

# FIREARMS EVIDENCE

## INTRODUCTION

Firearms evidence must be properly collected and handled in order to expedite and maximize the examination results.

## PRECAUTIONS

- **Always handle all evidence with gloves.**
- Do not pick up the firearm by placing a pencil or some other object in the barrel so that trace evidence will not be dislodged or removed. Pick up by checkered portion of the grip.
- Handle the firearm carefully with the muzzle always pointing in a safe direction (or as safe as possible), even if the safety is on or the firearm is not cocked. The safety may be faulty or the trigger pull may be very light ("hair trigger"). Place the firearm into a box (preferred), paper bag, or envelope for transport back to the workstation.
- Knives/Firearms/Sharp items: should be placed in a new cardboard box and secured with plastic zip-ties.
- If the firearm is loaded, it must be unloaded before shipping to the crime laboratory. If, for some reason, the firearm cannot be unloaded, the submitting agency must call the crime laboratory and determine when and how to hand deliver the firearm to the laboratory.
- If the firearm is to be processed for latent fingerprints or DNA, caution should be exercised in order to prevent the destruction of prints or the contamination of potential DNA on the firearm. The submitting agency should call the crime laboratory for instructions prior to packaging and submitting evidence to the laboratory if there are questions regarding latent fingerprints or DNA.
- If a firearm or other metal object is recovered from fresh or salt water, it should be placed in a container of the water it was found in immediately (do not leave exposed to the air for any length of time). Immersion in that water will keep additional corrosive effects to a minimum.
- Do not clean the firearm before submitting.
- Do not fire the firearm before submitting.

**Proper labeling of evidence** includes the contents, source, date, time, item number (alpha-numeric as necessary), agency name and case number, and the name or initials of the collector.

- Secure weapons in new cardboard boxes with zip-ties or other method to prevent movement.
- Document and label the package appropriately (see [section 4](#) of this manual).

## SIGNIFICANCE

The laboratory examination may reveal information about the firearm, ammunition, target object, and circumstances of the firearm incident. The examination may determine:

- Caliber of the fired ammunition.
- Type of firearm (by examining the recovered bullets and expended cartridge cases).
- Whether the recovered bullets and expended cartridges cases were fired from the recovered/submitted firearm.
- Any malfunctioning of a submitted firearm.
- Entrance and exit bullet holes in clothing.
- Approximate relative distance from muzzle to target.
- Any obliterated serial numbers.
- Reconstruction of events.

## METHODS USED

- Detailed examination of firearms including test firing and collection of fired bullets and cartridge cases.
- Microscopic comparisons between test fired bullets and cartridge cases, to each other, and then with submitted fired bullet and cartridge case evidence for specific firearm association.
- Microscopic examination of fired bullets for caliber determination, number of firearms used and the generation of a list of possible responsible firearms.
- Microscopic examination of fired cartridge cases to determine the number of firearms used.
- Polishing, acid etching and other methods applied to items with obliterated identifying markings or serial numbers.
- Visual and microscopic examination and chemical processing of items for the presence of gunshot residues, normally lead and gunpowder. These examinations will normally result in the determination of whether the muzzle of a firearm was in contact/near contact with a target, or at an intermediate or distant range from the target at the time of discharge.
- Review and examination of reports, images or other information to assist in the analysis of trajectories or in the reconstruction of events.

## CONCLUSIONS

Microscopic conclusions will normally be reported as:

- The identification of a specific firearm to fired bullet or cartridge case evidence.
- The elimination of a specific firearm as having fired a bullet or cartridge case evidence.
- The identification or elimination of a specific firearm to fired bullet or cartridge case evidence cannot be made (inconclusive).
- The submitted evidence is unsuitable for microscopic comparison.

## DEFINITIONS

- **Identification:** The opinion of a qualified examiner that there is sufficient agreement of features and microscopic detail (class and individual characteristics) to conclude that two (or more) tool marks originated from the same source.
- **Elimination:** The opinion of a qualified examiner that there is sufficient disagreement of features and microscopic detail (class and/or individual characteristics) to conclude that two (or more) tool marks originated from different sources.
- **Inconclusive:** The opinion of a qualified examiner that there is not sufficient agreement or disagreement of features and microscopic detail (class and/or individual characteristics) to conclude that two (or more) tool marks originated from the same source or from different sources.

**Unsuitable:** The opinion of a qualified examiner that there is not sufficient microscopic detail or features for comparison.

## OPERABILITY AND TEST FIRES

The Crime Laboratory Firearms Section has developed a video for agencies to do their own test fires/operability testing. This video demonstrates how to test firearms, which will then allow the firearms scientists to focus on the critical forensic analysis in the laboratory. There are certain circumstances that might require submission of an operability case. Those circumstances

include but are not limited to full auto conversions, damaged firearms, and other non-functional firearms. Trigger pull weights are not reported. The laboratory will also continue the operability testing on cases that require microscopic comparison. Turning this service back to our customer/user agencies allows us to focus on cases requiring our work in the laboratory. The laboratories have a range and can assist an agency with the test firing of firearms. Non-standard caliber ammunition can be provided at agency request. The video can be found on the FLSB website of the WSP [Firearms Operability Video](#).

## OTHER EXAMINATIONS

- Elemental analyses of gunshot residue for the presence of lead, barium and antimony are not conducted (ie. GSR on hands).
  - Experience has shown that neither positive nor a negative finding of gunshot residue can determine if an individual fired a gun. A positive finding means only an association with, or exposure to, a fired gun, fired ammunition component, or other contaminated surface either purposeful or accidental. On the other hand, since gunshot residue is not always deposited and is so easily lost through normal activity, no significant conclusion can be drawn from a negative finding.
- The attempted association of a specific fired bullet to a specific discharged cartridge case is not normally conducted.
- Elemental analysis of lead bullets or bullet cores for identification to a lot or box of ammunition is not conducted.

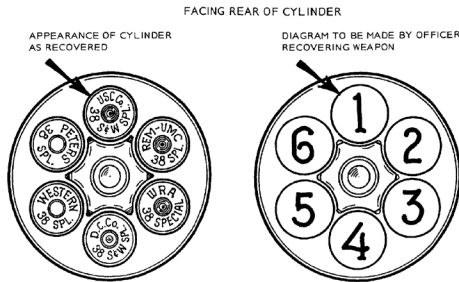
## COLLECTION AND PRESERVATION

- All items should be inventoried. Record the source, date, time, agency case number, item number, and description of the item. Descriptions of firearms should include the serial number (do not confuse with part numbers), make, model, caliber, and the condition when found (i.e., loaded or unloaded, cocked or uncocked, safety on or off, etc.).
- The area of recovery should be measured, sketched, and photographed, showing the positions of the item.
- Unload the firearm, if possible.
- Handle carefully in order to preserve trace evidence. Do not remove the trace evidence unless the entire object cannot be submitted. Before removing, describe the location of the trace evidence and photograph or sketch the evidence in place.

## UNLOADING A REVOLVER

- Place a line on the cylinder on each side of the top strap with a pencil or felt pen prior to opening or moving the cylinder. This will inform the examiner which chamber was at the top.
- While pointing the barrel downward, open the cylinder; before moving the cylinder or removing the cartridges, make a diagram of the cylinder. Number the chambers, starting at the top and going clockwise; note any cartridge in each chamber, whether the cartridge has been fired, and the headstamp information, indicating the manufacturer. See example:

## HEADSTAMP



Chamber #	Condition	Information
1	Fired	S&W
2	Fired	REM
3	Fired	WRA
4	Loaded	S&W
5	Loaded	WES
6	Loaded	PET

- Each cartridge or cartridge case that is removed should be placed in an individual container. The number of the chamber from which it was removed must be noted on the container.
- The firearm, cartridges and cartridge cases must be marked prior to packaging and shipping. A tag is an acceptable method of marking the firearm.
- Unfired cartridges should be marked with an indelible felt tip pen along the case.
- Fired cartridge cases should be handled in a similar fashion as cartridge cases collected at a scene. Note: a mark made with a permanent marker may be removed during examination.
- **Never** mark the base of a fired or unfired cartridge.

## UNLOADING A SEMI-AUTOMATIC PISTOL

- Remove the magazine. Handle the magazine with care if it is to be processed for latent prints or DNA. Do not remove any cartridges. Mark the magazine. Package the magazine in a paper envelope, small box, etc. Seal and label the container. Submit with the firearm.
- Remove the live cartridges, if any, from the chamber. Mark the cartridge, indicating that it was removed from the chamber, place in a container, and seal and label the container. Submit with the firearm.
- Note the serial number of the firearm for proper identification.

## UNLOADING BLACK POWDER FIREARMS

### Percussion cap revolvers

- Remove the percussion caps from the cylinder and then remove the cylinder from the frame.
- Do not attempt to remove the projectile and charge from the individual chambers.

### Percussion cap rifles

- Remove the percussion cap. Do not attempt to remove the projectile and charge from the firearm.

### Flint Lock pistols and rifles

- Remove the flint and any powder in the flash pan. Do not attempt to remove the projectile and charge from the firearm.

Call the Crime Laboratory for shipping instructions. If there is a problem with unloading Black Powder Firearms, they can be hand delivered to a laboratory with a Firearms section. Please call ahead.

## RECOVERED BULLETS, PROJECTILES, AND FRAGMENTS

- Each bullet or fragment recovered from the crime scene should be carefully packaged in an appropriate container, such as a small box (e.g., a pill box) or envelope (preferred). Seal and label the container.
- If a bullet is buried in a wall or other object, cut around the bullet. Remove the material containing the bullet. Do not probe the hole or try to dig out the bullet—it may damage the bullet. Place in a container, and seal and label the container.
- Do not touch recovered bullets with bare fingers. Possible traces of blood or other evidence on the bullet could be contaminated or removed by handling. Use a clean, unused pair of disposable gloves or pick up with clean tissue.
- Shot pellets should be collected and submitted in the same manner as bullets.
- Search for shot shell wads and shot cups whenever a shotgun is involved.
- Shot patterns should be measured, sketched, and photographed. If possible, the surface containing the shot pattern should be recovered.
- Bullets and fragments recovered at an autopsy should be carefully rinsed, dried, and placed in a small container or envelope. Seal and label the container. Do not seal bullets that are damp or wet in plastic containers as this may cause corrosion and damage the markings on the bullets.

## FIRED CARTRIDGE CASES AT SCENE

- Consider whether the items will be submitted for processing for fingerprints and/or DNA. Wear gloves to collect the evidence and prevent potential contamination.
- Each cartridge case should be placed in a small container or envelope. Make sure the packing is appropriately labeled. Do not mark the cartridge case on the base or on the side.

## GUNSHOT RESIDUE FOR DISTANCE DETERMINATION

If fired at close range, a firearm will discharge partially burned and unburned gunpowder particles onto the target surface. The appearance (i.e., the pattern and density of the particles) may assist in establishing the distance between the firearm and the target surface.

In addition to gunpowder particles, soot, vaporous lead, and small lead particles are also produced during the discharge of a firearm and these substances can be found on a target surface around a suspected bullet hole. These various products of the discharge of a firearm can be identified using chemical testing and the results of the various chemical tests can also be used to determine whether a firearm was in contact/near contact with a target, at an intermediate range from a target, or a distant range from a target at the time of discharge.

Drop-off distance is the approximate distance where the firearm and ammunition combination in the examination no longer deposits observable/detectable residues on the specific target material. Drop-off distance is normally indicative of the difference between intermediate range and distant range. If an approximate drop-off distance is reported, this wording will be added to the report:

“Testing to determine the approximate drop-off distance was conducted in a laboratory setting. A variety of scenario-based variables may have affected the evidence which could change the drop-off distance greater than any measurement uncertainty in performed laboratory tests.”

## **CAUTION:**

Chemical testing of clothing may have a detrimental effect on retesting and subsequent testing may not produce results similar to the original.

- If clothing is submitted, each article must be air-dried and packaged separately. Package the clothing in paper bags or wrap in brown paper. Do not package in plastic bags. Seal and label the containers, noting the contents.
- If the pattern is on skin, 1:1 color photographs of the wound and entire pattern should be submitted, before and after the wound area is cleaned. A scale or ruler must be included in the photographs. Close-up photos of the entry and exit wounds should be submitted as well as close-up photos of typical gunpowder particles in the pattern. Some of the particles should be picked off and folded in a piece of clean paper. The paper should be sealed, labeled, and placed in an envelope. Seal and label the envelope.
- The laboratory should be informed of the locations of the entry and exit wounds found on the body. Copies of autopsy or medical reports may be helpful in the course of the analysis and should be submitted to the laboratory.
- The suspect firearm and the same type of ammunition should be submitted. The gunpowder pattern on the proximity test target material may be compared to the patterns visible on or chemically developed on the submitted clothing.
- In the case of black powder firearms, the unknown factors of powder type and amount will be limiting factors in trying to establish distances between the firearm and target.

## **FIREARMS PARTS**

- It is important to collect any and all firearm parts found at the crime scene.
- It may be possible to reassemble the firearm for testing; a firearm type and manufacture may be identified.
- All of the collected parts may not be from the same firearm.
- The parts may be packaged in a box (preferred), a paper bag, an envelope, etc. Parts packaged in a box may be strapped down to prevent shifting during transport. The packaging should be marked with the appropriate identifying marks, such as agency case number, item number, and description of the item.

## **SERIAL NUMBER RESTORATION**

- The serial number on a metal surface of a firearm (as well as office equipment, bicycles, machinery, or other high value item) may be obliterated to conceal ownership. Chemical processing can often restore the number. Do not wipe or abrade the surface.

## **SHIPPING FIREARMS AND RELATED EVIDENCE**

- Package the firearm in a suitable box. Firearms packaged in a box should be strapped down with zip ties to prevent shifting during transport. Mark the sealed box with the appropriate identifying marks, such as agency case number, evidence item number, and description of the item.
- When packaging semiautomatic pistols, place a zip-tie through the magazine well and out of the ejection port to render the firearm safe. Please do not put the zip-tie inside the barrel of the pistol as this may disturb trace evidence within the bore of the barrel.
- All firearms must be unloaded before being shipped or hand-carried to the laboratory. If the firearm is difficult to unload, contact the crime laboratory for assistance. Secure the weapon in a new cardboard box with plastic ties to prevent movement.
- Carriers have different rules regarding the shipping of firearms and ammunition. Please contact the carrier with specific questions regarding the shipping of this type of evidence.

# 1.0 TOOL MARK EVIDENCE

## INTRODUCTION

A tool mark is a mark made by one object on the surface of another, softer object. Although these marks are generally made at the entry point of a burglary, various kinds of tool marks can be found elsewhere, such as fractured knife blades, cut marks on wire, abrasions left on a vehicle, cut marks on a padlock, and machine marks on a metallic surface.

## TYPES OF TOOL MARKS

- Some tool marks only show the basic shape of the tool. This type of tool mark lacks specific detail that can single out a particular tool; only the general shape and size of the tool can be determined—wood impressions are often of this type. Since wood will fracture or partially "spring" back, often only the general form and size of the tool can be determined.
- The tool mark that is of more value is the type that consists of striations (a series of narrow, fine grooves, some of which are microscopic) and indentations which show the individual characteristics of the tool. These marks can often lead to the identification of a particular tool.

## METHODS USED

The submission of a tool with a questioned/unknown tool mark will normally result in the making of test tool marks in an appropriate medium using the submitted tool. These test tool marks will be microscopically compared to each other and then compared with the questioned/unknown tool mark. Casting of the test tool marks may be required depending on the type of questioned/unknown tool mark submitted. Also, trace evidence on the tool or toolmark will be assessed and evaluated for potential examination by another section.

## CONCLUSIONS

Microscopic comparisons will normally be reported as:

- The identification of the submitted tool to the questioned tool mark.
- The elimination of the submitted tool from the questioned tool mark.
- The identification or elimination of the submitted tool to the questioned tool mark cannot be determined (inconclusive).
- The submitted tool mark is unsuitable for microscopic comparison.

## OTHER EXAMINATIONS

Fracture matches and some impression/pattern evidence (i.e., footwear and tire tracks) are assigned to the Materials Analysis Unit.

## PRECAUTIONS

- Do not attempt to fit a suspected tool into the questioned mark. The tool mark may be damaged, the tool may be altered, and trace evidence may be lost or contaminated.

- In the case of cut wire type materials, mark the end of the wire type material cut by an agency representative during the retrieval of the evidence with paint, permanent marker, or wrap with tape, indicating this is a cut produced by a known tool. This provides information to the laboratory as to which end of the wire type material is to be compared with the suspected tool.
- Care must be taken to protect the suspected tool so that the face of the tool is not damaged, thus changing the tool mark it will produce. Protect the face of the tool with soft tissue paper.
- Handle the tool with gloves, as DNA might be recovered from a tool left at the scene.
- Protect any trace material on the face of the tool. Paint, metal particles, and other materials from a surface frequently adhere to the tool. The trace material can be compared with samples of the surface containing the tool mark.
- Samples of the surface adjacent to the tool mark must be taken. Later, when the suspect tool is recovered, trace materials on the tool can be compared to the samples taken at the scene. This information can be very valuable, particularly if the tool mark comparison is not definitive.

## **PRESERVATION OF TOOL MARKS**

- When possible, submit the object containing the tool mark. This may entail submitting a drawer, a metal screen door, or cutting out a portion of the object containing the tool mark.
- Close-up photos that include a scale must be made if the object containing the tool mark cannot be submitted. The film plane should be parallel to the tool mark. Oblique lighting will increase details visible in the photo.
- It is important that the tool mark be kept clean and dry. An exception is when a tool mark on a metal surface is subject to rusting. To retard rusting, coat the tool mark with a light film of oil.
- Casting of the tool mark may be done as a last resort. A cast will never completely replicate the details of the original tool mark. Suitable silicone rubber casting materials, such as Mikrosil or AccuTrans, can replicate a significant amount of the details in a tool mark. A formulation with a lesser degree of replication will cause a loss of the finer details in the tool mark and reduce the chances for a definite conclusion.
- Casting should be done by an experienced person. Improper casting may produce a worthless cast and damage the tool mark. **DO NOT PRACTICE ON THE EVIDENCE.**

## **TOOL FRAGMENTS**

- At crime scenes, burglary tools may break during the commission of the crime. Fragments of the broken tool may be found near the scene or even in the tool mark itself.
- Since these fragments may be very small, a flashlight held obliquely to the floor surface is helpful. A magnet may also be used to locate the fragments that contain iron.
- The recovered fragment may be fitted to the suspect's broken tool and constitute what is called a physical match. The physical match may identify the tool as the one used at the crime scene.



## 2.0 INTEGRATED BALLISTIC IDENTIFICATION SYSTEM (IBIS)/NATIONAL INTEGRATED BALLISTIC INFORMATION NETWORK (NIBIN) EVIDENCE

The Integrated Ballistics Identification System (IBIS)/National Integrated Ballistic Information Network (NIBIN) has greatly increased the ability of the Firearms Sections to identify incidents in which the same firearm was used. Often, IBIS/NIBIN can offer new leads in “dead end” cases and reduce the number of unsolved firearm cases.

IBIS/NIBIN is located in the Spokane, Tacoma and Seattle Crime Laboratories. Please submit IBIS/NIBIN entries to one of these laboratories. If there are any questions regarding submissions for IBIS/NIBIN entry, please contact the Firearms Section at one of these three labs that handle firearms evidence.

### METHODS USED

- Images of evidence and test fired cartridge cases will be entered into the NIBIN database for correlation with existing stored images. Automatic searches of NIBIN Region 15 (Washington, Idaho, Montana, Alaska and Northern California) occur when a cartridge case is entered into NIBIN. The cartridge case will also be searched any time a new cartridge case with appropriate characteristics is entered into NIBIN. Agencies can make a special request to have a cartridge case searched against any specific area that is outside of NIBIN Region 15, but is within the United States. The stored images of cartridge cases are maintained indefinitely.
- The submitting agency representative will be contacted regarding a potential association between submitted evidence items or test fired cartridge cases and existing database images.
- If needed for warrants, arrests, trial, etc., confirmation of potential associations between submitted evidence items or test fired cartridge cases and existing database images may be requested and the cartridge cases from the involved cases will be examined by a Firearms Examiner. The results of this examination will be communicated to the representatives of the agencies involved.

### SUBMISSIONS FOR NIBIN ENTRY

The following items may be submitted for IBIS/NIBIN entry:

- Recovered fired cartridge cases (evidence).
- Test fired cartridge cases – from primarily semiautomatic pistol and semiautomatic rifle firearm types.
- Please contact the Firearms Sections about any special situations or firearms questions related to IBIS/NIBIN entry.

The Crime Laboratory Division Firearms Section has developed a video for agencies to do their own firearms test fires/operability testing for NIBIN/IBIS entry. The video is entitled WSP Firearms Operability Testing Process and is located on the WSP website. ([Firearms Operability Video](#))

In an effort to increase customer service and provide quicker ways to submit items for IBIS/NIBIN, cartridge cases to be entered into IBIS/NIBIN will be handled in one of three ways:

- 1) They may be submitted as evidence and will be documented and handled as evidence. An RFLE needs to be submitted and chain of custody will be maintained.
- 2) They may be handled as walk-ins and remain in the possession of an agency representative who remains present during entry.
- 3) FOR TEST FIRES ONLY: They may be handled as non-evidence and delivered to the laboratory (e.g. by mail or in person) or created on-site by law enforcement personnel exclusively for IBIS/NIBIN entry, then placed in a location designated by the laboratory and entered into IBIS by any authorized IBIS/NIBIN operator. THESE TEST FIRES WILL BE DESTROYED.

Options 1 and 2 are recommended for evidence cartridge cases and option 3 is recommended for test fires. Since test fires under option 3 are destroyed, if an agency wants to retain test fires as evidence that the firearm is operable, it should create additional test fires for that purpose.

Please submit test fires in a test fire envelope or other appropriate packaging. The following information should be included on the test fire envelope/package for the IBIS/NIBIN entry:

- Agency name, case number, and contact
- Date seized
- Make/Model/Caliber/Serial Number/type (pistol, rifle, shotgun)
- If the firearm will be returned to a citizen or destroyed
- Any relevant scenario based information (location recovered etc.)

No evidence bullets or bullets produced during the test firing of firearms are currently being entered into the NIBIN database.