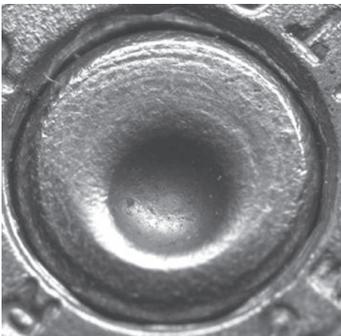
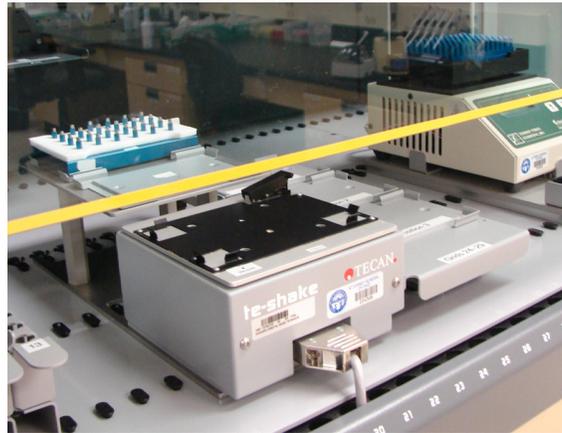


Physical Evidence Training Manual

Ohio Bureau of Criminal Investigation
Office of the Ohio Attorney General



MIKE DEWINE
★ OHIO ATTORNEY GENERAL ★





MIKE DEWINE

★ OHIO ATTORNEY GENERAL ★



Bureau of Criminal Investigation
Office: 740-845-2001

1560 State Route 56 SW
P.O. Box 365
London, OH 43140
www.OhioAttorneyGeneral.gov

Dear Colleagues,

We are pleased to present you with this updated version of the *BCI Physical Evidence Training Manual*, a guide for BCI agents and other law enforcement professionals to the best practices of crime scene evidence collection.

Thorough, meticulous evidence collection is at the core of every successful case. The information in this manual will help ensure your evidence collection activities provide solid bases on which cases can be built.

My office is committed to serving and assisting the men and women on the front lines of law enforcement. We're working to equip BCI with the staff, the resources, and the technology to deliver the most timely and accurate lab results possible. Our plan is to pursue the goal of making BCI the premier criminal investigation and analysis agency in the nation.

Thank you for dedicating your career to law enforcement and for joining me in helping to protect Ohio's families and children. For additional information about the protocols and procedures in this manual, please contact BCI headquarters at 740-845-2001.

Very respectfully yours,

Mike DeWine
Ohio Attorney General

Contents

CHAPTER 1 <i>Physical Evidence Introduction</i>	1
Evidence is Used as an Investigative aid.....	1
The Value of Various Pieces of Evidence Differs.....	1
Physical Evidence is Used to Support the Case in Court.....	1
CHAPTER 2 <i>Physical Evidence at a Crime Scene</i>	3
BCI Crime Scene Unit	3
Securing the Crime Scene.....	3
Crime Scene Searches	4
Collecting, Marking, and Identifying Evidence	5
Common Errors in Collecting Evidence.....	5
What to Look for.....	5
What to Mark.....	6
Log-Required Information	6
Preservation: Prevent Loss	6
Containers.....	6
Alteration	6
Contamination	6
CHAPTER 3 <i>Physical Evidence and the BCI Crime Laboratory</i>	7
Training and Information	7
Types of Analyses Performed	7
Identification Analysis	7
Comparison Analysis	7
Services Available at BCI Laboratories.....	8
Submission of Evidence: Chain of Custody.....	9
What to Submit	9
Procedures for Submission	9
Methods of Submission	10
Preparation of Evidence for Mailing.....	10
Evidence Return.....	11
Laboratory Reports	11
CHAPTER 4 <i>Biological Sample Collection, Documentation, and Preservation</i>	13
Suggested Supplies for Collection of Biological Evidence	13
Safety	13
Types of Biological Evidence	14
Standard Samples.....	14
Biological Sample Collection, Documentation, and Preservation	14
Preservation of Biological Evidence	15
Contamination	15
Collection of Body Fluid Stains From Various Surfaces	15

DNA Testing in Conjunction With Blood Spatter Interpretation.....	16
Documentation of Biological Evidence Collection	17
Sexual Assault Evidence Collection	17
ODH Sexual Assault Evidence Collection Protocol.....	18
Additional Information and Evidence Collection from the Scene of a Sexual Assault	20
CHAPTER 5 Trace Evidence.....	21
Paint.....	21
Glass.....	21
Animal Hairs.....	22
Fibers	22
Footwear and Tire Impressions	23
Vehicle Lamp Examination.....	24
Gunshot Residue (GSR) Analysis.....	25
CHAPTER 6 Firearms Evidence.....	27
Definitions of Firearms Terms	27
Handling Firearms.....	27
Bullets	28
Cartridge Cases.....	29
Shotgun Shells	29
Pellets and Wads (Shotgun)	29
Unfired Ammunition	30
Shot and Powder Patterns.....	30
National Integrated Ballistic Information Network (NIBIN).....	30
NIBIN Submission Guidelines.....	31
Serial Number Restorations	31
Tool Marks.....	31
CHAPTER 7 Latent Print Evidence	33
Handling of Evidence	33
Marking	33
Packaging.....	33
What to Submit.....	33
Automated Fingerprint Identification System (AFIS): Latent Print Search	34
Results of Examinations.....	34
CHAPTER 8 Document Evidence	35
Types of Examinations.....	35
Preparation of Evidence for Submission	35
Collection of Standards for Handwriting and Printing.....	36
Sources of Handwriting Specimens	39
Collection of Standards for Typewriting.....	40
Handwriting Sample Form	41
CHAPTER 9 Chemistry	43
Controlled Substances.....	43
What can be Determined.....	43

Special Considerations	43
Fresh Botanical Material.....	43
Laboratory Report	43
Volatile Fluids, Explosives and Arson Samples	43
CHAPTER 10 Digital Evidence (Computer Crime)	45
BCI Cyber Crimes Unit.....	45
The Digital Crime Scene.....	46
Preventing the Destruction of Evidence	46
A Word About Search Warrants.....	47
Submitting Evidence to the Cyber Crimes Unit.....	48
Items That may Contain the Evidence You Need	48
CHAPTER 11 Polygraph.....	51
CHAPTER 12 Quick Reference for Collection and Packaging Techniques	53
CHAPTER 13 Proper Security Seals on Evidence	55
Bagged Evidence.....	55
Cardboard Boxed Evidence.....	56
Evidence Submitted in Mailing Tube	56
Evidence Submitted in Envelope	56
Evidence Submitted in Plastic	56
Appendix A.....	57
Reproducible BCI Evidence Submission Sheet	59
Appendix B.....	61
Reproducible BCI Biological Sample Consent Form	63

CHAPTER 1

PHYSICAL EVIDENCE INTRODUCTION

Physical evidence can assist with the following critical tasks:

- Establishing the fact that a crime has been committed
- Eliminating or exculpating persons suspected or charged with a crime
- Identifying a person suspected of or charged with a crime

Physical evidence is any legally obtained object or material that aids the investigator in the reconstruction of the offense or the identification of the offender.

Evidence Is Used As an Investigative Aid

Physical evidence and the conclusions drawn from the examination of physical evidence may assist the investigator by giving direction to the investigation, and by pointing toward a certain individual and eliminating others. It should be used only as an aid, and should not replace a complete investigation. The officer's investigation is the most important factor in the successful conclusion of a case and is necessary to obtain maximum value from the physical evidence.

The Value of Various Pieces of Evidence Differs

Many types of physical evidence do not provide positive identification; that is, the particular piece of evidence cannot be individualized to a particular source. Nevertheless, these types of evidence can be of value to the investigator, even if only in a negative sense, such as aiding in the elimination of suspects or leads. The weaker types of physical evidence must be treated with the same respect as the most individualizing, as even these will aid in proving the case in court.

Physical Evidence Is Used To Support the Case in Court

Physical evidence will make a more solid case in court. Even though many types of physical evidence cannot be conclusively tied to a certain source, they will add support to the investigative testimony.

CHAPTER 2

PHYSICAL EVIDENCE AT A CRIME SCENE

BCI Crime Scene Unit

Upon request, the Crime Scene Unit provides 24-hour crime scene investigation services free of charge to any local, state, or federal law enforcement agency. The Crime Scene Unit's primary objective is to obtain physical evidence and to provide expertise and specialized equipment. The Crime Scene Unit provides agencies with computer-generated composites, shooting reconstructions, Global Positioning Satellite (GPS) mapping of outdoor scenes, 3-D crime scene sketches, on-site latent print processing of difficult-to-transport items, and computer-generated animation reenactment of crime scenes for courtroom presentation. The unit also provides training on related crime scene investigation topics to agencies upon request.

For crime scene assistance during business hours, please call the nearest BCI office:

Youngstown office.....330-884-7555
Bowling Green office..... 419-353-5603
London office 740-845-2224
Richfield office..... 330-659-4600

After hours and on weekends, contact the Crime Scene Unit at (800) 282-3784.

Securing the Crime Scene

As soon as possible, after arriving at the scene, the officer should take steps to protect the scene from anyone not directly involved with the investigative process. This includes other officers, the media, curiosity seekers, and family members.

The protection of the scene will reduce crime scene contamination. To reduce contamination, officers first responding at the scene should attempt to protect the scene by:

- Establishing the boundaries of the crime scene
- Keeping unauthorized personnel out of the secured scene
- Removing all unauthorized personnel
- Detaining and separating any witnesses to the crime
- Logging all authorized personnel entering and leaving the secure crime scene area
- Continuing security until properly relieved

These protective measures must be taken as early as possible to prevent valuable or even vital evidence from being destroyed. Most evidence at a crime scene is vulnerable, and often the most effective evidence is easily damaged. By taking proactive steps in protecting the scene, contamination and destruction of evidence can be avoided.

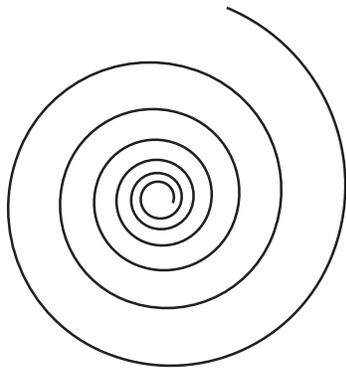
Crime Scene Searches

The crime scene provides the major opportunity to locate physical evidence. The initial response by law enforcement is often the only chance to recognize, record, and collect evidence. Many times there is only one opportunity to do it right. Law enforcement should not relinquish control over the scene and its surroundings, until all evidence has been discovered and collected. If law enforcement must return to the scene at a later time, legal problems may arise because pertinent evidence was not recognized or collected properly the first time. Finding physical evidence is not enough. To be of value, the evidence must be legally seized and properly processed.

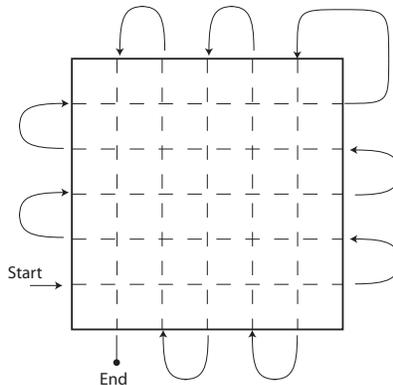
The law enforcement officer must remember that a suspect brings physical evidence to the crime scene and also, takes evidence from the scene. No two crimes are alike. Therefore, no specific guidelines can be offered that will list the exact step-by-step order in which a scene should be processed. The following information generally describes the steps taken in processing the crime scene for physical evidence.

Systematic Search

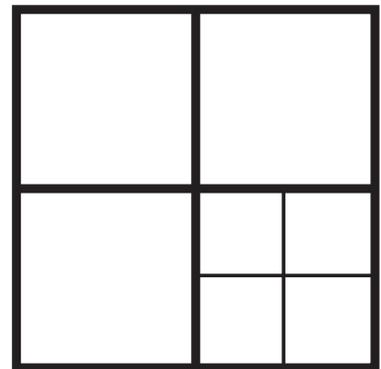
Evidence is anything material and relevant to the crime being investigated. Knowing what to search for is indispensable to an effective crime search. The use of Search Patterns ensures thoroughness. The search for physical evidence includes a wide area that contains the lines of approach and flight by the perpetrator. Thus, a crime scene must include the specific setting of the crime and its general surroundings. All search patterns have one common denominator — they are designed to systematically locate any evidence at the crime scene or any other area where evidence might be found. Most patterns involve partitioning search areas into workable sizes. Adapt the search pattern to the area involved, the personnel available, the time limits imposed by weather and light conditions, and the circumstances of the individual crime scene. Examples of search patterns are **spiral**, **grid**, **strip or line**, and **quadrant**.



Spiral search method



Strip or line search method



Grid search method

Physical Evidence at a Crime Scene: Collecting, Marking, and Identifying Evidence

How evidence is collected directly influences its later value. Always photograph and sketch before collecting evidence. Collect and identify all objects that are or may have the potential of being evidence. In deciding what might be useful to collect, it also helps to know the types of analytical services that BCI provides. Please refer to the information on page 8 for a list of available services.

Common Errors in Collecting Evidence

- Not taking enough of the sample evidence
- Not obtaining standards for comparison
- Not obtaining control samples
- Not packaging the evidence properly
- Not marking the evidence for later identification

What to Look For Things Left Behind

Search for items foreign to the scene. These can range from such obvious items as objects belonging to the suspect (billfolds, glasses, papers, etc.), to fingerprints or footprints, to more obscure items (fragments of cloth or tools, blood, etc.). Pay particular attention to areas where activity took place, points of entrance and exit, or point of attack. Be especially watchful for small items such as pieces of tools or footprints on paper. People familiar with the scene can be helpful in establishing which items were present prior to the offense.

Things Carried Away

These do not include stolen items, but rather items from the scene or victim, such as paint, glass, blood or safe insulation that were carried away inadvertently. Pay particular attention to those areas of activity where an interaction between the suspect and the scene or victim may have resulted in materials being transferred to the suspect's clothing, person or tools.

Comparison Samples

Collect samples immediately. Collect samples from the scene even though there is no immediate suspect. These may be useful at a later date and usually cannot be obtained after the scene has been cleaned up and restored to its original condition. Even if law enforcement does not make an arrest until several days later, paint, glass or other trace materials may be found in the suspect's possession or vehicle.

Identification

The item must be properly marked so that it may be identified at a future date. In many cases, the evidence will not be seen by the investigator from the time it is collected until the case goes to court. This could be a considerable length of time.

What to Mark

Investigators should mark the item with their initials and the date, never with a non-individualistic type marking. If the item is small or easily damaged, seal it in a container, and mark the container. If investigators are uncertain about the marking of any evidence, they should inquire at the BCI laboratory. Avoid the marring or destruction of personal property that may be returned to its owner. Place initials and other identifying information on an attached tag or label, or on the sealed packaging the item is in.

Log-Required Information

Document all required information, including who, when, and where collected; as well as case identification and a brief description of the item.

Preservation: Prevent Loss

Package all evidence in such a manner that small items will not be lost from the container or in the seams or folds of the container. Trace materials (paint chips, glass fragments, safe insulation, etc.) must be packaged in sealed, leak proof containers. If a mailing envelope is used, use an additional inside container such as a pill box, "druggist folded paper," etc.

Containers

Use the best available container suited to the type of evidence being submitted. For example, transport volatile substances such as gasoline or alcohol in containers with tight-fitting lids to prevent evaporation.

Prevent Alteration

Except for wet or bloody items, handle and package the evidence in such a manner that it reaches the laboratory in the same condition as you collected it. Air-dry wet or bloody items in a clean secure location. Never place wet or damp items in a plastic bag because they will decay and the evidentiary value will be lost.

Physical Evidence at a Crime Scene: Prevent Contamination

Separate items so there is no mixing of items from various locations. Never place more than one person's clothing in one container or items from the scene and the suspect in the same container. To avoid contamination, do not allow the suspect or the suspect's clothing to come into contact with items at the scene. Where specific information may be desired about individual items of clothing, bag each item separately. Special care must be taken to prevent spillage of liquids or powders, which would cause possible cross-contamination.

CHAPTER 3

PHYSICAL EVIDENCE AND THE BCI CRIME LABORATORY

The Laboratory Division of the Ohio Bureau of Criminal Investigation assists all Ohio law enforcement agencies in criminal investigations.

No Civil Work

The laboratory is not permitted to become involved in civil matters and cannot accept material from any source other than a law enforcement agency, and then only in connection with a criminal investigation.

Training and Information

The Laboratory Division provides information about evidence handling in specific cases and also general training and information for instructional purposes. Laboratory staff may be available to lecture as part of training courses for law enforcement personnel, as permitted by the laboratory work schedule.

Types of Analyses Performed

The laboratory performs analytical tests and examinations that are classified into two main types — **identification** and **comparison**.

Identification Analysis

Identification of an evidence item may provide investigative information or help to meet certain statutory requirements. An example of this type of analysis would be the identification of a powder as a controlled substance. Other similar testing might include the examination of a fired bullet to determine the make of ammunition, the identification of a piece of stationery from its watermark, or the characterization of an industrial material transferred to clothing of a crime victim.

Comparison Analysis

Comparison of evidence material to an exemplar from a known source may individualize the item or link it to the source. These include such comparisons as a bullet with a gun, a sample of paint on a tool tip with paint from a pried door, a latent fingerprint from a crime scene with a suspect's prints, a forged signature on a check with a suspect's writing, or the DNA profile of a blood or semen stain with a subject's known DNA profile. Comparison testing requires that known standards be collected and submitted to the laboratory before the testing can be completed.

Services Available at BCI Laboratories

Documents — comparison of handwriting or hand printing to known exemplars

- Examination of documents for authenticity
- Examination of documents for indented writing, obliterations and alterations.
- Determination of and comparison of sources of documents (e.g. typewriters, photocopiers, printers, printing processes)

Latent Prints — Processing of evidence for friction ridge impressions

- Comparison of latent finger, palm and foot prints to known subject impressions
- Performance of Automated Fingerprint Identification System (AFIS) search on latent prints

Serology/DNA — Identification of blood, semen, urine, feces and saliva

- Can identify gender and if of human origin
- DNA comparisons of questioned stains and known standards
- Comparison of DNA from no-suspect cases with DNA from convicted offenders and other cases (CODIS)

Trace — Comparison of trace evidence (fibers, glass, paint, polymers, misc.) with known standards

- Direction of force determination on broken windows
- Vehicle lamp filament examination (on/off determination)
- Examination of items for matching - break and tear configurations
- Examination/comparison of footwear and tire impressions
- Examination of samples from shooting subject's hands for gunshot residue

Firearms — Comparison of recovered bullets or cartridge casing with bullets or casing test-fired from submitted guns

- Firearms identification
- Weapon function testing
- Muzzle-to-target distance determination
- Weapon prediction from fired components
- Tool mark identification
- Comparison of recovered bullets or cartridge casings with those in database (NIBIN)

Chemistry — Identification of controlled substances

- Chemical analysis of unknown materials for a controlled substance
**No toxicology (drug and alcohol testing in blood and urine) is available at BCI.
Please call 740-845-2629 for a referral.**

Polygraph — Examinations of victims

- Examinations of suspects
- Examinations of witnesses
- Stipulated examinations

Submission of Evidence: Chain of Custody

Chain of custody is the documentation of the custody and identification of evidence from the time it is collected until it is entered as evidence in court. Each person who handles a piece of evidence must be able to testify in court as to when and where the evidence was received, where it was while in custody, and when and how it left custody. Each person must also be able to identify it as the item in question.

Identification — Each person in the chain must mark the evidence so that the item can be identified at a later time in court. This includes a citizen who may have found an item and presented it to an authority.

What to Submit

Pertinent Items

Submit only evidence that is pertinent to the case and that the laboratory is to use in performing tests. Limited storage area does not allow holding evidence merely for storage purposes.

Comparison Samples

If a comparison is desired, always be sure to submit adequate standard samples from the scene, suspect or victim. See individual sections for information about specific types of comparison samples.

Procedures for Submission

Submit evidence directly to the laboratory without prior analysis and handle according to the procedures in this manual. Please adhere to the packaging guidelines below. Improperly packaged evidence cannot be accepted.

Packaging

Use the best available containers, and package the evidence according to the guidelines given for each type of evidence. Do not use staples to secure packaging. Staples can cause injury to individuals handling evidence and do not provide a tamper-evident seal.

Identification

Identify each item with agency case number, item number and initials. Each package must have a unique item number.

Secure Seals

- Each package must be secured with a tamper-evident closure.
- For closures that do not require mechanical strength, such as an envelope, use evidence tape.
- For closures requiring mechanical strength, such as a bag or box, use clear packaging tape.
- Initial and date the package across the edge of the seal.

See “Chapter 13 — Proper Security Seals on Evidence” for more information.

Electronic submission form

There is also the capability to submit case information electronically through OHLEG. For details contact the OHLEG help desk at 866-406-4534.

Standard submission form

Some submitters may choose to use the BCI evidence submission form found in Appendix A. If utilizing this form, the information provided should include:

- Victim and subject names
- Criminal charge, date and location of the offense
- Specifics on who should receive the report (including mailing address and ZIP code).
- All phone numbers where the investigator can be reached.
- BCI laboratory case number if evidence has been previously submitted on the same case to any BCI laboratory.
- Case Synopsis

Please provide a brief written summary (not the entire case report) of the case to relate the evidence to the offense. This enables the examiner to determine what comparisons and analyses will be of the most value to the investigation.

Physical Evidence at the BCI Crime Laboratory

Include a brief description of each evidence item, including its source. The following are examples of how evidence items might be listed on the submission sheet:

Item Description

- 1) Black jacket from John Smith.
- 2) Underwear from John Smith.
- 3) Sheet from John Smith's bedroom.
- 4) Rape kit from Jane Doe.
- 5) Swabbing of suspected blood stain from floor of living room in John Smith's residence.

Methods of Submission

- **In Person** — Evidence may be submitted in person to any of the locations listed on the Evidence Submission Sheet.
- **Mail/Delivery Service** — Evidence may be sent to BCI via U.S. mail or other carriers

Preparation of Evidence for Mailing

- Place securely sealed items in a container that is sturdy enough to withstand the rigors of transportation and handling.
- Place small pieces of evidence in packages large enough to prevent loss.
- Place liquid samples in tightly sealed containers, and if possible, place in a second sealed plastic container to prevent leakage.
- Cushion fragile evidence so that characteristic markings (such as scratches, cracks, fingerprints, trace evidence, etc.) are neither disturbed nor unintentionally added during transport.
- Seal the outer container with a sturdy tape. Mark the outer package "Laboratory/Evidence" to ensure it is received by appropriate personnel.
- Attach a sealed envelope **addressed to "Evidence Receiving"** that contains a completed submission sheet and a synopsis of the offense.

Choice of Carriers

Most packages may be sent by certified or registered mail, “return receipt requested.” This provides proof of mailing and receipt at the laboratory.

Larger packages may be sent by Federal Express, United Parcel Service, or another commercial delivery service that is capable of package tracking.

Evidence Return

Please pick up evidence as soon as possible after examination is completed. Evidence will be returned by U.S. mail or another carrier that provides a signed receipt of delivery upon completion, as necessary or if requested.

Laboratory Reports

Recipients — Laboratory reports are issued only to the submitting agency, another law enforcement agency designated by the submitting agency, or, upon request, to the prosecutor’s office responsible for the prosecution of the case.

CHAPTER 4

BIOLOGICAL SAMPLE COLLECTION, DOCUMENTATION AND PRESERVATION

CODIS Database: The Combined DNA Index System (CODIS) is a nationwide database containing the DNA profiles from hundreds of thousands of criminal offenders, crime scene evidence, and missing persons and their relatives. Ohio BCI is the state repository for offender DNA specimens required per Ohio Revised Code. Ohio law defines which offenders are placed in the state database and what categories of Forensic DNA profiles may be searched against them. The FBI dictates which forensic DNA profiles are permitted for upload to the national database, software security, and interstate match confirmation procedures. All suspect standards submitted to BCI's laboratories are placed in the state DNA database; these profiles are not uploaded to the national database. The state searches are conducted daily, or as needed. The national search comparing forensic profiles to profiles processed from known individuals is conducted weekly, or as needed.

Project LINK (Linking Individuals Not Known) combines DNA profile results as well as other investigative details in an effort to locate missing persons and identify human remains. DNA profiles of unidentified remains are compared to DNA profiles obtained from biological relatives of missing persons through the CODIS software. Project LINK offers free DNA collection kits complete with instructions, collection swabs (for the biological relatives) and envelopes, and consent forms upon request. The completed kit(s) is then submitted to a BCI evidence reception office. Typically, the DNA swabs are outsourced to a CODIS participating laboratory for both STR and mitochondrial DNA analysis. All DNA data results and the investigative details (date missing/date of death, GPS, identifying markings/tattoos, etc.) are affiliated with the sample entry and are considered in the software's match evaluation feature. This national search is run monthly, or as needed.

Suggested Supplies for Collection of Biological Evidence

Examples of sources for each item are given. Other acceptable sources exist as well and inclusion on this list should not be considered an endorsement of any products.

- Latex gloves
- Sterile, individually wrapped cotton tipped swabs
- Fresh 10 percent bleach solution (make fresh each time)
- Marking pen
- Scalpel or razor blades
- Plastic containers
- Assorted envelopes, paper bags, and cardboard boxes
- Sterile distilled water or saline (*i.e.* contact lens solution)

Safety

Observe universal safety precautions, including the use of gloves, masks, and protective eyewear whenever collecting biological evidence.

Types of Biological Evidence

DNA profiling may be performed on any of the following biological evidence:

- saliva (mouth cells), sputum
- semen or semen stains
- teeth
- bones
- vaginal secretions
- soft tissue
- internal organs
- hairs with roots
- skin cells and sweat found on worn clothing items such as collars and hatbands
- nasal secretions
- blood or blood stains
- vomit
- feces
- urine

These are examples and not an exhaustive list. In general, DNA testing may be performed on any body tissue or fluid.

Note that hairs without roots require specialized mitochondrial DNA testing not available at BCI.

Standard Samples

Standard samples are needed to make comparisons between DNA profiles from evidence and victims or suspects.

For a living person — A mouth swabbing can be collected. To collect a buccal swab, rub a sterile cotton swab 10 times around the cheek and gum on one side of the mouth. Repeat with a second swab. Allow the swabs to dry, being sure not to touch the cotton or allow it to contact any object while drying. When dry, package the swabs together in a single paper envelope and tape the envelope closed. The oral swab standard may be stored at room temperature. The envelope must be labeled such that the name of the donor of the sample is clearly identified.

Please do not submit liquid blood tubes as standards.

Biological Sample Collection, Documentation and Preservation

For deceased or missing persons

Provided that ownership can be established, various personal items may be used, such as:

- Toothbrushes — May contain traces of mouth cells.
- Inhalers — Such as are used by asthmatics, may contain traces of mouth cells.
- Razors (electric or regular) — May contain traces of skin and blood.
- Hairbrushes — DNA can often be recovered from hair roots.
- Biological Relatives (mother, father, children, siblings) — Blood or mouth swabbing standards can be used to determine a missing person's DNA profile via a paternity or reverse paternity test.
- Autopsy

Where there is relatively no decomposition: Blood dried on a cotton swab or cotton fabric or a muscle sample (approximately 0.25 cubic inch).

Where some decomposition has occurred: two or three teeth with healthy roots or a defleshed femur section (at least 5 inches in length).

- Remains — Bones from burial sites may be useful in DNA profiling (order of preference: teeth, then femur, then other bones). If possible, avoid submitting bones with obvious breaks or cracks.

Preservation of Biological Evidence

DNA profiling works best when the sample is properly packaged and protected from decomposition. It is important to dry a wet item as soon as possible to prevent decomposition. Package all biological samples in paper or cardboard so that they are allowed to dry.

Extremely wet items may be transported from the scene in plastic bags or containers and then immediately hung to dry in a secure area. A paper placed under the item will collect any trace evidence that falls off. Once the items have dried, they may be packaged in paper along with the underlying paper.

Package knives and other dangerous items in a cardboard box. Cover sharp edges with cardboard. Failure to do so may lead to injury of those handling the evidence and laboratory workers, compromising the evidence.

Contamination

DNA profiling is extremely sensitive. Body fluid samples too small to be seen may give DNA profiling results. Therefore, incidental contamination must be prevented. Wear gloves when collecting biological evidence. Gloves protect the evidence from contamination by the collector's hands and protect the handler from biohazards associated with the sample. Change gloves between samples to prevent sample-to-sample contamination.

Avoid the use of forceps and scissors. If it is necessary to use these instruments, rinse in 10 percent bleach between samples. To make 10 percent bleach, mix one part bleach and nine parts tap water, sterile distilled water, or saline. The bleach will prevent sample-to-sample contamination. Thoroughly wipe the instrument dry with a clean tissue before touching a sample. ***Residual bleach may destroy the sample.***

Under certain circumstances, wear a mask. Talking, coughing and sneezing may potentially transfer detectable quantities of saliva and/or nasal secretions to the sample.

Package each sample separately to prevent sample-to-sample contamination.

Collection of Body Fluid Stains From Various Surfaces

Photograph and document the location of all stains prior to collection.

Nonporous Surfaces

It is preferable to collect dried stains on surfaces such as car doors and window ledges by rubbing with a sterile cotton-tipped swab lightly moistened with sterile distilled water or saline. Allow the swabs to dry before packaging in paper.

Porous Surfaces

For items such as upholstery, carpet padding, or carpeting, cut out the stain or bring the entire item to the laboratory. If these options are not available, such as in the case of bodies, sidewalks or brick walls, swab as much sample as possible onto a lightly moistened swab as described for nonporous surfaces. Swabbing of porous surfaces may result in greatly reduced amounts of sample and should be used as a last resort.

Liquid Body Fluids

Absorb liquid body fluids onto a dry, sterile cotton swab and allow to dry.

Touch DNA Samples

One of the latest trends is requests for analysis of samples that are thought to have been touched by the criminal during commission of the crime. At this time, BCI is only accepting touch DNA samples on violent crime cases. In touch DNA cases, the amount of sample that might be present is extremely limited. When possible, it is preferred that the item be submitted rather than swab-bings from the item.

Examples of this type of sample are:

- Swabs of smudged latent prints
- Blind swabs from touched areas such as door handles, gear shifters, steering wheels, gun triggers and unfired handled cartridges

It is our opinion that the analysis procedure most likely to produce a DNA profile from these touch DNA samples will consume the entire sample. By consuming the entire sample there is no sample left for any requested reanalysis by the defense counsel, which is problematic during litigation. In these cases, written authorization from the Prosecutor's Office is currently being requested by the BCI laboratory before DNA analysis can begin.

In an effort to provide more timely forensic science service, the laboratory would like to work with you to attain the elements necessary for the DNA analyses of these cases prior to submission. Touch DNA cases submitted for analysis must include:

- Reference standards from each known suspect (consisting of two oral swabs, packaged together and labeled with the person's name). Due to federal requirements, a complete DNA laboratory report including a conclusion and statistics can not be issued based on a CODIS hit. Suspect standards are required regardless of whether the suspect has a sample in the convicted offender database (CODIS).
- Reference standards from each victim (consisting of two oral swabs, packaged together and labeled with the person's name). Victim standards are required for elimination purposes in DNA mixture profiles, which are commonly encountered in touch DNA samples.
- A brief synopsis of the offense such that the relevance of each submitted item to the alleged offense is clear. Federal requirements mandate that the lab must have this information before a profile can be entered into a CODIS database.

DNA Testing In Conjunction With Blood Spatter Interpretation

A combination of blood spatter pattern interpretation and determination of the source of blood stains can be helpful in some situations. Photograph blood spatter patterns with a size scale prior to the collection of blood stains. Document the exact location from where the blood stains were collected. Note that blood spatter pattern interpretation may require considerable additional documentation. Contact the BCI Crime Scene Unit for assistance, if necessary.

Documentation of Biological Evidence Collection

Proper sample documentation is critical to supporting the chain of custody. Mark each sample with an agency case number, item number and the initials of the collector.

Descriptions of Evidence Samples

On the submission paperwork, please use a brief phrase to identify the item so that its relationship to the investigation is clear.

Examples:

- 1) Swab of red stain from kitchen floor of John Doe residence.
- 2) Trousers from John Doe.
- 3) Underwear from Mary Smith.
- 4) Beverage can from Smith residence front yard.
- 5) Suspected semen stain from sofa cushion at Smith residence.

Case Synopsis

Proper sample documentation is critical to the interpretation of DNA profiling results. Objective observations of the crime and the location of the evidence samples prior to collection should be recorded. Supply this information in the form of a brief case synopsis when the items are submitted to the laboratory. The synopsis should include sufficient information to relate the relevance of each submitted item to the alleged offense. Federal requirements mandate that the lab must have this information before a profile can be entered into the CODIS database.

Sexual Assault Evidence Collection

Useful evidence may be collected from the victim, subject and scene in a sexual assault.

The Ohio Department of Health (ODH) has published the *Ohio Protocol For Sexual Assault Forensic and Medical Exams* that describes a detailed examination protocol for medical personnel to maximize the effectiveness of evidence collection. This protocol may be accessed at <http://www.odh.ohio.gov/odhPrograms/hpr/sadv/sadvprot.aspx>

Sexual Assault Nurse Examiners

Many hospitals in Ohio have a Sexual Assault Nurse Examiner (SANE) program. A SANE is a nurse who has requested and received intensive specialized training in the treatment and examination of sexual assault victims. SANEs are specially trained to collect evidence, to document injuries and to provide testimony.

Sexual Assault Evidence Collection from Victim

It is best to collect evidence immediately after the assault. The victim is discouraged from changing clothes or bathing prior to collection. Normally, evidence is collected from the victim if fewer than three full days have elapsed since the assault. However, semen evidence can be recovered from bedridden or deceased victims after a much longer time period.

A sexual assault evidence collection kit is used by medical personnel. The law enforcement officer should encourage local hospitals to use an approved sexual assault evidence collection kit and to stress to medical personnel the importance of proper and complete evidence collection. Of course, when the victim has received serious injuries, medical treatment will be the first priority of the medical staff.

Choice of Sexual Assault Evidence Collection Kit

The Ohio Department of Health has designed an evidence collection kit that is optimized for law enforcement purposes. This kit is available from:

Ohio Industries for the Handicapped
4795 Evanswood Drive, Suite 102
Columbus, OH 43229-6281
614-846-4877

The use of other kits that are not consistent with the current Ohio Department of Public Health protocol may decrease the effectiveness of evidence collection.

ODH Sexual Assault Evidence Collection Protocol

The following elements of the Department of Health sexual assault evidence collection kit protocol are critical. The law enforcement representative should verify that each step has been completed exactly according to the protocol.

Evidence Collection from the Victim

- **Victim Information** — A form that documents the victim's description of the assault, any injuries and any consensual sexual contacts within the previous three days is required to be completed. The latter is necessary to determine the need for elimination standards. If a sexual assault patient has had consensual contact with a husband or boyfriend within three days of the assault, an oral swab standard is obtained from him for comparison to any DNA recovered after the assault.
- **Clothing Collection** — Outer clothing and underwear worn during or after the assault may contain trace evidence and body fluid stains. Collect the underwear even if the victim has changed. Each clothing item must be packaged in a separate paper bag. The law enforcement officer should obtain any additional clothing worn during or immediately after the assault. In the event that clothing must be cut off in the emergency room, request that no cuts be made through any existing rips or holes.
Underpants worn by the victim immediately prior to the examination must be collected and packaged in the kit box. This step must be completed regardless of whether the victim has changed clothes since the assault.
- **Pubic Hair Combing** — Combing may contain hairs and other trace evidence from the suspect.
- **Fingernail Scrapings or Cuttings** — The victim's fingernails may contain skin or blood from the perpetrator.
- **Vaginal/Penile, Oral and Anal Swabs** — These swabs must be collected regardless of the victim's statement. The victim may be too embarrassed or too traumatized to report all elements of the assault.
- **All Swabs** — For each collection area, all of the swabs supplied must be collected and properly labeled. If semen or other body fluids are present, DNA testing will be performed on these swabs. If all of the swabs supplied in the kit are not collected, there may not be enough sample to perform DNA testing. The swabs must be dried before packaging.
- **Smears** — Smears on glass slides are made from the swabs before they are dried and packaged.

The smears are used by the crime laboratory to look for sperm cells. The swabs are not to be discarded after making the slides, but they are to be submitted with the kit.

- **Skin Swabbings** — These swabbings are collected if any stains are found on the victim. Dried stains are collected with a swab moistened with sterile distilled water or saline. Even when no stain is visible, swabbings of body areas where the victim has reported oral contact by the perpetrator frequently contain enough saliva to produce a DNA type.
- **Bite Marks** — Using a ruler for scale, photograph and swab any bite marks. The perpetrator's saliva can be recovered from the area around the bite mark. DNA testing can be performed on this saliva.
- **Chain of Custody** — The chain of custody must be maintained. The law enforcement representative should verify that the sexual assault evidence collection kit has been properly sealed and documented.

Approved sexual assault evidence collection kits collected according to the current ODH protocol can be stored indefinitely at room temperature.

Consent to Collect Biological Samples for DNA Analysis — See Appendix B.

Suspect Evidence Collection

If a suspect is apprehended within 48 hours of a sexual assault, it may be possible to collect biological or trace evidence transferred from the victim. The evidence is collected by medical personnel using the same type of sexual assault evidence collection kit as is used for victims.

- **Penile Swabbings** — These may contain vaginal secretions from the victim. External penile swabbings are collected with swabs moistened in sterile distilled water or saline.
- **Subject Clothing and Underwear** — The subject's clothing and underwear may contain body fluid stains and trace evidence from the victim.
- **Subject Fingernail Scrapings/swabbings** — Traces of the victim's skin cells or body fluids may be found under the subject's fingernails. This may be the only source of evidence in cases of digital penetration.
- **Pulled Pubic and Head Hair Standards** — Pubic and head hairs are collected for comparison to any foreign hairs found on the victim.
- **A Subject's Oral Swab** — A subject's oral swab is needed for comparison to any evidence DNA profiles.
- **Subject's Vehicle and Personal Items** — Objects such as pens, wallets and clothing worn during or after the assault may contain body fluids, hair and other trace evidence.

Additional Information and Evidence Collection from the Scene of a Sexual Assault

The law enforcement officer must provide a description of the incident to the laboratory along with the evidence collection kit. The description of the incident is necessary for the laboratory staff to determine the best approach to the analysis of the evidence.

Collect and preserve additional evidence items from the scene, including condoms, beverage containers used by the assailant, bed sheets, and cigarette butts. Because condoms cannot be easily dried, refrigerate or freeze them and submit to the laboratory immediately to prevent loss of evidence.

Sexual Assault Cases without a Suspect

Evidence from no-suspect cases can be submitted to a BCI laboratory. Even though no suspect has been identified, DNA profiles developed from semen or blood evidence will be automatically entered into the Combined DNA Indexing System (CODIS), a nationwide database developed by the Federal Bureau of Investigation. CODIS consists of two databases: a database of DNA profiles from individuals convicted of sexual offenses and other violent crimes and a database of DNA profiles from evidence of violent crimes. DNA profiles from evidence submitted to BCI will be searched against the CODIS databases. Investigative leads may be developed through matches to specific individuals or by matches to evidence in other cases (serial offenses).

Assistance with Effective Sexual Assault Evidence Collection

Please contact the BCI DNA Laboratory in London, Ohio, at 740-845-2505 with any concerns, questions, problems, or requests for training.

CHAPTER 5

TRACE EVIDENCE

Paint

Be especially careful to prevent loss of small samples or mixing of samples from various sources. Place each sample in a tight pill tin, or enclose in a paper fold and place in an envelope. Never place samples directly into an envelope as the chips may fall out of the corners of the envelope and be very difficult to recover for examination. Placing paint chips in plastic bags is also not recommended as static electricity makes recovery difficult. The use of tape lifts to collect paint samples should also be avoided.

Identify each sample as to its source (i.e. questioned paint from Source A, known paint from Source A, known paint from Source B, etc.). If it is suspected that there is paint on a tool, protect that portion of the tool so that the paint is not lost. When taking a sample for comparison purposes, be sure to include all paint layers and obtain the sample from as close to the area of damage as possible.

What Can be Determined

From paint smears or single layers, it may be determined that samples are of the same color and possibly the same type of paint.

From multi-layered chips, it may be possible to state that the two samples originated from the same source (depending upon the number of layers, and whether the layers are repaint layers and/or original layers). In hit and run cases, the year, make and model of the vehicle from which the paint originated can sometimes be determined with the assistance of an automotive paint database.

In rare instances, larger pieces of paint can be physically fitted together to form matching individual break configurations, proving they did at one time form a single unit.

Glass

Comparison

For a glass comparison, a standard sample of two or three inches across is adequate. The standard sample should be comprised of glass fragments removed from the frame rather than from the ground or floor. This will insure that you have sampled glass from the pane in question. Laminated glass, such as that found in automotive windshields, has two layers of glass separated by a clear film. Collect and submit a separate sample from each pane. In locations with multiple panes (e.g., double and triple pane windows), take samples from each pane, package separately and mark appropriately.

Fitting Together

If the problem is one of fitting pieces together, such as a headlight lens in a hit-and-run case, be sure to obtain all pieces available, otherwise the relevant pieces necessary to make the fracture match may be missing. Label carefully as to where the samples were collected from, and package samples separately (taking the necessary precautions to protect the broken edges).

Direction of Force

To determine the direction of force causing a break (whether from a bullet or other force), certain information is necessary. The glass must be marked to indicate which side of the glass was facing the inside and which side was facing the outside. It is best to have the window frame with the remaining glass, but if this is not possible, submit all available good-sized pieces with the above information.

What Can be Determined

Comparison can be made to determine whether two samples have the same physical properties, optical properties and/or elemental composition. This comparison may result in a determination that the two specimens could, or could not, have originated from the same source.

Examination can be done to assess whether pieces can be physically fitted together to form matching individual break configurations, proving they did at one time form a single unit.

Examination can be done to determine from which side of the glass the breaking force came.

Animal Hairs

Contact:

U.S. Fish and Wildlife Service
National Forensics Laboratory
1490 East Main Street
Ashland, OR 97520-1310

Phone: 541-482-4191

Fax: 541-482-4989

Fibers and Related Evidence

Fibers

Be especially careful to prevent the loss of the samples or mixing of the samples from various sources. Enclose in a paper fold and place in an envelope. Never place samples directly into an envelope as the fibers may fall out of the corners of the envelope and be very difficult to recover for examination. Placing the fibers in plastic bags is also not recommended as static electricity makes recovery difficult. Fibers may also be collected using clear adhesive tape, and subsequently attaching the tape to an acetate sheet.

If actual swatches of fabric are collected, care should be taken not to damage or fray any of the fabric edges as this can effect possible comparisons that can be preformed.

What can be Determined

Examination of the fibers physical, optical and chemical characteristics can be made to determine the fiber type (cotton, wool, nylon, etc.) and sometimes possible end uses of that fiber (carpet, clothing, rope, etc).

Comparison can be made to determine if two fiber samples are of the same type, color, microscopic appearance and chemical composition. This comparison may result in a determination that the two samples could, or could not, have originated from the same source.

Comparison of a questioned piece of fabric can be made with a suspected source to determine if they have the same coloring and fabric construction characteristics, followed by a full fiber comparison of all the different fiber types/colors that may be present in the fabric sample. Although the conclusion possibilities for a fabric comparison are the same as for the comparison of individual fibers, a fabric association is much more significant than an individual fiber comparison. If appropriate, an attempt will also be made to physically fit a questioned piece of fabric together with a suspected source to form a matching individual tear configuration, proving they did at one time form a single unit.

Comparison can be made between a questioned fabric impression (for example, found on a vehicle in a hit-skip) and a suspected source. This comparison may result in a determination that the suspected source fabric could, or could not, have made the questioned impression.

Comparison of a questioned piece of rope or cord can be made to a known rope or cord to determine if they have the same coloring and construction characteristics, including a full fiber examination and comparison of all the different components of the rope or cord. This comparison may result in a determination that the two samples could, or could not, have originated from the same source.

Footwear and Tire Impressions

Care must be taken to submit the impression or its replica (lifts, photographs, or plaster casts) in as near to the original condition as is possible. Whenever possible, the actual item the impression is on should be submitted, rather than just a lift, cast or photograph of the impression. If making a lift or cast of an impression, it should always be photographed first. Always submit all photographs of an impression, even if you are also submitting a lift or cast of the impression. If the photo's were taken with a digital camera, submit the ORIGINAL digital files rather than a printout.

Photographs must be taken from directly above the impression, with the camera film plane exactly parallel to the plane of the impression. Also include a scale in each photograph and make sure the scale is parallel and level with the impression (cannot be slanted relative to the impression or camera). Fill the frame with the impression, use a 50 mm lens or set the zoom in the middle of it's range to avoid distortion, light the impression as evenly as possible to avoid washing out portions of the impression. Include a marker of some kind (i.e. a number marker) next to the impression so the photograph can be associated with the appropriate lift or cast.

If using a digital camera, use at least a 10mp or 12mp camera if possible. Collect the digital image at the camera's highest resolution setting and use a lossless format such as .Tiff or .Raw. If the image can only be collected as a .Jpg then use the highest quality setting (largest file size/least compression) for that format that is available. Never save over the original image, always make a copy of the image to work with for enhancements or adjustments.

If casts are made, a dental stone like material should be used. Do not wash the casts, submit them in the condition in which they are removed.

Submit the actual known shoes or tires (not just photographs of the shoes or tires) to be used for comparison.

Marking

Mark the impression lift or cast with your initials, the date, the location from where it was taken and any marker number or identifier that would associate it with the photograph(s) that were taken before it was collected.

What Can be Determined

It may be possible to eliminate a known shoe or tire from having made the questioned impression.

It may be possible to conclusively identify a known shoe or tire as the one that made the questioned impression.

It may be possible to include a known shoe or tire as being one that could have made the questioned impression.

Vehicle Lamp Examination

Vehicle lamps can be examined in an attempt to determine if they were “on” or “off” at the time of an accident or impact. Most tungsten filament type vehicle lamps are suitable for this type of examination; however, LED lamps and High Intensity Discharge (HID) headlamps cannot be examined.

Great care must be used when removing, handling and packaging vehicle lamps; the filaments of the lamps must be protected against shock and/or physical damage. Whenever possible the entire lens assembly (with the lamps still installed) should be removed and submitted to the laboratory. All of the lamps from the vehicle (i.e. headlights, taillights, turn signal lights, parking lights etc.) should be collected; however, only those that were in the vicinity of the impact need to be submitted initially. In the event that a determination cannot be made about the particular lamp(s) in question, an examination of the remaining lamps may be helpful.

When submitting the vehicle lamps, photographs of the vehicle that depict the overall damaged area(s) and the specific area(s) the lamps were removed from should also be submitted. These photos are necessary to help interpret the characteristics observed in the lamps. Never turn the vehicles light switch “on” to check if any of the lights work, this can adversely affect the subsequent lamp examination.

Marking

The lamps should be marked with the collecting officers’ initials and to indicate where on the vehicle the lamp was installed and what the lamp’s purpose was (i.e. driver side low beam headlight, passenger side rear turn signal, etc.).

Packaging

If submitting an intact lens assembly (with the lamps installed) it can be packaged in a box surrounded by shock absorbing material such as paper or packing peanuts. If the lens assembly is broken exposing the installed lamps, the opening should be covered with heavy paper or something similar to protect the lamps, then packaged as described above.

Small lamps can be packaged by turning a styrofoam cup upside down and inserting the base of the lamp into the bottom of the cup so it fits snugly. Tape can be applied to the inside of the cup to prevent the lamp from pushing all the way through the bottom and tape can be applied carefully over the base of the lamp to secure it to the cup (be certain to avoid any contact with the filaments

or filament posts). Additional styrofoam cups are then used as spacers by cutting the bottoms of the cups out completely and stacking the cups on top of the cup holding the lamp until the entire lamp is covered by the spacers. Finally, an intact styrofoam cup is added to the top of the stack and all the cups are taped together to completely enclose, secure and protect the lamp.

What Can be Determined

It may be determined that a lamp was “off” at the time it was subjected to an impact (and/or at the time the glass envelope was broken), “on” at the time it was subjected to an impact (and/or at the time the glass envelope was broken), or there may be an inconclusive finding. It may further be determined if a lamp is functional at the time of the examination.

Gunshot Residue (GSR) Analysis

The elements lead, barium and antimony are separate components in the unburned primer of most types of ammunition; when a firearm is discharged, they are vaporized and expelled from the gun. As the vapor cools, these separate components can come together to form individual particles that fall onto nearby objects, such as the hands of the shooter. Samples can be collected from a suspected shooter’s hands and analyzed using a scanning electron microscope equipped with an energy dispersive x-ray spectrometer (SEM/EDS).

Sample collection kits to perform this analysis may be purchased through a number of law enforcement suppliers. Law enforcement agencies should check with their supplier to determine if a satisfactory kit is available. Contact the laboratory if there is a question on the suitability of a particular kit.

SEM/EDS collection kits are easy to administer and can be stored indefinitely before and after use. Each kit contains a Gunshot Residue Information Form to be filled out and submitted to the lab with the collected samples.

Collection Procedure

- Put on the disposable gloves provided with the kit.
- Carefully remove the cap from the vial labeled ***Right Hand***. While holding the vial cap, lightly press the collecting surface of the stub, using a dabbing motion, onto the back of the subject’s right hand until the area has been covered. Using the same stub, repeat this process on the palm side of the subject’s right hand until the area has been covered. If possible, try to avoid areas of the hand heavily coated with blood or debris. After sampling both sides of the subject’s right hand, return the cap, with metal stub, to the ***Right Hand*** vial.
- Repeat procedure for the ***Left Hand***.
- Fill out all information requested on the Gunshot Residue Analysis Information Form.

What can be Determined

Laboratory results may indicate the presence or absence of particles that are highly indicative of gunshot primer residue on the submitted samples.

Gunshot residue is not deposited on the hand in a permanent way and may be easily removed or transferred (either intentionally or unintentionally). Therefore, time and the subject's activity between the shooting and the collection are critical factors. It is recommended that the GSR collection should be taken from an active individual within two hours of the shooting. If the subject is deceased or otherwise immobilized, time is less critical.

An individual may get GSR on their hand by discharging a firearm, being in the vicinity of a firearm when it is discharged or handling an item with GSR on it. GSR may be removed from an individual's hand by washing the hands, wiping the hands or through normal activity over the course of a few hours. For these reasons, regardless of a positive or negative finding, this analysis cannot determine whether or not an individual fired a weapon.

CHAPTER 6

FIREARMS EVIDENCE

Definitions of Firearms Terms

- **Handgun** — A short firearm designed to be aimed and fired from one hand.
- **Revolver** — A handgun with a cylinder of several chambers so arranged as to revolve on an axis.
- **Semi-Automatic** — A firearm, which upon firing, ejects the fired cartridge case, and loads another cartridge from a magazine as a continuous action; also referred to as auto loading.
- **Single Action** — The method of firing a handgun which requires cocking the hammer by hand and then causing the hammer to fall by pulling the trigger. This requires two separate actions.
- **Double Action** — The method of firing a handgun by cocking the hammer and causing the hammer to fall by a single pull of the trigger in one continuous action.
- **Automatic Weapon** — Any firearm that will fire two or more shots with a single pull of the trigger.
- **Rifle** — A firearm with a rifled barrel designed to be held to the shoulder when firing.
- **Shotgun** — A firearm, usually having a smooth bore, designed to be held to the shoulder and to fire shot or rifled slug. Some shotgun barrels, designed specifically for slug shooting, are rifled.
- **Bullet** — The single projectile fired from a rifle or handgun.
- **Rifled Slug** — The slug fired as a single projectile from a shotgun.
- **Shot Pellets** — Multiple projectiles loaded in a single shot shell.
- **Cartridge** — A single unit of unfired ammunition consisting of the cartridge case, projectile(s), gunpowder, and primer. Also applies to a shot shell.
- **Cartridge Case** — The container for all the other components of a cartridge.

Handling Firearms

Never insert anything in the barrel as this may damage the identifying characteristics and dislodge material that may be inside the barrel. Using gloves, pick up the weapon by the trigger guard so as not to disturb any fingerprints, or DNA. Note the condition (cocked, un-cocked, safety on or off, etc.) and do not wipe or clean. Whenever possible and using gloves, remove the clip or magazine from semi-automatics and automatics. Remove any cartridge in the chamber and identify as having been removed from the chamber.

Leave revolvers as found unless doing so would create a safety hazard. If it is necessary to unload, first mark the cylinder of the gun to indicate the chamber position in line with the barrel. Then, prepare a diagram of the cylinder (as viewed from the rear); designate the chamber in line with the barrel as “1” and number the remaining chambers in a clockwise direction in sequence “2,” “3,” “4,” *etc.* Package the contents of each chamber (either a live cartridge or a fired cartridge case) separately as it is removed and number the package to correspond to its position in your diagram. If any chamber is empty, note that fact on the diagram. It is sometimes possible to determine the order in which shots were fired from this information.

Mark loaded weapons clearly. Postal regulations forbid mailing of ammunition.

Marking

Record the make, model and serial number (if known) of the weapon. Place your initials and other identifying information on an attached tag or label, or on the sealed packaging for the gun. If it is necessary to mark the weapon, use discretion and mark in an inconspicuous place so as not to disfigure it.

What Can be Determined

If the identifying marks (make, serial number, etc.) have been removed, the make, caliber, and possibly the serial number of the weapon can be determined. In addition, the condition of the weapon (whether it is in working order and, if so, whether it has any defects which might have an effect on the investigation) can be determined, as well as whether the weapon has been used to fire a particular bullet or cartridge case.

Bullets

Handle the bullet so as not to dislodge any extraneous materials or damage the markings.

If a bullet is lodged in wood or similar material, cut out the section of material and bring it to the laboratory. At autopsies, request the use of hands or rubber-tipped forceps to minimize the possibility of damage to the bullet. Wrap each bullet separately in tissue or cotton to prevent damage and place it in a marked container. Do not package bullets in any container that has even trace amounts of formaldehyde or embalming fluid. Contact the laboratory for answers to specific questions.

Marking

Avoid placing any markings on the bullet as this may destroy important evidence on the bullet's surface (rifling characteristics, adhering trace evidence). Instead, seal the bullet in an appropriate container (as described previously) and mark the container with your initials, the date and information about where the bullet was found. If there is more than one bullet, package each one separately with exact information and markings on each package. This may be very important, especially if the bullets turn out to be from more than one weapon. If, for some reason, it is absolutely necessary to mark the bullet, place markings only on the bullet's base, not on the nose area or the rifled area on the side.

What Can be Determined

The type and make of ammunition, the possible type and make of the weapon from which the bullet was fired (within limits), and whether or not it was fired from a specific weapon, provided the weapon is available for test purposes, can be determined.

Cartridge Cases

Handle so as not to add any scratches or marks. Wrap each one separately to prevent damage. Be sure to note the location(s) found as this may be helpful in the investigation, especially if an autoloading weapon was used.

Marking

Avoid inscribing any markings on the cartridge case as this may interfere with characteristics needed for identification to a firearm. Instead, seal the case in a container and mark the container

with your initials, date and information on where it was found. If there is more than one cartridge case, package each one separately with pertinent information on each package. If, for some reason, it is necessary to mark the cartridge case, mark as close as possible to the open end.

What Can be Determined

Information can be developed on the type of weapon and ammunition used. It can also be determined whether or not a cartridge case was fired in a specific weapon, provided the weapon is available for test firing.

Shotgun Shells

Marking

Preferably, seal the shell in a container and mark the container (as described under “Cartridge Cases”). If, for some reason, it is necessary to mark the shell, mark on the plastic (or paper) portion with a permanent marker. Do not write over any existing factory printing on the shell.

What Can be Determined

The type of ammunition and whether or not it was fired in a specific weapon, provided the weapon is available for test firing, can be determined. Occasionally, the type of shotgun can be determined from the type and location of marks.

Pellets and Wads (Shotgun)

Recover as many as possible. At least four or five pellets are usually needed for accurate sizing. Always dry the wads before packaging to prevent deterioration.

Marking

Do not mark the items. Seal them in containers and mark the containers with your initials and information concerning where and when they were obtained.

What Can be Determined

Possibly shot size, gauge and type of ammunition used can be determined.

Unfired Ammunition

Marking

See “Cartridge Cases.”

What Can be Determined

Unfired cartridges or shotgun shells found at a crime scene may have been worked through the action of a gun without being fired and may have some markings (extractor, ejector, etc.) that can be used to link them to a specific gun.

Shot and Powder Patterns

It is necessary to have the same weapon and type of ammunition used in the incident to make valid comparison patterns. Always seize available pertinent ammunition as this is most likely to be the type of ammunition which was used. Accurately measure patterns on bodies and photograph with a scale included. Count the number of holes in patterns, if possible. This may give information as to size of shot load. Submit patterns on clothing or similar items for laboratory examination. The item to be examined must be protected to prevent damage to the area to be examined for residues. Package all items individually.

Marking

Initial all items submitted and give pertinent information as to where and when found.

What Can be Determined

Whether or not a hole was caused by a bullet, differentiation between entrance and exit holes, and the distance (within limits) from which the shot was fired can be determined. Occasionally, the barrel length or number of lands and grooves of the weapon, if fired at close range or wrapped in cloth, can be determined. This is an unusual circumstance, but watch for it.

Meaning of Result: Test results will assist in determining the direction from which a victim was shot and, with powder or pellet patterns, an estimate of the distance may be provided as well.

National Integrated Ballistic Information Network (NIBIN)

BCI laboratories are equipped with NIBIN, an automated system for computerized storage and search of information derived from firearms evidence items, particularly fired cartridge cases. This technology, which is linked to other major crime labs in Ohio and nationally, allows firearms examiners to enter and store images of microscopic characteristics present on fired cartridge cases (including both crime scene specimens and test specimens from known firearms).

With this system, it is possible to make connections between specimens being held in two or more crime labs, linking specimens from different crime scenes or linking a crime scene specimen to a confiscated weapon specimen entered at a second NIBIN site.

NIBIN Submission Guidelines

The procedure for submission of specimens for entry into NIBIN is essentially the same as for submission of other types of evidence to the crime lab. Specific information relating to NIBIN submissions is as follows:

- The NIBIN system is optimized for use with the following types of guns at this time
 - ❑ Semi-automatic pistols, rifles, and shotguns
 - ❑ Any fully automatic firearm

The weapon or firearms evidence component for entry need only be submitted to one NIBIN site. Any entry put into the system at one site automatically goes into the statewide database.

Agencies choosing to test-fire the weapons they confiscate and submit the test specimens may

do so. Two test specimens from each weapon are required. Because proper orientation for entry of the cartridge cases depends on determining the location of the extractor mark, it is preferable to test fire guns with new ammunition. New ammunition will not have previous markings from being worked through the action of a weapon.

- The following information is required for proper entry of specimens into the system:
 - Date of seizure of the firearm
 - Brand of firearm
 - Model, name or number (if known)
 - Caliber
 - Serial number (if present)
 - Type of firearm

Serial Number Restorations

Do not attempt to raise the number. Instead, bring the item to the laboratory, if practical. If not practical, contact the laboratory for instruction. If possible, obtain from the dealer or manufacturer the serial number location on the submitted item.

What Can be Determined

If the metal removal has not gone too deep and the obliterated number has not been obscured by over-stamping, it is possible, in many cases, to restore the number. Obliterated molded numbers in plastic items may also be restored.

Tool Marks

Handle tools with care and protect the tips so that any trace evidence such as paint chips or marks that might be on them will not be lost. Never try a tool in a tool mark as this may damage the mark and destroy the evidential value of any trace evidence on the tool. If practical, remove the portion of the item with the mark and submit it to the laboratory. If this is not practical, replica casts of the tool mark may be made. Contact the laboratory for instructions.

Marking

Mark the item with the tool mark and all tools with your initials and identify them as to where and when obtained.

What May be Determined

Whether or not a particular tool made the mark in question may be determined.

CHAPTER 7

LATENT PRINT EVIDENCE

Handling of Evidence

Marking

Do not mark directly on evidence, as it may disturb any potential friction ridge detail. Tag or mark the container, “Caution, latent prints,” otherwise latent prints may inadvertently be destroyed in handling.

Packaging

To package non-porous items (bottles, guns, etc.), suspend them in a box by notching out areas in the sides. Do not wrap them in cloth, plastic, or any wrapping that will come in direct contact with the object. To package porous items (letters, checks, etc.), place the materials in a paper envelope.

What to Submit

- **Items to be Processed** — The latent print section will process items, photograph and/or lift prints, and perform comparisons.
- **Items Not to be Processed** — Do not process items that are to be examined for DNA or trace evidence. The laboratory can process these items in a specialized way to prevent interference between examinations.

Do not attempt to lift bloody fingerprints, even when dry, because the ridge detail of the print may be destroyed by the lifting process.

- **Dusty or Oily Objects** — For items that have visible prints on oily or dusty surfaces, do not dust or attempt to lift the prints. Photograph prints or submit the object as it was found.
- **Latent Lifts and/or Photographs**
 - ❑ The latent print section can evaluate the lifts/photographs for friction ridge detail and perform any necessary comparisons.
 - ❑ When submitting photographs, images must contain a measuring device. Images without a measuring device will prevent the ability of the examiner to search the print through APFIS/AFIS.
 - ❑ For digital images, the photograph must be taken in either a .TIF or .RAW file format. Images taken in a .JPEG format can only be used for comparison purposes and will not be able to be searched through APFIS/AFIS.

- **Comparison Prints**

- ❑ *Subjects* — Submit complete major case print cards that include complete rolled fingerprints and palm prints, including lower joints of each finger and the outside edge of each hand from each subject. If no impressions are available and the subject has a felony record, a fingerprint card may be on file at BCI or the FBI. Submit each subject's name, date of birth, and/or Social Security number, BCI, or FBI number.
- ❑ *Eliminations* — Submit complete major case print cards from any individuals who may have come in contact with the evidence, such as the victim, victim's family members, or friends and police officers.

Automated Palm and Fingerprint Identification System (APFIS)

BCI maintains a database comprised of finger and palm print cards received from adults arrested for felony offenses and juveniles of felony offenses. Prints of sufficient quality will be searched through APFIS to aid in identifying unknown subjects. Candidates generated by APFIS are verified by a latent print examiner.

If the initial search does not produce any identifications, the prints may be entered in to the Unsolved Latent Print Database (ULDB) where they will be automatically searched against all new finger and/or palm print cards that are received by BCI. This search can generate candidates which can then be compared against the preserved friction ridge impressions.

Prints may also be searched through the FBI's national fingerprint database, the Integrated Automated Fingerprint Identification System (IAFIS).

Results of Examinations

The Latent Print Section will submit a report that will state:

- Whether or not any identifiable friction ridge detail was located
- What type of friction ridge detail was found (finger, palm, or latent print)
- Results of comparison to submitted known exemplars
- If APFIS and/or IAFIS searches were performed and whether an individual was identified
- What additional exemplars might be needed for completion of comparisons

CHAPTER 8

DOCUMENT EVIDENCE

Types of Examinations

Handwriting or Hand Printing

Under the proper conditions, it is possible to determine whether a particular person did or did not write or print a particular document or signature.

Printing Devices

It is usually possible to determine if a particular check writer, adding machine, typewriter, photocopier, or similar machine were used. However, computer printers are not typically identifiable.

Stamping Devices

Often, an ink-using stamping device has enough individual characteristics to identify it as having made a particular impression.

Examination of Inks and Papers

Different inks can be distinguished from one another, but it is not possible to identify a particular pen as producing a writing. The success in comparing papers depends upon the uniqueness of the materials in question.

Miscellaneous Document Problems

The success of working with obliterations, restorations, alterations, indented writing etc., depends upon the circumstances in the individual case. Consult the laboratory for information on particular cases.

Preparation of Evidence for Submission

Markings

Do not mark document evidence in any manner. Make notes as to pertinent contents or identifying information rather than marking on the document. Mark containers before inserting documents. If the document is inserted first, indented writing may be placed on the document. Some officers, in making their own preliminary examinations, circle or underline specific details in questioned documents. This practice not only weakens the value of a document as evidence, but often damages the physical evidence it contains.

Latent Prints

Do not process the document for latent prints. If this is desired, request that the items also be processed for latent prints and this will be done in the laboratory. Include information as to whether the document should remain undamaged.

Submit in Condition Found

Submit the document in the condition found; do not fold, staple or otherwise change the condition of the document as this may alter factors that are a part of document examination. The document should not be subjected to any testing before submission. Be cautious about copying, as some machines submit the document to heat and/or pressure.

Packaging

Place all documents in a paper envelope as soon as possible to prevent alteration.

Protection of Indented Writing

Indented writings are usually invisible to the naked eye and may prove or disprove factors such as identity or the chronology of a certain writing. They are commonly found on tablet-type specimens, usually with a glue and/or fiber stripe on one side. Do not attempt to make visible the indented writing by use of lead pencils, fingerprint powder, ashes, etc.

Charred Documents

Handle them as little as possible as they are very fragile and easily damaged. The most practical procedure is to submit them in the container found, if possible. If not, place carefully in a sturdy box using absorbent cotton under them. Charred documents must be hand delivered to the laboratory. Do not subject them to rough handling. Do not mail charred documents.

What to Submit

- **Original Questioned Documents** — When working with questioned documents, it is preferable to have the original specimens as some of the characteristics and points used for comparison do not show up on copies. However, if the originals do not exist copies are acceptable.
- **Comparison Samples** — See below for recommendations on collecting handwriting, hand printing and typewriting standards.
- **Samples of Materials** — Investigation frequently reveals that the subject had access to paper, pens, envelopes, typewriter ribbons, carbon paper, etc., similar to those used for producing the questioned document. Submit samples of these types of materials.

Collection of Standards for Handwriting and Printing

Verification of Standards

In order to examine a questioned document for authenticity, it must be compared with specimens that have been verified as written by the person in question. These verified specimens are called standards. This verification is established by one of the following:

- Acknowledged by the writer.
- Testimony of a witness to the writing.

Types of Standards Needed

The standards should be of the same type as the questioned document. For example, hand printing is of little value for comparison with cursive handwriting and vice versa. After normal standards are obtained, offhand writing (the hand not normally used for writing) may be obtained if considered relevant or the subject may be requested to write in a particular style based upon features observed in the questioned writing.

Avoiding Disguise

In obtaining specimens of handwriting to compare with questioned writing, the important factor is to obtain standards that are free from all attempts at disguise. No one can completely disguise his writing; an individual cannot be aware of all of his writing habits. Even when disguise is attempted, it can often be penetrated if sufficient sample material is properly obtained. It is difficult to maintain all the elements of a disguise throughout an extensive sample.

Dictate the Specimens

It is recommended that the subject write the actual text in question. Dictate the material, do not permit the subject to copy directly from the questioned document. Some persons are apt to copy the style as well as the content of the questioned article instead of writing naturally. If the writer wishes to disassociate himself from the questioned article, he may avoid forms, spellings and other details that would be of use to the examiner.

Dictate the same text at least five times, removing each page as it is written so that any disguising forms or styles must be reproduced from memory. Dictate the first specimen with absolutely no effort made to hurry the writer. Increase the speed in the following specimens until in the third sample the subject is writing as fast as possible without scrawling to keep up. This is done to assist in avoiding disguise. In some instances it may be advisable to have the material written again on another day. The subject might forget the disguises in the earlier sample.

Duplicate Conditions

Duplicate, as closely as possible, the writing conditions of the questioned document. Give the writer paper of the same size, quality and form (line or unlined), as was used for the questioned document. Provide a writing implement similar to that used in the questioned document (ballpoint pen, stub or fine point pen, pencil with soft or hard lead). If possible, the writing implement, paper and ink used in preparing the questioned document should be used for the standard.

If checks are involved, take the sample on voided blank checks from the same bank, or on checks as similar as possible. If these are not available, use narrow strips of paper similar in size and quality, lined in the manner of a check. Have all writing reproduced, including material on both sides of the check. Submit five to 10 such specimens for each questioned check. When only the endorsement is questioned, see the procedure for signatures.

Signature Samples

When only verification of a signature is desired, it is usually relatively easy to obtain genuine known signatures. Public records (voting records, deeds, license applications, applications for utility service and employment records) are all excellent sources of genuine signatures where probably no attempt at disguise was made. Genuine cancelled checks are also an excellent source. While there is no set number required, try to submit 20 to 25 of these known signatures. Give preference to those samples written nearest the date of the questioned signature.

Make Notes

Make notes about happenings while the specimens are being obtained and convey this information to the examiner. Note the subject's actions while writing; that is, does he appear to write freely or carefully, is he nervous, etc. Note instructions given to the writer while preparing the standards; right or left hand, backhand, etc. Include information with regard to serious illness or other circumstances that might affect any of the samples submitted, questioned or standard.

Marking of Standards

Each page of the standards should be numbered (in order written), dated, and initialed by the officer obtaining the specimens. Make all markings where they will not interfere with the sample material. Be sure the writer signs and dates standards.

Additional Standards

As with signatures, other non-request specimens written by the parties at about the same period of time as the questioned document may be of value. You must be able to prove that the writing is actually that of the person in question for the samples to be used as standards. If possible, obtain standards from the alleged victim(s) and all suspects. Contact the laboratory with any questions regarding handwriting examination.

Sources of Handwriting Specimens

- Account books
- Administrator's reports
- Affidavits
- Agreements
- Assignments
- Autographs
- Automobile insurance applications
- Automobile license applications
- Automobile title certificates
- Bank deposit slips
- Bank safe deposit entry slips
- Bank savings withdrawal slips
- Bank signature cards
- Bank statements, receipts for
- Bank and trust company loans
- Bible entries
- Bills of sale
- Bonds
- Books, signatures of owner in
- Building "after hours" registers
- Building permits
- Business license applications
- Charity pledges
- Checkbook stubs
- Checks, including endorsements
- Church pledges
- Complaints (legal)
- Convention registration books
- Contracts
- Cooking recipes
- Corporation papers
- Criminal records
- Credit applications
- Credit cards
- Deeds
- Deeds of trust
- Depositions
- Diaries
- Dog license applications
- Drafts
- Drive-it-yourself applications
- Driver's license applications and tests
- Druggist's poison registers
- Employment applications
- Envelopes
- Express receipts
- Fingerprint cards
- Fishing license
- Funeral attendance register
- Gas service applications
- Gasoline mileage records
- Gate records at defense plants
- Greeting cards
- Hospital admissions forms
- Hotel and motel guest registers
- Hunting licenses
- Identification cards
- Insurance forms
- Installment payments
- Inventories
- Leases, real property
- Letters, personal and business
- Library cards and applications
- Light company applications
- Life insurance applications
- Loan applications
- Mail orders
- Manuscripts
- Document Evidence
- Marriage records
- Membership cards and applications
- Memoranda of all kinds
- Merchandise receipts
- Military papers
- Mortgages
- Newspaper advertisement copy
- Notes
- Occupational writings
- Package receipts
- Parent's signatures on report cards
- Partnership papers
- Pawn tickets
- Passports
- Payroll receipts

- Pension applications
- Permit applications
- Petitions, referendums, etc.
- Photograph albums
- Pleadings
- Police reports
- Postal cards
- Power company applications
- Probate court papers
- Promissory notes
- Property damage reports
- Receipts for rent, etc.
- Registered mail return receipts
- Registration for voting
- Releases of mortgages
- Rent receipts
- Rental contracts for equipment
- Reports
- Retail store sales slip
- School and college papers
- Social security cards and papers
- Special delivery letters
- Sport and game score cards
- Stock certificates, endorsements on
- Surety bond applications
- Tax estimates and returns
- Telegram copy
- Telephone service applications
- Time sheets
- Traffic tickets
- Transcribed testimony (signed)
- Voting registration records
- Water company service applications
- Wills
- Workers' compensation papers

Collection of Standards for Typewriting

Please contact the laboratory prior to submitting any typewriter evidence.



Ohio Bureau of Criminal Identification and Investigation

Rev. 10-00

Questioned Document Section / Bureau of Criminal Identification and Investigation
Handwriting Specimens of:

Name: _____

Address: _____

Date: _____

Case Number: _____

Department: _____

“Our Londond business is good, but Vienna and Berlin are quiet. Mr. D. Lloyd has gone to Switzerland and I hope for good news. He will be there for a week, at 1496 Zermont St., and then goes to Turin and Rome, and will join Col. Parry, and arrive at Athens, Greece, Nov. 27th. or Dec. 2nd. Letters there should be addressed: King James Blvd. 3580. We expect Chas. E. Fuller, Tuesday. Dr. L. McQuaid and Robt. Unger Esq. left on the ‘Y.X.’ Express tonight.

For Handwriting Specimen

Pay to the Order of _____ 20 _____
\$ _____
Dollars

Pay to the Order of _____ 20 _____
\$ _____
Dollars

Pay to the Order of _____ 20 _____
\$ _____
Dollars

Pay to the Order of _____ 20 _____
\$ _____
Dollars

The specimens on this form have been written by me in a voluntary manner and I am aware that this completed form may be used against me in a court of law.

Date: _____

Signed: _____

Witnessed By: _____

CHAPTER 9

CHEMISTRY

Controlled Substances

What Can be Determined

The weight and identity of the material submitted for analysis and the identity of the controlled substance contained therein can be determined. Please only submit items that need to be tested or identify those that need to be tested.

Special Considerations

Package all material in separate sealable containers. Since establishing possession or control of the substance is one of the primary elements in drug cases, each piece of evidence should be marked with the location or the person from whom it was obtained. When submitting substances to the laboratory, list each item separately on the agency submission sheet and include a description of the substance.

Syringes are not accepted. Swabs and syringe rinses will not be accepted without prior supervisory approval.

No currency will be accepted without visible residue. No officer field test kits will be accepted. Please limit the number of paraphernalia items that contain residue to three (3) per case.

When submitting clandestine lab cases for analysis, please contact the laboratory prior to submission.

Suspected Khat should be kept frozen until submission. (Please notify the evidence staff if evidence needs to be put in the freezer).

Please notify the evidence receiving staff if any items submitted for analysis need to be refrigerated to preserve the integrity of the evidence (i.e., food items)

Botanical Material

Recently harvested or live suspected marijuana plants should be dried prior to submission. Botanicals should not be packaged in plastic bags or containers because the plant material will become moldy if it is unable to dry. Paper bags, brown wrapping paper, and cloth sheets are better suited for these samples. Please remove all extraneous materials (i.e., rope, plastic stakes, tape, bottle caps, etc.). All vegetable matter must be removed from its growing medium prior to submission (i.e., roots and dirt).

Laboratory Report

After analysis, the submitting agency will receive a laboratory report as to the analytical results obtained. Attached to this lab report is a notarized affidavit, which along with the report, may be used at all court proceedings in place of the direct testimony of the analyst. The prima facie ac-

ceptance of the report/affidavit is outlined in Section 2925.51 of the Ohio Revised Code. In order for this provision to be effective, the prosecutor's office must receive the report affidavit well before trial and must serve a copy upon the accused or his attorney.

Further Analysis

In the event that analysis of volatile fluids, explosives, arson samples, and alcoholic beverages are needed, please contact the following agencies for further assistance:

Volatile Fluids, Explosives, Arson Samples:

State Fire Marshal
8895 E. Main St.
Reynoldsburg, OH 43068
614-752-8200

Alcohol Samples:

OSHP-Crime Lab
1538 Alum Creek Drive
Columbus, OH 43209
614-466-4790

CHAPTER 10

DIGITAL EVIDENCE (CYBER CRIME)

BCI Cyber Crimes Unit

The BCI Cyber Crimes Unit provides services to Ohio-based law enforcement agencies on two fronts — investigative assistance and forensic processing of all types of digital storage media.

Four special agents assigned to the London Cyber Crimes Unit and one special agent assigned to the Richfield Cyber Crimes Unit provide investigative assistance as needed 24-hours-a-day, 7-days-a-week.

Examples of this investigative assistance include:

- On-site response to a critical incident
- Interviewing/interrogating a technologically savvy perpetrator
- Executing search warrants
- Capturing data in the field
- Identifying Internet-based offenders.

The unit also provides help in conducting covert Internet-based communications and transactions, provides telephone conferences to discuss Internet or computer-based crimes and provides search warrant/subpoena language.

During normal business hours, the London agents can be reached by calling 740-845-2411. The Richfield agent can be reached by calling 330-659-4600, ext. 267. After hours and on weekends, call the BCI London Communications Room at 740-845-2227.

Computer forensic specialists in London and Richfield, as well as the special agents, process all types of digital storage media for potential evidence. Typically, this includes all types of computers and associated removable storage media; but it may also encompass items like Personal Digital Assistants (PDA's) and digital cameras.

The Digital Crime Scene

Preventing the Destruction of Evidence

As with any crime scene, the responding officer(s) must prevent the destruction of evidence by the offender or co-conspirators. Unfortunately, digital evidence can be destroyed by initiating a destructive process through a single keystroke or by a co-conspirator next door or many miles away. Hard drives and other digital storage media can be physically damaged beyond recovery.

(The following suggestions apply to single or multiple computers in a residence. Business networks must be approached in a different manner, often with expert assistance. Procedures may change at any time due to new hardware encryption protocols currently reaching the market.)

- 1) Because of the possibility of losing digital evidence, immediately move everyone away from the keyboard and the computer.
- 2) Don't allow the suspect to save the file he/she was working on, to shut down open applications or to power down/turn off the computer.
- 3) If the computer is turned on, look at the screen and attempt to determine if any destructive programs are running.
- 4) If you see something such as "formatting C:" or "wiping", you should immediately power down the computer by disconnecting the power cord from the rear of the computer. If it is a laptop computer, remove the power cord and remove the battery.
- 5) If the computer is not on, ***DO NOT TURN IT ON.***
 - Turning on the computer, whether at the scene or back at the office, makes changes to the data that could actually destroy evidence crucial to your case. Only someone prepared to perform a proper forensic exam using accepted practices should deal with the computer once it is in your custody.
- 6) If there are no destructive programs running, see if any evidence of value is visible on the screen.
 - You may have interrupted him/her in the act and might find child pornography images, chats where the suspect is trying to entice a child to engage in sexual conduct, threatening e-mail messages, fraudulent Internet transactions, etc.
 - If found, document any evidence thoroughly in your notes and photograph the screen to preserve the evidence.
 - If this procedure is going to take awhile or interviews and other investigative tasks intervene, disconnect the phone line (modem) or network cable (DSL/cable modem/broadband) from the rear of the computer to prevent a co-conspirator offsite from accessing the computer and destroying evidence.
- 7) You can now power down the computer.
 - The generally recommended procedure is to disconnect the power cord from the rear of the computer instead of doing a normal operating system shutdown. (This procedure can vary if it is not a Microsoft® Windows®-based operating system) This procedure is not recommended for business network servers.
- 8) Photograph the entire computer system, front and back. Get a close up photograph of the

- rear of the computer where the various cables connect to the computer.
- 9) Label each cable and its connection point, using stickers or masking tape, so that the system can be re-assembled for court if necessary.
 - For example, the end of the printer cable might be labeled “1” or “A” and the corresponding place where it plugs into the back of the computer would also be labeled “1” or “A”.
 - 10) Once the labeling is complete, photograph the rear of the computer again with the labeling showing. If a port or connection point is open/empty, mark it as such.
 - 11) The various cables can now be disconnected from the computer and the individual parts of the system collected.
 - 12) Be on the lookout for passwords or other information scribbled on Post-it® Notes and stuck to the monitor or scraps of paper near the computer or under the keyboard/desk blotter, etc.
 - 13) Seize all forms of digital storage media and external drives (see accompanying photographs).
 - Seize books, notes, manuals, software, etc., as these items may later be found to contain passwords or other important notations or may be needed during the ensuing forensic processing and analysis.
 - 14) Package any items containing digital storage media in paper boxes or bags. Avoid using plastic bags which may disrupt the data through static electricity discharges.
 - 15) Don't transport or store the digital evidence near radio transmitters or large magnets. Very high and very low temperatures can damage some of the sensitive electronic devices as well.
 - 16) If the suspect is being cooperative, ask for any passwords/pass phrases that he may have enabled on the computer or that were used to encrypt files or folders.

A Word About Search Warrants

It is common for a search warrant to include a listing of all types of computer and digital hardware to be seized from a specific location. Many departments, however, fail to link this list with the items they are really looking for. For example, if you are working on a child pornography investigation, what you are really looking for are images of juveniles nude and/ or engaged in sexual conduct. Likewise, in a sexual battery investigation what you might really be looking for are communications (chats, e-mail, Instant messages) between the suspect and the victim.

In a credit card fraud investigation what you might really be looking for are Internet transactions conducted with the stolen credit card number or maybe just the victim's name and credit card number on the suspect's computer. So, in addition to the list of hardware to be seized, include a listing of the items you are really looking for depending on the specific case facts.

Some departments routinely seize computers and digital storage media with one search warrant and then obtain a second search warrant to actually search the items they have previously seized. Some departments seize computers with a search warrant written in such a manner (not including what they are really looking for) that it is necessary to obtain a second search warrant in order to process the computer for evidence. If you can establish probable cause in your initial search warrant to not only seize the computer(s) from the original location but also search the computer(s) for what you are really looking for, it can expedite the process and cut down on headaches later.

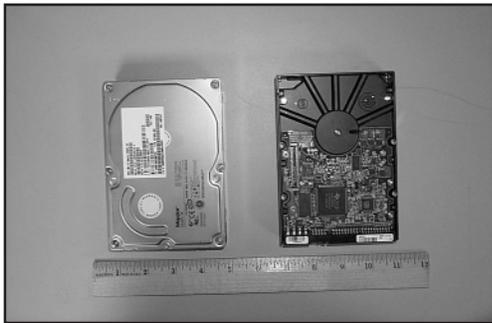
As with all legal issues, discuss this issue with your county prosecutor.

Submitting Evidence to the Cyber Crimes Unit

Computers, digital storage media and others items to be processed by the Cyber Crimes Unit are submitted directly to the London or Richfield units. This type of evidence is not accepted through the regional BCI laboratories. Digital evidence is accepted in the units Monday through Friday from 8:00 a.m. to 5:00 p.m. Be sure to bring a copy of written consent to search or a search warrant and case summary along with the evidence. In cases of prior examination of the computer or media, please call ahead to make special arrangements.

Items That May Contain the Evidence You Need

Every officer assisting in the execution of a search warrant knows what to look for when searching for a gun, knife, bloody clothing, narcotics, etc. A lot of officers do not know what a hard drive, thumb drive or compact flash card look like. Typically, the evidence you need to make your case will be contained within some type of media storage device. New data storage devices come out all the time. If you find an item marked *digital storage, data storage, digital wallet, etc.*, it may contain the evidence you are looking for. The following photographs are some of the common digital storage devices that officers should be on the lookout for when searching a suspect's residence, car and **person**.



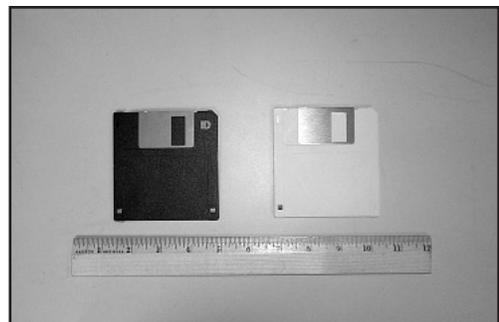
Typical Hard Drive



Laptop Hard Drive



5.25-inch floppy disk



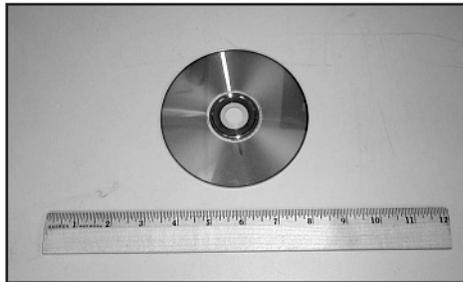
3.5-inch floppy disk



Zip Disk – 100, 250, 750 Mb



Zip Drive to read Zip Disk



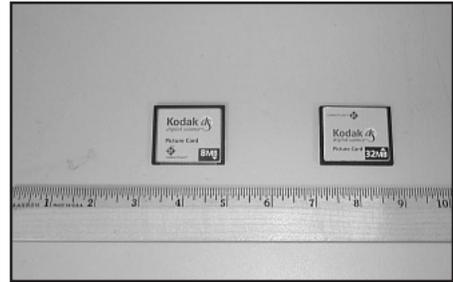
Compact Disk – Writable and Re-writable



Data Storage Tapes – Typically used for business server backups.



DVD – User-recordable



Compact Flash Card – Used in digital cameras



Thumb drive – May be on suspect's key ring or in pocket

CHAPTER 11

POLYGRAPH

Polygraph is used to determine the truthfulness of statements made by a suspect, victim or witness, or to substantiate information in an investigation. BCI provides polygraph services free of charge to assist law enforcement agencies and prosecutors in criminal matters.

To schedule polygraph services, please call the nearest BCI office:

Athens	740-249-4383
Bowling Green	419-353-5603
London.....	740-845-2614
Richfield	330-659-4600

Information about the person being tested should be made known to the examiner at the time the test appointment is made (*e.g.*, health issues and medications).

To assist the polygraphist, a complete copy of the case facts may be requested prior to the testing date.

If during the course of the investigation it becomes necessary to verify the victim's statement, law enforcement may consider utilizing a polygraph test to clarify that statement. If both the victim and the suspect are to be polygraphed, it is best polygraph practice to test the victim first. However, law enforcement cannot ask or request the victim to take a polygraph as a condition for initiating or proceeding with the official investigation.

Stipulated tests will be performed upon request in compliance with bureau guidelines. Please advise at the time of scheduling if a stipulated test is being requested.

BCI does not conduct polygraph examinations in connection with:

- Civil cases and cases for which no criminal prosecution is intended.
- Juveniles under the age of 13 or without a parent's or legal guardian's consent.
- Non-criminal internal matters of a law enforcement or government agency.
- Pre-employment of police officers.
- Persons who arrive at the laboratory and are unduly emotionally upset, intoxicated or under the influence of drugs.
- Persons who suffer from epilepsy (Grand Mal).
- Persons who have a serious heart condition, unless they have a doctor's written consent.
- Persons who are pregnant.

Understanding that each case is unique, or if there are any questions concerning your case, contact the polygraphist in the office of your area.

CHAPTER 12

QUICK REFERENCE FOR COLLECTION AND PACKAGING TECHNIQUES

Marking Requirements

Mark either directly on the packaging material or attach a label or evidence tag. Indicate the place where the item was collected, date, time, name of collector and case number. Any special marking instructions are noted under the individual items.

Item Collection and Packaging

Blood

Blood at scene (wet) — Collect on sterile swabs, allow to dry, package in paper.

Blood on clothing (wet) — Wrap so that the blood is not transferred. Air dry immediately to prevent degradation of blood. Bloody clothing may be packaged briefly in plastic for transport to a drying area, subsequent to drying package in paper.

Blood on fixed object (dried) — Collect stain with swab moistened with sterile distilled water or saline. Allow swab to dry and package in paper.

Blood soaked in soil — Collect just the blood-soaked soil and dry immediately. Package in paper.

Blood in snow — Collect the blood-soaked snow, absorb onto sterile swab, dry, and package in paper.

Reference standard from suspects and victims — Blood or buccal samples are acceptable. See “*Chapter 4 — Biological Sample Collection, Documentation and Preservation*” for procedures and collection kits.

Computers — For a summary on the technique for handling document evidence see “*Chapter 10 — Cyber Crime Evidence*”

Documents — For a summary on the technique for handling document evidence see “*Chapter 8 — Document Evidence*.” Use tweezers and handle carefully by the edges; place in sealed envelope; don’t mark on document. Place markings on the envelope prior to inserting the document.

Drugs

Drugs and narcotics — Leave in original container and heat seal in plastic.

Drugs (suspected lab items) — Place in cardboard boxes and seal with evidence tape.

Drugs (suspected marijuana) — Package in paper. Do not use plastic bags or containers unless the material is thoroughly dried.

Drug records — Place in envelope. Make markings on envelope prior to inserting records.

Drug tablets and powder — Use tweezers or small brush to transfer to pillbox and heat seal in plastic.

Drug paraphernalia — Place in plastic bag and heat seal.

Fibers — Use tweezers to collect, enclose the fibers in a paper fold and place in an envelope. Never place samples directly into an envelope as the fibers may fall out of the corners of the envelope and be very difficult to recover for examination. Placing the fibers in plastic bags also is not recommended

as static electricity makes recovery difficult. Alternatively, collect the fibers using clear adhesive tape, and attach the tape to an acetate sheet. If actual swatches of fabric are collected, care should be taken not to damage or fray any of the fabric edges as this can affect possible comparisons that can be preformed.

Glass

Glass fragments — Collect sample from window (not ground or floor), place in pillbox and place in an envelope and seal.

Glass broken for direction determination — Carefully collect as many broken pieces as possible and place in box; carefully collect pieces from frame marking the inside, outside and the location. Bring the frame with the remaining pieces intact, if possible.

Hair

Hair — Collect samples and fold into paper or use clear tape to lift samples, affix to clear acetate backing or white paper and place in an envelope and seal.

Hair standards from suspect or victim — Have suspect or victim pluck at least 20 of their own hairs. Fold hair sample into a piece of paper and place in an envelope and seal.

Latent fingerprints — Use dusting powder of contrasting color to surface, lift with fingerprint tape and place on card of contrasting color to powder. Alternatively, photograph the fingerprint. Initial the lift or photograph.

Liquid (poison or acid) — Leave in the original container if possible. Otherwise, place in a glass container and heat seal in plastic.

Paint

Paint (liquid) — Leave in original container if possible. Otherwise, place in an appropriate container and seal and heat seal in plastic.

Paint chip — Use tweezers to collect and place in pillbox or fold into a piece of paper. Then place in an envelope and seal.

Paint (dry standard) — Use a knife, scalpel or razor blade to scrape paint (including all layers down to the substrate) onto paper. Fold and place in an envelope and seal.

Paper for chemical — Use tweezers and carefully place in an envelope and seal or use a processing paper bag.

Rope (twine or cord) — Collect and place in a paper envelope or bag and seal, leaving any knots intact. If it is necessary to cut the rope to remove it, tape the ends and indicate that you have made the cut.

Sexual assault evidence — See “*Chapter 4 — Biological Sample Collection, Documentation and Preservation.*”

Shoe and tire impressions — Always photograph with scale first (see this section under Trace Evidence for proper photography techniques), then, package the item the impression is on in such a way as to protect the impression area from damage or alteration. If it is not possible to submit the actual item with the impression, lift the impression using tape, a gel lifter, a static lifter or if appropriate, cast using dental stone type casting material. When dry, initial the cast and place it in a box (do not wash the cast). Always submit the photographs with the lifts or casts.

CHAPTER 13

PROPER SECURITY SEALS ON EVIDENCE

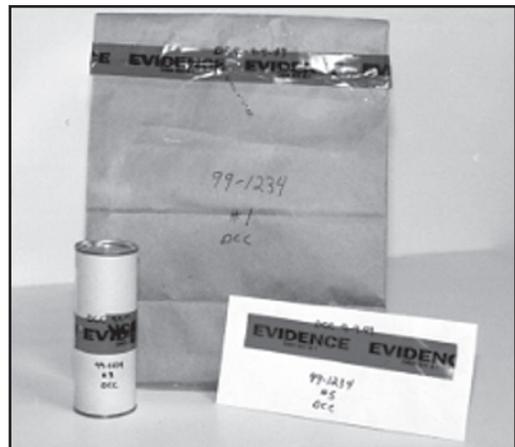
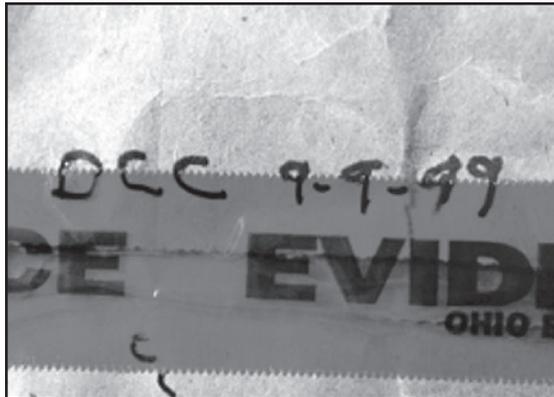
Standards established by the American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB) govern evidence security:

- A container is properly sealed only if its contents cannot readily escape and only if entering the container results in obvious damage/alteration to the container or its seal.
- Tape used to seal containers must be initialed or otherwise identified to document the person sealing the evidence. Heat sealed packages must have initials or other identification across the heat seal to be properly sealed.

The following examples illustrate evidence sealing methods that satisfy ASCLD-LAB standards. *The BCI laboratories cannot accept evidence that does not meet these criteria.*

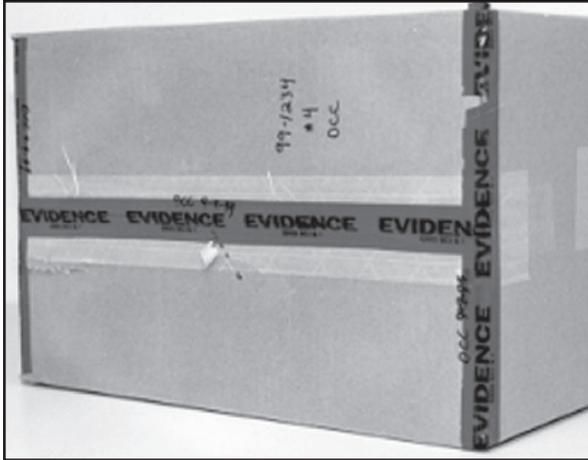
Bagged Evidence

- The agency case number, item number and collector's initials are written on the bag.
- The bag, which requires a strong mechanical seal, is closed with a strip of packaging tape that runs the entire length of the opening.
- A piece of tamper-resistant evidence tape may be placed across the packaging tape.



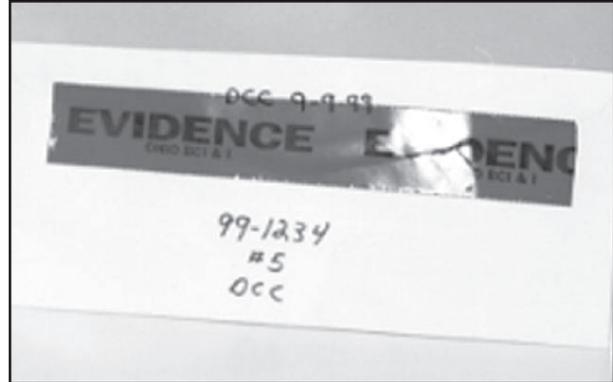
Sources of Tamper-Resistant Evidence Tape

Sirchie Fingerprint Laboratories: 800-356-7311
Lightning Powder Company: 800-852-0300
Criminal Research Products: 800-635-5225
Lynn Peavey Company: 800-255-6499
Kinderprint: 800-227-6020



Cardboard Boxed Evidence

- A cardboard box is closed similarly to the paper bag, with packaging tape providing mechanical strength.
- Evidence tape is used to seal all open edges.
- The closure on the bottom of the box is secure.



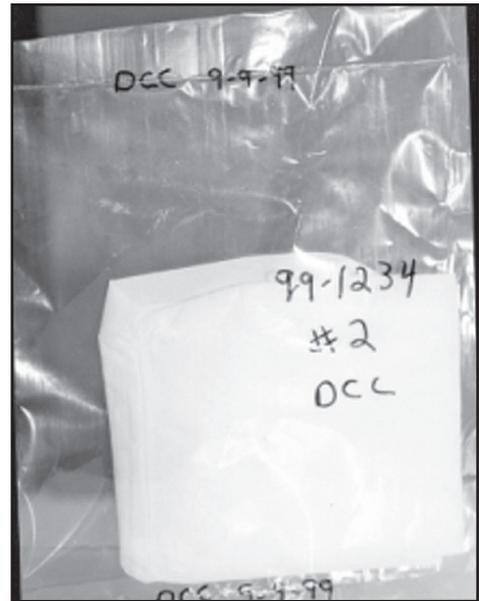
Evidence Submitted in Envelope

- No packaging tape is used on an envelope because it does not require a strong mechanical seal.
- Evidence tape is placed along the entire length of the flap.



Evidence Submitted in Mailing Tube

- A mailing tube is sealed with only evidence tape because a strong mechanical seal is not required.



Evidence Submitted in Plastic

- Evidence sealed in plastic is secured by initialing the heat seal.

Appendix A

REPRODUCIBLE BCI EVIDENCE SUBMISSION SHEET



Evidence Submission Sheet
BCI-101 (Rev. 11-07)

NEW
ADD'L:
PLEASE REFER TO THIS BCI LAB NUMBER WHEN MAKING INQUIRY.
RECEIVED IN LABORATORY AT BCI LONDON

BCI Bowling Green Office 1616 E. Wooster St., Ste. 18 Bowling Green, OH 43402 Phone: 419-353-5603	BCI London Office P.O. Box 365 London, OH 43140 Phone: 740-845-2001	BCI Richfield Office 4055 Highlander Pkwy. Richfield, OH 44286 Phone: 330-659-4600	BCI Youngstown Office 20 Federal Plaza West, 3rd Fl. Youngstown, OH 44503 Phone: 330-884-7555	Date:	Time:	Day:	Agency Case Number:
---	---	--	--	-------	-------	------	---------------------

Offense:	Date of Offense/Discovery:				Location:
Subject(s): (First, MI, Last Name)	Race	Sex	DOB	BCI#	
Victim(s): (First, MI, Last Name)	Race	Sex	DOB	BCI#	

Submitting Agency:	Submitting Officer:
--------------------	---------------------

Case Investigator:	MAILING ADDRESS:
Telephone Number:	

Latent Prints	Chemistry	DNA	Biology	Trace	Firearms	Documents	Photo	GSR
<input type="checkbox"/>								

Please List Individual Items:

Item Number:

Synopsis Attached? ____ Yes ____ No	Is Subject in Custody? ____ Yes ____ No	Due Date:
Returned to: (Signature)		Should there be any change in the status of this case including trial dates, please contact BCI immediately. Refer to the BCI Lab number.

Appendix B
REPRODUCIBLE BCI
BIOLOGICAL SAMPLE
CONSENT FORM

**OHIO BUREAU OF CRIMINAL IDENTIFICATION
AND INVESTIGATION**

**CONSENT TO COLLECT BIOLOGICAL SAMPLES
FOR DNA ANALYSIS**

I _____ HAVE BEEN INFORMED BY
_____ AND _____,

WHO HAVE PROPERLY IDENTIFIED THEMSELVES AS AUTHORIZED AGENT(S) OF THE OHIO BUREAU OF CRIMINAL IDENTIFICATION AND INVESTIGATION, OF MY CONSTITUTIONAL RIGHT NOT TO HAVE BIOLOGICAL SAMPLES TAKEN FROM ME WITHOUT A SEARCH WARRANT.

KNOWING OF MY CONSTITUTIONAL RIGHT TO REFUSE SUCH A SEARCH, I WILLINGLY GIVE PERMISSION AND CONSENT TO THE ABOVE NAMED AGENT(S) TO OBTAIN THOSE BIOLOGICAL SAMPLE(S) THEY DEEM NECESSARY FOR DNA TESTING PURPOSES TO WIT:

THE ABOVE NAMED AGENT(S) FURTHER HAVE MY PERMISSION AND CONSENT TO TAKE FROM MY PERSON THE BIOLOGICAL SAMPLES LISTED ABOVE WHICH THEY **DESIRE FOR DNA TESTING PURPOSES IN THE CASE OR CASES UNDER INVESTIGATION.**

THIS WRITTEN PERMISSION TO OBTAIN BIOLOGICAL SAMPLES WITHOUT A SEARCH WARRANT IS GIVEN BY ME TO THE ABOVE NAMED AGENT(S) VOLUNTARILY AND WITHOUT ANY THREATS OR PROMISES OR COERCION OF ANY KIND.

SIGNED BY ME ON THIS _____ DAY OF _____, 20____, AT _____ AM-PM.

LOCATION OF CONSENT: _____

SIGNED: _____ WITNESS _____

ADDRESS: _____ WITNESS: _____

CITY: _____ STATE: _____

DOB: _____

SSN: _____ CASE NO: _____

Ohio Bureau of Criminal Investigation

1560 State Route 56 SW
London, OH 43140
740-845-2001

www.OhioAttorneyGeneral.gov

BCI is accredited by the Commission
on Accreditation for Law Enforcement Agencies

Revised 9/2013