STATE OF NORTH CAROLINA

OFFICE OF STATE PERSONNEL

POSITION DESCRIPTION FORM (PD-102R-92)

APPROVED CLASSIFICATION:

EFFECTIVE DATE:

ANALYST:

(This space for Personnel Department Use Only)

7. Pres. 15 Digit Pos. No. 3613-0000-0002-100 Prop. 15 Digit Pos. No.

Department, University, Commission, or Agency

8. Department of Justice

Institution & Division

9. State Bureau Of Investigation/ Crime Lab

Section and Unit

10. Molecular Genetics Section

Street Address, City and County

11. 121 East Tryon Rd., Raleigh, NC 27603

Location of Workplace, Bldg., and Room No.

12. Crime Lab Building

Present Classification Title of Position

1. Forensic Molecular Geneticist Supervisor

Usual Working Title of Position

2. Special Agent In Charge

Requested Classification of Position

3.

Name of Immediate Supervisor

4. J. Richardson

Supervisor's Position Title & Position Number

5. Assistant Director of Laboratory Services

Name of Employee

6. Vacant

I. A. PRIMARY PURPOSE OF ORGANIZATIONAL UNIT:

The primary purpose of the Molecular Genetics Section is to accept, find, preserve, and analyze evidence in criminal cases for the presence and source of body fluids and to report these findings to the requesting law enforcement agency and the courts.

B. PRIMARY PURPOSE OF POSITION:

The primary purposes of this position are to direct, supervise, administer, and run the Molecular Genetics Section of the SBI Crime Laboratory. The Molecular Genetics Section includes three functional Units; the DNA Analysis Unit, the Body Fluid Identification Unit, and the DNA Database Unit. Each of these three units have their own supervisor who report to this position. There are a total of ten (11) agent/examiners , four (4) Database analysts, and one (1) office assistant to be supervised. This position reports directly to the Assistant Director of Crime Laboratory Services. Supervisory duties include:

1) Monitoring and directing performance and potential of subordinates through section organization and supervision of work
2) Directing the technical operation of the Molecular Genetics Section
3) Communicating with subordinates, management and the Criminal Justice Community
4) Planning, research and development, and fiscal management of the personnel, equipment, and supplies in the Section and to meet Section goals and objectives
5) Administrative management of the Section

C. WORK SCHEDULE:

171 hours/28 day cycle. The regular work hours are from 7:00 am to 4:30 pm. All agents are on call 24 hours a day, seven days a week to handle crime scenes or court testimony anywhere in the State. Most agents work over the required 171hours a month. Crime scene work may last many hours with little opportunity for rest.

D. CHANGE IN RESPONSIBILITIES OR ORGANIZATIONAL RELATIONSHIP:

A job study of the Section was completed by the Department of Justice Personnel Department in January, 2001, which resulted in the reclassification of several positions and the renaming of all positions in the section. This job description accurately reflects these changes.

II. A. DESCRIPTION OF RESPONSIBILITIES AND DUTIES:

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

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

a. 35% -Monitoring and directing performance and potential of subordinates through section organization and supervision of work

This position has been given the responsibility and authority to organize and direct the work of the Molecular Genetics Section to obtain the maximum utilization of the people and resources available.

This position is responsible for conducting case reviews to determine if tests run by Section analysts meet appropriate standards. Case review involves the review of criminal cases to ensure that the proper tests and controls have been run and documented, that the correct results and conclusions have been obtained, and that the laboratory report is correct and scientifically valid. One also checks that the chain of custody of the evidence is present and unbroken, and that the quality assurance measures required have been met.

The Molecular Genetics Section of the SBI Crime Laboratory is unique in that this Section alone has to meet national standards imposed by the US Congress pursuant to the DNA Identification Act of 1994. Section analysts must also meet national quality assurance guidelines for DNA testing set by the Director of the FBI and the Scientific Working Group on DNA Analysis Methods (SWGDAM). National standards include a yearly audit of the Section by a DNA expert from another state crime laboratory and an inspection from the American Society of Crime Laboratory Directors - Laboratory Accreditation Board (ASCLD/LAB) every five years. In order to participate in these external audits or inspections, this position must be a qualified DNA examiner. This position is also an ASCLD/LAB Inspector and Inspection Team Captain, as well as a SWGDAM auditor, and usually audits or inspects up to four laboratories per year. Like the rest of the Crime Laboratory, this Section has to meet the standards set by our two accrediting agencies, ASCLD/LAB and CALEA (Commission on Accreditation of Law Enforcement Agencies). Case reviews are critical in ensuring the standards set by our various oversight groups are met.

This position is also charged with applying Bureau and State Personnel guidelines to recognize and discipline employees in the discharge of their duties. This includes monitoring the work performance of employees and taking corrective action when appropriate.

This position also must create and maintain a Performance Management Work Plan for each subordinate in compliance with State Personnel guidelines. Clear and uniform work plans must be established and agreed on with each employee within the Unit. Formulation of work plans is complicated since there are four functional working groups within the Section, each of which is highly specialized.

This position also must monitor the court testimony of each agent/examiner in the Section. Court testimony is the ultimate test of examiner competence. There is a real challenge in presenting highly technical DNA typing test results to a jury, and thus the monitoring of agent/examiner testimony is a critical quality assurance measure.

This position must also be able to testify for any agent/examiner in the Section who is out on leave or training, or in rebuttal to a defense expert who is brought in to cast aspersions on the veracity of the work done by Section agent/examiners. This position handles court orders for discovery, and testifies as to the policy and procedures of the SBI in relation to court ordered discovery.

This position is assisted by three subordinate supervisors who manage the DNA Analysis Unit, The Body Fluid Identification Unit, and the DNA Database Unit.

***b. 27 % - Directing the Technical Operation of the Molecular Genetics Section**

This position is responsible for directing the research and development of new testing methodologies used by the Molecular Genetics Section. The field of Molecular Genetics (commonly referred to as DNA analysis by the public) is one of the fastest changing and evolving technologies in science. Methods in use today will be antiquated in less than three years as faster, more powerful, and more discriminating tests are developed. This position must be knowledgeable and current in understanding the technology used, as well as the direction the technology is taking in the future. This position is also responsible for maintaining a current reference file/Section library of the latest information to use as a resource by Section analysts.

For example, this Section has completed a year long validation of a new DNA testing method called STRs (Short Tandem Repeat) based on PCR (polymerase chain reaction) amplification techniques. This position must keep abreast of new testing technologies and participate in national efforts to validate new technologies (ie. through SWGDAM). The position also must be able to write and process grant applications for funding of research projects, to design and direct a year long set of experiments, and to act as a knowledge resource for the scientists conducting the research when problems occur. One must also be able to ensure that the scientists have the proper equipment, supplies, and training to conduct this research.

This position is responsible for allocating and assigning the human resources between the three functional groups within the Section so that work is allocated fairly and equitably. This includes planning for anticipated changes within the Section and seeing that analysts have the proper cross-training to move within different Units of the Section as the need arises. In addition, this position must assign the financial resources (equipment and supplies) to the various Units within the Section. Individual work assignments are made by this position, including emergency, after hours assignments to respond to requests for crime scene assistance at homicides anywhere in the state.

This position ensures that the work conducted by agent/examiners adheres to the quality control/assurance policies set in place by the SBI Policy and SBI Laboratory Procedures Manual as well as by our accrediting agencies.

***c. 10% -Communicating with subordinates, management and the Criminal Justice Community**

This position must communicate effectively, both orally and in written form, with subordinates and top Bureau management to ensure that the goals and objectives of the Section and the SBI are being met. Clear, concise instructions must be given to subordinates as to what is expected of them. This position must also keep management aware of Section activities, accomplishments, and problems that may affect operations, and do so in a timely fashion.

This position must also maintain an effective liaison with Criminal Justice agencies and other Bureau Units to resolve problems and/or misunderstandings. On an average day, this position handles approximately a dozen phone, fax, or e-mail requests for information on cases, instructions on collecting, preserving, or submitting evidence to the Section, information on Section analysis techniques, requests for emergency crime scene assistance from Section agents, and calls for court.

This position has a significant amount of contact with District Attorneys in preparing cases for court, effective strategies for presentation of scientific evidence, additional testing that may be needed, and direction as to where to take their cases for advanced testing. This position has been given the responsibility to receive, review, and respond to Court Orders from Superior Court Judges for discovery of laboratory notes and practices. This position and a member of the Attorney General's staff were responsible for writing and disseminating the SBI Laboratory's DNA Discovery policy that has been distributed to all judges and District Attorney's in the state. Quite frequently an Order will be received that exceeds the scope of allowable discovery, and then this position must educate the Judge, District Attorney, and defense attorney on what is permissible under state law and Bureau policy. This position must be extremely knowledgeable in this area of the law and have case cites committed to memory or in easy access. This position

maintains close contact with the SBI Legal Counsel for assistance with legal matters that fall outside established discovery guidelines. Equally frequent, this position must be able to provide sample court orders to District Attorneys that meet these discovery guidelines.

This position also has frequent contact with legal staff of the Attorney General's office. This position receives portions of the state and appellate defenders briefs on DNA issues for comment and technical expertise. For example, this agent has been asked to write an affidavit by a member of the Capital Litigation staff in response to a Motion For Appropriate Relief from the Appellate Public Defenders office relative to DNA testimony.

This position has had contact with members of the North Carolina General Assembly. This position was a co-author of North Carolina General Statute §15A-266 (The DNA Database and Databank Act of 1993) and was responsible for shepherding this Act through the legislative process by meeting and briefing key legislators, appearing before committees, etc.

This position releases information obtained from the DNA Database Unit outside the SBI. Criminal penalties are attached in North Caroline General Statute §15A-266 for unauthorized release of confidential information from the DNA Database. Any time a "hit" or match is made by the CODIS DNA computer system between a DNA profile on record from a convicted offender and an unsolved case, this position or his designee will have to generate an Affidavit to attach to a search warrant and the search warrant itself. This position has obtained and served search warrants pursuant to a CODIS generated "hit". As more offenders are entered into the computer system and more cases are typed with DNA techniques, this job function will increase in frequency.

This position must also be capable of communicating clearly in the form of written grant proposals to obtain funding for projects. The intent and methodology used in the grant project must be clearly stated and the operational budgets must be complete.

This position also participates in court proceedings throughout the State of North Carolina. Oral testimony in these actions is considered to be one of the most important responsibilities. Opinion testimony is given to the court as to the examiner's findings from analysis of evidence submitted to the laboratory and/or of evidence located, collected and preserved from crime scenes (See Section IV).

An examiner is subpoenaed almost daily to appear or to be placed on standby for court throughout the State of North Carolina. This often requires the examiner to respond on short notice to appear in court several hundred miles from the Raleigh headquarters. Occasionally, an examiner must drive to two different locations in one day to give testimony in separate trials. The examiner must possess the ability to present scientific data in layman terms while remaining scientifically accurate and possess the ability to withstand intense cross-examination during these proceedings. Testimony must be presented in a professional, believable, and understandable manner.

Assistance is rendered to court officials by providing information and opinions in pretrial conferences which may occur either by telephone or in person. The information supplied during these pretrial conferences is used by the prosecutor or defense attorney to prepare his case for court. Visual aids are frequently made by an examiner to illustrate crime scene diagrams or to list results of laboratory analyses for presentation to the jury. This position also requires knowledge of the rules of evidence as it applies to testimony and court proceedings and in grand jury testimony. As an expert witness, the examiner is also called upon to assist the prosecutor or defense attorney with formulating questions in the cross examination of witnesses on the stand.

The court must qualify an individual as an expert in the field of forensic molecular genetics before expert testimony may be given. An examiner testifies in criminal cases ranging from a simple breaking and entering case to serious felony cases involving rape and murder. To that end, the testimony given by an examiner can directly corroborate or impeach statements of suspects or victims, thus impacting the administration of justice by the North Carolina court systems. The misrepresentation of testimony can deprive an innocent man of his life or liberty, or can cause a guilty party to go free.

II. A (cont)

As expected, court regularly interferes with the completion of other work, attendance of scheduled professional schools and meetings, as well as with personal and family arrangements (scheduled vacation, anniversaries or other plans). This particular aspect of this position requires an individual to be highly flexible with any outside commitments and/or family.

This position is also authorized to meet with the press, make himself available for interviews, and does so frequently.

d. 10% - Planning and implementing Section goals and objectives

This position identifies Section goals and objectives through consultation with subordinates and top management. Goals and objectives for the Section must be coordinated with the agency as a whole and should be realistic. The position then plans for the orderly implementation of these goals and objectives. CALEA accreditation standards require goals and objectives be in place for five (5) years in advance. With newly evolving technologies in use in the Molecular Genetics Section, this is a real challenge. This position also assesses and reports the progress of meeting these goals and objectives to top management. This position then prepares and submits the appropriate budget and justifications to implement these goals.

e. 10% - Administrative management of the Section

This position is responsible for the administrative management of the Section and is assisted in this work by two team leaders, a subordinate manager, and secretary who handles Section leave, time records, and expense accounts.

This position is responsible for preparing correspondence, reports, publications, and other staff work and to reviewing other work generated within the Section for the same function.

This position is responsible for managing the budget of the Section, recommending equipment and supplies to order, preparing the requisitions, evaluating equipment, and dealing with vendors. This position also maintains a complete inventory of all equipment issued to the Section.

This position is responsible for issuing and approving the Section Technical Procedures, Quality Assurance, and Training Manuals.

This position is responsible for ensuring that all staff members receive adequate training and continuing educational opportunities both of a scientific and law enforcement nature.

f. 5 % - Maintaining professional standards through training

Training

Every Molecular Geneticist must complete an extensive training program conducted in the lab. This involves lecture material, demonstrations, practice runs, supervised runs, reading the literature, written tests, and proficiency tests. The tests must be passed with 100% accuracy. After being trained in the various sections of molecular genetics, the trainee then works selected cases under close supervision. Finally, the trainee is put into full rotation to work cases.

Each Molecular Geneticist is a Special Agent in the SBI and therefore, must compete the same training that is required for the field agents. They must attend the Basic Law Enforcement Academy/SBI Academy in Salemburg, NC, for a period of 21-24 weeks. They are instructed in law, firearms, self defense, physical **fitness, laboratory analysis, field investigations, and undercover work. They must live in a dormitory in Salemburg during the week and be available for assignments 24 hours a day.**

II. A (cont)

It is important to keep current in both legal and scientific literature since both are constantly changing. Every year there is in-service training for all agents. All agents must qualify with their handgun every year and have the opportunity to shoot three times per year.

Every Molecular Geneticist attends at least one professional meeting a year. Someone always attends the Southern Association of Forensic Scientists meetings which keep this laboratory in touch with other state labs. Workshops and conferences are also attended in order to keep the section current with the changing technology.

g. 2% - Casework/DNA Database Analysis

This position needs to be proficient in the performing and/or interpretation of results obtained from testing methods employed in the section, so as to manage and assist with casework/DNA Database analysis when necessary.

The day-to-day lab work of a Forensic Molecular Geneticist in the Body Fluid Unit involves the examination of articles of evidence for the presence of blood or other body fluids such as semen and saliva (often contaminated with sweat, urine, fecal material, or vaginal fluid), the identification of the body fluid and its species origin. This analysis involves screening large amounts of evidence from multiple sources for the presence of a body fluid and then determining its evidentiary value in the case.

The Molecular Geneticist in the STR DNA Analysis Unit is responsible for analyzing evidence using DNA typing tests to compare unknown body fluids with known standards. This involves receiving evidence in the form of blood and other body fluids, performing the DNA analysis on that evidence, writing a report based upon that analysis and then testifying to the findings in court.

The Molecular Geneticist can be called upon to assist the drug chemistry section to analyze marijuana cases at anytime.

Blood analysis

Blood analysis involves several steps:

Visual examination of articles of evidence such as clothing, weapons, vehicles, and household objects reveal blood as stains or crusts. Various lighting conditions or microscopy may be used.

Preliminary testing is done with the phenolphthalin test on a rubbing of a suspected area. The analyst must also have a knowledge of other current and historical tests serving a similar purpose, including the benzidine, ortho-tolidine, chloromazine, leuco malachite green, tetramethyl-benzidine, and peroxide tests.

Stains testing positive with the preliminary test is confirmed as human blood with the ABACard HemaTrace test whick involves reacting a small eluate of sample with a commercially prepared substrate involving an antigen antibody reaction. Blood can be confirmed using a microcrystalline test known as the Takayama test, which involves reacting a small amount of material on a microscope slide with freshly made reagent to obtain hemochromogen crystals, viewed under a microscope. Species origin can be determined by reacting an extract of the sample with commercially prepared antisera in the Ring Precipitin or Ouchterlony tests. The analyst must be knowledgeable of other tests such as cross-over electrophoresis and radio-immuno assay. Testing for animal blood is routinely done on wildlife protection cases and hit-and run cases.

If the stain is of human origin, the analyst then determines if the evidence meets the DNA case acceptance policy or is sent back to the investigating agency.

Body Fluid Analysis

Semen identification starts with screening suspected stains by the acid phosphatase test. Confirmation consists of microscopic identification of spermatozoa using a differential stain procedure on an extracted sample of suspected stain on a microscope slide. This is then viewed at high magnification on a microscope. In the absence of spermatozoa, another confirmatory test, ABACard p30, is used to identify semen.

Saliva testing involves testing for elevated levels of amylase, which is an indication of, but not specific for saliva. This is performed with commercial test kits on a stain extract and compared to a visual table of known positives or read at 620 nm on a spectrophotometer.

STR DNA Analysis

Forensic DNA analysis is conducted because it provides the best method of determining differences between two individuals. Therefore, forensic DNA analysis provides the best method of excluding individuals who have been falsely accused of committing a crime.

Forensic DNA analysis using the PCR STR method involves basically a five-step process. The first step in this process is the isolation and purification of DNA from evidentiary samples as well as known standards. Because of the extreme sensitivity of this DNA technology, great care must be exercised to ensure that there is no cross contamination between any forensic samples. For this reason, the DNA extraction procedure for the evidentiary samples is separated by time and/or space from the known standards. Also, each piece of evidence is placed into its own separate test tube and the entire procedure is performed using strict aseptic techniques. To the perform the DNA extraction, chemicals are added to the samples which break open the cells releasing the DNA into solution. The DNA for each sample is concentrated using a membrane filtration system.

Quantitation of extracted DNA is required using a slot-blot apparatus. Chemiluminescent technology is utilized to effectively determine the amount of human DNA present. This process involves taking extracted DNA from known and question samples and fixing them to a membrane through a slot-blot apparatus. The apparatus uses a vacuum to pull the sample through a well and onto a membrane. Once the DNA is on the membrane, it is probed with a human specific probe and treated with a luminescent chemical. After the luminescent chemical is modified, it will release energy in the form of light and be detected on x-ray film. The x-ray film is developed in a large film processing machine. The relative signal strength of the image compared to known standards allows the quantitation of DNA to be performed.

Small sequences of the DNA are then copied utilizing the polymerase chain reaction process. Polymerase change reaction (PCR) is a laboratory processes where small regions of DNA are copied millions of times. The regions that are copied are called Short Tandem Repeats (STRs). To perform PCR, the DNA samples are mixed with specific primer sequences of DNA that are flourescently tagged, enzyme, and buffer, and amplified using thermocyclers. The thermocycler acts as a molecular Xerox machine for the DNA. The thermocycler must be programed for different temperatures and times in order to accomplish the copying process. Essentially, the DNA is “unzipped’ and the primers attach to the DNA. The enzyme in the reaction mixture then allows a copy of the DNA to occur. The result is millions of copies of the DNA that is specific to the primers.

Following PCR, the amplified DNA is separated by size through a process known as electrophoresis. Electrophoresis is the separation of charged particles in an electric field. A polyacrylamide gel is prepared with wells formed in one end into which the forensic samples are injected. When placed into an electric field, the DNA fragments present in these wells separate by size forming banding patterns.

The generation of data for interpretation of the DNA samples requires the use of laser imaging equipment and extensive computer programs to evaluate the profile and compute statistical calculations. First, the DNA in the gel is then analyzed on a FMBIO gel scanner. The polyacrylamide gel containing the flourescently-labeled DNA fragments is

placed in the scanner and the laser driven fluorescent imaging equipment scans the gel and produces an image of

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the DNA banding patterns in the gel. The image may be further analyzed using advanced Hitachi software. The computer compiles the data and assigns allelic values to the DNA banding patterns as well a determines the relative intensity of each band. This computer analysis aids the analyst in determining stutter (a PCR artifact), band intensity differences that aids in the determination of mixtures, and allelic values of micro-variants and off-ladder variants. After computer analysis, the allelic designation for each STR locus is determined for each sample by the analyst, independent of the computer. From the results of the analysis, a match/non-match determination is made. If a match of a forensic sample to a known individual is made, the allelic designation are entered into complex computer programs that enable the analyst to estimate the frequency of the particular DNA profile in the population and enter the DNA profile into the Combined DNA Indexing System (CODIS) for comparison with DNA profiles from other cases and from convicted offenders within the State and across the United States. If there is a non-match between a forensic sample and a known sample, then the CODIS system is used to perform a search for a matching profile in the SBI DNA Database.

This analyst is responsible for reviewing STR case reports written by other section analysts. This review consists of a technical critique of data analysis, statistical computations, and conclusions. The data interpretation is checked for accuracy as well as the accuracy of the statistical calculations.

The analyst must be knowledgeable of over 2000 scientific papers regarding the analysis and typing of blood and body fluids, both to have a thorough background and to withstand cross-examination in court. He must also be aware of assorted legal decisions and requirements on both analysis and chain of custody. His expert status must be recognized by each court in order to testify, based on his background and training. He must conduct his analysis essentially independently, subject only to review of his notes and reports, but not on the actual work involved.

Maintaining the documentation of chain of custody of evidence, writing reports, stating the results of analysis, reviewing the reports of other analysts and testifying to the results of analysis in court are also mandatory responsibilities of this position. Showing the ability to perform the DNA analysis correctly by accepting proficiency tests regularly and obtaining an accuracy of 100% is also an important duty. This testing involves both known proficiency tests as well as blind testing and being able to identify a match or non-match between two or more unknown samples. The analyst's report and findings are used routinely for police investigations, and for court by both prosecution and defense. 100% accuracy is required or justice is compromised, letting a guilty suspect go free to the detriment of public safety or sending an innocent one to jail or death. Often the analyst's work is the only determining factor in an investigation or trial.

- Maintaining documentation of chain of custody, lab reports, and reports stating the results of analysis.

Documentation

Chain of Custody

The Forensic Molecular Geneticist must maintain the chain of custody by careful and accurate documentation to ensure the admissibility of the evidence in a court of law.

Chain of custody is a legal term which applies to the accounting of all the successive steps involved in the handling of a specimen from the time of collection to the time of trial. This process includes four major steps (1) the initial possession of the specimen or object; (2) transport to the laboratory; (3) the method of storage at the laboratory prior to analysis; and (4) possession of the unused portion of the specimen or object after analysis and up to the time of trial.

Maintenance of the chain of custody includes the following duties which the Forensic Molecular Geneticist must be able to perform.

II. A (cont)

A. Note taking, sketching and/or photographing of the location of blood spatters, luminol reactions, visible blood and various articles of evidence at the crime scene.
B. Proper packaging and identification of any evidence collected from the crime scene.
C. Signing the request for examination form and providing the submitting officer a copy as a receipt if evidence is delivered to the lab.
D. Noting the condition (sealed or unsealed) and how the evidence is received at the lab if not hand delivered (FCM, Certified, UPS).
E. Identification of the evidence submitted by marking the case number, item number, date received, analyst initials or other marks of identification on the packaging and/or container as well as the item.
F. Providing proper storage (refrigeration for blood) and security for evidence while in the lab.
G. Recording the transfer of evidence within the lab by computer records.
H. Insuring the correct lab report and evidence are returned to the submitting officer in a sealed and secure manner.

Laboratory records

The Forensic Molecular Geneticist must maintain records in the lab which provide information about the evidence submitted to the laboratory, procedures and methods used in analysis of the evidence and quality control of these procedures and methods.

A. Note taking - Forensic Molecular Geneticist must maintain detailed notes describing the physical characteristics of the evidence submitted (color, size), the location of various stains and the general condition of the evidence submitted (contamination and deterioration). The Molecular Geneticist must denote which stains are to be tested (location and number) and also the control areas on the article of evidence. The specific test performed, number of areas tested. And results of the test must be recorded. All test performed must be done in accordance with the methods and procedures as outlined in the Molecular Genetics Section Manual. The Molecular Geneticist uses the notes he has prepared to refresh his memory in preparation for court testimony. The Molecular Geneticist's notes are subject to being taken and reviewed by court officials and may be entered into evidence.

B. Quality Control - Records must be maintained which document that the tests were performed under the appropriate conditions (pH, time voltage), that the reagents used in the performance of these tests worked correctly, and that the control samples gave the correct results. Temperature charts on incubators, refrigerators and other equipment are also maintained.

Report Writing

The Forensic Molecular Geneticist is responsible for writing laboratory reports and crime scene investigation reports which can be drawn from the analysis.

A. Crime Scene Investigation Reports - The Forensic Molecular Geneticist prepares a report describing certain observations made at the scene of a crime. These observations may include blood spatter interpretations, luminol reaction interpretations, or usual observations of the placement of certain blood stains. Crime scene reports oftentimes include sketches and photographs in addition to narration which provide useful information that the investigating officers may use in attempting to reconstruct what occurred at the scene of the crime. These reports also make note of any evidence which is collected by the Molecular Geneticist to be later analyzed in the laboratory. Copies of these reports are sent to the investigating officers and district attorneys and serve as an official document which may be introduced as evidence in court proceedings.

B. Laboratory reports - laboratory reports serve as official documents which state what evidence was submitted to the lab, what type of analysis was requested, the results of the analysis, and the disposition of the evidence.

In these reports, the Molecular Geneticist makes comparisons between known and questioned samples, draws conclusions based on these comparisons and often- times, gives statistical information as to what

II. A (cont)

percentage of the population could possess certain blood grouping characteristics. Copies of these reports are sent to investigating officers and district attorneys. The Molecular Geneticist uses this report during oral testimony in a court trial.

h. 1% - Assisting at crime scenes

Crime Scene Investigations

As an "on call" law enforcement officer, the Forensic Molecular Geneticist must be prepared to travel state-wide, on very short notice, in order to offer laboratory assistance in the field at a crime scene to any requesting law enforcement agency. The assistance requested may require on site collection of visible blood, interpretation of blood spatter present, searching and seizing articles with noted body fluid stains present, chemically searching with luminol for invisible traces of blood, searching for and collecting seminal stains, and collecting standards from suspects. The Molecular Geneticist must take good field notes and have the ability to draw sketches and take photographs in order to produce an accurate final written report of the crime scene investigation. Knowledge of the laws concerning search and seizure are necessary when the Molecular Geneticist is requested to either assist in writing a search warrant application prior to a crime scene search or actually collect articles of evidence from the scene or the suspect's person.

Collection of Body Fluids

A visual examination of the crime scene may reveal stains which appear to be blood or seminal fluid. On-site preliminary tests may be conducted and, if these results are positive, then the stain may be collected by cutting the material, absorbing the stain onto clean cotton threads with distilled water, or seizing the entire article as evidence. Notes must be taken to identify the relative location from which the evidence was taken, the date and time, and the initials of the individual who collected the evidence. The evidence must be air dried, properly packaged, sealed, and secured for transport to the laboratory for further analysis by the Molecular Geneticist.

Blood Spatter Interpretation

Requests to examine the pattern(s) of visible blood stains at the crime scene are sometimes asked of the Molecular Geneticist in order to reconstruct the scenario which occurred for the officers. Valuable information concerning the direction and velocity of travel of the blood and the height and shape of the spatters may aid in corroborating statements made by witnesses.

Search and Seizure

Prior to conducting a crime scene search for evidence, legal jurisdiction and documentation must be established. Primarily, these steps are attended to by the requesting officer. The Molecular Geneticist, however, may be asked to assist in writing the search warrant application for the specific evidence to be obtained.

Likewise, prior to the collection of items or known samples being taken from the victim or suspect, legal jurisdiction and documentation must be obtained. Often, the Molecular Geneticist is consulted as to the specific methods to document and/or collect samples. The Molecular Geneticist must maintain current knowledge of the fast changing laws concerning the search and seizure of evidence so as not to jeopardize the admissibility of evidence in court.

A portion of the visual search of the crime scene may include an extensive examination in more than one location for articles of clothing, cleaning cloths, weapons, stains on car sears or in trunks, etc., which field test positive for body fluids relevant to the case and can be collected as evidence. Once the evidence is secured, the Molecular Geneticist

shares the legal burden with other officers in preparing an Inventory List of the evidence seized.

II. A (cont)

Luminol Testing

The most frequently requested field test conducted by the Forensic Molecular Geneticist is the luminol test for the presence of blood which is not readily visible to the unaided eye. Luminol is a chemical mixture which is sprayed over an area in the dark and reacts with blood by producing a very low level of light. Distinct patterns made from blood such as a body outline, wipe patterns, shoe tracks, hand prints, and smears may be detected with luminol. The interpretation of luminol reactions are not specifically confined to blood in origin. Consequently, further field testing also must be performed to identify presumptive blood stains. The indication of the presence of blood and the particular patterns which can be revealed with luminol test often serve as important investigative leads, and directly or indirectly may lead to the discovery of other evidence.

II. B. OTHER POSITION CHARACTERISTICS:

1. ACCURACY REQUIRED IN WORK

One hundred percent (100%) accuracy is required in all results. Determinations must be conclusive and unequivocal since an error can cost an innocent individual his life or liberty and allow a guilty offender to possibly commit his crime again. Also, the reputation of the analyst, his job, and the credibility of the lab is in jeopardy when one is not exact in his work. Constant proficiency testing is undergone to assure that each analyst produces accurate results and interpretations.

2. CONSEQUENCE OF ERROR

As noted above, the greatest error is to report an erroneous result which would assist in the conviction of a falsely accused individual. This could deny the person several years of freedom (if not his life) and could also result in a lawsuit for the State. Management judgment errors could lead to a personnel action against the State, or the waste of significant funds if an incorrect technical direction is taken.

3. INSTRUCTION PROVIDED TO EMPLOYEE

This position receives instructions in a very general fashion and is expected to implement policies and or programs that the agency expects. An example of this type of instruction is one that this position received from the SBI Director several years ago - “Set up a DNA Unit within the Section”. How this was to be done, what resources were to be allocated to this effort, etc were left entirely to this position to work out.

4. GUIDES, REGULATIONS, POLICIES AND REFERENCES USED BY EMPLOYEE

`The policies, guidelines, and procedures used by the employee include the NC General Statutes, the SBI Policy and Procedures Manual, the SBI Crime Laboratory Policy and Procedures Manual, the SBI Molecular Genetics Section Policy and Procedures Manual, the SBI Molecular Genetics Section Safety Manual, NC Department of Justice Policy and Procedures, ACSLD-LAB Certification Standards, and SWGDAM Quality Assurance guidelines, CALEA Accreditation guidelines, and state laws governing search, seizure and arrest.

5. SUPERVISION RECEIVED BY EMPLOYEE

The work of the employee is formally reviewed by the Assistant Director of Laboratory Services twice a year. However, the supervision received is minimal and generall

y painted in broad categori es or ideas.

6. VARIETY AND PURPOSE OF PERSONAL CONTACT

The employee is in daily contact with members of the law enforcement community, attorneys, judges, members of the general scientific community, the press and members of the international forensic science community. The purposes of these contacts are to establish leads, give advice and direct law enforcement officers on procedures to be followed for the collection, preservation, and submission of evidence, handling of court matters or orders, or to refine a particular technique with the assistance of a contact in another state.

II B (cont)

7. PHYSICAL EFFORT

The employee may be required to perform light to medium work at times. This position needs to be able to perform the physical duties expected of a sworn law enforcement officer.

8. WORK ENVIRONMENT AND CONDITIONS

This position works with blood and body fluids from an individual who may be carrying viruses for AIDS, hepatitis, herpes, VD, TB, etc. In addition, contact is also made with several carcinogenic, radioactive, and embryo toxic materials on a routine basis.

9. MACHINES, TOOLS, INSTRUMENTS, EQUIPMENT, AND MATERIALS USED

SigSauer Model P220 .45 cal. handgun, state owned automobiles, Maglite, sophisticated computers and software, Ultraviolet/Visible Spectrophotometer, Electrophoresis tanks and power supplies, Ultraviolet illuminator, Polaroid cameras, Nikon SLR camera, carousel slide projector, photographic film processor, film duplicator, autoclave, incubators, vacuum oven, microwave oven, hot plates/stirrers, heat blocks, vortex, rotators, balances, centrifuges, pipettors, pouch sealer, solution dispensers, hybridization incubators, DNA Imaging Systems, radiation counters, fluorimager, gene amplifiers, thermocyclers, and lasers.

10. VISUAL ATTENTION, MENTAL CONCENTRATION AND MANIPULATIVE SKILLS

The visual senses are used predominantly and require close attention. This is primarily the case when examining scanned images, ensuring that samples match their respective case numbers, etc. This position requires that the individual be attentive and mentally alert at all times for mistakes can be dreadfully consequential. One must continually check the work being performed to make sure each task is correct and can be accountable before superiors and courts of law. Close visual attention is necessary when reviewing reports of analysis or preparing reports of activities.

11. SAFETY OF OTHERS

This position is responsible for the health and safety of every member of the Molecular Genetics Section. Extreme care must be taken to prevent the spread of contamination by hazardous materials. Special care is taken to avoid contamination of all analysts casework by amplified DNA product. This position is responsible to see that all employees have the proper training, education, personal protective equipment and experience to handle carcinogens, embryo toxins, radioisotopes, and infectious viral agents safely.

12. DYNAMICS OF WORK

This position is constantly being challenged with managing a complex, changing technology, with varying levels of financial, human, and physical resources available to accomplish the tasks. This position must be flexible to handle emergency phone calls for court, crime scene assistance, the press, or to respond to case inquiries. This position rarely is able to plan the next day's activities, but rather must be free and flexible enough to respond to immediate needs, or switch gears from one project to another.

The forensic analysis of evidence using DNA techniques is currently in a state of change and most likely will remain so for several years to come. The basic methods in use today will gradually be phased out in the near future to incorporate use of newer DNA methodology than currently in use or being implemented/validated now.

III. KNOWLEDGE, SKILLS & ABILITIES AND TRAINING & EXPERIENCE REQUIREMENTS

A. KNOWLEDGES, SKILLS AND ABILITIES

1. Additional knowledge, skills, and abilities to perform as an SBI Agent are as follows: A thorough working knowledge of the methods, procedures and practices used in the investigation of criminal offenses, and the principles of securing and identifying a variety of crime related evidence.

2. The ability to investigate criminal cases, to interpret and apply criminal law of North Carolina in investigations, to make arrests, to prepare comprehensive and detailed reports pertaining to individual cases, to present efficient court testimony, to apply the principles, techniques, and procedures of modern criminal investigation, and the use of evidence in criminal case investigations.

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

4. The Agent must maintain a physical condition which permits certification by the North Carolina Justice Standards Commission for law enforcement officers.

5. A minimum educational requirement of a Bachelor's Degree in a Biological Science for a background to understand the specialized area of forensic molecular genetics and related other related tests as well as the completion of the SBI Academy.

6. Laboratory skills demonstrating the manual dexterity and ability required to conduct forensic tests.

7. Excellent physical and mental health sufficient to pass the SBI Academy and the withstand the stress and physical demand of long hours at the laboratory and at crime scenes.

8. A thorough knowledge of the laws and regulations regarding the analytical and enforcement work performed. Special emphasis on the laws concerning admissibility of DNA evidence, expert witness testimony, the laws and case law governing discovery, search and seizure are critical.

9. The ability to establish and maintain favorable working relationships with other law enforcement officers, district and defense attorneys, the news media, judges, and forensic scientists.

10. The ability to manage human and financial resources to achieve maximum productivity.

11. As the technical leader of this Section, this position must have a thorough knowledge of how to design and carry out scientific experiments.

12. The ability to validate new DNA procedures to be used in forensic casework.

13. Thorough knowledge of how to use computer hardware/software to manipulate and integrate data generated.

14. The ability to organize, analyze, and process data with scientific accuracy and serve as an expert witness in court hearings and trials.

15. The ability to prepare, write, and implement large scale grant programs.
16. The ability to manage personnel in the Section and handle personnel issues that arise in accordance with OSP guidelines.

III B (cont)

17. The ability to assess the performance of employees, suggest appropriate changes to improve performance, and to see that employees obtain the best and most appropriate training available.

18. The ability to write and serve search warrants for blood, saliva, and hair standards pursuant to a DNA CODIS "hit" , and to defend the search warrant in a court of law if challenged.

19. The ability to set and plan Section goals and objectives and to implement these goals and objectives.

20. The ability to plan and monitor the Section budget (or grant budgets), to be thoroughly well versed with the ordering procedure of the agency for supplies and equipment.

21. The ability to travel anywhere in the State at a moment's notice for court or crime scene assistance.

B. 1. REQUIRED MINIMUM TRAINING

This position is required by the US DNA Identification Act of 1994 to be the Technical Manager /Leader of the DNA units and as such MUST possess, at minimum, a Masters Degree and college course work in genetics, biochemistry, molecular biology, statistics, and population genetics. Bureau Agents are required to complete the SBI Academy. Agents in this position will have completed additional hours of in-house training in their specialty area. Management training is a must for this position.

2. ADDITIONAL TRAINING/EXPERIENCE

Formal education does not fully prepare an individual for entry into this position. This formal education is a minimum level for a trainee. In order to become a fully trained analyst, an individual with a college degree must undergo an in-

house training program and complete course work in genetics, biochemistry, and graduate molecular genetics, statistics and population genetics. In addition, Agents will receive additional in-service law enforcement training each year.

The Special Agent In Charge will also have a minimum of seven (7) years progressive experience as a Forensic Molecular Geneticist.

3. EQUIVALENT TRAINING AND EXPERIENCE

No training and/or experience can substitute for this educational requirement, especially the SBI Academy and in-house training in the area of specialization. It is the critical building block necessary for subsequent training and experience.

Management training is a must in preparing an individual for accepting the responsibilities associated with this position.

C. LICENSE OR CERTIFICATION REQUIRED BY STATUTE OR REGULATION:

This position is required by the US DNA Identification Act of 1994 to be the Technical Manager /Leader of the DNA units and as such MUST possess, at minimum, a Masters Degree and college course work in genetics, biochemistry, molecular biology, statistics, and population genetics.

III C (cont)

Bureau Agents must be certified law enforcement officers. This position is responsible for obtaining search warrants pursuant to North Carolina General Statute § 15A-266 when the DNA Database Unit makes a DNA match from a convicted felon sample to an unsolved case profile, a responsibility which requires that this position be a sworn law enforcement officer.

No license or certificate is required to perform laboratory duties, however, the examiner must satisfy the trial judge in each case before being allowed to testify. This is called being court qualified.

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:

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

Signature: Title: Date: