North Carolina
State Bureau of Investigation

EVIDENCE FIELD GUIDE

North Carolina Department of Justice
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Address Requests for additional copies to:

North Carolina State Bureau of Investigation
Evidence Control Unit
121 East Tryon Road
Raleigh, North Carolina 27603

919-662-4500 (Extension - 1501)

or

Requests may be faxed to the
North Carolina State Bureau of Investigation
Evidence Control Unit at
(919) 661-5849

While supplies last, additional copies will be provided at no cost to any law enforcement officer whose duties include the collection, preservation, and submission of evidence to the North Carolina State Bureau of Investigation Crime Laboratory Division

Table of Contents

SPECIAL NOTICE # 1
EVIDENCE SEALS

All evidence submitted to a North Carolina State Bureau of Investigation Crime Laboratory **must** be in a container which is sealed. The only seals which will be accepted are:

- Tape
- Heat Sealed Packages
- Packages with "*Tamper-Proof*" Seals

All evidence seals must be initialed by the person sealing the package or placing a seal on the package.

In the case of tape, the initials may be on the tape, under the tape (if the tape is clear), or partly on the tape and extending onto the package surface. But, in any case, the initials must be either on the tape, or partially on the tape.

For tamper-proof packages, the initials must be on the seal. For heat sealed packages, the initials must be as close as practical to the seal.

Evidence which does not meet (or exceed) the sealing requirement cannot be accepted for analysis by a North Carolina State Bureau of Investigation Crime Laboratory.

If it is not practical to package a piece of evidence, such as an entire vehicle, the officer or technician submitting that evidence should securely attach a tag to the evidence and initial the tag.

All evidence containers/packages must be sealed to the extent that nothing can be added to or removed from the container/package.

SPECIAL NOTICE # 2
EXPLOSIVES and HAZARDOUS DEVICES

All explosive related evidence shall be hand carried to the SBI Raleigh Laboratory. If the evidence involves an improvised explosive device (IED), then it is the responsibility of the submitting officer to make sure that the device has been rendered safe by a qualified individual such as a certified bomb technician, an EOD specialist, or a member of the SBI Hazardous Device Unit.

When explosive or hazardous device evidence is going to be submitted to the laboratory, one of the following individuals should be contacted **prior to submission**:

- Chief Evidence Technician
  Evidence Control Unit
  919-662-4500 (Ext. 1216/1201)

- Special Agent In Charge
  Trace Evidence Section
  919-662-4500 (Ext. 3516)

This contact should be made so that proper personnel can be on hand at the time of submission.

Extra precaution should be taken when handling materials such as flash powder and blasting caps. These materials are sensitive and spark sensitive. If there are any questions regarding the submission of explosive or hazardous device evidence, contact the Special Agent In Charge of the Trace Evidence Section before arriving at the laboratory with the evidence.

Where to Submit Evidence

Submit Evidence
to the Laboratory Serving Your Area:

North Carolina State Bureau of Investigation
Post Office Box 2000
Garner, North Carolina
27529-2000
(919) 662-4500 (Ext. 1501)

for commercial deliveries only, use:

121 East Tryon Road
Raleigh, North Carolina 27603
Attention: Evidence Control

SBI Western Regional Laboratory
Post Office Box 2408
Skyland, North Carolina
28776-2408
(828) 654-0525

for commercial deliveries only, use:

9B Walden Ridge Drive
Asheville, North Carolina 28803

Note: The Western Regional Laboratory
accepts only **Drugs**, **Latent** and **Firearms Evidence**
For a list of counties serviced by the Western Laboratory; please see page 7.

Should you have any questions
about which laboratory handles your evidence,
please call either laboratory
for assistance
prior to submitting the evidence.

Western Regional Laboratory services the following counties:

Alexander
Alleghany
Ashe
Avery
Buncombe
Burke
Cabarrus
Caldwell
Catawba
Cherokee
Clay
Cleveland
Davie
Gaston
Graham
Haywood
Henderson
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Mecklenburg
Mitchell
Polk
Rowan
Rutherford
Stokes
Surry
Swain
Transylvania
Watauga
Wilkes
Yadkin
Yancey

If you need assistance in the field

prior to collecting or submitting evidence

The North Carolina State Bureau of Investigation maintains District Offices located across the state. Assistance is available to any law enforcement agency in the state for processing crime scenes and collecting evidence. Each SBI District Office has at least one crime scene search specialist whose primary purpose is to assist law enforcement agencies in the proper location, collection, preservation, and packaging of evidence at crime scenes.

You may request crime scene assistance through the appropriate SBI District Office.

In many cases, additional technical field assistance is available from the Crime Laboratory; however, it is generally best to first contact the appropriate SBI District Office.

If assistance is needed after regular working hours, you may make your request through the SBI Operations Center at 919-662-4500. If you are not sure which SBI District Office serves your area, you may call 919-662-4500 to obtain that information.

EVIDENCE CONTROL

Evidence Control Units in the Raleigh Central Laboratory and the Asheville Regional Laboratory ensure proper evidence flow and tracking. The Evidence Control Units receive, distribute and return all evidence processed by the SBI Laboratory.

Evidence Technicians receive and store all evidence submitted to the laboratory after the case information is logged into the laboratory's information management system. The evidence is transferred to the appropriate laboratory analyst(s) for analysis upon request. Generally, the submitting officer will not meet directly with the Agent who will conduct the analysis. Exceptions to this practice may be made for individual cases when circumstances require the submitting officer to talk directly with the analyst(s). If you feel you have a special need to discuss certain aspects of your case, you may request such a meeting with the Agent(s).

EVIDENCE ACCEPTANCE POLICY

The SBI Laboratory accepts any evidence which meets the following criteria:

- The evidence has been obtained as the result of an official criminal investigation.
- The submitting agency is a bona fide law enforcement agency or company police with arrest powers commissioned through the North Carolina Department of Justice's Training and Standards.
- The investigating officer intends to pursue a criminal case pending the results of evidence analysis and/or the related investigation.
- The evidence has not been previously examined by another analyst or laboratory, unless prior approval has been requested and received from the SBI Assistant Director of Crime Laboratory Services.

EVIDENCE SUBMISSION PROCEDURES

Adherence to proper evidence submission procedures is essential for analysts to evaluate evidence properly, to maintain the chain of custody, and to maintain the physical integrity and evidentiary value of submitted items. Failure to follow the laboratory's instructions when submitting evidence could result in the evidence being returned.

Should you have any questions as to the proper evidence submission procedures, it is always best to call the laboratory first.

Submission Forms (Copies of forms are located on pages 12-17)

- Attached to each "Request for Examination of Physical Evidence" form is an instruction sheet with numerous submission highlights. Please read the instruction page in its entirety before completing the form.
- Fill out the "Request for Examination of Physical Evidence" form (SBI-5) **completely**, supplying all information requested. Be sure to complete Parts B, C and/or D as instructed.

The SBI Supplement form must be completed on all computer forensics requests. The form must indicate the legal authority by which the computer evidence was seized and a copy of the legal documentation (search warrant, court order, etc.) must be attached to the form.
Use a continuation page (SBI-5A) when needed. Both SBI-5 forms and Continuation forms are available from either the Evidence Control Unit or DCI Terminal SBM1.

The chain of custody of each piece of evidence submitted must be tracked while in the possession of the laboratory; therefore, do NOT use a separate page(s) for itemization of the evidence.

Either type the form or print it legibly, ensuring that all copies are useable.

Please request additional forms before you run out, either by phone or DCI Terminal SBM1.

- Do not allow submission forms, packages, or other cases you may be transporting, to become contaminated by biological or other potentially hazardous evidence. Keep all submission documents and other evidence away from contaminated evidence when preparing evidence for submission to the laboratory or transporting evidence to the lab. For safety reasons, stained submission documents will not be accepted by the laboratory.

- Some considerations for completing the form include:

  (1) **Requesting Officer:** Please use the same officer for all submissions in a given case. This simplifies keeping case records together, as well as grouping submissions on the laboratory report. The laboratory always returns evidence to the **requesting officer** unless otherwise requested on the SBI-5.

  (2) **SBI File #:** Whenever an SBI Field Agent is involved in a case, supply that agent's file number (both new and old number when applicable). Indicate on the SBI-5 the CAA (Case Agent Assigned) and the DIC (SBI District Office in Charge) - this information is available from the SBI Field Agent.

  (3) **SBI Lab #:** If evidence has previously been submitted in a case and you know the laboratory number, please provide that number. If you do not know the specific number, please advise the laboratory that other evidence has been submitted in the case.

  (4) **Race/Sex/Age:** Provide this information for all suspects and victims as it is valuable in several kinds of laboratory analyses. If an individual's date of birth is unknown, provide your best estimate of the person's age.

  (5) **Analysis Requested:** Be as specific as possible. If you are not sure of what tests may be performed, please call the laboratory prior to completing the form, or refer to the appropriate sections of this guide for further information. Clearly state the analysis you need performed on each item of evidence. Clarify the request if necessary stating what you need to know from the analysis on the bottom of the form or on a separate sheet of paper. The laboratory will not arbitrarily examine evidence without a specific request for each discipline needed cleared requested on the SBI-5.

(6) **Origin of Evidence:** Give the exact location where the evidence was seized/collected, (i.e., victim (name), suspect (name), bedroom, vehicle, etc.) **Note: For the safety of all who might handle the evidence, always indicate when evidence was recovered or seized from a body cavity or contaminated area**.

(7) **Disposition of Evidence:** Evidence cannot be stored at the laboratory; therefore, unless other arrangements are made, all evidence will be mailed back to the requesting officer. Bulky evidence, large quantities of controlled substances, and some hazardous material evidence will be retained with the understanding that it **must** be picked up by the submitting agency within fifteen days.

(8) **Remarks or Synopsis**: Briefly describe in Part B of the submission form what happened. Supply sufficient detail to illustrate how the evidence submitted relates to the investigation. A copy of your investigative report may suffice if it contains that information. Be sure to specify why you are submitting each item so that analysts may conduct appropriate examinations.

SBI-5 (1/2000)

NORTH CAROLINA STATE BUREAU OF INVESTIGATION

Physical Evidence Examination Request Instructions

IF INSTRUCTIONS ARE NOT FOLLOWED, EVIDENCE IS SUBJECT TO BEING RETURNED

IF MORE SPACE IS NEEDED TO LIST ITEMS, USE AN **SBI-5A** (Continuation Page)

If the status of this case changes in any manner (i.e. case closed), please NOTIFY THE LABORATORY IMMEDIATELY

1. Number all items using **NUMERICAL VALUES ONLY** e.g., 1,2,3,4, etc.

2. Type or print ALL information.

3. **ALL CONTAINERS MUST BE SEALED WITH TAPE. THE PERSON SEALING THE EVIDENCE SHOULD PLACE THEIR INITIALS ACROSS THE TAPE ONTO THE CONTAINER ITSELF. HEAT SEALED AND TAMPER-PROOF EVIDENCE CONTAINERS MUST BEAR THE INITIALS OF THE INDIVIDUAL SEALING THE CONTAINER**. For clarification concerning the packaging or labeling of evidence, please refer to the ***SBI Evidence Guide***. This guide may be obtained by contacting the SBI Crime Laboratory. If there are still unanswered questions, please contact the appropriate laboratory personnel.

4. Complete the following part(s) of this form for evidence being submitted for the designated examinations:

Only Part A: for Drug, Toxicology, Documents, or Latent Evidence
Parts A and B: for Poison & Tampering, Trace Evidence, or Firearms
Parts A, B, and C: for Body Fluid/DNA Evidence
Parts A, B, & D: for Hair & Fiber Evidence
Parts A, B, C and D: for Hair, Fiber, and Body Fluid/DNA Evidence

5. Completed ***Request for Examination of Physical Evidence*** *forms* must be in an envelope attached to the **OUTSIDE** of the mailing package. **MAIL ONLY ONE CASE PER MAILING PACKAGE.** Be sure to mail the **original and the first carbon copy** of the form. You may retain the **second carbon copy** for your records.

6. DO NOT MARK THE OUTSIDE OF EVIDENCE ENVELOPES/PACKAGES WITH WORDS SUCH AS DRUGS, FIREARMS, ETC.

7. The number of dosage units or packages of each type of controlled substance should be noted on the Request Form (e.g., two red tablets, five plastic bags of white powder, etc.).

8. Drug evidence seized from different people on the same occasion or the same person on different occasions must be submitted on separate SBI-5 forms (see ***SBI Evidence Guide***).

9. Green plant material and/or any wet evidence (e.g., clothing) should be dried out and submitted in **PAPER** bags (NOT PLASTIC).\

10. Prior to submission, you **MUST** separate drugs from containers to be processed for latent prints.

11. All firearms submitted to the laboratory must be **UNLOADED**. If you are not able to unload the weapons, transport the item(s) to the laboratory in person. Advise laboratory personnel of any loaded weapons immediately upon arrival.

12. All glass containers (ESPECIALLY TUBES OF BLOOD) must be adequately protected against breakage and leakage (i.e., padding and plastic bags).

13. Sharp metal objects or glass objects (e.g., knives, glass, razor blades, crack pipes, etc.) must be secured to heavy cardboard with ends protected.

14. **HYPODERMIC NEEDLES ARE NOT ROUTINELY ACCEPTED FOR ANALYSIS**. If analysis of a syringe is crucial to an investigation, the analysis must be requested (in writing) by the appropriate District Attorney before the evidence is submitted.

15. The Crime Laboratory's acceptance policy in hair cases is as follows:

    A. Cases will only be accepted when proper standards are submitted from **ALL** victims and suspects.
    B. Hair evidence will be accepted only after it has been removed from large, bulky items (e.g., clothing and bedding, etc.)
    C. Hair evidence will be accepted only in cases in which the hair is a vital part of the evidence.

16. Any package containing biological materials or materials exposed to biological contamination **MUST** be properly identified as **BIOLOGICAL HAZARDS.** In addition, you must indicate on the submission form(s) that the case contains Biohazardous Evidence.

17. When submitted for latent print comparison purposes, fingerprint cards bearing known inked impressions are evidence and must be listed and identified as an item of evidence.

18. Elimination inked impressions are required in all simple, property type cases submitted for latent print analysis.

19. The laboratory report(s) will be mailed to the Requesting Officer.

NOTE: There are many legal and technical problems associated with the acceptance of evidence in court (basically the proper and positive identification of evidence). The primary responsibility for proper identification rests with the investigating officer. Take the necessary precautions to insure the proper preservation, identification, and packaging of items of evidence. This evidence is being submitted in connection with an official investigation of a criminal matter.

SUBMIT THE EVIDENCE TO THE LABORATORY SERVING YOUR AREA:

North Carolina State Bureau of Investigation
Post Office Box 2000
Garner, North Carolina 27529-2000
(919) 662-4500 (Ext. 1501)

SBI Western Regional Laboratory
Post Office Box 2408
Skyland, North Carolina 28776-2408
(828) 654-0525

NOTE: The Western Regional Laboratory accepts only Drugs and Latent Evidence.

North Carolina State Bureau of Investigation

SBI-5 (1/2000) Page _____ of _____

Use SBI-5A ***Continuation Sheet*** to list additional items of evidence

PART A REQUEST FOR EXAMINATION OF PHYSICAL EVIDENCE

Requesting Officer: _____ County of Offense: _____ SBI Lab # _____

Requesting Agency: _____ ORI #: _____ SBI File # _____

PLEASE PLACE A CHECK MARK (√) BESIDE THE PREFERRED ADDRESS

☐ Agency P. O. Box, City and Zip**:** _____ Agency File # _____

☐ Agency Street Address, City and Zip: _____ Type of Case: _____

CAA **(SBI Case Agent Assigned):** _____ DIC **(SBI District in Charge):** _____ Date of Offense: _____

Investigating Officer Name and Best Contact Number – Name: _____ **Contact Number:** _____

VICTIM(S)	Race/Sex	DOB	**SUSPECT(S)**	Race/Sex	DOB	**ID #**

Has any evidence in this case been submitted to the laboratory previously? _____ If yes, to which section(s)? _____

Lab Item #	**Agency Item #**	**Type Container/Description of Evidence**	**Examine For**	**Exact Location Found (Use names for body fluid/DNA Evidence)**

Additional Analysis Requested / Instructions:

EVIDENCE WILL BE RETURNED TO THE REQUESTING OFFICER

SBI LABORATORY CHAIN OF CUSTODY USE ONLY

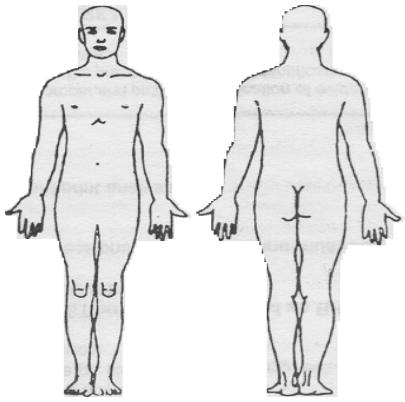
The signatures of North Carolina State Bureau of Investigation employees appearing below indicate that the material described above under *TYPE CONTAINER / DESCRIPTION OF EVIDENCE* was delivered to the person (approved carrier) indicated, on or about the date stated, and was delivered in essentially the same condition as

ITEM(S)	**Received By:** (Print) (Initial)	**Received From**: (Print) **(Initial)**	**DATE**

SBI-5 (1/2000) **COMPLETE PART B OR ATTACH A COPY OF THE INVESTIGATIVE REPORT** Page 1A

SBI LAB NO.: _____

PART B: Description of the incident (Brief Summary of the events of the crime). Be sure to provide details as to who may have been bleeding in cases involving body fluid/DNA evidence.



For Firearms Examination

(Show entrance and exit wounds)

PART C: (For body fluid/DNA cases)

Have samples from all possible bleeders or body fluid donors been included? **Yes** _____ **No** _____

Have any of the above subjects been transfused in the last 120 days? **Yes** _____ **No** _____

In sexual assault cases answer the following:

1. Was the attacker known to the victim? _____ Yes _____ No

2. Did the victim have sex with someone within 72 hours prior to the attack? _____ Yes _____ No

3. A. Is a known blood sample from the consenting sex partner available at this time? _____ Yes _____ No

   B. Do you plan to submit this sample? _____ Yes _____ No

4. What statement(s) has/have the suspect(s) made:

   A. _____ Denies being involved B. _____ No statement C. _____ Claims it was consensual

NOTE: No DNA testing will be conducted on evidence samples unless known blood samples from all victims and suspects are submitted. In sexual assault cases, known blood must also be submitted from any consensual sexual partners of the victim within 72 hours of the assault, if DNA

typing is requested.

PART D: (For hair, fiber and other particle analysis cases)

Crime Occurred: (Check all that apply)

_____ Suspect's Residence _____ Victim's Residence

_____ Suspect's Vehicle _____ Victim's Vehicle

_____ Other location (describe): _____

Have the suspect(s) and victim(s) lived at the same residence or shared a common environment? _____ Yes _____ No

If this is a rape case, has consent or common environment been involved? _____ Yes _____ No

IF YES, HAIR SAMPLES SHOULD NOT BE SUBMITTED FOR EXAMINATION

Be sure to indicate the race of the victim(s) and suspect(s) listed on Page 1

Please retain all hair and fiber evidence until either (1) the hair samples from all suspects and victims **are obtained** for hair analysis, **OR** (2) all fiber standards (carpeting, upholstery, clothing of suspect/victim) **are obtained** for fiber analysis. **YOU MUST SUBMIT THE NECESSARY STANDARDS BEFORE ANALYSIS CAN BE PERFORMED.**

North Carolina State Bureau of Investigation

SBI-5A (1/2000) Page _____ of _____

CONTINUATION PAGE
Supplement to SBI-5 / Part A
REQUEST FOR EXAMINATION OF PHYSICAL EVIDENCE

Agency File # _____ **SBI File #** _____ **SBI LAB #** _____

Lab Item #	Agency Item #	Type Container/Description of Evidence	Examine For	Exact Location Found (Use names for body fluid/DNA Evidence)

Additional Analysis Requested / Instructions:

SBI LABORATORY CHAIN OF CUSTODY USE ONLY

The signatures of North Carolina State Bureau of Investigation employees appearing below indicate that the material described above under *TYPE CONTAINER / DESCRIPTION OF EVIDENCE* was delivered to the person (approved carrier) indicated, on or about the date stated, and was delivered in essentially the same condition as

ITEM(S)	Received By: (Print) (Initial)	Received From: (Print) (Initial)	DATE

Evidence Packaging

- Package and seal each item individually as appropriate for that type of evidence. See specific sections of this guide for more detailed instructions. One basic rule of evidence packaging is:

  Do not use plastic bags for bloody clothing or undried plant material.

- Mark each item with the item number you listed on the SBI-5, your name or initials, and your case number. Complex item numbers which include both letters and numbers (e.g., FRM-1-360) create tracking problems within the laboratory. Please limit item numbers to simple numbers which run in numerical order.

- Seal and package evidence with protective padding to prevent breakage, leakage, cross-contamination or deterioration. Note: An evidence package is considered sealed only if its contents cannot readily escape and if entering the container results in obvious damage/alteration to the seal. **Stapled or zip-locked seals are not proper seals.**

  REMEMBER: All seals must be initialed (with permanent ink) by the individual sealing the evidence, and the initials must be on the tape. It is a good idea to initial the seal in such a manner that the initials extend off of the tape onto the package.

- When possible, place all sealed items that will be processed by a single laboratory section into one container (e.g., envelope, bag, box) and seal that container. For example, in a drug case involving four separate items, seal each item individually and then place it together with the other three into one larger container. Identify the container as to what items are inside.

- If you submit numerous items in a case for examination by separate sections of the laboratory, divide the items into sealed containers according to the laboratory sections that will receive the evidence. This helps to maintain the chain of custody as persons in the chain but not involved in evidence analysis need not open and mark each individual item.

In-Person Submissions

- Bring all copies of the evidence submission form to the laboratory. The forms will be signed showing transfer of the evidence to us, and one copy will be returned to you as a receipt. Due to the heavy volume of incoming evidence, SBI Laboratory personnel will not sign other agencies' receipts.

- Personal delivery of evidence is the preferred method for any computer evidence, perishable evidence, evidence of significant monetary value, firearms, and large quantities of controlled substances.

- **ALL WEAPONS ARE TO BE PLACED IN THE GUN RACK UPON ENTERING AN SBI EVIDENCE SUBMISSION AREA**.

- **Weapons should be unloaded prior to submission; however, if the weapon is loaded due to a technical reason, advise lab personnel immediately upon your arrival. See Firearms guidelines.**

- When a weapon is submitted to the laboratory, it will be inspected to ensure the weapon is unloaded and safe prior to receipt.

If a weapon cannot be unloaded or should not be unloaded for technical reasons, a Firearms Examiner will be made available to assist you.

Mail Submissions

- Only enclose evidence from one case per package. Generally speaking, a case is defined as an "incident." Do not package or mail multiple cases (or incidents) together.

- Place all sealed, packaged items into a strong, suitable sized cardboard box. An envelope may be used if there is no danger of damage from rough postal handling.

  Pad the evidence to prevent shifting or damage during mail handling. Seal the container adequately with strong tape and **initial the seals**. Wrap boxes with brown paper whenever possible.

- Place the original and first copy of the submission form (SBI-5) into an envelope addressed to the right SBI Laboratory, and make sure your return address is clearly indicated. Tape this envelope to the **outside** of the evidence package. Keep the third copy for your records.

- Mark the outside of the package "Attention: Evidence Control." **Do not indicate "drugs," "firearms," or victim/suspect names on the outside of the package.**

- Apply proper postage and send via first class mail or appropriate commercial carrier. Live ammunition and weapons have strict shipping requirements. Be sure to check with your shipper on these restrictions prior to mailing these types of evidence.

- Any package containing biological materials or materials exposed to biological contamination **must** be properly identified as **BIOLOGICAL HAZARDS**.

Evidence Submission Checklist

- Are the evidence submission forms **completely** filled out including the supplemental form and Parts B, C and D as instructed?

- Are there two copies for the laboratory and one for you?

- Have you indicated the type analysis needed for each item of evidence?

- Is each item of evidence separately marked, packaged separately and sealed? Are the seals initialed?

- Is the overall package properly sealed and marked? Are the seals initialed?

- Are two laboratory copies of the submission sheet in an envelope attached to the **outside** of the main package so that the sealed evidence package will not have to be opened to remove the forms?

- Is your return address legible?

- Has the appropriate postage been affixed?

Change in Case Status/Information

If the status of a case or the progress of an investigation changes and there is no longer a need for the evidence to be analyzed, please advise us of the change via fax to the Central Laboratory at (919) 661-5849, and to the Western Regional Laboratory at (828) 654-9682. Knowing that the analysis is no longer needed will free valuable analysis time for other cases.

Requests to correct erroneous information after submitting the original Request for Examination of Physical Evidence form must be made in writing by the officer or agent who made the initial request. Such requests can also be made via fax to the Central Laboratory at (919) 661-5849 and to the Western Regional Laboratory at (828) 654-9682. The request must refer to the erroneous information which appeared on the submitted form and specify the appropriate change(s).

Protection of Evidence from Deleterious Change

It is the responsibility of the laboratory to ensure, insofar as reasonable and possible, that evidence does not undergo deleterious change while in our possession.

However, proper collection and packaging of evidence are the responsibility of the submitting officer. One of the purposes of this field guide is to make investigators aware of how to handle certain evidence to prevent deterioration prior to its getting to the laboratory.

When an officer delivers evidence packaged in such a condition or in a container in which the evidence will deteriorate, he/she may be asked to repackage the evidence prior to submission.

Drug Chemistry & Toxicology Section

Capabilities and Services

- Analyses to determine the presence of controlled substances
- Analyses of alcohol in blood in DWI cases
- Analyses of controlled substances in blood in DWI cases
- Analysis of non tax-paid alcohol
- Clandestine laboratory investigations

Evidence Submission Guidelines

The Drug Chemistry Section accepts evidence if a criminal arrest has been made or is anticipated. Evidence from concerned parents, schools, organizations, private citizens, found property and evidence that has no value for criminal prosecution will not be accepted. A suspect's name must be listed on the SBI-5.

- Submit evidence by United States mail, commercial carrier (such as UPS), or in person. Avoid courier mail, as it does not provide as reliable a chain of custody as other methods of evidence submission.

- Personal delivery represents the safest method of submitting evidence to the laboratory. When submitting sizable quantities of any drug, try to arrange an appointment for personal delivery.

- Fill out the Request for Examination of Physical Evidence form (SBI-5) completely prior to submission. If the evidence is to be mailed to the laboratory, attach an envelope containing the SBI-5 form to the outside of the evidence. For security reasons, do not label the outside packaging “Drugs” or “Drug Evidence.”

- Drug evidence seized from different people should be submitted on separate SBI-5 forms, even if the people were arrested at the same time or at the same incident. This procedure will result in separate laboratory reports being issued for each person, which will avoid problems and confusion in subsequent judicial proceedings.

- Drug evidence seized from the same person on different dates should be submitted on separate SBI-5 forms.

- Evidence seized from body cavities or evidence contaminated with blood, body fluids or biological waste should be clearly marked as a biohazard and notations concerning this evidence should be made on the SBI-5. Submitting officer should make every attempt to remove contaminated packaging and submit in clean bags.

- Use numbers when labeling items of evidence. Do not use letters or Roman numerals.

- Submit the best evidence in each case, omitting drug paraphernalia, powder residues and cigarette butts.

- Because of the high volume of evidence coming into the Drug Chemistry Section, do not submit multiple items in misdemeanor cases. Similarly, do not submit misdemeanor amounts and residues in felony cases.

- Be sure that all items are properly separated and sealed to prevent cross-contamination. Place each item in a separate container and then seal all items into one container for submission to the laboratory.

- Avoid excessive use of tape on evidence packages. Close and seal evidence containers carefully, but not so as to make them difficult to open without damaging the contents.

- Never enclose tablets, cigarettes, or powder residues in tape.

- Do not submit used field test kits. The Drug Chemistry Section cannot test drug samples that have been field tested.

- Avoid sending plants (including mushrooms and cacti) to the laboratory unless they have been thoroughly dried. Green plants which are sealed in plastic bags will decompose, destroying their evidentiary value.

- Do not send entire plants and do not send plants with the roots still attached. The charge of manufacturing does not require a weight, so a representative sample is sufficient.

- Do not send obviously non-controlled items to the laboratory. Most pharmaceutical dosage units are plainly marked. Consult the *Physician’s Desk Reference* to rule out the non-controlled drugs before submission.

- When submitting items containing suspected controlled substances for latent print and drug analysis, separate the suspected controlled substance evidence prior to submission.

- The inherent dangers of hypodermic syringes, including the transmittal of disease (AIDS, hepatitis, etc.) is significant. The Drug Chemistry Section will not accept hypodermic syringes for analysis unless the importance of such evidence is essential to a criminal prosecution and a written request for analysis is made by the District Attorney or an Assistant District Attorney.

  An exception to this guideline is commercially prepared hypodermic syringes (*Tubex*, *Carpuject*, etc.) which contain a pharmaceutical preparation and the request for analysis is to determine dilution/substitution of the pharmaceutical preparation.

Limitations to Evidence Submission

- The Drug Chemistry Section generally will not identify more than two items from the same schedule of the Controlled Substances Act per suspect in any given case unless the analysis of the additional items will shift the charge from a misdemeanor to a felony (as in the case of marijuana or Schedule II, III, and IV substances) or to a trafficking charge.

- When two or more subjects are charged collectively with the same items, the group will be treated as a single individual for purposes of analysis.

- Only enough dosage units to constitute a felony will be analyzed in any drugstore burglary.

- Because the laboratory has a very limited storage capacity, bulk quantities of controlled substances will be sampled or analyzed by a chemist and returned to the submitting officer on the same day. To ensure that a chemist is available, contact the Drug Chemistry Section for an appointment before transporting evidence to the laboratory.

- Evidence in product liability cases, drug residues on U.S. currency, and cases involving stomach contents (lavage) will not be analyzed.

- Carefully evaluate the circumstances surrounding suspected poisoning. The Drug Chemistry Section will not accept poison cases unless prior approval has been obtained from the section Special Agent in Charge. The SBI Laboratory does not analyze for bacterial toxins, which occur when food spoils. County Health Departments, the North Carolina Department of Health and Human Services (Laboratory Services Division) and the North Carolina Department of Agriculture (Food and Drug Protection Division) laboratories analyze for bacterial toxins. Domestic disputes and complaints of bad-tasting food or beverages do not warrant the submission of items to the laboratory.

Drug Dilution/substitution Cases

- When submitting injectable liquids for dilution analysis, a control sample of each type of drug in question must be submitted.

- Make sure the control sample is from the same manufacturer and is of the same dosage level (concentration) as the questioned sample.

Non Tax-paid Alcohol Cases

- The Drug Chemistry Section determines ethanol, methanol, and isopropanol concentrations for illegally manufactured liquor. In cases dealing with multiple buys or numerous samples from the same source, only two random samples will be analyzed.

- Alcohol analysis requires only small samples of the liquor. Submit only a 5 ml sample of liquor for analysis. The laboratory can provide small sampling vials if needed.

Toxicology Cases

The Toxicology Unit of the Drug Chemistry Section analyzes blood to determine the presence of alcohol or controlled substances in DWI cases. Analysis of blood to determine the presence of alcohol or controlled substances in other criminal cases will be done at the written request of the District Attorney or Assistant District Attorney.

The Toxicology Unit will not screen blood for controlled substances when the blood has an alcohol concentration above the statutory minimum to show impairment (0.08 gram of alcohol per 100 milliliters of whole blood).

The Toxicology Unit does not conduct employee screening for controlled substances or participate in drug monitoring programs. Blood or urine samples related to such programs will not be accepted for analysis.

The Office of the Chief Medical Examiner conducts all analyses related to death investigations. Postmortem evidence, including drug paraphernalia and controlled substances found with a deceased person, should be submitted to the Toxicologist in the Chief Medical Examiner's Office.

Blood Specimens

Please observe the following guidelines when submitting blood for analysis:

- Submit all blood in commercially available kits such as *Vacutainer* or *Venoject*. Use only kits which contain a preservative and an anticoagulant (gray top test tubes).

- Do not submit dried blood samples. The Toxicology Unit cannot test dried blood samples for alcohol or drugs.

- Be sure the person taking the blood sample does not leave the needle or other unnecessary items in the kit.

- Use the protective packaging included with the kit for submission to the Toxicology Unit of the Drug Chemistry Section.

- Collect 20 ml of blood in two 10 ml test tubes from the suspect as soon as possible after the incident in question.

- Do not send blood collection kits from different suspects as part of the same evidence submission.

- Blood samples need to be protected from heat, and storage in a refrigerator is recommended.

- Indicate any suspected controlled substance being used by the suspect on the SBI-5 when submitting the suspect's blood for analysis.

- After the analysis is completed, blood samples in DWI cases are retained in the laboratory for a period of sixty days and then destroyed, unless otherwise requested by the submitting agency.

- Please note that blood-alcohol analyses conducted by hospitals often give higher concentration values than those conducted by the Toxicology Unit because hospitals use blood serum instead of whole blood for their analyses.

Urine Specimens

- Collect and submit urine and blood samples in drug facilitated assault/rape cases.

- Do not submit urine samples for DWI cases, except when testing for GHB (gamma hydroxy butyric acid) is requested.

- Use a leak proof container placed in a zip-lock type plastic bag when submitting a urine sample.

- Collect at least 20 milliliters of urine for analysis.

Report Interpretation

The Drug Chemistry Section reports analysis results as follows:

- Blood-alcohol concentrations are reported as grams of alcohol per 100 ml of whole blood.

- Any weight listed on the laboratory report shows only the weight of the material identified and does not include the weight of the bags and containers.

- The report of a "trace" or "residue" amount of a controlled substance when a non-controlled substance is the major component indicates that the material or packaging had at one time been exposed to that controlled substance, and still has residual amounts of the controlled substance present. The controlled substance could have originated from outside sources, including contaminated utensils used in drug processing.

- Particular salt forms of a drug are not usually reported. For example: morphine sulfate, cocaine hydrochloride, or methamphetamine hydrochloride would generally be listed on the laboratory report only as morphine, cocaine, or methamphetamine, respectively. The form of cocaine more commonly known as "crack" will be listed as cocaine base when such identification is possible.

- Alcohol concentration for liquor submission are reported as a percent by volume. To convert the concentration to "proof," double the percent concentration (e.g., 80 percent by volume equals 160 proof).

Latent Evidence Section

Capabilities and Services

The Latent Evidence Section provides assistance in the analysis of any item of evidence which falls into one or more of the following categories:

- **Latent Fingerprints**
- **Latent Palmprints**
- **Latent Footprints (bare feet)**
- **Footwear Impressions**
- **Tire Impressions**
- **Other Impressions (gloves, etc.)**

Although the term “latent” refers to hidden or invisible impressions, the Latent Evidence Section also accepts and analyzes “patent” (visible) impressions. Please note that throughout the following guidelines, “latent” refers to both visible and invisible impressions.

Latent fingerprints, palmprints, and footprints can be of sufficient value for *positive* identification purposes. Such evidence can indicate that a subject’s finger, palm, or foot *did* make the impression in question, based on the scientific improbability of two friction ridge skin formations being exactly the same.

Although positive identifications can be made in footwear and tire track cases, these impressions are of less value, as these examinations relate only to tires and footwear and not to specific individuals. On much the same premise as fingerprint identification, tire and footwear examination results are judged on a track’s uniqueness, individuality, and class characteristics.

In conjunction with the Office of the Chief Medical Examiner, the Latent Evidence Section provides assistance in the identification of unknown deceased individuals. For such assistance, contact the Latent Evidence Section on a case-by-case basis.

The section also provides limited technical field assistance in the collecting of latent prints, footwear impressions, and/or tire impressions. Please contact the appropriate SBI District Office’s Crime Scene Search Specialist and allow him/her to review the scene and to determine if additional laboratory assistance is required.

Evidence Submission

Latent Fingerprints, Palmprints, and Footprints

Some of the factors affecting latent prints and their quality include the surface material containing the latent print(s); the amount of perspiration, oils and foreign matter on fingerprint ridges; weather conditions; pressure; duration; and the handling of the item containing the latent fingerprint(s). Latent prints are very fragile and can easily be destroyed; therefore, extreme care should be used when handling any item suspected of containing latent prints.

- ❖ Send all inked fingerprints used for latent comparison purposes *directly* to the Latent Evidence Section to ensure proper chain of custody.

- ❖ Submit a suspect's full name, race, sex, state identification number (SID), *and* date of birth. If inked impressions are not submitted with the evidence, the SBI files will be checked.

- ❖ If it is necessary to have the FBI Identification files checked, please notify the examiner.

- ❖ When possible, collect a set of inked impressions specifically for latent print examination.

- ❖ Always process surfaces suspected to have been handled, even if the evidence has a surface believed to be a poor medium for latent prints. Most fingerprint technicians have been surprised at one time or another by a surface from which an identifiable latent print has been recovered.

- ❖ Develop a routine or pattern in fingerprint processing to ensure each scene is completely examined. Entrance and exit areas, if known, are of primary importance. **First**, search the scene for tire and footwear impressions, then for latent prints. Also, examine other areas believed to have been occupied by the perpetrator(s).

- ❖ Articles that appear to have been moved or disturbed may also indicate a perpetrator's movement. However, the perpetrator may have been careful not to leave impressions, so make attempts to locate and process any articles left by a suspect.

- ❖ Most crime scene processing for latent prints consists of using photography and powders. Latent print processing with powders involves the gentle application of powder to the slightly adhesive skin oils left on the surface of non-porous items.

- ❖ Apply powder with a brush dipped in fingerprint powder, or use a magnetic wand dipped in special magnetic powder. Generally, black will be the only powder color needed, even on black or dark colored items (the latent prints will actually be grayish in color when developed). **Please note that black fingerprint powder is generally easier to use than silver or fluorescent powders as these powders have a tendency to coat the surface area as well as the latent prints making differentiation of the latent prints from the background more difficult.**

- ❖ Powdering and lifting latent prints takes practice, and we recommend that training include a variety of shapes and surfaces likely to be encountered at a crime scene. Remember, once a print is destroyed, it *cannot* be reconstructed.

- ❖ After a print is developed on a non-porous surface, photograph it if equipment is available, being sure to **include a scale in the picture** so that the print may later be restored to accurate size.

- ❖ Now, lift the developed print with fingerprint tape. Smoothly place the tape onto the print and press to eliminate wrinkles and air bubbles which would interfere with the pattern. **DO NOT leave the tape on the item.** Carefully peel the tape off in one continuous motion, and smooth it onto a contrasting lift card surface.

- ❖ A thicker, more pliable fingerprint tape (polyethylene tape) is now on the market. This product allows the lifting of latent prints from curved surfaces without wrinkling.

- ❖ Supply the following information on all lifts:

1. the name (or initials) of the individual making the lift,
2. the date the lift was made,
3. a case number or other identifying number, and
4. an indication of where the lift was obtained.

- Be sure to mark an "X" over any prints left on the tape by the lifting officer.

- Porous or absorbent surfaces, such as paper and unfinished wood, ordinarily cannot be processed with powders, as skin oils soak in and are not left exposed to the powders. Chemical processing in the laboratory and photography to preserve the image can make such prints visible for comparison. Due to the necessity for photographing these reactions, and the danger of the chemicals involved, such processing must be done in a laboratory.

- Various laser and light source instrumentation is available in the SBI Crime Laboratory. The equipment has limited capabilities in field situations, and is best utilized in a controlled environment.

- In general terms, any item that experience tells you is a difficult surface for latent prints should be submitted to the Latent Evidence Section for processing.

- The method of analyzing an item of evidence is determined by the analyst assigned to each case. In the event that special circumstances exist which cause you to request a specific type of analysis, please attach a letter of explanation.

- For wet items, the best results will be obtained in the laboratory. Allow wet items to air dry naturally. **Do not dry with forced hot air** (e.g., hair dryer). Do not attempt to powder process a wet item of evidence. Do not package a wet item of evidence.

- In the event that you *must* process a wet item for latent prints, the Latent Evidence Section recommends the use of Small Particle Reagent (SPR).

- **DO NOT** process or attempt to lift prints in blood. Allow bloody items or prints to air dry naturally. Do not dry with forced hot air (e.g., hair dryer). **Do not use "super glue" on bloody prints**, as this may interfere with biological examination.

- Only when a specific item of evidence cannot be submitted should an attempt be made to process a bloody print. Please call the Latent Evidence Section on a case-by-case basis.

- Please note that there is no scientific method for determining the age of a latent print.

NC Automated Fingerprint Identification System and FBI Integrated Automated Fingerprint Identification System

The Latent Evidence Section provides local agencies with access to the state's Automated Fingerprint Identification System (AFIS) as well as the FBI's Integrated Automated Fingerprint Identification System (IAFIS). The AFIS computer stores images of most of the ten-print fingerprint cards on file at the State Bureau of Investigation. The IAFIS computer stores most criminal fingerprint cards maintained by the Federal Bureau of Investigation. These criminal fingerprint cards can be transmitted to the Latent Evidence Section via the internet.

The AFIS computer can search a latent fingerprint from a crime scene against all criminal fingerprint cards stored in the system. If the person who left a fingerprint at a crime scene has a prior criminal record, and fingerprints from that record are stored in the AFIS, the SBI may be able to identify the latent print and provide the name of a potential suspect.

The IAFIS allows for latent fingerprints to be searched nationally. If a person has a criminal record in another state the SBI may be able to effect an identification to that individual.

Please note that the North Carolina AFIS and the FBI's IAFIS currently *cannot* search palmprints; the joints, sides or tips of fingers; or footprints.

In addition, do not assume that a crime was committed by someone who does not have a prior record simply because the AFIS and/or IAFIS do not identify the latent fingerprints submitted from a crime scene. Not all criminal fingerprint cards are loaded into the AFIS and/or the IAFIS, and depending on the quality of the fingerprint card entered into the AFIS and/or IAFIS, it may be impossible to match a particular individual's fingerprints with those left at a crime scene.

AFIS Evidence Submission

- The NCSBI Laboratory requires the submission of elimination inked impressions in all simple, property type crimes. **Any case of this type which is submitted without elimination inked impressions will be evaluated and compared to any available known standards; however, no search will be conducted of the AFIS/IAFIS until elimination prints are submitted.** The submitting officer will be notified by report that elimination prints are needed and the case may be resubmitted once elimination prints are obtained. Further, the Crime Laboratory recommends that elimination prints be submitted in all cases when feasible.

- Submit latent fingerprints for AFIS/IAFIS searches with a completed evidence submission form (SBI-5) to the SBI Evidence Control Unit.

- When completing the required submission form, provide all requested information concerning potential suspect(s). If known, include the gender (sex) of the suspect(s), the race of the suspect(s), or any other type of descriptive information.

- Any questions concerning the submission of AFIS/IAFIS latent print searches should be directed to the SBI Latent Evidence Section.

- Process arrest fingerprint cards through the Criminal Information and Identification Section. Please note that arrest fingerprint cards are for recording purposes only. Arrest fingerprint cards are not treated as evidence, and no chain of custody is recorded while they are being processed.

- Arrest fingerprint cards may not be acceptable in court without a stipulation by the defense, so do not submit routine arrest criminal fingerprint cards to the Crime Laboratory unless you intend for them to be used as evidence.

- Do not submit latent fingerprint evidence to the Criminal Information and Identification Section.

- Any questions concerning arrest fingerprint cards should be directed to the Criminal Information and Identification Section.

- ❖ In latent print cases, provide both entire fingerprint *and* palmprint impressions of the subjects involved. This is especially important in cases involving numerous latent prints. When fingerprinting someone, collect complete and legible prints. Please note that prints suitable for classification purposes are not always of sufficient quality for latent print comparisons.

- ❖ Prior to packaging evidence related to latent prints, conduct a visual examination for obvious latent prints. If any are observed, package the evidence in a suitable container that will prevent the impression from smudging or damage.

- ❖ Follow the Crime Laboratory's standard evidence submission procedures. **Check all packages for proper seals and sufficient labeling.**

- ❖ Hand-carrying fragile evidence to the laboratory is the best way to prevent damage.

- ❖ Remember not to package wet items. Air dry them and then package them in paper bags or cardboard boxes.

- ❖ The Latent Evidence Section will not accept controlled substances. Remove drug evidence from any container **PRIOR to it being** submitted for latent print analysis.

- ❖ Wear surgical (or smooth surface) gloves and handle evidence "lightly". Do not write on containers to be processed for latent prints. Place such items in a non-evidence container and label carefully.

- ❖ When submitting tape, package each strip or piece in separate containers to prevent the loss or cross-contamination of trace material, and to prevent pieces from adhering to one another.

Footwear and Tire Impressions

At many crime scenes, tire and footwear impressions are often as difficult to locate as fingerprints. Proper protection at the crime scene will reduce the chances of additional impressions being made by emergency and investigating personnel. Observant crime scene officers must seek out this evidence at all crime scenes.

- ❖ When obvious footwear and tire impressions are located, check the personnel and vehicles present, as often these impressions can be eliminated.

- ❖ Entrance and exit areas are good places to check for footwear and tire impressions. Sometimes, doors are kicked and items inadvertently stepped on. Consider such possibilities during crime scene processing.

- ❖ Elapsed time between when an impression is left at a crime scene and when the shoes or tires are collected can greatly affect the laboratory's ability to conduct a conclusive examination. Collect known shoes and tires as soon as possible, and include the elapsed time between the offense and evidence collection when submitting items to the laboratory.

- ❖ In all instances, attempt to obtain tires or footwear from those involved. Submit *both* shoes or boots, and any tire consistent with the questioned tire impression. Mark all submitted tires as to their location on the vehicle. If tire tread differs on any of the wheels, only submit those tires exhibiting a similar tread design as the evidence.

- ❖ Please do not make impressions of shoes, boots, or tires being submitted to the laboratory.

Such “known standard” impressions are better done in the laboratory where care of such evidence can be assured, and trace material can be controlled. The only exception would be if you are trained by the SBI in making tire tread standards.

- When footwear impressions are located on hard surfaces, occasionally they can be enhanced by fingerprint powder. This process can be detrimental to the impression, so great care should be taken when applying the powder. Always photograph any visible impressions prior to processing. If at all possible, seize the item in question and protect the impression. Transportation to the laboratory is often justified in these cases so that evidence can be more elaborately processed and examined.

- In instances of dust prints, the impressions can be lifted with special gelatin lifters. Photographs of these impressions are important, as the lifts sometimes do not have sufficient contrast to conduct a comparison. In all photographs, aim the camera perpendicular or at a 90 degree angle to the impression and provide a scale. Show the center of the impression in the center of the frame to reduce distortion. Be sure the scale is not on or in the impression. Dust impressions should be submitted in a folder and then placed in an envelope. **Dust impressions should never be placed in a cardboard box.**

- Each SBI District Office’s Crime Scene Search Specialist is equipped with an electro-static dust print lifter, a very good method for collecting dust impressions from smooth surfaces. To request this assistance, contact the SBI District Office in your area.

- Photograph impressions in soil or soft material such as sand or mud, and then cast the impressions using dental stone. Place a scale in the photographs at the same level as the impression, taking care not to cover an area that may be useful for identification purposes.

- When photographing impressions, always:

    1) Use a scale and take the photograph perpendicular or at a 90 degree angle to the impression.
    2) Fill the viewfinder of the camera with the impression (i.e., get as close as possible).
    3) Submit negatives of impressions as evidence to the Latent Evidence Section.

- Casting soil or soft material impressions involve a process of mixing the dental stone, pouring the dental stone into the impression, and making the proper identifying markings. As in fingerprint processing, this technique can be perfected through practice and experimentation.

- The SBI Crime Laboratory recommends using dental stone to cast soil or soft material impressions. Plaster shrinks as it dries and can cause problems in comparing questioned impressions.

- Package footwear or tire impression evidence in a strong cardboard or wooden box. Cushion well with a suitable packing material. Dust impressions are the exception, as previously discussed.

- Do not clean casts. Damage to the cast or loss of crucial detail may occur.

- Package items of evidence immediately in separate containers to prevent loss or cross-contamination of trace material.

- Due to the fragile nature of footwear and tire impression evidence, please hand-carry it to the laboratory. If such evidence must be mailed, take extra care in packaging it.

- Contact the SBI Crime Laboratory if you have any questions. Latent evidence analysts are happy to respond to any questions or concerns you may have about evidence collection and submission.

Report Interpretation

A latent print report lists the evidence processed and the results of the examination. A latent print that the examiner thinks can be identified, should the inked impressions of the corresponding area be available, is an “identifiable” latent print, or a “latent print of value for identification purposes”.

Reports with latent print identifications indicate the subject’s name, the finger or palm identified, and, when possible, the location of the print. The Latent Evidence Section attempts to return evidence as soon as the examination is completed, as the Crime Laboratory has insufficient storage space to keep evidence until court date.

Footwear and tire impression reports list the items submitted and the result of the examination and comparison. There are four conclusions that may be drawn by comparing footwear or tire impressions:

- **The questioned impression is identified as having been made by the known shoe or tire.** (In this case, the examiner notes a sufficient number of individual, unique identifying characteristics in the same relative position on both the known and questioned impression.)

- **The questioned impression is not consistent with having been made by the known shoe or tire.**

- **The questioned impression is consistent with having been made by the known shoe or tire, or any other shoe or tire of the same or similar design.**

- **The questioned impression is of insufficient detail to conduct a conclusive comparison.**

Evidence in all cases is usually returned to the requesting officer. In the event evidence is retained for pickup, please make arrangements to pick it up as soon as you receive the report.

TRACE EVIDENCE

Due to the wide variety of evidence analyzed in the Trace Evidence Section, this section of the Evidence Field Guide is arranged in the following order:

1. CAPABILITIES AND SERVICES

2. PARTICLE EVIDENCE

3. STANDARDS

4. FIBERS

5. HAIR

6. PAINT - AUTOMOBILE PAINT AND OTHER PAINT TRANSFERS

7. AUTOMOBILE PARTS

8. LIGHT BULB FILAMENT EXAMINATION

9. GLASS EVIDENCE

10. GUNSHOT RESIDUE ANALYSIS

11. ILLEGAL BURNINGS AND ARSONS

12. EXPLOSIVES

13. EXPLOSIONS AND SUSPICIOUS WHITE POWDERS

14. SCANNING ELECTRON MICROSCOPE AND ENERGY DISPERSIVE X-RAY SYSTEM

15. PHYSICAL MATCHES

16. METALS

17. PEPPER SPRAY

CAPABILITIES AND SERVICES

The Trace Evidence Section deals with a wide variety of evidence not examined by other sections of the laboratory. Most of this evidence is very small and is not obvious to the investigator at a crime scene. The purpose of this section is to identify these materials and compare them to a suspected source.

The Trace Evidence Section normally analyzes accelerants, gunshot residue, hair, fibers, paint, glass, metals, explosives, physical match examinations, headlight filament examinations, and pepper spray. Analysis of unusual evidence such as feathers, wood, and plant material can be arranged.

The characteristics of trace evidence found at a crime scene can be determined and can be compared to the characteristics of a material of known origin to determine whether the evidence found at the crime scene could have originated from the material of known origin. The value of trace evidence is influenced by the distribution of the material of known origin; in other words the rarer the material of known origin, the more valuable the evidence could be. The significance of this type of evidence is also limited by the amount of trace evidence found and the number of its characteristics that can be determined in the laboratory. The value of trace evidence can be strengthened when several types of trace evidence are found in one place. For instance, certain types of paint, glass, and wood may be fairly common individually, but if a suspect has some of each of these on his clothes of the same type found at a burglary scene, the chances are reduced that he accumulated this combination of materials innocently.

The following pages of this guide discuss different types of trace evidence that may be found at a crime scene, the proper way to collect and package trace evidence, and how to interpret the results of reports received from the laboratory when trace evidence is analyzed.

PARTICLE EVIDENCE

Particle evidence can help establish contact between two items, such as between a suspect's clothing and a broken window or between a car hood and a hit-and-run victim's clothing. Particle evidence involves demonstrating the presence of common material, often of small size, implying transfer of the material from one object to the other.

Several types of particle evidence may occur on the same item, so generalized handling rules apply to articles to be examined for transferred particles. Some types of particle evidence require additional special considerations, which will be outlined following these general rules:

Since particles tend to be of small size, exercise great care not to lose particles or to transfer material between two items to be analyzed.

Submit an entire questioned item when possible.

Do not attempt to remove possible transferred evidence by shaking, brushing, or picking.

Package each item individually in a container with leak-proof seams. **Do not use plastic bags or boxes**, particles may cling to them because of static electricity present and be lost. Seal all openings and seams thoroughly.

When an entire item cannot be protected or submitted, collect any visible foreign matter with the fingers or tweezers and package it in a suitably sized container such as a pill can or paper envelope (seal all openings).

Microscopic particles may, if necessary be collected using sticky tape. Use tape with a methanol (alcohol) soluble adhesive (3M tape no. 902). Call the laboratory for sources of this type of tape.

After collecting the particles, place the tape immediately into a clean zip-lock or cellophane bag and seal the bag. **Do not wad the tape or fold the adhesive sides of the tape together**. Do not allow the tape to stick to paper or cardboard. **Do not collect paint chips with tape**.

When submitting clothing worn by a suspect or victim, have the wearer remove the clothing while standing on a piece of clean paper large enough to catch any falling debris. Brown wrapping paper is ideal; do not use newspaper. Carefully shake the debris to the center of the paper, and fold the paper into thirds and seal all the edges.

Package each item of clothing separately, with a detailed description of the manner in which the suspect/victim was dressed--what was worn over what, if the jacket or shirt was open or closed, and so forth.

STANDARDS

Standards represent the source of suspected transferred particles, such as walls, carpets, bedding, soil, ground debris, and so on. Analysts need standards to determine what types of particles were available for transfer and to compare with any found on questioned items.

Collect standards from all items that could have been involved in either a primary (direct contact) or secondary transfer (from an article contacted by both suspected and known items).

Where a mutual transfer is suspected, treat both items as questioned.
Follow the packaging directions outlined in the section on PARTICLE EVIDENCE.

Whenever possible, submit the entire item.

When it is not possible to submit the entire item, collect a representative sample of as large a size as needed to show any variation in the item.

FIBERS

Fiber evidence can help criminal investigators resolve suspect identity, establish a sequence of events, corroborate witness information, identify murder weapons, and establish leads in a case.

Fiber evidence can be found at the scene of various types of crimes, such as murder, rape, burglary, arson, hit-and-run, drug trafficking, and even extortion.

Some types of fiber evidence that may be found at a crime scene or on or about a suspect:

clothing
carpets
bedding
fibers in hair, under fingernails, or on the body
wigs
masks
gloves
yarn fragments (at the point of entry)
buttons
ropes and twine
tape
burned fabric
fabric impressions
fibers on weapons
fibers under tape or envelope flaps
cloth sacks
fibers on bumpers or fenders (in hit-and run cases)
plastic bags

Obtain fiber evidence as soon as possible to prevent loss or contamination of the evidence. Consider fiber evidence a primary source of information, not as a last resort.

Take precautions to prevent contamination of fiber evidence:

- Do not interview the victim(s) and suspect(s) in the same areas.
- Keep the crime scene clear of unnecessary personnel.
- The suspect should never be brought back to the crime scene.
- Officers who have had contact with the suspect should not be allowed to participate in the search of the crime scene.
- Clothing items from the victim and the suspect should not be allowed to rest on the same surface before packaging.
- Each item of evidence should be packaged separately as soon as possible.

Clothing and bedding should be placed in paper bags or cardboard boxes, taped securely, and then submitted to the laboratory.

Standards should be collected from larger items such as carpet or upholstery during the initial search of the crime scene. These items may not be available at a later date.

Yarns and larger fibers that can be easily seen can be collected using tweezers. The evidence should be placed into a container of suitable size and taped securely.

Fibers may be collected from larger areas, such as car seats, using tape. Use tape with a methanol (alcohol) soluble adhesive (3M tape no. 902). Call the Trace Evidence Section for sources of this type of tape.

After collecting the fibers, place the tape immediately into a clean zip-lock or cellophane bag and seal the bag.

Do not wad the tape or fold the sticky sides of the tape together.

Do not allow the tape to stick to paper or cardboard. **Never vacuum**. Vacuum sweepings collect "too much" evidence and reduce the evidentiary value of trace evidence.

When collecting ropes or cords, clearly identify cut ends. Protect knots; do not untie them.

HAIR

Hairs may be transferred from one person to another in contact crimes. At the laboratory, hair analysis involves a microscopic comparison of questioned hairs to known hair standards from the victim(s) and suspect(s). The analyst then determines whether the hairs are consistent and if they could have originated from the same source.

Collection of Hair for Analysis

Hair examinations are done by making comparisons of *head* and *pubic* hair collected from the victim and the suspect to the questioned hairs. Hairs from other parts of the body lack sufficient identifying features to be submitted for comparison (e.g. arm, chest, beard, or leg hairs). Please note that age and gender cannot be determined by hair analysis.

Collecting Standards

> Collect hair standards by plucking and/or combing a total of *50 full length hairs* from the head and pubic area only. Because hair characteristics may vary over the head and pubic region, investigators must collect the hair standards from various areas of each region. For example, comb and/or pluck hairs from the front, top, back, and sides of the head. *Never* collect hairs from one spot only and never cut locks of hair. If the trauma of plucking would be too great, then the hairs may be cut just at the surface of the skin, one at a time. In sex offense cases (especially rape), collect pubic hair combings *before* collecting a pubic hair standard. Place head hair and pubic hair samples in carefully labeled separate envelopes. Make sure that the seals are secure to prevent contamination of the hair standards.
>
> Always attempt to collect and submit known hair samples from both the suspect(s) and the victim(s) as soon as possible. Hair analysis without suspect and/or victim hair standards provides very little evidentiary information. Therefore, proper standards should *always* be collected. If possible, determine if an individual has dramatically altered their hair length or color after the date of the offense.

Collecting Hair Evidence

Tweezers: Hairs found at the crime scene or otherwise related to a criminal act may be collected using tweezers and placed in envelopes. When using tweezers, be sure not to squeeze the tweezers so hard that the hair is crushed or damaged. To make it easier to see hairs on a surface, hold a light source (such as a flashlight or lamp) at an angle to the surface being examined.

Taping: The laboratory will only accept tapings collected using 3M methanol soluble tape (# 902). Call the Trace Evidence Section for sources of this type of tape. Wrap the tape around your hand and pat the surface where hair evidence may be located. Then place the tape immediately into a clean zip-lock or cellophane bag and seal the bag. Do not wad the tape or fold the sticky sides of the tape together. Do not allow the tape to stick to paper or cardboard.

Vacuuming: These are not examined on a routine basis and are only examined with the prior approval by the Special Agent in Charge of the Trace Evidence Section.

Bulky Items: Due to the limited personnel resources in the SBI Laboratory, agencies are requested to tape bulky items (ex: clothing, bedding, furniture) for hair examinations. Exceptions to the above must be approved by the Special Agent in Charge of the Trace Evidence Section.

Wrap or bag each item of evidence separately for transportation to the laboratory to prevent hairs on one item of evidence from being transferred to another. Hairs are durable and can be easily transported without damage as long as they are not crushed (e.g., by being placed under a heavy object).

Collection of Sexual Assault Evidence Collection Kits by Medical Personnel

Frequently, medical personnel will collect sexual assault kits, which include pubic hair combings and hair standards, for investigators. In the event medical personnel seem unfamiliar with evidence collection, let them know that there is an instruction sheet contained within the kit. Emphasize the necessity of collecting proper head and pubic hair standards.

DNA Analysis

Positive hair associations are automatically evaluated for DNA analysis, it does not have to be requested. Therefore, known hair standards MUST be submitted with the evidence, as well as a DNA standard (cheek scraping). If hairs of evidentiary value are found, and if a suitable root is present, then the root will be removed and transferred to the DNA unit. If no suitable root exists, then the hair evidence will be sent to the FBI lab for mitochondrial DNA analysis (or to a private lab if requested). It should be noted that if DNA analysis on any evidence in the case is being conducted in Forensic Biology, no hair evidence will be examined. This is because DNA analysis is more conclusive than hair analysis. However, if Forensic Biology does not find any DNA evidence of value, then the evidence should be submitted to the Trace Evidence Section for hair analysis.

In rare instances in non-suspect cases, hair may be approved for a CODIS search. This must have prior approval by the Special Agent in Charge of the Forensic Biology Section.

PAINT

Paint chips and smears may be transferred whenever a painted surface comes in contact with an object or a person. Hit and run situations and breaking and entering are the two most common criminal activities that are likely to involve paint transfers. Paint evidence is significant due to varying layer sequences, differences in chemical composition, and other physical characteristics.

Automobile Paint

- For a typical automobile collision, collect a minimum of four samples for submission: a standard from each vehicle involved and a questioned sample from the damaged area of each vehicle.
- Standards should be collected from the area immediately adjacent to the damaged area. It is especially important to collect paint standards from each panel of the car that is damaged, since bumpers, hoods, doors, etc. may have different types of paint even though they are the same color.
- When contact occurs between an automobile and a person, submit the individual's clothing and any other personal items which may have been involved. Submit clothing in paper bags.
- Be sure to provide the paint examiner with the following information: color, make, model of vehicle and the location of damage on each vehicle. Try to include a brief summary of how the accident happened.

Other Paint Transfers

- Burglary tools, such as screwdrivers and crowbars, may retain paint traces. Whenever possible, submit the entire tool.
- Painted windows and door frames often have many layers of old paint. Submit wood sections containing all the paint layers.

Smears

- Paint smears are also useful evidence. If possible, submit the entire object containing the smear (i.e., car bumper, mail box post). If this is not possible, carefully remove a portion of the object leaving the smear attached.

Collection

- Using a razor blade or knife, cut all the way to bare metal (or other substrate) to obtain whole paint chips. Sometimes cutting a wedge-shaped chip is easier. It should be noted that automobiles often have at least four layers of paint, so it is important to be sure that all of the layers are collected.
- Paper folds make the best container for paint chips. Paper envelopes are also acceptable if all four corners and the flap are properly sealed.
- Plastic bags should not be used for paint chips or smears because the paint will develop a static electrical charge making it more difficult to handle.
- Metal canisters may be used as containers for paint evidence, but they are not preferred because small paint chips tend to be trapped in the tape used to seal the canister.
- Never use tape to collect paint chips, smears, or standards.

AUTOMOBILE PARTS

Collisions are violent and oftentimes pieces break off of the suspect vehicle and remain at the scene. Therefore, the scene should be searched for broken automobile parts, such as turn-signal covers, chrome strips, large paint chips, metal parts, and/or decorative items.

- The part may be physically matched back to the suspect vehicle providing proof that the vehicle was at the scene of the accident.
- If there is no suspect vehicle, the make, model, and year of the vehicle from which the part originated may be able to be determined.

LIGHT BULB FILAMENT EXAMINATION

Light bulbs are examined in an effort to determine if the lamp was “ON” or “OFF” at the time of a motor vehicle accident. Headlights, parking lights, brake lights, turn signal lights, and marker lights can be examined. These bulbs are usually from but are not limited to automobiles and motorcycles. The filament area of the bulb is the most valuable part for laboratory analysis, and even small pieces of the remaining filament can yield valuable information.

Officers should be careful to prevent further damage when removing bulbs from vehicles. The remains of headlight bulbs should be removed and placed filament first into a Styrofoam cup. Tape can then be placed over the back side of the bulb to attach the bulb to the cup. Smaller bulbs can be packaged in a cup or small box that is padded with tissue paper. When necessary to prevent damage to the bulb, the entire lamp assembly should be removed by cutting connecting wires. The assembly can be placed in a padded container such as a box filled with tissue paper or bubble wrap. Take extra care to prevent damage to the filaments. Be sure to collect all of the bulbs from the impact area. Package each bulb or assembly separately. All properly packaged items from the same case can be placed in a cardboard box with appropriate padding. Since mailed packages often encounter extensive damage, it is suggested that properly packaged items be personally delivered to the laboratory.

GLASS EVIDENCE

When a window is broken, glass fragments rebound away from both sides. Fragments can be found in the hair or clothing of the suspect or victim as well as embedded in the object used to break the window. The most common types of cases with glass evidence are hit-and-run and breaking and entering.

- *Hit-and-Run:* In these cases, glass can be found on the clothing of the victim, at the scene, and possibly on the clothing of the suspected driver. The clothing of the victim and/or suspect should be collected as soon as possible by following the instructions in the “Collecting Glass” section below. ALWAYS submit a standard sampling of glass from the broken window/windshield. If the headlight casing on the suspect vehicle appears to be made of glass, it may be possible to match glass from the headlight casing to glass fragments found at the scene (see the “Physical Match” section below).

- *Breaking and Entering:* In these cases, glass can be found on the suspect’s clothing and sometimes on the object used to break the window. The clothing of the suspect should be collected as soon as possible as described under the “Collecting Glass” section below. The object used to break the window should also be collected. DO NOT attempt to remove the glass fragments from the object. ALWAYS submit a standard sampling of glass from the broken window. There are cases in which the window can be reconstructed to determine direction of force and order of impact, please see the "Physical Match" section below for

collection instructions. Direction of force can not be determined for tempered glass (ex: vehicle side and rear windows)

Types of Glass Evidence:

- *Vehicle side and rear windows:* Made out of tempered glass which causes the glass to dice when broken.
- *Vehicle windshields:* Constructed with a layer of plastic sandwiched between two panes of glass. This keeps the window from shattering during an accident and causing further injury to the occupants.
- *Headlights/Taillights:* Some vehicles also have glass headlights; many newer models have plastic headlights. It is difficult to perform analyses on headlight glass because its properties vary across the lens. The best way to work with headlights/taillights is by physically matching fragments from the scene or victim back to the suspect's vehicle.
- *Architectural glass:* What we commonly think of as windows, such as those used in houses and businesses. This type of glass shatters into large sharp pieces when broken. Additional analyses can be performed on this type of glass as described in the "Physical Match" and "Glass Fractures" sections below.
- *Container glass:* Used for products such as soda bottles, drinking glasses and pitchers. Physical match analysis can be performed on this type of glass as long as there are fragments of sufficient size.

Types of Glass Analysis:

There are several types of glass analysis performed at the laboratory, but not all pertain to all types of glass. Usually, glass analysis consists of visual examination, elemental analysis and refractive index measurements. However, some types of glass can allow the examiner to perform additional analyses such as physical match, direction of force and order of impact.

- *Visual examination:* Visually viewing the glass for its macroscopic properties such as color, thickness, and type. This can be done on almost all glass, except for very small fragments.
- *Elemental analysis:* An instrument reports the composition of different elements that make up the glass. The ratio of these elements is used to compare the questioned and known glass. This can be done on most glass, except for very small fragments.
- *Refractive index:* An instrument reports the optical properties of the fragment, which is used to compare the questioned glass to the known glass. This can be done on most glass, except headlights/taillights which vary significantly across the lens.
- *Physical match:* This is the best type of glass evidence because it positively identifies the questioned fragment as coming from the known source. Make sure that all fragments are collected. Physical matches can not be done on tempered glass (ex: vehicle side and rear windows).
- *Direction of force:* This can only be determined for architectural windows. It can not be done on tempered glass.
- *Order of impact:* Again, this can only be determined for architectural windows. It can not be done on tempered glass.

Collecting Glass

- *Standards (known glass):* ALWAYS collect a standard of the broken glass and make sure it is properly labeled as a standard. If more than one window is broken, collect and package them separately. If windshield glass is being collected, be sure to get both glass layers and label which was the outside/inside layer. The best packaging material for glass is metal tins, boxes or manila envelopes. If an entire window is being submitted, the best way to package it is in a flattened cardboard box with all the sides sealed.

- *Questioned Glass:* Glass evidence must be packaged carefully and sealed so that it does not escape through small holes or cause injury to those handling it. Glass is best when packaged in metal tins, boxes or manila envelopes. Make sure the packaging notes where the glass was found and whether or not it is a standard. Do not use envelopes for large pieces of glass. Wrap each large piece separately in cardboard and package tightly to prevent breakage.

- *Clothing:* To collect clothing, have the subject stand over a large piece of paper and carefully remove their clothing. Package the clothing with the paper together in a paper bag or box. Make sure that all sides of the bag or box are sealed properly. Glass fragments can also be found in the hair or skin of the subject and should be collected with the location noted. Shoes can be collected but since they come into frequent contact with many sources of glass on the ground, they are not considered the best source of evidence.

Physical Match

Some types of glass products fracture into fragments with can be physically matched together like a jig-saw puzzle. The examiner fits the pieces together by microscopically matching stress lines and breaks to positively identify the pieces as having been broken from a single pane, bottle or headlight/taillight.

- *Bottles and headlights/taillights:* Make sure to collect as many fragments as possible, as well as any possible sources of the glass. If significant portions of a bottle, headlight/taillight can be found and fitted together, leads concerning the type and manufacturer may be developed.

- *Architectural windows:* It is best to collect the entire window with the frame. The easiest way to package this is in a flattened cardboard box with all the sides sealed so that no fragments escape. Delivery is best when hand carried instead of mailed. Make sure to mark on the frame which side of the window faced the inside/outside of the structure and take care not to cause pieces to fall out while packaging. Also collect the glass fragments from inside the structure separately from those outside the structure.

Glass Fractures

Glass fractures form unique patterns, and examinations may result in valuable information as to the direction of breaking force or order of impact.

- *Direction of force:* Penetration of glass panes by bullets or high-speed projectiles produces a cone pattern from which the direction can be determined. Mark undisturbed pieces in the window as to “inside” or “outside” and submit all available glass so that enough pieces can be fitted together to identify the radial cracks near the point of impact and the point of impact itself. The direction of breaking force cannot be determined from tempered glass or very small panes of glass. Laminated glass, such as windshields, present special problems. If possible, submit the entire windshield.

- *Order of impact:* This type of analysis is most common with windows that have been shot several times. If enough pieces are physically matched together, it is possible to tell which bullet impacted the window first. This can not be done for tempered glass.

Glass Analysis Results

Unfortunately, due to the limited number of glass manufacturers, glass analysis cannot absolutely identify the source of the questioned glass to the exclusion of all others. This is because many companies that use glass in their products buy from the same manufacturer. The examiner can only conclude that the glass from the questioned source is or is not consistent with the glass from the known source. The only way to identify the source to the exclusion of all others is through a physical match. Also, there is no glass database for the examiner to use that will identify what make/model of car or manufacturer the glass fragment originated from.

GUNSHOT RESIDUE ANALYSIS

Gunshot Residue Kit collected from the Hands

When a firearm is discharged, three elements associated with gunshot residue - barium, antimony and lead - can deposit on the hand or hands of the person firing the gun. By measuring the concentrations and distributions of these elements on an individual's hands, as well as identifying characteristic gunshot residue particles that are present, the examiner attempts to determine if the subject could have fired a gun or been in close proximity to a firearm when it was discharged.

The collection of gunshot residue from the hands requires the use of a gunshot residue collection kit that utilizes both adhesive lifts and cotton swabs (combination kit). Contact the Trace Evidence Section for a list of current vendors that offer NCSBI approved collection kits.

In the use of all Gunshot Residue Kits the collection of gunshot residue should be conducted in accordance with the instructions provided in each gunshot residue kit.

When using the combination style kits, **first**, use the stubs with adhesive surfaces to collect residue for particle analysis.

Second, utilize the cottons swabs moistened with 5% nitric acid for bulk analysis. This second part of the GSR collection is only to be performed **after** sampling with the adhesive stubs. It should be noted that **TWO swabs should be used on each area of the hand (Two swabs for the control, two swabs for the left back, two swabs for the left palm, two swabs for the right back, and two swabs for the right palm).**

It is recommended that only individuals who have been properly instructed in GSR collection procedures conduct this test.

To avoid delay, provide all of the information requested on the data sheet enclosed with the GSR kit. On the rare occasions when required information cannot be provided, please indicate that on the data sheet.

Give special attention to the "Final Instructions" portion of the Instructions for Collecting Gunshot Residue" form.

In addition to the data sheet, also submit an SBI-5 "Request for Examination of Physical Evidence" form.

NOTE: In control test firings, it has been shown that the concentration of gunshot residue significantly declines after approximately 4 hours. In view of these findings, the SBI laboratory will not analyze samples taken more than 4 hours from live subjects conducting normal activity.

GSR from Clothing and Other Surfaces

This analysis is designed to determine the presence of characteristic gunshot residue particles on items that were near a firearm when it was fired. For instruction on this type of evidence, contact the laboratory or your district SBI crime scene agent.

Clothing for muzzle-to-target distance determination (i.e. having bullet hole(s) and/or shotgun pellet patterns) goes to the Firearms Section for analysis. The Trace Evidence Section does not analyze clothes from the victim of a gunshot wound.

ILLEGAL BURNINGS AND ARSONS

In many illegal burnings and arsons, petroleum products and chemicals are used to start the fires and/or increase the burning rate and damage from the fires. A careful examination of the fire scene by trained investigators can uncover points of origin, ignition sources, and accelerants. Suspected accelerant samples must be collected and preserved in proper containers to prevent evaporation and deterioration of the samples. Laboratory analysis of these samples can identify the accelerant used and support the investigators finding that the fire was intentionally set.

Site examination is particularly important in arson investigations since much of the evidence pertaining to possible cause is available only on-site. Arson examinations require highly specialized training and should be conducted only by investigators with appropriate experience.

For most fires, request assistance from the Fire Marshal, SBI arson investigators, or the SBI Crime Laboratory.

Guidelines to be used when collecting fire debris samples:

- Photograph the entire fire scene before removing any items. Give particular attention to suspected areas of fire origin.
- Search for unusual odors and burn patterns which may lead to the point of origin. Samples should be collected from these areas even if accelerant odors are not present and submitted for accelerant analysis.
- Samples should be packaged in airtight containers to prevent evaporation. Clean cans (new lined paint cans), glass jars, and nylon bags are the best containers.
- **DO NOT use paper or plastic bags.**
- Collect samples that are approximately the same size or volume as the container. For metal paint cans, the sample collected should fill approximately three fourths of the can. The headspace that is left at the top of the can is needed for extraction purposes.
- In samples where an accelerant odor is not detected, a DFLEX device, if available, may be added to the debris sample at the scene before sealing the container. This device adsorbs accelerants from the sample and reduces the chance of evaporation. **Follow the manufacturer's instructions when using DFLEX.**
- Do not place disposable gloves that were utilized in the collection of the evidence in the container with the collected sample.

- All containers can leak if not properly sealed. Be sure to clean the rim groove before placing the lid on a can. Completely seal cans and jars, and tape or heat-seal nylon bags. If you smell your sample when squeezing the container, the seal is not airtight. Be careful when selecting the type of container for the evidence. Sharp edges will easily puncture nylon bags resulting in the evidence not being capable of being analyzed. Also make sure the outside of the evidence is cleaned. Fire debris remaining on the outside of a metal can may cause the can to rust from the outside in.
- Suspicious containers found at the fire scene should be collected and if possible sealed with a lid or stopper. These containers should then be sealed in nylon bags.
- **Samples should be submitted promptly (ASAP) to prevent loss of accelerant.**
- When alcohols are suspected, this must be indicated on the "Request for Examination of Physical Evidence" form as additional testing is required.

Liquid Arson Samples

Liquid samples should be removed from large containers before submission to the laboratory. Place liquid samples in small glass or metal containers. Be sure to collect liquid samples from the top layer of the liquid, as the bottom layer of liquid is usually water.

Arson Standards

Comparison samples of liquids should be collected and packaged separately from debris samples. Control debris samples should not be taken from the fire scene unless they are requested by the crime laboratory.

EXPLOSIVES

Site examination is particularly important in explosive investigations since much of the evidence pertaining to possible cause is available only on-site. Explosive examinations require highly specialized training and should be conducted only by investigators with appropriate experience.

In the event of bomb threats or to recover undetonated explosives, including homemade explosives, propellants, or high explosives, request assistance from the SBI Hazardous Devices Unit. This unit can be reached by contacting the Intelligence and Technical Services Operation Center at 1-800-662-7610.

In post-blast situations, state and local law enforcement agencies can request crime scene assistance or expertise from the Trace Evidence Section of the S.B.I. Crime Laboratory.

EXPLOSIONS AND SUSPICIOUS WHITE POWDERS

Explosions may be classified in two general categories: (1) diffuse, which includes the explosion of gas mixtures and of dusts and (2) concentrated, which includes the explosion of such ordinary explosives as powder, dynamite, and nitroglycerine. Diffuse explosions occur over a relatively wide area, while concentrated explosions act at a point. This difference can be of the highest value to investigators since the first type is ordinarily of an accidental nature, while the second is more likely to be deliberate.

Mixing illuminating gas or the fumes of gasoline, ether, benzene, or other inflammable gas or vapor with air in proper proportions creates a highly explosive environment that may be ignited by a pilot light, match, spark, or any other local high temperature. A diffuse explosion will occur only when the composition of the gas mixture is within the explosive range. An unduly high concentration of either of the component gases as compared with the other, however, will not be

likely to provoke an explosion. Dust explosions are very similar in nature to explosions of gases and vapors.

Diffuse explosions generally result in erratic damage, blowing objects in random directions rather than in a definite and simple pattern. Diffuse explosions tend to blow exterior walls outward, crumple interior walls and deposit fragments in several directions. Diffuse explosions generally do not provoke local shattering and do not create a crater or area of special damage or discoloration.

Concentrated explosions can occur only through the action of explosives, such as powder, dynamite, nitroglycerine, and similar materials, which themselves constitute a complete explosive system. The materials are often termed "fixed" explosives, as no oxygen or other material is required to induce explosion. Concentrated explosions generally result in a violent rearrangement of elementary constituents and produce large volumes of gas which is heated and expanded by the heat of the reaction.

Compared with diffuse explosions, the forces of a concentrated explosion originate at a point, and all forces radiate from the point in three dimensions. Studying the pattern of an explosion may thus be important in determining the nature of the explosive material.

Explosives or objects suspected of containing explosives should only be handled by individuals with appropriate training and experience. **Please request assistance from the SBI Hazardous Devices Unit (1-800-662-7610).**

Please conduct investigations of explosions as follows:

Diffuse Explosions

- **Exercise care in moving about the site because secondary hazards (i.e., exposed electrical lines, ruptured gas lines, etc.) may be present.**
- If a diffuse explosion is suspected, attempt to determine its origin.
- Photograph and/or sketch the overall site and the presumed point of origin.
- Search carefully for the remains of fuses, wires, batteries, containers, and possible timing or triggering devices.
- Collect samples of the debris which has apparently been blown away from the presumed point of origin and fragmented into small pieces. Metal, wood, and glass are the best materials for examination.
- Provide photographs and a crime scene sketch along with the items submitted for analysis.
- When explosives are recovered, the Trace Evidence Section of the SBI Crime Laboratory should be contacted prior to submission.

Concentrated Explosions

- Exercise care in moving about the site because secondary hazards (i.e. improvised explosive devices [IEDS]) may be present.
- If the use of an IED or explosive ordinance is suspected, attempt to locate the seat of the blast (point of detonation). This is usually determined by characteristic cratering or areas exhibiting the most extreme physical damage.
- Photograph and/or sketch the overall site and the presumed seat of the blast.
- Search carefully for the remains of fuses, wires, batteries, containers (i.e. pipes, bottles) and possible timing or triggering devices.
- Collect samples of the debris which has apparently been blown away from the

presumed seat of the blast and fragmented into small pieces. Metal, wood, and glass are the best materials for examination.
- Provide photographs and a crime scene sketch along with the items submitted for analysis.

When bulk explosives, military ordinance, or IEDs that have been rendered safe are recovered, the Trace Evidence Section of the SBI Crime Laboratory should be contacted prior to submission.

Collected samples for both diffuse and concentrated explosions should be packaged in airtight containers to prevent evaporation or spread. Clean cans (new lined paint cans), glass jars, and nylon bags are the best containers.

Suspicious White Powders

Exercise care in the collection of suspicious white powders. The number one goal in the collection of this evidence is to contain and reduce accidental exposure to the substance. Utilize personal protective equipment to avoid exposure. Coordinate with the local health department or Public Health Regional Surveillance Team to determine if there is a credible biohazard threat. **If the suspicious white powder is thought to be biological in nature, contact the FBI Charlotte Field Office at (704) 377-9200 or the NC SBI at (919)662-4500 to initiate the HAZ-MAT response**.

The suspicious powder must be submitted to the N.C. State Lab of Public Health first to ensure that it is not biological in nature. **Contact the Bioterrorism and Emerging Pathogens Unit at (919) 807-8765 (Main Number) or (919)807-8600 (24 hours a day).**

Once the material has been analyzed by the Bioterrorism and Emerging Pathogens Unit and deemed to be non-biological in nature, the powder may then be submitted to the Trace Evidence Section of the SBI Crime Laboratory for identification.

All suspicious white powders should be packaged in “generalized triple packaging” as specified by the CDC for shipment of biological agents. This packaging consists of an inner sample biohazard bag or glass vial, an inner leak proof poly bag, and an outer Tyvek envelope. PAINT CANS SHOULD BE AVOIDED.

SCANNING ELECTRON MICROSCOPE AND ENERGY DISPERSIVE X-RAY SYSTEM

The Scanning Electron Microscope (SEM), equipped with an Energy Dispersive X-ray System (EDS), has become a versatile tool for all fields of science and technology because of its high magnification, its large depth of field, and its ability to perform elemental analysis rapidly without destroying evidence.

Typical applications include the following:

- Depth of field applications showing fracture edges and surfaces as well as geometric proportion comparisons.
- High resolution and magnification applications involving paint chips, hairs, fibers, crystalline structures, gunshot residue, and other particulate matter such as unknown powders and residue.
- X-ray capabilities for paint analysis (i.e., paint chips), crystalline structures, metals, gunshot residue, and a variety of particulate matter.
- Automated gunshot residue analysis of tape lifts from a subject’s hands.

Because SEM/EDS examinations are so sensitive to contamination, investigators should adhere to the following precautions and guidelines when collecting evidence to be submitted to the SBI Crime Laboratory:

- Treat all evidence as if it may be examined microscopically and elementally for extremely small particulate matter.
- Look for the smallest evidence and preserve it for laboratory analysis.
- Take care not to contaminate evidence.
- Provide detailed information in PART B (the *Description of the Incident* section) of the SBI-5 Request for Examination of Physical Evidence form, noting any unusual facts of the case or crime scene.

Results of SEM/EDS examinations will be considered with other instrumental examinations in forming the *Results of Analysis* portion of the Laboratory Report.

PHYSICAL MATCHES

The physical matching of one piece of evidence to another can establish that two items were once joined as one. If an article is randomly separated into two or more pieces during the commission of a crime, a jigsaw fit of the edges can show conclusively that the pieces were once joined. If a jigsaw fit is not possible, corresponding features on the pieces that show a pattern can be used to show that the pieces were once joined.

Physical matches are conclusive when performed on rigid items that are broken, such as glass, paint, wood, concrete, metal and some plastics. They may be less conclusive when performed on material that changes shape significantly under the stress needed to sever it, such as cloth, tape, threads, or soft plastic films.

Where a physical match is possible, collect the two (or more) pieces to be compared with great care to **avoid further fracture. Protect the pieces from damage in storage and in transport**. For large or unusual items call the lab for instructions.

METALS

Metals may leave chips, filings, or smears when they come in contact with other hard surfaces such as tools. Fracture matches can be attempted with larger fragments while the smaller metal samples can be analyzed to determine the base metals and impurities or alloys that make up the particles. When submitting metals particles for elemental analysis and comparison, the suspected source should be submitted along with the questioned metal particles.

Toolmarks occur readily on most metals and can provide positive proof of tool-to-metal contact. **Please note that the Crime Laboratory's Firearms and Toolmark Section analyzes toolmarks**.

PEPPER SPRAY

Oleoresin Capsicum canisters are routinely analyzed to determine the amount of pepper spray remaining in the canister and the functionality of the canister.
The following items need to be submitted:

- All of the canisters used in the incident under investigation.

- Any product information sheets or pamphlets available that describe the type of pepper spray being submitted.
- A minimum of one **unused** canister of the same brand, size, and type as the questioned canister. This is required for comparison. If another canister is not available, please contact the analyst ahead of time.

Clothing can also be analyzed for the presence of pepper spray. In these cases, however, it is mandatory that the canister involved in the incident be submitted as well.

DOCUMENTS AND DIGITAL EVIDENCE SECTION

The Documents and Digital Evidence Section is responsible for the scientific examination of all evidence in the form of questioned documents and digital evidence, such as computers and digital media. The Photography Unit and Graphic Arts Unit are also a part of the Documents and Digital Evidence Section.

Questioned Documents Unit

Evidence is submitted for document examination in cases such as forgery, identity theft, counterfeiting, embezzlement, homicide, suicide, anonymous writings, larceny, bomb threats, breaking and entering, etc.

Types of Analysis Performed by the Questioned Documents Section:

- Handwriting / Hand Printing
- Typewriting
- Charred Documents
- Photocopies (Machines)
- Indented Writing
- Paper Analysis
- Overwriting & Obliterated Writing
- Alterations
- Watermarks
- Printing (Machines & Instruments)
- Physical Match
- Check Writer Instruments
- Infra-Red Analysis
- Ultra-Violet Analysis

- Specialized Photography
- Stamped Impressions

Obtaining Known Writing

Handwriting identification depends on the **quality** and **quantity** of questioned writing and known standards submitted to the Questioned Documents Unit. Handwriting examination begins with the investigator and results obtained depend on how well he does his job in obtaining handwriting from suspects (known handwriting) for comparison with the questioned (disputed) writing.

The exemplars should follow the size, writing style, wording, type of paper and writing instrument as found on the questioned documents. Exemplars should be obtained from the subjects by dictating the verbatim text of the questioned material per exemplar paper. Fifteen (15) repetitions of the questioned material should suffice for examination purposes. Do not allow the suspect to see or copy the questioned document. Known standards must repeat the questioned writing.

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

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

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

Forms

Samples of the following forms may be obtained by contacting the Questioned Documents Unit at (919) 662-4500 ext. 1402.

A. SBI-130 (Handwriting Standards)

B. SBI-131 (Check Exemplar Forms)

C. Prescription Exemplar Forms

Typewriters and Check Writers

Submit typewriters and check writers in person to avoid damaging the machines.

Submit the typewriter and ribbon in question, if possible.
DO NOT clean or adjust the typewriter (typeface ball, bar or typewheel). Replace the ribbon before taking standards and submit the original ribbon in a separate envelope, labeled carefully.

If the typewriter can not be brought to the laboratory, prepare a number of “strike-ups” of the entire keyboard, both upper and lower case. Obtain at least three (3) keyboard strike-ups (upper and lower case letters) with the ribbon selector in the stencil position. This gives an uninked impression which more clearly shows type face defects.

Carbon paper impressions of machines equipped with cloth ribbons may be made by disengaging the ribbon on the machine and typing the questioned text directly on fresh carbon paper placed over a clean sheet of typewriting paper.
Next, type the entire questioned typewritten matter at least three to six times, unless the exhibits are lengthy. In that event, select two or three paragraphs from representative exhibits and type these two or three times each.

Similarly, repeat various addresses and return addresses on envelopes. If typewriting samples of a suspect machine are not directly obtainable, original business correspondence and records often afford satisfactory standards for comparison.

Indicate the make, trade name, serial number, service date and other particulars of machines from which exemplars are taken. Identify each submitted sheet by initialing and dating it.

Charred Documents

If the content of charred documents is known (e.g., legal documents), provide copies for comparison and verification.

If charred documents contain handwriting to be identified (e.g., checks, letters), submit known handwriting standards repeating the questioned writing.

Preserve charred documents in the condition you find them. For example, **DO NOT remove** charred documents from each other or from the container in which they were burned. Submit the container and its contents.

Handle charred documents as little as possible. Use gloves, tweezers and forceps to reduce the risk of damaging the evidence.

Place charred documents in a box and pack loosely with shredded paper or cotton. **Do not place evidence in a plastic bag or an envelope.**

Deliver charred document evidence in person only. Do not use the U.S. Postal Service or any other delivery service.
Indented Writing

DO NOT attempt to enhance indented writing or place any markings on the evidence. Take care not to make accidental indented writing on a document after its collection as evidence.

DO NOT mail documents containing indented writing unless packaged with great care. Place the documents between two stiff pieces of cardboard to preserve indentations.

DO NOT fold the questioned documents.

DO NOT write on envelopes after placing indented writing evidence inside.

Image Enhancement

Using computers and special lighting and filters, examiners may be able to detect and photograph writing on charred documents; alterations to documents; or decipher writing that has been obliterated. The writing on charred documents and the alterations or obliterations may be captured and photographs produced.

Photocopies

1. Obtain fifteen (15) exemplars with a blank page placed on the glass plate from the suspect copier(s) for comparison with the cover down.

2. Obtain fifteen (15) exemplars with a blank page placed on the glass plate from the suspect copier(s) for comparison with the cover up.

3. Obtain fifteen (15) exemplars with no document on the glass plate, with the cover down.

4. Record on each exemplar the date the exemplars were obtained, the name of the person who directed the exemplars, and the condition under which the exemplars were made, (with or without the blank page, glass cover up or down, etc.) and sequential order of the copies.

5. Record the make, model and serial number of the photocopy machine, information about the toner supplies and when toner was last added, service records, components changed and options such as color, reduction, enlargement and zoom.

6. Label photocopies inconspicuously as either questioned or known.

7. Do not fold photocopies when packaging to avoid markings on both questioned and known documents.

Digital Evidence Unit

Evidence is submitted for digital evidence examination in cases such as missing and exploited children, abduction cases, child pornography, homicide, financial crimes, terrorism, etc.

Types of Analysis Performed by the Digital Evidence Unit:

- Computer Forensics
    - Examination of computers and digital media
    - Examination of electronic storage devices, such as PDAs, digital cameras, etc.
- Video analysis
- Audio analysis

Computer Forensics

Case Acceptance Criteria

Personal computers, personal digital assistants (PDA's), floppy disks and other removable media, digital cameras, tapes and other storage media found at crime scenes may contain vital evidence that can be examined, retrieved and saved by our forensic examiners. The laboratory will accept computer forensic examination requests relating to the following incidents:

1. Crimes against children, e.g., child pornography, child abduction, sexual assaults against children, child molestation and traveling to meet a child for the purpose of sexual relations; **or**

2. Violent crimes, threats of violence or terrorism wherein a computer search may provide evidence of such crime, e.g., homicide, rape, or serious assault.

Collection of Computer Evidence

Caution should be used in the collection of computer evidence due to the volatile nature of this technology.

- If the computer to be seized is "off" at the time of discovery, **do not turn it on** or attempt to determine what evidence may be on it. By turning on the computer, you may alter the dates, times and files, thus changing and/or destroying evidence.

- If the computer is "on," save any file or files that are open at the time the computer is seized to a separate diskette and pull the plug from the back of the CPU. Clearly mark and submit the diskette to the laboratory at the same time as the computer.

  Note: If you are uncomfortable with computer operations or do not understand their operations, seek assistance from a knowledgeable crime scene specialist.

- Any relevant computer manuals or software located at the scene should also be collected and submitted to the laboratory as items of evidence.

- At the time of the crime scene search, it is imperative to search the area extensively for passwords. They may be jotted down on a desk blotter, a post-it note, or posted anywhere near the work station. Without them, data may be inaccessible.

Computer Forensic Submission Requirements

It is recommended that all computers be hand delivered to the SBI Crime Laboratory. Shipping computers to the Laboratory may unnecessarily subject them to rough handling, heat, or electric and magnetic fields, all of which could increase the risk of damage to the evidence stored on the computer.

Fill out the "Request for Examination of Physical Evidence" form (SBI-5) supplying all information requested.

Complete the SBI-5 Supplemental questionnaire. All computer forensic submissions **must** be accompanied by this portion of the form. Be sure to answer the questions in depth in order for the

examiner to understand the request and provide a productive file search. Due to legal issues, it is **imperative** to tell us under what lawful authority the evidence was seized and provide us with a copy of this documentation, i.e. court order, search warrant, etc.

Cases involving digital evidence, such as computers, should be packaged with **anti-static bags**. Be careful not to expose this type of evidence to magnetic fields. Magnetic fields are present in 2-way radios, police equipment, scanners, speakers, stereo equipment, etc. If available, the computer should be packaged in the original box (from the scene) or equivalent. Foam padding may be used to prevent shifting during transport.

Computer media should be packaged separately in evidence envelopes or bags and identified with sequential item numbers that represent an accurate inventory of the items being submitted.

Example (SBI-5 Form):

Item #1: Box containing one Digital PC 5000 computer processing unit.
Item #2: Paper bag containing five (5) floppy disks and one (1) CD-Rom.
Item #3: Paper bag containing three (3) operating manuals.

Items of evidence that have volatile memory or which are battery operated, i.e. PDA's, should be submitted with new batteries installed and the device should always be turned **OFF**. PDA's with rechargeable batteries should be recharged using the type charger provided with the device. Upon submission of this type of evidence to the laboratory, advise the receiving Evidence Technician that the evidence has volatile memory and the date the batteries were replaced or recharged.

As with all evidence accepted by the laboratory, containers must be adequately sealed and initialed by the person sealing the packages.

In most cases, computer evidence will not be returned to your department by mail or commercial carrier. Due to limited storage facilities at our laboratory, we must ask for your cooperation in picking up computer evidence as soon as you are notified that your case has been completed.

Items that SHOULD be submitted include:

- Laptop computers/PDAs
- Computer Processing Units (CPU)
- Digital cameras (including storage media)
- Computer software found at the scene
- User manuals
- Media (disks, floppies, etc.) regardless of what they are labeled
- Any passwords, user ID's, or screen names that are found at the scene

Do NOT Submit:

- Computer displays/monitors

- Keyboard, mouse, or other accessories
- Printers, Speakers

Video Analysis

Video tapes from surveillance cameras may be enhanced to improve the quality of the images, or to slow fast moving time lapse surveillance video and produce a video that may be viewed at a normal speed.

Images on videos may be captured and converted to still photographs.

When submitting video evidence carefully package it to prevent damage during shipment. On the evidence submission form indicate in some manner the area of the video that you are interested in. This may be indicated by listing the time in hours, minutes and seconds; or, describing the person you are interested in viewing. When locating the area of interest, avoid pausing or overplaying the video.

NOTE: Success in video enhancement is largely dependent on the quality of the surveillance video, camera placement and the lighting of the surrounding area. Video that is captured out of focus or in shadows will limit the amount of enhancement available.

Audio Analysis

Audio tapes may be enhanced to improve the clarity of the recording. Unwanted interference and noise may be filtered out. When submitting audio evidence, carefully package it to prevent damage during shipment.

Photography Unit

The Photography Lab is a full service photo processing lab that provides photographic services to all law enforcement agencies. Both conventional and digital photography services are available.

Photography Laboratory Film and Related Media Procedures:

Film and/or media sent to the Photo Lab for processing is considered **illustrative** or **substantive.**

I. Illustrative Film and Related Evidence:

A. Illustrative film and related evidence only demonstrates testimony and does not need the chain of custody recorded, and are normally used as court exhibits to facilitate a person's testimony.

B. An **SBI-6 Photo Lab Work Order Request Form** should be completed and the film and related evidence should be delivered to the Photography Lab located at the SBI Crime Laboratory, or it should be mailed to the State Bureau of Investigation, Attention: Photo Lab, P. O. Box 29500 Raleigh NC 27626-0500.

II. Substantive Evidence Film and Related:

D. Substantive evidence film and related includes seized film or tapes; or film that will be used for comparison, which requires a recorded chain of custody. This may include surveillance film or crime scene film that contains frames with shoe, tire, or latent impressions which will be used for comparison purposes.

E. An **SBI-5 Request for Examination of Physical Evidence Form** should be completed

and the evidence carried to the Evidence Control Unit at the SBI Crime Laboratory or mailed to the N. C. State Bureau of Investigation, Attention: Photo Lab, P.O. Box 2000, Garner, NC 27529-2000. This evidence will be returned through the Evidence Control Unit.

Graphic Arts Unit

The Graphic Arts Unit provides support to SBI Agents, Administration, all law enforcement agencies, other state agencies and district attorneys throughout North Carolina.

Types of Services Performed by the Graphic Arts Unit:

- Crime scene reconstruction sketches (2D & 3D)
- Court room exhibits
- Diagrams, Charts, Time lines
- On-site crime scene reconstruction
- Crime Zone Software Training
- Suspect Target Boards, Photo Line-Ups
- Brochures, Law Enforcement Bulletins, Wanted / Missing Persons Posters
- Certificates, Organizational Charts, Diplomas
- Special projects

Submission requirements:

Work orders should be accompanied by an **SBI-124 Form (Graphics Unit Work Order Request)**. Work requests for diagrams should include **measurements**.

FORENSIC BIOLOGY SECTION

Capabilities and Services

Agents assigned to the Forensic Biology Section assist in the investigation of homicide, rape, kidnapping, breaking and entering and assault cases. Services provided from this section include the identification of the body fluid (blood, semen or saliva) and DNA typing tests to determine who the potential donor of that body fluid may be. Crime scene assistance of luminol and blood spatter interpretation is also provided by this section and may be requested by any law enforcement agency in North Carolina. If such assistance is needed, the request should be channeled through the local SBI district office.

Evidence Submission Guidelines

Please submit only evidence that is relevant to the case. The purpose of testing is to establish a transfer of body fluids between the victim and suspect or between the bleeder and crime scene. An example of irrelevant evidence might include looking for the victim's blood on his own clothing or the suspect's semen on his own clothing.

Clothing

Allow clothing to air dry before packaging in a paper container. Lay the clothes out flat; do not fold them. Submit the entire article of clothing. If the clothes must be cut off, never cut through existing holes such as knife or gunshot holes.

Wet Blood Stains

If the entire item can be collected, do so. Air dry the bloodstain on the item thoroughly before packaging it in a paper container. Do not apply heat to dry an item.

If a wet stain is present and the whole item cannot be seized, the stain can be removed using a clean sterile cotton swab. If a swab is used, include separately a clean unstained swab to be used as a control sample.

Dry Stains

The best choice is to collect the entire article; however, there are times when this is not practical. If a stain must be cut out of an article such as a carpet, cut the ENTIRE stain. If multiple areas are being cut out of an article, clean the cutting instrument before going to the next area to avoid cross contamination.

If an article cannot be removed entirely or cannot be cut, the sample may be absorbed onto sterile swabs. Place a drop of sterile water on the swab and shake the swab to remove excess water. Swab the stain until the stain is no longer visible or until the swab becomes saturated with stain. If possible, collect at least two swabs. If the sample is very small, be very careful not to dilute the sample. Collect the stain on the very tip of the swab until the swab tip is dark in color.

Standards

Known blood standards or cheek scrapings should be collected from all relevant people involved in the case. A proper blood standard consists of ONE lavender (EDTA) stopper blood tube OR a dried blood stain on S & S paper. A proper cheek scraping consists of 2 sterile swabs rubbed vigorously on the inside of an individual's cheeks. If an individual did not bleed, but his clothes are being sent in for comparison purposes, his DNA standard should also be sent for elimination purposes as his DNA may be present from saliva or skin cells.

The liquid blood samples should be kept under refrigeration prior to submission to the lab and should be submitted within two weeks of collection. Never freeze samples.

Alternate Standards

If no blood sample is available due to complete exsanguination (loss of blood), or if an individual has been transfused within 2 weeks, an alternate blood standard may be obtained which can include:

1. An article of clothing that is stained with what must be the subject's blood.

2. If the individual has been transfused but is still alive, wait 2 weeks to draw a purple top (EDTA) tube of blood or collect a buccal swab (cheek scraping) standard.

3. If the corpse is bled out or rotting, ask the pathologist for a 3 inch section of compact bone

(femur) or teeth (preferably molars without dental work.). Bone material that is still attached to tissue must be frozen prior to submission to the lab and be hand delivered. Please note that human tissue or bones cannot be destroyed or disposed of without a court order. This is the responsibility of the submitting agency.

Cases without suspect or elimination standards

The section is divided into two forensic units: Body Fluid Identification and DNA analysis. All cases, with or without suspect standards, will be routinely examined through Body Fluid identification. All cases, with or without suspect standards, (with the exception of misdemeanor property crimes) will be routinely examined through DNA analysis.

Exceptions:

1. If the misdemeanor property crimes are serial in nature, contact the Special Agent in Charge of the section. These will be reviewed on a case by case basis.

2. In sexual assault cases where the victim has had consensual sex within 72 hours of the assault, an elimination standard will still be required before any DNA analysis can be performed.

Sexual Assault Cases

1. Take the victim to the hospital as soon as possible to have a Sexual Assault Kit collected. Do not let the victim clean up prior to going to the hospital. Evidence could be lost by allowing them to clean up. The panties that will be collected in the Sexual Assault Kit are those that are worn after the attack. The ones removed before the assault are not relevant to the case.

2. If a suspect is apprehended, either consent or a search warrant will allow the SBI Suspect Evidence Collection Kit to be collected legally. Collect samples according to the instructions packaged within it. Never use a non-testimonial ID order to collect blood from suspects where DNA could be requested.

3. Additional articles which may bear body fluids and hairs may be collected by the responding officer or crime scene unit. Remember that the hair must be removed from these articles if you wish to have hair analysis done in the case.

4. The Sexual Assault Evidence Collection Kit can be stored in long term storage at room temperature.

Fingernail Evidence

The Forensic Biology Section often gets requests to look for tissue from under the fingernails of victims who have scratched their attacker. <u>DO NOT COLLECT</u> fingernail scrapings in these instances. If a large clump of tissue is found under the fingernail, the tissue can be collected with a sharp pair of unused, cleaned or sterile tweezers. Place this material in a sealed container and label it appropriately.

Cigarette Butts

Pick the butts out of the ashes and place in an envelope. If the victim or suspect is a smoker, determine his/her brand preference and indicate it on the envelope or submission sheet.

Fecal Material

The section has no test to identify fecal material. If DNA testing is needed on suspected fecal material, swab the exterior of the material and allow it to air dry thoroughly before submitting. DO NOT package the material as is and submit to the lab.

Mitochondrial testing

The section does not perform Mitochondrial testing. If this type of testing is needed, contact the FBI for submission to one of it's regional labs.

PACKAGING:

1. Submit biological evidence as quickly as possible after it is determined what questions in a case may be answered by DNA analysis. Do not submit blood just because it is found and collected; determine if analysis is needed, then submit the sample(s) as quickly as possible.

2. Submit the dried bloodstain only from the autopsy.

3. Package each item intended as a separate piece of evidence separately; i.e., victim's clothing in one container, victim and suspect's clothing in two containers, etc.

4. Always package in paper. Never use plastic bags, as they promote bacterial growth which renders DNA evidence useless.

5. Pad fragile and sharp articles so that they will not break or penetrate the packaging.

6. Air dry all evidence.

7. Store evidence in a cool and dry location.

SUBMISSION:

The depth and scope of examinations selected by the analyst for a given case depends to a large extent on the amount of information provided by the submitting officer. It is imperative, therefore, to include a complete description of the crime scene on the second part (Part B) of the Physical Evidence Examination Request Form (SBI-5) or to attach a copy of the investigative report. Analysts need to know for example:

How many people could have bled

What the officer believed happened and what he/she seeks to prove by the analysis

What, if any, unusual circumstances may have affected the blood stains such as soaking, heating or contamination.

Complete information is also essential in making determinations in sexual assault cases as to the

donor of any semen detected. Since one is dealing in these cases with a mixture of body fluids from at least two individuals, the analyst MUST know if the victim had sexual intercourse with any other individuals in the 72 hours prior to the assault. Other important information is; did the assailant ejaculate; did he wear a condom; what body cavities did the assailant penetrate; was oral sex involved (who on whom); did ejaculation take place outside the body, and if so, where was the semen deposited; and does the suspect deny having sex with the victim. Many of these questions must be answered before analysis can be completed.

Things to Ponder Before you Submit Evidence

Do not submit the suspect's clothing in a rape case for semen analysis. Finding the suspect's semen on his own clothing does not prove anything since it can be legally deposited there at any time.

The lab has no test to identify vaginal secretions, or sweat.

DNA will only be performed on cases where the identity of the assailant is in question. What we are looking for is a transfer of body fluids (DNA) between the victim and suspect, the suspect and the scene, etc.

The SBI Laboratory does not conduct paternity testing even if criminal charges are pending (i.e. the child was conceived as the result of a rape). By extension, we do not perform reverse paternity testing which would occur when one is asked to determine if a body or sample could be the result of a set of biological parents. The SBI Laboratory is accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board to conduct forensic testing. We are not accredited by the American Association of Blood Banks to conduct paternity testing. In addition, our analysts are not trained and have no expertise with the calculating of paternity indexes.

Safety Considerations for Biological Evidence

A number of potentially deadly hazards are associated with body fluid evidence. Bear in mind these safeguards which apply to all persons handling evidence possibly containing body fluids.

5. Always assume that unknown samples may be infected and handle the evidence accordingly. Use clean gloves; do not smoke, drink or eat until after removing the gloves and washing hands; do not agitate the stain and avoid flaking off fine particles that float in the air.

2. Whenever possible, check with the victims and suspects to determine if they have any disease such as, but not limited to, AIDS, hepatitis, TB and venereal disease and note this on the SBI-5.

NCSBI DNA Database

The State of North Carolina enacted General Statute §15A-266 on December 1, 1993. This statute requires the State Bureau Of Investigation to collect, analyze, and store DNA profiles of convicted violent criminals. In December of 2003, this statute was amended to include all convicted felons. The current law requires that prison and jail officials collect blood samples from all individuals convicted of a felony. The DNA profiles from these convicted offenders will be entered into a computer database at both the state and national level.

These samples should be submitted to the NCSBI DNA Database Unit, either by U. S. Mail or by personal delivery. Chain of custody forms must be maintained during exchange of evidence.

As of December, 2006, the SBI had over 99,000 genetic profiles in it's DNA database. Although the majority of these profiles are convicted offenders (85,000), the SBI also maintains genetic profiles from suspects, forensic unknowns, missing persons and unidentified remains. The SBI's DNA Database Unit is linked to other state and federal labs using CODIS (Combined DNA Index System) software which has blended forensic science and computer technology into an effective tool for solving violent crimes. CODIS enables state and local crime labs to exchange and compare DNA profiles electronically, thereby linking serial violent crimes to each other and to known convicted offenders. This allows DNA analysts to search DNA profiles obtained from unsolved crimes against the convicted offender profiles and other solved crimes in an effort to determine the originator of the forensic DNA profile. These searches occur at the state and national levels.

If CODIS returns a "hit" on an unsolved case to a convicted offender, then SBI agents will:

- Retest the database sample to ensure that the profile is correct.
- Check the thumb prints on the Database Collection Card to ensure the identity of the donor.
- Determine the current location of the offender and the location of the offender on the date of the offense.

Once all verification procedures have been completed, the officer who submitted the case will be notified as to the identity of the offender and that:

- This information can ONLY be used as probable cause to obtain a search warrant that will be used to obtain a known DNA sample from the suspect.
- An agent from the section can work in conjunction with the investigator to write and serve the warrant and return the samples collected to the lab for analysis.
- Since probable cause exists to obtain a search warrant, it will be left to the officer's discretion on whether to write up an arrest warrant at that time or wait until results are obtained from comparisons made to the sample drawn under the authority of the search warrant.

If an officer has a case in which the suspect refuses to give a known DNA standard, or if the officer lacks sufficient probable cause to obtain a known DNA standard, they should determine if the SBI has the suspect's blood sample on file in the DNA Database. To do this, the officer would use the Computerized Criminal History (CCH) files to check for a DNA flag that states "DNA YES". NOTE: This statement only indicates that a blood sample has been collected from this individual. It **DOES NOT** indicate that this individual's genetic profile has been entered into the DNA database. If the officer wishes to compare evidence to a convicted offender identified as being in the database, then the officer MUST contact an analyst in the Forensic Biology Section at 919-662-4500 for permission to submit the case without a suspect standard. This option should ONLY be used for those cases where it is IMPOSSIBLE to get a known DNA sample from the suspect.

FIREARM AND TOOL MARK SECTION

Capabilities and Services

- Determine whether a bullet, cartridge case, or shotshell was discharged from or in a particular firearm.
- Determine if a particular tool mark or tool impression was made by a specific tool.

- Determine if a broken part or piece of a tool or firearm was once a part of a particular tool or firearm.

- Determine if a gunpowder residue pattern is present on a given article (e.g., clothing, bed sheets, curtains), and, if present, determine how far a specific firearm muzzle was from the article at the time of firing.
- Identify bullets and/or cartridge cases as to type, caliber, and possible manufacturer. Provide listings of type, make, or caliber of firearms that may have fired a particular bullet.
- Determine shot size, wadding, gauge, and possible manufacturer.
- Perform serial number restorations on firearms.
- Determine if a firearm functions properly and trigger pull weight.
- Provide assistance at crime scenes pertaining to forensic firearm and/or tool mark examination.
- Provide seminars and classes related to forensic firearms and tool marks.
- Perform automated checks of bullet and cartridge case evidence from unsolved crimes against firearms and evidence from other crimes using the Integrated Ballistics Identification System (IBIS).
- Maintain a firearms reference collection.
- Maintain an ammunition reference collection.

Type of Analyses or Examinations

Firearm or Ammunition Cases

Bullets, cartridge cases, and shotshells are compared to a suspected firearm in the following manner: analysts fire test cartridges of the same manufacture, caliber or gauge, and bullet type or shot size from the suspect firearm. The test bullet, cartridge case, or shotshell is next compared microscopically with the submitted evidence bullet, cartridge case, or shotshell.

Tool Mark Cases

In tool mark examinations, analysts microscopically compare test tool marks made with a suspect tool to submitted tool marks. Generally, tool marks fall into two categories: impressions or striations.

Please note that it takes a considerable length of time to reproduce questioned tool marks with a particular tool. Therefore, do not submit a tool mark for comparison with a tool left at the scene of a crime unless the suspect tool can be tied to a suspected perpetrator through investigation.

Gunpowder Pattern Analysis

Gunpowder pattern analysis helps reconstruct aspects of a shooting, especially distance determination. Articles submitted for analysis are chemically treated with solutions capable of indicating the presence of nitrites from burnt gunpowder or lead particles and vapor. If a gunpowder pattern is located, the suspect firearm is test-fired at various distances using the evidence or similar type ammunition used in the crime. These test-firings produce standard test cloths. The gunpowder pattern on the test cloths that most resembles the pattern on the evidence provides an approximate muzzle-to-target distance at the time of firing.

Firearm Serial Number Restoration

Obliterated serial numbers prevent investigators from tracing firearms. The serial number may have been filed, punched, or even treated with acid. An examiner can frequently restore an obliterated serial number through a number of physical and/or chemical processes. Once the serial number is restored, a weapon can be traced and a determination of whether it has been stolen can be made. For gun trace information, please contact your local Bureau of Alcohol,

Tobacco, and Firearms (BATF) Office.

Integrated Ballistic Identification System

Integrated Ballistic Identification System (IBIS) is an automated computer system that captures the individual signatures of fired bullets and cartridge cases and stores them in a database. The system is designed to run correlations on these signatures to determine any possible matches. IBIS is part of the National Integrated Ballistic Information Network (NIBIN).

Evidence Submission

Firearms evidence should be submitted to either the SBI Lab in Raleigh or to the Western Regional Lab in Skyland, NC depending upon your department's location. Please refer to the end of this section for a list of counties that are served by the Firearm's Section in the Western Lab.

Proper collection, marking and handling of firearm and tool mark evidence makes the examiner's work easier and ensures a more complete examination. Please observe the following general guidelines for proper collection, working, and handling of firearm and tool mark evidence.

Firearms:

- Never place anything into the barrel of a suspect firearm.
- If the submitting officer deems it necessary to have the firearm processed for latent prints, handle the firearm only by those areas that normally do not yield fingerprints (e.g, checkered grips, edges of the trigger guard, or any knurled area).
- If possible, carefully unload the firearm at the scene. On revolvers, it is a good idea to note which chamber was under the hammer and/or the location of discharged and live cartridges in relation to that chamber. On pistols and other firearms that load by magazine, remove the magazine and unload the live cartridges from the magazine.
- Use care in marking firearms. Usually the side plate of revolvers and the slide area of automatics are the best locations for identifying marks. Be careful not to destroy any trace evidence when marking a firearm. If the firearm is to be examined for latent prints, do not mark the weapon - place all necessary information on a tag and attach the tag to the weapon. If possible, record the serial number, make, and model of the submitted firearm in your notes.
- Collect firearms separately in a paper or plastic bag. Do not use plastic bags for firearms that are being submitted to the Latent Evidence Section, Trace Evidence Section, or Forensic Biology Section.
- Only submit loaded firearms when absolutely necessary - and then do so in person. Place loaded firearms in sturdy containers, not paper or plastic bags or envelopes, and tie them down to prevent movement. Mark the package - **Caution - Loaded Firearm**
- Submit firearms discovered in water **SUBMERGED** in a sample of that same water. Please use a water container that can remain with the firearm when submitted. Some examples of containers are screw-capped PVC pipe, old paint cans, and Tupperware-type containers.
- In circumstances where the firearm cannot be submitted, but test fires are available, contact the SBI Firearms Section for further instruction.

Bullets, Cartridge Cases, and Shotshells

- Collect all live ammunition at a crime scene for use as standards.
- Do not mark cartridge cases or bullets in any manner. Place them in individual envelopes and place all necessary identification data on the outside of these envelopes. This process prevents accidental marring of the important surfaces of the bullet and/or cartridge case and accidental destruction of trace evidence. All containers should be sealed and initialed.
- When collecting bullet, cartridge case, shotshell, and similar evidence at a crime scene, do not attempt to wash or clean the evidence.
- Do not place cotton or tissue around bullets, as this material may adhere to blood or other matter on the surface of the bullet.
- At autopsies, we request that pathologists attempt to clean blood or other body fluids off of the evidence prior to packaging.
- Do not allow fired bullets or shotshell wads to remain sealed with blood and/or other body fluids in an air tight container.

Gunpowder Examination Evidence

- AIR DRY clothing or other articles submitted for gunpowder pattern examinations.
- Mark each piece of evidence for identification using a tag and attach the tag away from any bullet holes, powder, or blood.
- Place each piece of evidence in separate, sealed PAPER bags. Never use plastic bags to store gunpowder examination evidence.
- Always wear protective latex gloves when handling bloody items. Handle articles carefully, as shaking or brushing may remove evidence.
- Submit only the outermost garment(s) that have been shot. Underlying garments that are completely covered and/or garments that have not been shot should not be submitted.

Tool Mark Evidence

- Whenever possible, collect the item(s) containing the tool mark(s).
- In the case of extremely large or immovable items, either remove that section of the item containing the tool mark or make a cast of the tool mark using Mikrosil, silicone rubber, or other suitable casting material.
- Package all tool mark evidence separately. Package the working end of a suspect tool to prevent damage to the working surface and to prevent the loss of possible trace evidence. Do not use tape to cover or protect the end.
- Never touch or fit a suspected tool to a tool mark.
- Never clean a tool or a cast of a tool mark yourself. Submit the evidence, as is, to the laboratory.
- Never make your own test marks with a suspect tool.
- Mark all containers for identification and make sure they are properly sealed.

Test bullets and cartridge cases/evidence bullets and cartridge cases for entry into IBIS ONLY

- If dealing with **evidence**, determine if there is a need for other laboratory analysis to be performed. If so, use the Request for Examination of Physical Evidence form (SBI-5) and follow the submission instructions outlined on that form. NOTE: During routine casework, all fired evidence bullets, cartridge case and test fires from evidence firearms that meet the caliber requirements and are of matchable quality are entered into IBIS.
- If the **evidence** is being submitted for entry into the IBIS database **only**, indicate in the space “Examine For” IBIS only. Please indicate the actual offense in the “Type of Case” space on the SBI-5.

- Use one SBI-5 form for each case to be submitted.
- When submitting evidence for entry into IBIS **only,** no other laboratory analysis will be performed.
- When submitting **test** fired bullets and cartridge cases, use the SBI-21 IBIS Submission form.
- It is mandatory that the Case #, Incident/Recover Date, and the Description/Remarks sections are completed for each firearm test fired.
- Multiple case submissions of test fires may be made on the SBI-21 form.
- Only centerfire caliber handguns and caliber 7.62 x 39mm and .223 (5.56mm) rifles should be submitted for entry into IBIS. Do not submit rimfire caliber firearms (i.e. caliber 22's), shotguns, or rifles of any other caliber.
- IBIS is state-of-the-art technology. This technology is changing at a rate much faster than procedure manuals may be written and distributed. If you have any questions about the system, contact the SBI Firearm and Tool Mark Section.

Report Interpretation
Firearm Examinations

- Class Characteristics: Measurable features of a specimen which indicate a restricted group source. The class characteristics of firearms may include the caliber, the number of lands and grooves, the widths of the lands and grooves, direction of rifling twist, size and type of firing pin, and position and type of extractor and/or ejector.
- Individual Characteristics: Imperfections or irregularities produced accidentally during manufacture or caused by use, abuse, corrosion, rust, or damage. Individual characteristics are unique to an object and distinguish it from all other objects.

Bullets, cartridge cases, and shotshells compared to a suspect firearm

- Positive Result: The bullet, cartridge case, and/or shotshell was fired from and/or chambered in the suspect firearm. The bullet, cartridge case, and/or shotshell has the same class characteristics as the suspect firearm and sufficient agreement of individual characteristics to make an identification.
- Inconclusive Result: The bullet, cartridge case, and/or shotshell has the same class characteristics as the suspect firearm, but lacks sufficient agreement of individual characteristics or has no discernible individual characteristics thereby preventing the possibility of making a positive identification or elimination.
- Negative Result: The bullet, cartridge case, and/or shotshell was not fired in or from the suspect weapon. The bullet, cartridge case, and/or shotshell has different class characteristics than the suspect firearm.

TOOL MARKS COMPARED TO A SUSPECT TOOL

- Positive Result: The tool mark was made by the suspect tool. The tool mark has the same class characteristics as the suspect tool (e.g., shape, size, manufacturing marks, and so forth) and sufficient agreement of individual characteristics to make an identification
- Inconclusive Result: The tool mark displays the same class characteristics or some of the class characteristics of the suspect tool, but lacks sufficient agreement of individual characteristics or has no discernible individual characteristics thereby preventing the possibility of making a positive identification or elimination
- Negative Result: The tool mark was not made by the suspected tool. The tool mark either has different class characteristics than the suspect tool.

Firearms Reference Collection

The Firearm and Tool Mark Section maintains a reference collection of firearms confiscated by state and local law enforcement agencies.

Firearms may be submitted to the Firearm and Tool Mark Section Firearms Reference Collection by any law enforcement agency. It is **imperative** however, that submitted firearms be accompanied by a court order authorizing the SBI Firearm and Tool Mark Section to either (a) maintain the firearm(s) in the reference collection or (b) to destroy firearms serving no useful purpose.

NOTES