Technical Procedure for Fired Cartridge Case/Shotshell Examination

1.0 Purpose – To outline the procedures for examination and comparison of fired cartridge case and shotshell evidence.

2.0 Scope – This procedure applies to cases submitted to the Firearms Section that contain fired cartridge cases or shotshells. This procedure does not apply to NIBIN-only cases.

3.0 Definitions

- **Anvil marks** – Microscopic marks impressed on the forward face of the rim of a rimfire cartridge case as it is forced against the breech end of the chamber by the firing pin. These marks are characteristic of the breech under the firing pin and may be used to identify a cartridge case with a specific firearm.
- **Breechface impression** – Negative impression of the breech face of the firearm found on the head of the cartridge case and/or primer after firing.
- **Caliber (Ammunition)** – A numerical term, without the decimal point, included in a cartridge name to indicate the nominal bullet diameter.
- **Cannelure** – A circumferential groove generally of a knurled or plain appearance on a bullet or cartridge case that is typically used for crimping, lubrication, and identification.
- **Cartridge case** – The container for all the other components which comprise a cartridge.
- **Centerfire** – Any cartridge that has its primer central to the axis in the head of the case.
- **Chamber detail** – Individual microscopic marks placed upon a cartridge case by the chamber wall as a result of expansion during firing.
- **Class characteristics** – Measurable features of a specimen which indicate a restricted group source. They result from design factors, and are therefore determined prior to manufacture.
- **Comparison microscope** – Essentially two microscopes connected to an optical bridge which allows the viewer to observe two objects simultaneously with the same degree of magnification.
- **Ejection port** – An opening in the receiver or slide to allow ejection.
- **Ejector** – A portion of a firearm's mechanism which ejects or expels cartridges or cartridge cases from a firearm.
- **Extractor** – A portion of a firearm's mechanism which withdraws a cartridge or cartridge case from the chamber of a firearm.
- **Firing pin aperture** – The hole in the breech face of a firing pin through which the firing pin protrudes.
- **Firing pin aperture shear** – Striations created by the edge of the firing pin aperture as the cartridge case head moves against the breech face of a firearm.
- **Firing pin drag** – The tool marks produced when a projecting firing pin comes into contact with a cartridge case or shotshell during the extraction, ejection cycle.
- **Firing pin impression** – The indentation of the primer of a centerfire cartridge case or in the rim of a rimfire cartridge case caused when it is struck by the firing pin.
- **Gauge** – A term used in the identification of a shotgun bore. The number of round lead balls of bore diameter that equal one pound. Thus, 12 gauge is the diameter of a round lead ball weighing 1/12 pound.
- **Headstamp** – Numerals, letters and symbols (or a combination thereof) stamped into the head of a cartridge case or shotshell to identify the manufacturer, caliber, gauge, or give additional information.
- **Individual characteristics** – Marks produced by the random imperfections or irregularities of tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage. They are unique to that tool and distinguish it from all other tools.
- **Objective** – The lens or lenses in an optical instrument which form the image of an object.
- **Oblique lighting** – A method of illumination where the light source is placed at an angle, generally to produce shadows or enhance edges.

- **Primer** – The ignition component of a cartridge.
- **Rimfire** – A flange-headed cartridge containing the priming mixture inside the rim cavity.
- **Shell latch** – The part of a shotgun that holds live shotshells in the magazine tube.
- **Shotshell** – A cartridge containing projectile(s) designed to be fired in a shotgun. The cartridge body may be metal, plastic, or paper.
- **Stereomicroscope** – An optical instrument which provides three dimensional viewing of an object through paired objectives and eyepieces. Some models share a common main objective.
- **Subclass characteristics –** Features that may be produced during manufacture that are consistent among items fabricated by the same tool in the same approximate state of wear. These features are not determined prior to manufacture and are more restrictive than class characteristics.
- **Sufficient agreement** – Agreement is sufficient when it exceeds the best agreement demonstrated between tool marks known to have been produced by different tools and is consistent with the agreement demonstrated by tool marks known to have been produced by the same tool.

4.0 Equipment, Materials, and Reagents

- Comparison microscope
- Stereomicroscope
- Caliper
- Micrometer
- Ammunition Reference Collection
- Cartridge case identification software (e.g. CartWinPro or AFTE Headstamp Gallery)
- FBI General Rifling Characteristics File
- Engraver
- Cotton-tipped swabs
- Cleaning solutions such as Terg-A-Zyme, Hibiclens, ethanol, acetone, and cartridge case cleaner (5% v/v dilution of Birchwood Casey Concentrate in water)
- Magnet
- Personal protective equipment
- Soft bristle brush

5.0 Procedure

5.1 Cartridge cases and shotshells that are removed from the chamber, action, or magazine of a firearm shall not be microscopically compared to the firearm, unless specifically requested by the appropriate District Attorney's Office.

5.2 Fired Cartridge Case/Shotshell Examination

5.2.1 Item Preparation

5.2.1.1 Prior to analysis, ensure that any additional examinations (e.g., Forensic Biology, Trace, Latent, etc.) that must be completed before analysis by the Firearms Section have been completed.

5.2.1.2 Visually inspect the item for possible trace evidence such as hair, fibers, wood, etc. Note the location on the item where the trace material was found. Carefully remove the material and place in a container suitable for return to the submitting

agency or submission to the appropriate Laboratory Section for further examination.

5.2.1.2.1 If the trace material is not to be retained, indicate as such in the case notes.

5.2.1.3 Fired cartridge cases or shotshells contaminated with blood, bloody matter, or other biological material shall be evaluated for the need to preserve biological material. Upon evaluation and preservation, if required, the fired cartridge cases or shotshells may be cleaned with a soft bristle brush and a disinfectant such as Terg-A-Zyme, Hibiclens, and/or ethanol.

5.2.1.4 Fired cartridge cases or shotshells may generally be cleaned with a cotton-tipped swab saturated with ethanol, acetone, and/or cartridge case cleaner.

5.2.1.4.1 If cartridge case cleaner is used, any residual solution will be removed with water.

5.2.1.5 Mark all evidence cartridge cases and shotshells for identification.

5.2.1.5.1 Do not mark on the head or rim or mark on possible extractor or chamber marks. Find an area on the case devoid of markings.

5.2.1.5.2 If necessary, markings may be made inside a case mouth.

5.2.2 Physical Characteristics Examination

5.2.2.1 A Cartridge Case Worksheet shall be filled out for fired cartridge cases that are to be compared microscopically. Cartridge cases of similar class characteristics may be grouped together in the same entry. Similar information as applicable for fired shotshells that are to be compared microscopically shall be recorded on a Shotshell Worksheet.

5.2.2.2 Fired cartridge cases/shotshells that will not be compared microscopically shall be recorded on a Firearm Worksheet or on the Not Examined Worksheet as follows:

5.2.2.2.1 If the fired cartridge cases/shotshells were submitted with a firearm and are a caliber that can be fired by the firearm, either intentionally or otherwise, they shall be included on the Firearm worksheet for the firearm with which they were submitted or listed on the Not Examined Worksheet.

5.2.2.2.2 If fired cartridge cases/shotshells are submitted independently from a firearm or were submitted with a firearm, but are a caliber that cannot be fired by the firearm either intentionally or otherwise, they shall be listed on the Not Examined Worksheet.

5.2.2.3 Features of fired cartridge cases that shall be noted, if applicable, include:

5.2.2.3.1 Design characteristics of the fired cartridge case or shotshell:

- Manufacturer
- Caliber/Gauge
- Hull markings (load information)

5.2.2.3.2 Class characteristics of the firearm that fired the cartridge case or shotshell:

- Firing pin impression shape
- Breechface impression detail type
- Resizing marks or any other indications of reloading

5.2.2.4 Features of fired cartridge cases that may be noted, if applicable, include:

5.2.2.4.1 Design characteristics of the fired cartridge case or shotshell:

- Headstamp
- Ignition system (centerfire or rimfire)
- Composition of the case, primer, and/or hull
- Cannelure type and location
- Primer sealant presence

5.2.2.4.2 Class characteristics of the firearm that fired the cartridge case or shotshell:

- Firing pin drag or flow and firing pin aperture shear
- Extractor mark(s) and position
- Ejector mark(s) and position
- Chamber detail type
- Magazine lip marks
- Shell latch marks
- Ejection port markings
- Anvil marks

5.2.2.5 If a fired cartridge case/shotshell will be microscopically compared to either another evidence item or to a submitted firearm, the item must first be evaluated to identify characteristics suitable for comparison.

5.2.2.5.1 The result of this evaluation will be recorded in the case notes.

5.2.2.6 If items of different calibers will not be microscopically compared, the following statement will be included in the case notes and report:

"Items of different calibers were not microscopically compared to one another as no indications of having been fired by a firearm of improper caliber were observed."

5.3 General Rifling Characteristics (GRC) File Protocol

5.3.1 GRC File searches shall be performed at the request of the submitting agency.

5.3.2 If an evidence cartridge case is not identified to a particular firearm, a list of manufacturers of firearms of similar caliber and/or class characteristics may be compiled using the computerized General Rifling Characteristics (GRC) File provided by the FBI based on the discernible class characteristics present and the Forensic Scientist's training and experience.

5.3.3 A single list generated using combined class characteristics of both fired bullets and cartridge cases shall not be produced.

5.3.4 A performance check of the FBI GRC software shall be performed before use (see Attachment A). This performance check shall be recorded in the Completed Tasks area of the worksheet.

5.3.5 Fill in the applicable fields at the bottom of the GRC Search page with the pertinent case information and the information obtained during the examination of the cartridge case, and run the computerized search of the database files.

5.3.5.1 The search parameters may include caliber, breechface impression type, firing pin impression shape, extractor position and/or ejector position.

5.3.5.1.1 Because of variation in the original data entry into the GRC File, the Forensic Scientist shall include similar class characteristics when applicable. An example is selecting both circular and hemispherical firing pin impression shapes for a cartridge case with a hemispherical firing pin impression.

5.3.5.1.2 For rifle calibers, the Forensic Scientist shall always select smooth breechface impression detail in the search parameters in addition to any other breechface detail type observed.

5.3.5.2 Based on the Forensic Scientist's training and experience, the list may be filtered based on characteristics of the cartridge case that may indicate or exclude a particular type of firearm.

5.3.5.3 If multiple evidence cartridge cases have the same class characteristics or have been identified to each other, one list of possible firearm manufacturers may be compiled.

5.3.6 Record this information in the case notes and import the search results generated by the General Rifling Characteristic File into the case file.

5.3.7 Report the list of possible manufacturers in the main body of the report.

5.3.7.1 Always include a disclaimer line notifying the submitting agency that the list may not be all inclusive and should not be used to eliminate any suspect firearm.

5.3.8 If the list consists of more than twenty (20) possible firearm manufacturers, the complete list shall be imported into the Case Record Object Repository and the report shall contain a

statement that the list of firearms that may have fired the evidence cartridge case(s) was too numerous to be of investigative value.

5.4 Class Characteristics Comparison

5.4.1 Should a microscopic comparison be requested, the evidence fired cartridge cases or shotshells will first be evaluated for agreement of class characteristics to each other or to a submitted firearm. The Forensic Scientist may ascertain at this point if the class characteristics agree by noting whether or not the type of breechface detail, firing pin shape and detail type, etc. are similar.

5.4.1.1 If the class characteristics are different and this difference is not attributed to deformity or damage to the firearm after the firing of the evidence cartridge case/shotshell, the Forensic Scientist may conclude that the evidence cartridge case/shotshell was not fired by the evidence firearm or that the evidence cartridge cases/shotshells were not fired by the same firearm.

5.5 Individual Characteristics Comparison

5.5.1 The following is an illustration of an approved method of performing a comparison microscope examination of test and/or evidence fired cartridge cases or shotshells. Forensic Scientists may develop an individual routine for this type of examination; however, they shall incorporate the general underlined points mentioned below.

5.5.1.1 Select the correct objective (magnification) setting and ensure that the objectives are locked in place. Low magnification (10X - 15X) is typically used to examine the fired cartridge case or shotshell looking for areas with the most obvious individual characteristics. Higher magnification (20X or greater) is typically used to verify the correspondence of finer striations.

5.5.1.2 The illumination (lights) used shall be properly adjusted. Oblique lighting is usually preferred. The angle of case head surface and/or lighting angle may be manipulated to achieve the best view of the surface contour.

5.5.1.3 If a firearm was submitted for comparison, compare the test cartridge cases/shotshells fired by this firearm to each other to determine which microscopic characteristics are reproducing.

5.5.1.3.1 Breechface impression

5.5.1.3.1.1 Rotate one test cartridge case/shotshell to find the position that best highlights the individual characteristics on the primer and/or the base. When such an area is located, rotate the second test item to the same position.

5.5.1.3.2 Firing pin impression

5.5.1.3.2.1 The Forensic Scientist may also examine and compare the firing pin impressions of the test cartridge cases/shotshells. The cartridge cases/shotshells may be

tilted toward the light source to illuminate the firing pin impression.

5.5.1.3.2.2 Rotate one test cartridge case/shotshell to find the position that best highlights the individual characteristics in the firing pin impression. When such an area is located, rotate the second test item to the same position.

5.5.1.3.3 Chamber detail

5.5.1.3.3.1 If the breechface or firing pin impressions lack sufficient agreement to be matched, the test cartridge cases/shotshells shall be examined for chamber detail.

5.5.1.3.3.2 Position one test cartridge case/shotshell so that it is oriented horizontally on the stage and rotate it to find the position that best highlights the individual characteristics. When such an area is located, rotate the second test item to the same position.

5.5.1.3.3.3 Matching chamber detail may indicate that the cartridge case/shotshell was fired by the suspect firearm. However, to prove that conclusion, the Forensic Scientist shall:

5.5.1.3.3.3.1 Work unfired cartridges/shotshell through the action of the firearm. Examine the unfired cartridges/shotshells for the chamber detail used to match the fired cartridge cases. If the matching chamber detail does not appear on the unfired cartridges/shotshells, the conclusion may be made that the detail is fired-in, or;

5.5.1.3.3.3.2 In the absence of the firearm, document that the chamber marks on three (3) or more fired cartridges/shotshells are all in the same spatial relationship to the position/location of individual detail in the firing pin impression, breechface impression, and/or other known fired-in marks.

5.5.1.3.4 Cycling detail

5.5.1.3.4.1 The Forensic Scientist may also examine any extractor, ejector, chambering, and feed marks and any other

marks that may be present on the test cartridge cases/shotshells.

5.5.1.3.4.2 Position the test cartridge cases/shotshells on the stages in the position that most clearly highlights the area(s) of concern.

5.5.1.3.5 If the test cartridge cases/shotshells cannot be matched to each other, (the agreement is not sufficient) then more test cartridge cases/shotshells may be fired and inter-compared. If the test fired cartridge cases/shotshells still cannot be matched, the Forensic Scientist may reach the conclusion that the firearm in question does not reproduce its individual characteristics very well or that the firearm does not produce sufficient individual marks to reach a positive conclusion.

5.5.1.4 Compare evidence fired cartridge case(s)/shotshell(s) to either another evidence fired cartridge case/shotshell or a test fired cartridge case/shotshell.

5.5.1.4.1 In the case of comparison to a test fired cartridge case/shotshell, attempt to locate the area on the evidence cartridge case/shotshell that corresponds to the previously examined area of the test cartridge case/shotshell.

5.5.1.4.2 When comparing evidence cartridge cases/shotshells to each other, an area with obvious individual characteristics may be noted on one cartridge case/shotshell. The other cartridge case/shotshell may then be examined in an attempt to locate the corresponding area.

5.5.1.5 These examinations shall be made with the cartridge cases or shotshells in phase. This means that cartridge cases/shotshells that are being examined shall be oriented similarly using a common point of reference such as drag marks, extractor marks, ejector marks, etc.

5.5.1.6 The entire evidence item shall be considered. The Forensic Scientist shall examine and compare all detail of a similar type present on the fired cartridge case/shotshell. For example, when comparing chamber detail, the Forensic Scientist shall examine the entire case wall for all chamber detail present.

5.5.1.7 Evaluate for subclass characteristics.

5.5.1.7.1 If subclass characteristics are present on either the evidence cartridge case(s)/shotshell(s) or the test fired cartridge cases/shotshells but not present on both and is not attributed to deformity or damage to the firearm after the firing of the evidence cartridge case/shotshell, the Forensic Scientist may conclude that the evidence cartridge case(s)/shotshell(s) were not fired by the evidence firearm or they were not fired by the same firearm.

5.5.1.7.2 Subclass characteristics can be used for alignment and phasing of evidence and/or test cartridge cases/shotshells.

5.5.1.7.3 The method and outcome of evaluation shall be noted in the Comparison Exams worksheet.

5.5.1.8 The Forensic Scientist may halt the examination if he/she finds sufficient agreement to match in one area of detail. For example, if the Forensic Scientist finds sufficient agreement to match based on breechface detail, the Forensic Scientist need not examine and compare chamber detail. If, however, the Forensic Scientist does not find sufficient agreement in a particular area, the Forensic Scientist shall continue looking at other areas until he/she determines that there is sufficient agreement to match or until there are no more areas of detail to examine. If all fired-in detail is examined and is unable to be matched, the Forensic Scientist shall examine cycling detail.

5.5.1.9 If the cartridge cases/shotshells are matched to each other, the items shall be indexed with an indelible marker to indicate the position in which the agreement is most clearly viewed.

5.5.1.9.1 The Forensic Scientist may refer to previously indexed areas when describing the orientation, such as an extractor index mark.

5.5.1.9.2 Specific areas of chamber detail agreement shall be indexed on the case walls immediately adjacent to the agreement.

5.5.1.10 <u>If an identification is not initially made, the Forensic Scientist may consider the following possible reasons for the lack of sufficient agreement:</u>

5.5.1.10.1 The evidence cartridge case/shotshell and test cartridge cases/shotshells were fired by different firearms.

5.5.1.10.2 The firearm was damaged between firing the evidence cartridge case/shotshell and the test cartridge case/shotshell.

5.5.1.10.3 The test ammunition available is significantly different from the evidence causing a difference in the way the cartridge case/shotshell was marked.

5.5.1.10.4 Extreme fouling is/was present in the firearm, either prior to firing the evidence cartridge case/shotshell or occurring since the evidence cartridge case/shotshell was fired.

5.5.1.10.5 Damage occurred to the evidence cartridge case/shotshell causing distortion, deformation or the elimination of microscopic detail.

5.5.1.10.6 The evidence cartridge case/shotshell was fired by a firearm of an incorrect caliber.

5.5.1.10.7 Other reasons may exist and may be considered and tested if appropriate at the discretion of the Forensic Scientist based on his/her training and experience.

5.6 Range of Conclusions

5.6.1 The suggested report wording listed below may be modified at the Forensic Scientist's discretion to reflect more accurately his/her conclusions. Any such modifications to report wording shall be reviewed and approved by the technical reviewer.

5.6.2 Fired-in Detail

5.6.2.1 Identification

5.6.2.1.1 There is agreement of all discernible class characteristics and sufficient agreement of individual characteristics to constitute a match.

- "Item 1 was fired by Item 3."
- "Item 7 and 8 were fired by the same firearm."
- The Item 1 and 2 cartridge cases were fired by the same firearm as the Item 7 through 10 cartridge cases."

5.6.2.2 Inconclusive

5.6.2.2.1 There is agreement of all discernible class characteristics and some agreement of individual characteristics, but insufficient for an identification; or

There is agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility; or

There is agreement of all discernible class characteristics and possible agreement of individual characteristics, but the potential for subclass carryover could not be eliminated; or

There is agreement of all discernible class characteristics and some disagreement of individual characteristics, but insufficient for elimination.

- "There is agreement of all discernible class characteristics between the Item 11 shotshell and test shotshells fired by the Item 3 shotgun; however, the comparison of individual characteristics was inconclusive. Therefore, Item 11 could not be identified or eliminated as having been fired by Item 3."
- "There is agreement of all discernible class characteristics between the Item 1 and 2 cartridge cases; however, the comparison of

individual characteristics was inconclusive. Therefore, Items 1 and 2 could not be identified or eliminated as having been fired by the same firearm."

- "There is agreement of all discernible class characteristics and possible individual characteristics between the Item 4 and 5 fired cartridge cases and test fires created using the Item 2 pistol. However, the potential for subclass carryover could not be eliminated. Therefore, Item 4 and 5 were either fired by Item 2, or by a different firearm(s) manufactured with the same tool in the same approximate state of wear."

5.6.2.3 Elimination

5.6.2.3.1 There is significant disagreement of discernible class characteristics and/or individual characteristics.

- "Item 4 was not fired by Item 2."
- "Item 3 and 5 were fired by different firearms."
- The Item 4 cartridge case was fired by a different firearm than the Item 1 through 3 cartridge cases."

5.6.3 Cycling Detail

5.6.3.1 Identification

5.6.3.1.1 There is agreement of all discernible class characteristics and sufficient agreement of individual characteristics to constitute a match.

- "The Item 8 shotshell was cycled through the Item 10 shotgun."
- "Items 9 through 11 were cycled through the same firearm."

5.6.3.2 Inconclusive

5.6.3.2.1 There is agreement of all discernible class characteristics and some agreement of individual characteristics, but insufficient for an identification; or

There is agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility; or

There is agreement of all discernible class characteristics and possible agreement of individual characteristics, but the potential for subclass carryover could not be eliminated; or

There is agreement of all discernible class characteristics and some disagreement of individual characteristics, but insufficient for elimination.

- "There is agreement of all discernible class characteristics between the Item 6 shotshell and test shotshells cycled through the Item 1 shotgun; however, the comparison of individual characteristics was inconclusive. Therefore, Item 6 could not be identified or eliminated as having been cycled through Item 1."

- "There is agreement of all discernible class characteristics and possible individual characteristics between cycling marks found on the Items 2 and 3 cartridge cases. However, the potential for subclass carryover could not be eliminated. Therefore, Item 2 and Item 3 were either cycled through the same firearm, or through different firearms manufactured with the same tool in the same approximate state of wear."

- "There is agreement of all discernible class characteristics between cycling marks found on the Item 21 and 24 cartridge cases; however, the comparison of individual characteristics was inconclusive. Therefore, Item 21 and 24 could not be identified or eliminated as having been cycled through the same firearm."

5.6.3.3 Elimination

5.6.3.3.1 The Firearms Section does not eliminate based on cycling detail, as a cartridge case or shotshell can be cycled through a firearm with no tool marks resulting. However, there may be significant disagreement of discernible class characteristics and/or individual characteristics.

- "There is disagreement of discernible cycling class and/or individual characteristics between the Item 7 cartridge case and test cartridges cycled through the Item 5 pistol. However, due to the possibility of a cartridge being cycled through multiple firearms without cycling marks being produced, Item 7 could not be eliminated as having been cycled through Item 5."

5.6.4 Not microscopically compared

5.6.4.1 Cartridge cases and shotshells were removed from the chamber, action, or magazine of a firearm.

- "Item 6 was not microscopically compared."

5.6.4.2 The fired evidence in question is not suitable for comparison purposes (e.g. no marks of value, limited quantity of detail of unknown origin).

- "The Item 10 cartridge case is unsuitable for comparison purposes."

5.6.4.3 Cartridge cases and shotshells are different calibers than each other or a submitted firearm.

- "Items of different calibers were not microscopically compared to one another as no indications of having been fired by a firearm of improper caliber were observed."

5.6.5 Forensic Scientists shall include in their notes all conclusions reached from the microscopic comparison of evidence cartridge cases, shotshells and/or test fired ammunition components. Forensic Scientists shall also explain their reasons for reaching these conclusions. The reasons shall be clear and succinct and shall be able to be understood by any other competent forensic firearms scientist. The Forensic Scientist shall include the position and type of index marks used and which of the test fires (if an evidence firearm was fired) was used or if more than one test fire was used to reach the conclusions. Also, the notes shall indicate if any unfired cartridges/shotshells were worked through the action and the results of the microscopic examination and/or comparison of these live rounds.

5.7 Standards and Controls – N/A

5.8 Calibration – For caliper and micrometer calibration information, see the Firearms Section Technical Procedure for Instrument Calibration and Maintenance.

5.9 Maintenance – For comparison microscope, stereomicroscope, caliper, and micrometer maintenance information, see the Firearms Section Technical Procedure for Instrument Calibration and Maintenance.

5.10 Sampling – N/A

5.11 Calculations – N/A

5.12 Uncertainty of Measurement – N/A

6.0 Limitations – N/A

7.0 Safety – Examinations performed in the Firearms Section are inherently dangerous. These procedures involve hazardous chemicals, firearms, ammunition, and potential biohazards. All hazardous procedures shall be performed in compliance with the State Crime Laboratory Safety Manual. If the examination involves a biohazard, the Forensic Scientist shall use proper personal protective equipment, such as eye protection, a lab coat, and/or gloves.

8.0 References

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9.0 Records

- FA Worksheets

10.0 Attachments

- FBI GRC Database Performance Check Form

Revision History		
Effective Date	Version Number	Reason
06/25/2021	11	**Header** and throughout– corrected to reflect organizational change. Changed "fired in" to "fired by" and "IBIS" to "NIBIN" throughout. Removed all references of item designation numbers **3.0** – added term and definition for subclass characteristics**4.0** – Clarified and added example to cartridge case identification software. Added new **5.2.1.4.1** Removed old **5.2.1.5.2** **5.2.2.1** – removed "in FA" **5.2.2.2** – Changed "Disposition Page" to "Not Examined Worksheet" **5.2.2.2.1** and **5.2.2.2.2** – Changed "Comments block on the Disposition Page" to "Not Examined Worksheet" **5.2.2.3.1** and **5.2.2.3.2 –** updated list Added new section **5.2.2.4** for "may" note list **5.2.2.4.2** – changed "color" to "presence" in last bullet point. Added new **5.2.2.5** and **5.2.2.6** and related subsections. **5.3.3** – reworded sentence to clarify meaning. **5.3.4** – added second sentence. Added new **5.4** and related subsections. **5.5** – renamed section from "Comparison Microscope Protocol" to "Individual Characteristics Comparison". **5.5.1.3** – removed reference to order of comparison **5.5.1.3.3.3.1** – changed "live rounds" to "unfired cartridges/shotshells" **5.5.1.4** – changed "unknown" to "evidence" and removed old **5.4.1.4.1** and **5.4.1.4.1.1** subsections. **5.5.1.6** – changed "unknown" to "evidence item". Added **5.5.1.7, 5.5.1.7.1, 5.5.1.7.2, 5.5.1.7.3** **5.6** – added quotation marks around suggested report wording examples; changed "firearm" to specific firearm types throughout when referencing a submitted firearm; and added "fired" to item descriptions where appropriate. **5.6.2.2.1** – included sub-class result **5.6.2.3.1** – changed "not fired in the same firearm" to "fired by different firearms". **5.6.3.2.1** – included sub-class result **5.6.3.3.1** – Clarify elimination language, removed old suggested report wording, and added new suggested report wording. Moved unsuitable result section to new **5.6.4.2**. **5.6.5** – changed "live rounds" to "unfired cartridges/shotshells"

Attachment A: FBI GRC Database Performance Check Form

4/14/16
BS

(02-08-12)

Firearms/Toolmarks Unit
GRC Database Performance Check Form

Performance check for updated version of GRC database consists of five searches to ensure database has correct data:

Search #1:

1. Open GRC database
2. Click GRC Search
3. Select ***Firearm Type: PI – Semi-automatic pistol.***
4. Click Begin Search
5. Total Hits: 4535
6. Click Close

Search #2:

1. Select ***Firearm Type: PI, #Land/Groove: 6, and Twist Direction: Right.***
2. Click Begin Search
3. Total Hits: 3068
4. Click Close

Search #3:

1. Select ***Firearm Type: PI, #Land/Groove: 6, Twist Direction: Right, and Type of Rifling: Polygonal.***
2. Click Begin Search
3. Total Hits: 52
4. Click Close

Search #4:

1. Select ***Firearm Type: PI, #Land/Groove: 6, Twist Direction: Right, Type of Rifling: Polygonal, and Firing Pin Shape: Hemispherical.***
2. Click Begin Search
3. Total Hits: 35
4. Click Close

Search #5:

1. Select ***Firearm Type: PI, #Land/Groove: 6, Twist Direction: Right, Type of Rifling: Polygonal, Firing Pin Shape: Hemispherical, and Breech/Boltface Marks: Circular.***
2. Click Begin Search
3. Total Hits: 3
4. Click Close