

This product is available from:

ODV, Inc.

P.O. Box 180

S. Paris, ME 04281

Leucocrystal Violet

10 g 5-Sulfosalicylic Acid

500 ml 3% Hydrogen Peroxide

3.7 g Sodium Acetate

1 g Leucocrystal Violet

If Leucocrystal Violet crystals are yellow instead of white, do not use. This indicates crystals are old and solution will not work.

Spray the object until completely covered. Then allow object to air dry. Development of impressions will occur within 30 seconds. Store the solution in amber glassware and refrigerate.

Leucocrystal Violet Field Kit*

When the reagents are separated in the listed manner below, a “field kit” can be prepared. The field kit separation will allow for an extended shelf life.

Bottle A:

10 grams 5-Sulfosalicylic Acid

500 ml Hydrogen Peroxide 3%

Bottle B:

1.1 grams Leucocrystal Violet

Weigh out reagent and place in an amber 60 ml (2 ounce) bottle.

Bottle C:

4.4 grams Sodium Acetate

Weigh out reagent and place in an amber 60 ml (2 ounce) bottle.

Add approximately 30 ml of Bottle A reagent to Bottle B. Secure cap and shake Bottle B for two (2) to three (3) minutes. Pour contents of Bottle B back into Bottle A.

Add approximately 30 ml of Bottle A reagent to Bottle C. Secure cap and shake Bottle C for approximately two (2) to three (3) minutes. Pour contents of Bottle C into Bottle A. Secure Bottle A's cap and shake thoroughly.

Spray the target area; development will occur within thirty (30) seconds. After spraying, blot the area with a tissue or paper towel. Then allow object to air-dry.

Patent Blue

20 g Sulfosalicylic Acid

2 g Patent Blue V (VF)

Dissolved in 1L Distilled Water

Stain object by spraying or immersing the item in the dye solution for approximately one minute. Rinse well with distilled water.

Tartrazine

20 g Sulfosalicylic Acid

2 g Tartrazine

Dissolved in 1L Distilled Water

Stain object by spraying or immersing the item in the dye solution for approximately one minute. Rinse well with distilled water.

Source: Tri-Tech, Inc., Southport, N.C., www.tritechusa.com

Source: In part from *Processing Guide for Developing Latent Prints*, Revised 2000. Washington, D.C.: FBI. http://njiai.org/fbi_2000_lp_guide.pdf

* *Source:* John H. Olenik, Freemont, Ohio.

**Source:* John Fisher, Forensic Research & Supply Corp., Gotha, Fla.