

## PD-102R-92 Forensic Firearms Analyst II

STATE OF NORTH CAROLINA  
OFFICE OF STATE PERSONNEL

APPROVED CLASSIFICATION:  
EFFECTIVE DATE:

ANALYST:

(This space for Personnel Department Use Only)

### POSITION DESCRIPTION FORM (POLICE DEPARTMENT-102R-92)

1.	Present Classification Title of Position <b>FORENSIC FIREARM ANALYST II</b>	7. Pres. 15 Digit Pos. No.	Prop. 15 Digit Pos. No.
2.	Usual Working Title of Position <b>FIREARM and TOOL MARK EXAMINER</b>	8.	Department, University, Commission, or Agency <b>DEPARTMENT OF JUSTICE</b>
3.	Requested Classification of Position <b>FORENSIC FIREARM ANALYST II</b>	9.	Institution & Division <b>SBI - CRIME LABORATORY DIVISION</b>
4.	Name of Immediate Supervisor	10.	Section and Unit <b>FIREARM AND TOOL MARK SECTION</b>
5.	Supervisor's Position Title & Position Number <b>FORENSIC FIREARM ANALYST SUPERVISOR #2175</b>	11.	Street Address, City and County <b>121 EAST TRYON RD.; RALEIGH; WAKE</b>
6.	Name of Employee	12.	Location of Workplace, Bldg., and Room No. <b>SBI CRIME LAB BUILDING.; ROOM # 1200CC</b>

### I. A. PRIMARY PURPOSE OF ORGANIZATIONAL UNIT:

To determine if a particular ammunition component was fired in or from a specific weapon, muzzle-to-target distance determination, ammunition component identification, firearm function, obliterated serial number restoration, conduct specialized crime scene searches, determine if evidence tool marks were made by a specific tool, and give expert testimony about the findings.

### B. PRIMARY PURPOSE OF POSITION:

The main purpose of the Forensic Firearm Analyst II Agent is to determine if a particular ammunition component was fired by a specific weapon, or a particular mark was produced by a specific tool, to conduct quality control checks on all the Section's casework, and to handle the most complex cases. Forensic Firearm Analyst II Agents examine and compare fired bullets, shotgun shells, and cartridge cases recovered in criminal investigations to determine if they were fired by a suspects' weapons. Tool marks and impressions recovered in criminal investigations are examined and compared with tools recovered from suspects to determine if the tool marks and impressions were made by evidence tools.

Gunshot residue patterns and shotgun pellet patterns are examined to determine how far away an object was from the muzzle of a weapon when the weapon was fired. A firearms and ammunition reference file is maintained and studied in order to maintain an up-to-date working knowledge of current manufacturers specifications of firearms and ammunition. The reference file is helpful in the identification of ammunition and firearms. Ammunition and

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ammunition components are examined and identified by type, caliber, and manufacturer. Firearms and firearm parts are identified and examined for function, safety, alterations, and modifications.

Obliterated serial numbers and identification marks on firearms are restored by the section, which allows a firearms history of ownership to be determined. In addition to performing other examinations relating to firearm and tool mark evidence the section provides instruction in firearm and tool mark examination to Bureau personnel, to personnel in other law enforcement agencies, and to others in the criminal justice community.

Forensic Firearm Analyst II Agents take charge of and conduct specialized crime scene searches and reconstruct crime scenes.

Forensic Firearm Analyst II Agents work in one section of the Crime Laboratory. The Crime Laboratory analyzes evidence and provides assistance not only to other agents in the Bureau, but also to any law enforcement agency in the State of North Carolina.

### C. WORK SCHEDULE:

Regular work hours are normally 8:00 AM to 5:00 PM. Crime scenes, court, and special assignments can cause examiners to work irregular hours.

**D. CHANGE IN RESPONSIBILITIES OR ORGANIZATIONAL RELATIONSHIP:**

This position is now working the most complex cases submitted to the section. In addition, this position works with greater independence and more flexibility in making casework decisions. This position will now be responsible for review of other agents' casework and the review of correlations on the Integrated Ballistic Identification System.

## II. A. DESCRIPTION OF RESPONSIBILITIES AND DUTIES:

Method used (Check One):      Order of Importance: [ ]  
 Sequential Order:      [X]

Place an asterisk (\*) next to each essential function.

\* **1. FIREARM AND TOOL MARK EXAMINATIONS - 45%**

Forensic Firearm Analyst II's expertise may be broadly divided into the two (2) areas of firearm identification and tool mark identification. Forensic Firearm Analyst II's perform very tedious microscopic examinations and comparisons using the stereo microscope and the comparison microscope to examine criminal evidence. A Forensic Firearm Analyst

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II's main function is to determine if a particular ammunition component was fired in a specific weapon, or a particular tool mark was produced by a specific tool. This is done by comparing the unknown (fired bullets, cartridge cases, and/or shotshells) with the known (the tests which are fired from the suspect weapon). Forensic Firearm Analyst II Agents identify ammunition and ammunition components, both fired and unfired, by type, caliber, manufacturer, and other general characteristics. Forensic Firearm Analyst II Agents identify guns, gun parts, and evaluate them as to function, safety and alterations.

Tool marks and impressions recovered in criminal investigations are examined and compared with tools recovered from suspects. By comparing tests made with the suspect tools, with the submitted evidence tool marks, Forensic Firearm Analyst II Agents are able to determine if the tool produced the mark in question. An identification of a bullet to a gun or a tool with a mark by a Forensic Firearm Analyst II Agent is to the exclusion of all other guns or tools.

### **\* 2. Muzzle-to-Target Distance - 15%**

Muzzle-to-target distance determinations is the examination of a target (usually the victim's clothing) microscopically and sometimes chemically to determine how far the target was from the suspect weapon when it was fired. Muzzle-to-target distance tests can be divided into two (2) types, depending upon the type weapon used. Distance determinations with a rifle and/or handgun are done on a visual, microscopic and chemical examination of the burned gunpowder and lead residues. Distance determinations for shotguns are done by examining the size and density of the pellet pattern as well as microscopic and chemical examinations. These examinations require extensive testing to obtain the standards needed to determine the muzzle-to-target distance. An educational background in chemistry is needed in order to be able to safely mix and use the chemicals required for the detection of the gunshot residues. This chemistry background also is needed in order to comprehend why and how the chemicals react to the substances they are used to identify.

### **\* 3. Quality Control - 22 %**

A Forensic Firearm Analyst II Agent conducts quality control checks for the accuracy of other Forensic Firearm Analyst II's as well as Forensic Firearms Analyst I's microscopic conclusions.

### **\* 4. Weapon Repair - 5%**

Forensic Firearm Analyst II Agents must be familiar with the operating mechanisms of all types of firearms in order to be able to repair weapons that are not in normal operating order. Weapons submitted in cases that do not work must be repaired so that test bullets, cartridge cases, or shotshells may be obtained for comparison to the evidence. Forensic Firearm Analyst II Agents are also responsible for the repair of all Bureau issued and approved weapons. These include but are not limited to Sig Sauer P-series pistols, Heckler and Koch MP-5 submachine guns and Model 69 Gas Guns, Remington Model 870 shotguns and Model 700 Rifles, Colt AR-15 Carbines, Benelli M1 Super 90 shotguns, and Smith & Wesson J-frame revolvers.

### **\* 5. Crime Scene and Technical Assistance - 5%**

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Investigators request assistance of Forensic Firearm Analyst II Agents to assist in the collection and/or location of evidence or to help reconstruct the events at major crime scenes. The opinions and observations of an expert are necessary for the purpose of securing the proper evidence or providing investigative leads. Forensic Firearm Analyst II Agents have numerous requests for technical assistance over the phone. Officers wanting information on the collection and submission of evidence or advice to use in developing investigative leads are frequent.

### **\* 6. Serial Number Restoration- 3%**

Forensic Firearm Analyst II Agents restore serial numbers on firearms that have been obliterated. Serial numbers are chemically restored using strong solutions of acids to dissolve away the metal to expose the serial number. An educational background in chemistry is required to safely handle and use the acids involved. The acid must be mixed with other chemicals and diluted with water to keep the acid strength proportional to the "hardness" of the metal on the firearm involved. Forensic Firearm Analyst II Agents have to understand the molecular structures of various steels and alloys used in firearms manufacturing.

### **\* 7. Research and Development - 3%**

Forensic Firearm Analyst II Agents evaluate and make recommendations for equipment such as firearms and ammunition for the Bureau, as well as other state and local law enforcement agencies. A Forensic Firearm Analyst II Agent conducts research on new products, helps to develop new policies and procedures for the laboratory, and other related duties as needed.

### **\* 8. Instructing - 2%**

Forensic Firearm Analyst II Agents are called upon to teach in many criminal justice and police programs such as: Basic Law Enforcement Training Academies, North Carolina State Highway Patrol School, SBI Academy, In Service schools, and Criminal Justice seminars. Forensic Firearm Analyst II Agents instruct on, but are not limited to, such topics as firearm and tool mark identification, evidence collection and evidence submission.

## **II. B. Other position characteristics (cont'd)**

1. Accuracy required in work: 100%

2. Consequence of error:

An error can release a dangerous felon back into society or confine an innocent person to prison and possibly cause that individual to face the death penalty.

3. Instructions provided to employee:

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Intensive two (2) year training program which covers all S.O.P. for every facet of both Firearm and Tool Mark identification. Attendance and successful completion of the SBI Academy and BLET Certification.

4. Guides, regulations, policies, and references used by employee:

Bureau policy and procedure manual, section policy and procedure manual, Chemistry and Physics textbooks, AFTE and section training manuals, AFTE Glossary and numerous written publications referencing firearms and tool marks.

5. Supervision received by employee:

Review of all casework and administrative policies and procedures.

6. Variety and purpose of personal contacts:

Forensic Firearm Analyst II Agents deal with many people every day, whether in person or by phone. Forensic Firearm Analyst II Agents receive and return evidence and discuss the significance of the evidence with the investigating officers. Evidence requiring analysis by more than one (1) section requires the coordination by Forensic Firearm Analyst II Agents working with other agencies such as the FBI and ATF. Forensic Firearm Analyst II Agents discuss the results of their analysis both by phone and in person with District Attorneys and investigating officers. Forensic Firearm Analyst II Agents testify as experts in court and have contact with many people in the criminal justice system, as well as the general public.

7. Physical effort:

Daily routine involves handling and moving objects in excess of one hundred (100) pounds. Frequently objects as heavy as four hundred plus (400+) pounds must be moved. Substantial hand strength is needed to handle heavy recoiling objects.

8. Work environment and conditions:

There are several areas of examination that require Forensic Firearm Analyst II Agents to use chemicals that can be hazardous. Muzzle-to-target distance determinations require Forensic Firearm Analyst II Agents to steam the bloody clothes with acid and spray the clothes with several chemical solutions. Serial number restorations require Forensic Firearm Analyst II Agents to use strong Hydrochloric Acid to dissolve metal on a firearm. If used incorrectly this acid can cause severe burns to the skin, eyes, and respiratory system.

9. Machines, tools, instruments, equipment, and materials used:

The main instrument used by a Forensic Firearm Analyst II Agent is the comparison microscope. Other instruments and tools used by the Forensic Firearm Analyst II Agents are: Stereo microscope, analytical balance, fume hood,

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shoot tank and cotton box, chronograph, reloading tools, handcuffs, flashlights and service weapons.

### **10. Visual attention, mental concentration and manipulative skills:**

The whole examination process requires close visual attention. Every analytical step involves some type of visual observation. The most notable would be the actual comparison using the comparison microscope. A comparison may last from one (1) to many hours, however, the eye strain is so demanding one must take a break from the scope at least every hour. Microscopically examining the clothing or other evidence under the stereo microscope requires close visual attention, but over a much shorter duration (minutes) than the comparison microscope (hours).

The most intense mental concentration would be while making a comparison through the microscope and determining if it was an identification or not. The mental concentration and the visual attention are both at the greatest levels at the same time. This intense concentration and eye strain can lead to frequent high stress levels and severe headaches.

### **11. Safety for others:**

The handling and test-firing of weapons would both be very important factors in keeping others safe. Careless handling of a weapon during examination by a Forensic Firearm Analyst II Agent not only can kill or injure the Forensic Firearm Analyst II Agent, but others in the laboratory as well. Forensic Firearm Analyst II Agents test-fire weapons indoors frequently, right down the hall from their co-workers. Shooting and handling loaded weapons in the laboratory area can definitely be unsafe to others in the laboratory, if not carried out in a safe manner.

### **12. Dynamics of work:**

Firearm and Tool Mark identifications are very multifaceted disciplines. There is no such thing as a routine firearm and/or tool mark case. The examiner is taught through a very structured training program how to handle and seek solutions in these very diverse disciplines. The Forensic Firearm Analyst II Agent consistently has to solve unknowns for which no set procedures are in place. They must also have the diversity to understand and work with changing and new standard operating procedures.

They must have a thorough knowledge of how to conduct criminal investigations in order to reconstruct crime scenes and maximize evidence potential.

## **III. KNOWLEDGE, SKILLS AND ABILITIES, TRAINING AND EXPERIENCE REQUIREMENTS:**

### **A. Knowledge, Skills, and Abilities:**

1. Some of the Knowledge, skills and abilities to perform as an Forensic Firearm Analyst II Agent are as follows:

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A working knowledge of the methods, procedures and practices used in the investigation of criminal offenses, and of the principles of securing and identifying a variety of crime related evidence.

The ability to investigate a variety of criminal cases, to interpret and apply criminal laws of North Carolina in investigations, to make arrests, to prepare comprehensive and detailed reports pertaining to individual cases, to present effective expert testimony, and to apply the principles, techniques and procedures of modern criminal investigation.

The ability to use firearms, tools and equipment involved in evidence collection and preservation effectively.

The ability to establish and maintain favorable working relationships with other law enforcement agencies and officers.

The Forensic Firearm Analyst II Agent must be in and maintain a physical condition which permits certification by the North Carolina Justice Standards Commission or law enforcement officers.

A thorough knowledge in firearms, ammunition, reloading, tools, chemistry, laboratory practices, are needed by the Forensic Firearm Analyst II Agent. A "mechanical mind" is also important in understanding how to repair weapons and to use tools in tool mark cases.

A person needs the background in firearms and ammunition in order to recognize what they have, how it works, what it is designed to do, and what it can do. Reloading is needed to be able to duplicate evidence loads and load down factory loads so that good tests may be obtained. A person needs a background in tools to be able to understand what type of tool could have been used to produce a tool mark so they can try and duplicate it. Knowledge of tool use can also be important in trying to cut out tool marks and other objects so they can be compared on the microscope. Chemistry is needed in order to understand how and why the reactions are taking place during GSR analysis. Laboratory practice is needed in order to safely work in a laboratory using chemicals to analyze evidence.

A Forensic Firearm Analyst II Agent should possess safe gun handling skills since they will be handling weapons almost continuously throughout their analysis. A Forensic Firearm Analyst II Agent must have good writing skills since they will be required to write reports on the results of the analyses. A Forensic Firearm Analyst II Agent must a good public speaker in order to testify to his results as an expert witness in court. Forensic Firearm Analyst II Agents must also be able to work and communicate well with other people due to the amount of contact with other people, such as police officers, district attorneys, and the general public.

### **B. Required Minimum Training:**

1. Very intensive structured two (2) year training program with numerous proficiency

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tests. Study of manufacturing techniques at firearm, ammunition, and tool making facilities. Successful completion of the SBI Academy and BLET requirements.

2. Additional Training/Experience:

Continuing education to keep abreast of changing analytical procedures.  
A four (4) year college degree in physical sciences or engineering with minimum of two (2) semesters of chemistry and one (1) semester of physics.

3. Equivalent Training and Experience:

There is no substitution of training or experience for formal education. There is no substitution of experience for additional training.

C. License or Certification Required by Statute or Regulation:

Each Forensic Firearm Analyst II Agent is a certified law enforcement officer and meets those standards set by the N. C. Justice Standards Commission.

**IV. CERTIFICATION:** Signatures indicate agreement with all information provided, including designation of essential functions.

**Supervisor's Certification:** I certify that:

- a. I am the Immediate Supervisor of this position; that
- b. I have provided a complete and accurate description of responsibilities and duties; and
- c. I have verified (and reconciled as needed) its accuracy and completeness with the employee.

Signature:

Title:

Date:

**Employee's Certification:** I certify that I have reviewed this position description and that it is a complete and accurate description of my responsibilities and duties.

Signature:

Title:

Date:

**Section or Division Manager's Certification:** I certify that this position description, completed by the above named immediate supervisor, is complete and accurate.

Signature:

Title:

Date:

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**Department Head or Authorized Representative's Certification:** I certify that this is an authorized, official position description of the subject position.

Signature:

Title:

Date: