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The FBI DNA Laboratory: A Review of Protocol and Practice Vulnerabilities

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Office of the Inspector General

Chapter Three
The FBI's DNA Laboratory and DNA Protocols

The **FBI** enforces over 200 federal laws and has jurisdiction to investigate all federal criminal violations not specifically assigned by Congress to another federal agency. Its investigations routinely address matters such as counterterrorism, foreign counterintelligence, organized crime, civil rights, and financial crime. As part of its law enforcement mission, the **FBI** also is authorized to provide other law enforcement agencies with cooperative services, such as fingerprint identification, laboratory examinations, and police training. Because the successful investigation and prosecution of crimes requires, in many cases, the collection, preservation, and forensic analysis of evidence, the **FBI** Laboratory Division and the forensic science specialties available to it are a central component of **FBI** operations.

I. THE FBI LABORATORY DIVISION

The **FBI** Laboratory provides leadership in the scientific analysis and prosecution of crimes throughout the United States. It is the only full-service federal forensic laboratory and is one of the largest forensic laboratories in the world. According to the **FBI**, Laboratory activities further three primary goals: 1) to provide forensic services to the **FBI** and other law enforcement agencies; 2) to deploy effective communications, collection, and surveillance capabilities to support investigative and intelligence priorities; and 3) to provide technical and forensic assistance through research, training, technology transfer, and access to information and forensic databases. The Laboratory seeks to meet these goals through forensic examinations, investigative operations support, research and development, application of information technology, and training.

Laboratory personnel conduct scientific examinations of evidence, free of charge, for federal, state, and local law enforcement organizations within the United States. As part of these examinations, Laboratory personnel may analyze physical evidence ranging from blood and other biological materials to explosives, drugs, and firearms. According to the **FBI**, the Laboratory conducts more than one million examinations each year.

In March 2003, the Laboratory moved to its new facility in Quantico, Virginia, resulting in the relocation of approximately 650 Laboratory employees. The design of the new facility is meant to provide for ideal security and evidence control. Offices and public areas are separated from the laboratory areas to avoid evidence contamination. Also, laboratory areas are accessed through "biovestibules" that are meant to provide storage and serve as airlocks between laboratories and offices.[30]

A. Structure of the Laboratory Division

The Laboratory is located organizationally within the Law Enforcement Services Directorate of the **FBI**. It is comprised of various branches, divided into sections, which are further broken down into units. The subject of this review, the DNAUI, is part of the Scientific Analysis Section, as shown in the following Laboratory organizational structure:

Federal Bureau of Investigation

[*Image not available electronically*]

B. DNA Analysis Unit I

1. Organization and Functions

In 1988, a DNA Analysis Unit was established in the Laboratory. Prior to that time, body fluid examinations were performed by the Serology Unit. Although the DNA Analysis Unit was split into two units in 1993, they were re-joined in 1994. In 1998, the DNAUI and DNA Analysis Unit II (DNAUII) were formed. DNAUII was created when the Laboratory established a separate group to analyze a different type of DNA than is analyzed by the DNAUI.

The DNAUI analyzes nuclear DNA, or DNA found in the nucleus of a cell, while DNAUII analyzes mitochondrial DNA, or DNA found in the mitochondria of a cell. The mitochondria are about the size of bacteria and are scattered throughout a cell outside its nucleus. Since there are between 500 to 1,000 mitochondria in every cell, as opposed to one nucleus, mitochondrial DNA analysis affords a better chance of a DNA profile than nuclear DNA analysis in cases where a sample is decayed or degraded, such as skeletal remains that have been exposed to the elements for years. Consequently, the DNAUII receives and analyzes evidence samples and human remains that have not, or most likely will not, generate a traditional STR profile, such as teeth or pieces of bone that have no tissue attached. These types of evidence items are common in cases involving unidentified remains and missing persons. DNAUII receives evidence from across the country, since the specialized equipment, training, and facilities that are required for mitochondrial DNA analysis are usually beyond the resources of state and local laboratories. Further, because mitochondrial DNA analysis is more sensitive to trace amounts of DNA than STR analysis, it requires even greater safeguards in facilities and techniques to avoid contamination.

The DNAUI identifies and characterizes body fluids and body fluid stains recovered as evidence in crimes using traditional serological techniques and related biochemical analysis. These stains are analyzed and compared to results from the known body fluid samples submitted by the victim(s) and/or suspected perpetrator(s). This work is completed in the DNAUI in assembly-line fashion by teams of forensic scientists, which include a Serologist, a PCR Biologist, and an Examiner. The following chart represents

the organization of the DNAUI:

DNA Analysis Unit 1 Organizational Chart

[*Image not available electronically*]

The DNAUI participates in CODIS, which is administered by the CODIS Unit within the Laboratory. CODIS is a national DNA information repository that allows local, state, and federal crime laboratories to store and compare DNA profiles from crime scene evidence, from convicted offenders, and from unidentified remains. The **FBI** provides participating laboratories with special software that organizes and manages their DNA profiles and related information, including enabling participating laboratories to compare DNA profiles. CODIS is organized as a hierarchy that encompasses national, state, and local indexes. DNA profiles are uploaded into the national index from the state indexes and into the state indexes from the local indexes. The forensic laboratories at each level of the CODIS hierarchy decide which DNA profiles will be uploaded to the next level, and conversely, the state and national levels determine, based upon applicable state and federal legislation, what profiles they will accept from the local and state indexes.

The DNAUI operates at the "state index" level, meaning that it uploads directly to the national database, or NDIS. The DNAUI has been uploading profiles to NDIS since September 1998. As of February 2004, the DNAUI had submitted approximately 1,602 forensic profiles (DNA profiles resulting from forensic or crime scene analysis work) to NDIS. According to DNAUI management, the Unit uploads approximately 30 forensic profiles per month to the CODIS database. In addition, the DNAUI oversees the Federal Convicted Offender Program, which involves analyzing known DNA samples from convicted felons in the federal system and uploading the resulting profiles to NDIS for comparison to crime scene evidence profiles from across the country. As of February 2004, the DNAUI had uploaded 213 offender profiles to NDIS.[31]

One of the goals of CODIS is to match DNA profiles from case evidence to other previously unrelated cases or to persons already convicted of other crimes. To determine the extent to which this goal is being met, the CODIS Unit has collected statistics from CODIS participants on the number of investigative leads that have been provided through CODIS' match capabilities. As of February 2004, the DNAUI reported a total of 187 investigations aided by CODIS.[32]

2. **Operations**

   a. **Flow of Evidence to DNAUI**

      At the time of our review, the Laboratory's Information and Evidence Management Unit, and specifically the **Evidence Control Center** (ECC) within that Unit, received all incoming evidence for the Laboratory.[33] The ECC staff were

responsible for ensuring that the evidence was sealed properly and that its receipt by the **FBI** was formally documented on a chain-of-custody form. The ECC staff would open the outer layer of packaging to retrieve the submission paperwork and the individually packaged sealed evidence containers. The ECC staff then would review the submission letter to determine the contents of the sealed container and what tests were requested. In addition, ECC staff labeled each evidence container with unique identifying numbers, as well as a Laboratory case number that would link it with other items received on the same case. Those identifiers, along with the information about the submitter and contents, were entered into the ECC's tracking system.

After all intake work was completed, the evidence was placed in secured storage where it would not deteriorate. The ECC then assigned the evidence to a specific unit within the Laboratory, termed the "primary unit." The primary unit was selected based upon an evaluation of the submission paperwork, from which ECC staff determined which unit would need to complete its work first to avoid contamination or deterioration of the evidence and/or would be conducting the most testing. Due to the nature of DNA evidence and its sensitivity to contamination, the DNAUI often served as the primary unit.

After the primary unit assignment was documented in the ECC system, the evidence was transferred to the designated unit and the necessary chain-of-custody documentation was completed. Within the primary unit, a coordinating Examiner was assigned to ensure that the evidence was routed in the proper order to all other units that will be performing tests on the various items of evidence.[34]

Throughout the analysis process, **FBI** policy requires that the chain-of-custody documentation be maintained to reflect all inter-unit transfers and to record which personnel processed the evidence. As part of this policy, after all laboratory analysis is completed, an inventory is performed to ensure that the evidence is accounted for. The evidence and all by-products of the analysis process are then repackaged and transferred back to the ECC for return to the submitter.

b. **Team Structure**

In those instances where the primary unit is the DNAUI, the coordinating Examiner works with a Serologist and PCR Biologist as a team to inventory evidence items, perform preliminary testing to identify and isolate sources of DNA on those items, and analyze any resulting DNA.

Teams in the DNAUI are divided into a form of assembly line, and each member of the team completes a portion of the analysis process and shares in the responsibility for that process. The three team members and their duties and responsibilities are as follows:

1) The Serologist assists with the initial and final evidence inventories and performs serology testing to determine what body fluids may be present in the evidence. Once body fluid screening is completed for a stain on an item of evidence, a portion of that stain is transferred to the PCR Biologist.

2) The PCR Biologist (the position held by Blake) is responsible for taking cuttings, swabs, or other material containing DNA from the Serologist and

completing the PCR/STR process through the production of GeneScan® and Genotyper® data for the Examiner. Included in this process are the following activities:

- Extraction: the release or removal of DNA from evidence;
- Quantification: the measurement of the concentration of DNA in a sample;
- Amplification: the replication of extracted DNA so that the DNA can be detected by the analyzer or a capillary electrophoresis machine;
- Capillary electrophoresis: the use of a capillary electrophoresis machine to detect and measure the DNA fragments in a DNA sample; and
- Initial data review: the review of all data produced by the capillary electrophoresis instrument that is collected and analyzed by the Genescan® software.

3) The Examiner on each team serves as the first-line supervisor for the team members and are responsible for the work performed by them. Further, unless otherwise specified in written protocols and procedures, the Examiners are given sufficient autonomy to direct how the team will function. Examiners typically can assign work, structure communications, define the decision-making authority of other team members, and specify the level of direct involvement of the Examiner in the work of the other team members.

The Examiner on the team is supplied with all of the documentation from the Serologist and PCR Biologist, as well as the data produced from the capillary electrophoresis process (complete with sample lists, injection lists, and Genotyper® data). The Examiner is responsible for ensuring that:

- The decisions made by the Serologist (if not made in direct interaction with the Examiner) are sound, and that all evidence items are inventoried, examined, and transferred to the PCR Biologist properly;
- The decisions made by the PCR Biologist (if not made in direct interaction with the Examiner) are sound, and that DNA is extracted from all appropriate sources, quantification is completed correctly, batches of samples contain the required positive and negative controls and reagent blanks, and capillary electrophoresis is completed correctly;
- Chain-of-custody forms and case file documentation are completed properly; and
- The actions taken by the team members, as revealed by the written documentation supplied to the Examiner, are in accordance with DNAUI procedures and policies.

In addition, the Examiner is responsible for reviewing the filtered capillary electrophoresis data, or Genotyper® data, and drawing conclusions about the usability of that data based upon the control results. For this review, the sample and injection lists serve as a guide to show the order that the samples were analyzed and to indicate the presence of the appropriate control samples. Each

Examiner decides whether to complete this data review from printouts or directly from the electronic data on the computer. If there are data quality problems, or control result problems, then the Examiner will work with the PCR Biologist to troubleshoot those issues. Otherwise, the Examiner proceeds to draw conclusions about the evidence based upon the data generated from the capillary electrophoresis. The Examiner then writes a report stating those conclusions and, if necessary, later testifies in court about them.

After the discovery of Blake's misconduct, the DNAUI changed its policies to require that the GeneScan® data be supplied to and reviewed by the Examiner, as well as the Genotyper® data, since it was the failure of Examiners to review GeneScan® data that allowed Blake to proceed undetected. See generally Chapter Four, Section II (describing the DNAUI GeneScan® review policy) and Chapter Four, Section V.C (describing the Laboratory's initial remedial actions after the discovery of Blake's misconduct).

c. **Case Documentation and Review**

DNAUI team members demonstrate compliance with the Laboratory's protocols primarily through the documentation that they produce as they perform their work. Although the Examiner can be involved at critical junctures in the DNA analysis process, the Examiner does not witness most of the work performed. Consequently, team members must thoroughly document their work in the case file to establish for the Examiner that they have followed the applicable protocols.

According to DNAUI personnel and the written procedures for case file documentation, a case file should include the following:

- Incoming submission letter;
- Acknowledgment letter (the letter that is sent to the submitter of the evidence to acknowledge receipt);
- Communication log;
- Chain-of-custody form;
- Search sheet (a sheet produced by the ECC advising unit staff whether previous submissions of evidence on that same case have been received, so that individual items can be sequentially and uniquely labeled throughout the case);
- Evidence inventories (listing of the items received, the submitter, and when the items were received);
- Task-specific case notes (includes a set of notes for serology work, PCR work, and examiner analysis);
- Capillary electrophoresis printouts;
- Population statistics calculations;
- Documentation of case file review;

- Administrative sheets (listing information specific to CODIS or DNAUI's new information management system); and

- The file copy of the final DNA report.

Both technical and administrative case file reviews are required for every DNAUI case. The initial technical review is performed by the team's Examiner. In addition, another Examiner who is not involved in the case performs an independent technical review or peer review of the case file. The peer reviewer draws his or her own conclusions from the supporting documentation without regard to the conclusions or report produced by the first Examiner. The results of these evaluations are then compared for consistency and any discrepancies resolved. Finally, the Unit Chief conducts an administrative review of the case file and examines the order and completion of the case file documents, report format, and other administrative items.

According to DNAUI personnel, a thorough technical or peer review generally involves checking:

- The incoming letter to verify the accuracy of the file worksheets, specifically confirming: 1) names; 2) exams requested; 3) evidentiary samples received (referred to as unknown or questioned samples); 4) DNA reference samples received (reference samples are provided by the victim and/or suspected perpetrator(s) for comparison purposes, and are often referred to as known samples); 5) case ID number; and 6) any other identifiers or miscellaneous information applicable to the case.

- The chain-of-custody documents to verify that they reflect the disposition of every item;

- Each page of laboratory documentation to verify that it is numbered (so it will be evident if any pages are misplaced) and that every page is initialed by the team member who produced it;[35]

- The serology paperwork to verify that: 1) all pertinent serology information is recorded and is correct; 2) the required serology controls were run; 3) appropriate serology testing was performed, and 4) the Examiner agrees that no more serology testing should be performed; and

- The PCR paperwork to verify that: 1) the questioned and known samples were processed at different times; 2) the Examiner agrees with the quantification results; 3) all samples selected were amplified; 4) the worksheet that summarizes the DNA profile results (also referred to as a call sheet) agrees with the Genotyper® printouts; and 5) the technical parameters used to interpret the data are consistent with protocol requirements.

After the Examiner reviews these items, the Examiner (whether the initial Examiner or peer reviewer) determines what conclusions and statistics should be reflected in the report. For the peer reviewer, this determination is compared with the actual case report to verify that both Examiners agree. Finally, if the profile will be uploaded to CODIS, both reviewers confirm that the identifying paperwork listing the DNA profile is correct, and that the profile is appropriate for inclusion in the database.

II. THE FBI'S DNA PROTOCOLS

A. Overview of Existing Protocols

The activities of the DNAUI are governed not only by the Quality Assurance Standards that apply to all forensic DNA laboratories (as described in Chapter Two, Section II), but also by the **FBI** Laboratory's own procedures and protocols. These guidelines are contained in five **FBI** documents: 1) the **FBI** Laboratory Division Quality Assurance Manual; 2) the DNA Analysis Unit I Quality Assurance Manual; 3) the **FBI** Laboratory Division Caseworking Procedures Manual; 4) the Procedures for the Serological Identification of Biological Substances on Evidentiary Materials; and 5) the Short Tandem Repeat Analysis Protocol. As explained in Chapter Five, Section I (Assessment Foundation and Process), the OIG's assessment of vulnerabilities in the DNAUI's internal control structure focused on these protocols.[36] A brief description of each document is provided below:

1. FBI Laboratory Division Quality Assurance Manual

The **FBI** Laboratory Quality Assurance Manual addresses laboratory policies and operational practices. It is organized into 17 sections and identifies requirements and guidance for case documentation, evidence control, court testimony and testimony monitoring, authorization of deviations, corrective action, document control, calibration and maintenance, internal audits, laboratory security, proficiency testing, and conflict resolution. The document applies to all units in the Laboratory and therefore does not contain guidance specific to the DNAUI.

2. DNA Analysis Unit I Quality Assurance Manual

The DNAUI Quality Assurance Manual is organized into 20 sections and covers topics including:

- Organization, management, authority and accountability;
- Personnel qualifications, training, and continuing education;
- Facilities, security and evidence control;
- Case assignment, documentation and review;
- Reagents, equipment, and validation;
- Court testimony monitoring;
- Proficiency testing, audits, and corrective action; and
- Environmental health and safety.

3. FBI Laboratory Division Caseworking Procedures Manual

The Caseworking Procedures Manual provides guidance for all units within the Laboratory. It is divided into 12 sections, each covering a different aspect of the caseworking process. Topics include:

- Processing a request for examination;

- Inventorying, identifying, recording, acknowledging, examining, shipping, and transferring evidence;
- Formatting, content, review, and issuance of a "Report of Examination"; and
- Retaining case-related documentation.

4. **Procedures for the Serological Identification of Biological Substances on Evidentiary Materials**

This document is written specifically for DNAUI Serologists and identifies the methods and requirements for each of the serology procedures utilized by the DNAUI. It contains 72 sections, describes 6 routine and 8 non-routine serological procedures, and provides a general discussion of guidelines regulating laboratory set-up.

5. **Short Tandem Repeat Analysis Protocol**

The STR Protocol specifies the procedures and requirements for processing DNA evidence using short tandem repeat (STR) analysis. See generally Chapter Two, Section I.C (describing STR analysis). The document is divided into 46 sections and covers the major processes involved in STR analysis, including extraction, quantification, amplification, electrophoresis, data evaluation and interpretation, and report writing. In addition, the Protocol provides information that applies generally to STR analysis, including guidelines for reagents, supplies, and equipment; special quality control considerations; and laboratory set-up instructions.

The protocols above implement the Quality Assurance Standards that apply to all forensic DNA laboratories. The national standards require laboratories to develop and adhere to operational standards that are tailored to their specific functions and circumstances. In general, these standards afford laboratories broad discretion regarding the content of their written procedures. See Section 9 "Analytical Procedures" in Appendix 3.

B. **Protocols Designed to Protect the Integrity of the STR Process**

Certain DNA protocols are specifically designed to protect the integrity of the STR process by helping to identify the presence of contamination and prevent its occurrence. They include: 1) the required use of quality controls; 2) on-going cleaning and decontamination; and 3) the systematic separation of sample sources and of stages in the analysis process.[37]

1. **Quality Controls**

As discussed in Chapter Two, Section I (General Principles of DNA Analysis) of this report, the use of positive and negative controls and reagent blanks serves as an indicator of contamination and whether the equipment and reagents functioned properly during the analysis process. The positive control allows the PCR Biologist and Examiner to determine the accuracy and consistency of the amplification and capillary electrophoresis processes each time DNA samples are analyzed. The negative control and the reagent blank reveal whether contamination was present in the reagents or whether contamination was introduced during the testing process. DNAUI procedures require the PCR Biologist to process positive and negative controls and reagent blanks with every batch of DNA samples analyzed. The Examiners, along with the PCR Biologists, analyze the control results to ensure that the data generated from the DNA samples meet the quality standards established for the resulting DNA profiles.

The failure to analyze properly the positive and negative controls and reagent blanks does not necessarily render DNA testing results inaccurate. Rather, it limits the conclusions that the DNAUI scientists may draw from the testing. Without properly analyzing the negative control and the reagent blank, DNAUI scientists cannot be sure that the only source of the test results is the DNA from the evidence under examination. The results could reflect impurities in the reagents or contamination introduced during the testing process. If the positive control is not analyzed properly, the DNAUI scientists cannot evaluate how well the amplification and capillary electrophoresis processes worked.

2. **Cleaning and Decontamination**

Adequate cleaning and decontamination procedures limit the possibility that forensic scientists will contaminate DNA samples during the testing process. Two types of contamination are of concern: 1) an evidence item or a DNA sample can be contaminated with DNA from a different case or from a different piece of evidence from the same case; and 2) the forensic scientist might also contaminate evidence with his or her own DNA.

The DNAUI cleaning and decontamination procedures can be summarized as follows:

- The Serologists and PCR Biologists clean their work surfaces and then cover those surfaces with clean brown paper each day before retrieving the evidence or samples from storage. The brown paper should be changed before each new evidence item is examined. The work surface always should be cleaned between cases and between the processing of items containing unknown DNA samples and those containing known DNA samples. If a piece of evidence is very messy, or if the item might have touched the work surface, the work surface should be cleaned before a new item is examined.

- Serologists and PCR Biologists wear gloves while examining evidence or processing samples. The gloves should be changed between items, or more often if necessary. When appropriate, the Serologists and PCR Biologists should wear facemasks when examining or testing evidence.

- Non-disposable utensils should be either cleaned or sterilized between use on separate evidence items. Pipette tips should be disposable and be changed for every use.

- Vacuum or fume hoods (hoods) should be small, enclosed work areas from which the air is vented to another location, often outside the building. When necessary, the air also should be filtered to remove hazardous particles before it is released. The hoods should be decontaminated using ultra violet light at the beginning and the end of the workday. The hoods should be cleaned on a weekly basis, or more often if necessary. For example, if something was spilled in the hood or a piece of evidence was extremely dirty, the hood would be cleaned immediately. PCR Biologists should cover their hood work-surface with disposable paper prior to beginning their work. This paper should be changed before each new item is processed. The PCR Biologists also should clean the hood between the processing of DNA samples from evidence and their processing of DNA samples from known sources (such as reference samples).

- Reagents should be decontaminated using ultra-violet light.

In addition, the DNAUI uses a contamination log to track occurrences of contamination. The log assists Unit management in identifying when staff members may need additional training or oversight, or in determining whether a procedure needs to be strengthened to avoid future incidents of contamination.

3. **Separation of Sample Sources and of Stages in the DNA Analysis Process**

The separation of the different types of samples and stages in the analysis process is important in reducing the possibility that DNA from one sample can contaminate another sample. For instance, samples from crime scene evidence (unknown samples) should be processed separately from samples submitted by suspects or other known individuals (known samples) to eliminate the risk of the suspect's DNA contaminating an unknown DNA sample. In the same way, it is also important to separate large and small samples of DNA to avoid the risk that the low quantity DNA will be contaminated by the high quantity DNA sample. Depending on the level of contamination, the DNA from the low quantity sample could be "drowned out" by the contamination, thus altering the test results for the low quantity sample.

The DNAUI Serologists and PCR Biologists attempt to limit such cross-contamination through the following procedures:

- Serologists work on one case at a time and examine only one piece of evidence at a time. The remaining evidence stays in storage until the first item is examined and returned to storage. PCR Biologists also work on cases sequentially and process samples from one item at a time. In addition, while adding samples and reagents to test tubes, the PCR Biologists are supposed to have only one test tube open at a time. The test tubes remain capped until the Biologist adds something to the test tube.

- The Serologists and PCR Biologists always work on the crime scene evidence and unknown DNA samples before working on samples submitted by known individuals. To the extent possible, they also process low quantity DNA samples before working with the high quantity samples.

Several steps in the DNA testing process are performed in separate rooms in the DNAUI's new facility at Quantico, Virginia. The Serologists examine evidence and take cuttings or swabbings in one room. The PCR Biologists extract the DNA from the cuttings or swabbings in a second room under a hood. They also prepare the extracted DNA for amplification in that room. The actual amplification process takes place in a third room.

Once the DNA has been amplified, the DNAUI addresses the potential for amplification-related contamination as follows:

- Once employees work in the amplification room, they are not allowed to go back into a pre-amplification area for the remainder of the day. Employees must change lab coats and gloves before entering the amplification room, and again as they prepare to leave the amplification room. There are dedicated lab coats that are only worn in the amplification room.

- All equipment that is used in the amplification room stays there; the amplification room has dedicated instruments, equipment, and utensils. The tube racks used to transport the unamplified DNA to the amplification room are thoroughly cleaned before they are returned to use in the pre-amplification area.

- All amplified DNA stays in the amplification room until it is frozen and ready to be sent back to the submitter. The amplified DNA is packaged separately and sealed before it is packaged with the rest of the evidence being returned to the submitter.

The foregoing descriptions of the DNA analysis process, the standards and protocols that govern that process, and the structure and operations of the **FBI** Laboratory, particularly the DNAUI, provide context necessary to understand fully the findings and recommendations of our vulnerability assessment, as well as Blake's wrongdoing and how she exploited a loophole in the Laboratory's protocols to avoid detection. Before proceeding to address the results of our assessment, we describe below the events that precipitated the review, namely the discovery of Blake's disregard of protocols in the DNAUI.

Footnotes

30. Additional information about our assessment of the DNA Analysis Unit I (DNAUI) portion of the new Laboratory building is contained in Chapter Five, Section II.B.1.a of this report.

31. The DNAUII, also a CODIS participant, oversees the National Missing Persons DNA Database Program. Because missing persons' remains are frequently too deteriorated for nuclear DNA analysis, mitochondrial DNA analysis often is the only forensic option. The DNAUII also facilitates the collection and analysis of reference samples from relatives of missing persons for comparison to unidentified remains that are found as a means of determining their identity.

32. CODIS's primary metric, the "Investigation Aided," is defined by the **FBI** as a case that CODIS assisted by producing a match between profiles (linking two cases together, or linking a case profile to an offender profile) that would not otherwise have been developed.

33. By the date of this report, the ECC was reorganized into the Evidence Control Unit.

34. During our fieldwork, we were notified by the DNAUI Unit Chief that new procedures were being drafted and tested. By the date of this report, staff of the Evidence Control Unit have taken the place of the coordinating Examiner and are responsible for the routing, tracking, and administration of evidence movement throughout the Laboratory.

35. See generally Chapter Four, Section II.B (discussing initialing requirement).

36. Around this time Blake also applied to become a Special Agent, but her application was rejected due to inadequate testing scores. She also withdrew from a lecture course for DNA Examiners because she was receiving failing marks.

37. The descriptions below of these procedures reflect information collected during the course of our vulnerability assessment and are not necessarily found in the same level of detail in the DNAUI's protocols. This information was obtained during lengthy interviews with DNAUI staff members and management. Information regarding the weaknesses detected in the DNAUI protocols is found in Chapter Five, Section II of the report.