



June 2017

FBI LABORATORY

Chemistry and Trace
Evidence Units
Generally Adhere to
Quality Standards, but
Could Review More
Examiner Testimonies

Why GAO Did This Study

The FBI Laboratory, within the Department of Justice (DOJ), is responsible for analysis of forensic evidence for the FBI, other parts of DOJ, and domestic law enforcement agencies, among others.

GAO was asked to examine how the FBI Laboratory ensures the reliability of its forensic examinations, in particular within its Chemistry and Trace Evidence Units. For these two units, this report addresses (1) how the FBI Laboratory works to ensure quality in conducting forensic examinations, and (2) the extent to which it has taken steps to ensure adherence to the FBI Laboratory's quality standards.

GAO reviewed policies and procedures of the FBI Laboratory and its Chemistry and Trace Evidence Units; audit and accreditation reports from 2008, when the Laboratory was accredited to international standards, through 2015, the most recent available; the training records of all 47 staff who conducted casework in these two units from fiscal year 2011 to July 2016, the most recent available; and evaluation records for examiner testimonies and related laboratory reports in these two units from fiscal years 2011 to 2015, the 5 fiscal years prior to this review. GAO also independently sought to obtain testimony transcripts the FBI was unable to obtain for this period.

What GAO Recommends

GAO recommends that the FBI Laboratory's transcript acquisition procedure routinely capture and use additional information critical to transcript acquisition. The FBI concurred with our recommendation and described planned actions for implementation.

View [GAO-17-516](#). For more information, contact Diana Maurer at (202) 512-8777 or maurerd@gao.gov.

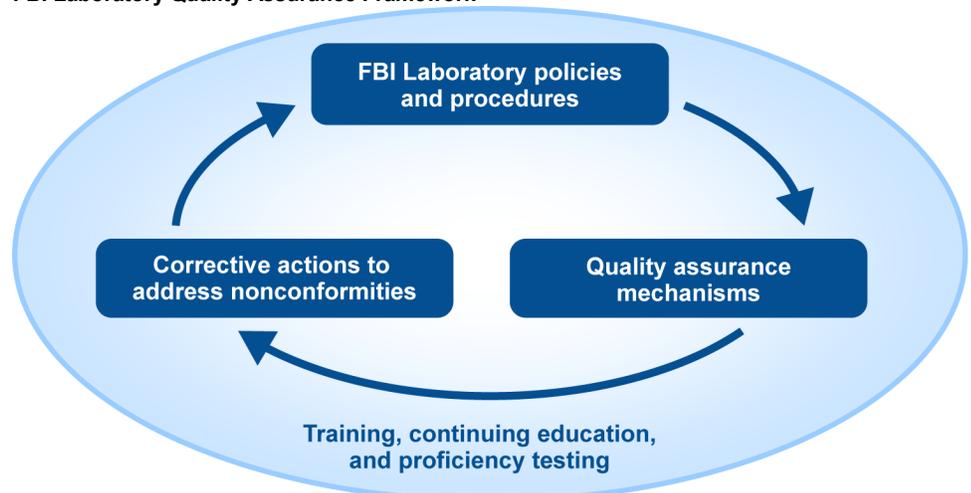
FBI LABORATORY

Chemistry and Trace Evidence Units Generally Adhere to Quality Standards, but Could Review More Examiner Testimonies

What GAO Found

The Federal Bureau of Investigation (FBI) Laboratory has a framework in place to help ensure quality in its forensic examinations of chemical and trace evidence. Based on accreditation results and GAO's review, the framework meets international and accreditation standards. The FBI Laboratory quality assurance framework consists of policies and procedures, quality assurance mechanisms, corrective actions, and training requirements that are designed to ensure quality in its forensic examinations and related activities (see figure). The framework includes policies, procedures, and training specific to each unit of the Laboratory, such as the Chemistry and Trace Evidence Units.

FBI Laboratory Quality Assurance Framework



Source: GAO analysis of FBI Laboratory information. | GAO-17-516

GAO found that the FBI Laboratory generally ensures the Chemistry and Trace Evidence Units adhere to quality standards for conducting forensic examinations, including conducting audits, implementing corrective actions, ensuring staff have appropriate training, and reviewing laboratory reports. However, the Laboratory's program to review examiner testimonies to ensure they are accurate and within the scientific limits of the given forensic discipline is limited by difficulties in acquiring testimony transcripts. Specifically, the Laboratory did not acquire transcripts and conduct internal evaluations for nearly half of the testimonies (78 of 164) given by Chemistry and Trace Evidence Unit examiners from 2011 through 2015, citing difficulties in locating transcripts and lack of response from courts. To better understand these factors, GAO sought and obtained almost half of the 78 transcripts (36 of 78). While attempting to obtain the remainder, GAO confirmed some of the difficulties identified by the FBI. Consistent with internal control standards, the FBI Laboratory could better ensure it obtains more transcripts for review by routinely capturing and using additional information that is critical to transcript acquisition, such as court jurisdiction and points of contact. Obtaining additional transcripts could help the FBI Laboratory expand its monitoring of examiner testimonies to help ensure the testimonies are accurate and within scientific limits, as defined by FBI and accreditation standards.

Contents

Letter		1
	Background	4
	FBI Has a Framework In Place To Help Ensure Quality In Its Forensic Examinations of Chemical and Trace Evidence	10
	FBI Laboratory Generally Ensures Chemistry and Trace Evidence Units Adhere to Quality Standards, but Could Review More Testimonies	14
	Conclusions	29
	Recommendation for Executive Action	30
	Agency Comments	30
Appendix I	FBI Laboratory Practices for Internal and External Evaluations of Court Testimony	32
Appendix II	Comments from the Federal Bureau of Investigation	33
Appendix III	GAO Contact and Staff Acknowledgments	34
Tables		
	Table 1: Types of Corrective and Preventive Actions to Address and Prevent Nonconformities from 2008 through 2015	18
	Table 2: FBI Laboratory Initial Training Program Requirements for Examiners and Technicians in the Chemistry and Trace Evidence Units	21
Figures		
	Figure 1: FBI Laboratory Quality Assurance Framework	11
	Figure 2: Relationship of the FBI Laboratory Quality Assurance Policies and Procedures	13

Abbreviations

ANAB	ANSI-ASQ National Accreditation Board
ANSI	American National Standards Institute
ASCLD/LAB	American Society of Crime Laboratory Directors/Laboratory Accreditation Board
ASQ	American Society for Quality
DNA	Deoxyribonucleic acid
DOJ	Department of Justice
FBI	Federal Bureau of Investigation
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
NAS	National Academy of Sciences
NIST	National Institute of Standards and Technology
OSAC	Organization of Scientific Area Committees
PACER	Public Access to Court Electronic Records

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



June 28, 2017

The Honorable Charles E. Grassley
Chairman
Committee on the Judiciary
United States Senate

The Honorable Patrick J. Leahy
United States Senate

Forensic science plays a vital role in the United States criminal justice system at the local, state, and federal levels.¹ The Federal Bureau of Investigation Laboratory (FBI Laboratory), within the U.S. Department of Justice (DOJ), uses a variety of scientific and forensic techniques to analyze evidence to help solve crimes.²

The quality of the FBI Laboratory's forensic work is important because forensic evidence can influence whether a criminal defendant is acquitted, convicted, or even charged. To ensure that justice is served, evidence presented by the FBI Laboratory must be reliable and objective. However, from 2009 to 2012, DNA testing revealed that three men had been wrongfully convicted based at least in part on overstated FBI examiner testimony that exceeded the limits of science.³ As a result, in 2012, the FBI together with DOJ and in partnership with the National Association of Criminal Defense Lawyers and the Innocence Project initiated a review of FBI microscopic hair comparison analysis cases conducted prior to

¹Forensic science encompasses a broad range of disciplines and methods including the analysis of hair, fibers, chemicals, and other materials, to help solve crimes.

²By regulation, the FBI Laboratory serves not only the FBI, but also provides, without cost, scientific and technical assistance, including expert testimony in federal or local courts, to other parts of DOJ, other federal agencies, and foreign and domestic law enforcement agencies.

³Forensic deoxyribonucleic acid (DNA) analysis, as defined by the FBI, is the process of identification and evaluation of biological evidence in criminal matters using DNA technologies.

2000.⁴ As of April 2015, the review found that at least 90 percent of trial transcripts the FBI analyzed as part of the review contained erroneous statements. Further, the review found that 26 of 28 FBI agents/analysts provided either testimony with erroneous statements or submitted laboratory reports with erroneous statements.

You asked us to examine how the FBI Laboratory ensures the reliability of its forensic examinations, in particular within its Chemistry and Trace Evidence Units. This report addresses (1) how the FBI Laboratory works to ensure quality in conducting forensic examinations of chemical and trace evidence, and (2) the extent to which the FBI Laboratory has taken steps to ensure that the Chemistry and Trace Evidence Units adhere to the Laboratory's quality standards.

To address how the FBI Laboratory works to ensure quality in conducting forensic examinations of chemical and trace evidence, we identified the standards, policies, and procedures to which the FBI Laboratory, as a whole, and the Chemistry and Trace Evidence Units, in particular, must adhere. Specifically, we reviewed FBI policies and procedures related to the Laboratory's quality assurance and corrective action processes, such as the FBI Laboratory Quality Assurance Manual and Laboratory Operations Manual.⁵ We also reviewed the laboratory standards issued by the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC), and by the accrediting bodies for the FBI Laboratory and Chemistry and Trace Evidence Units—the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) and the American Board of Forensic Toxicology.⁶

To assess the extent to which the FBI Laboratory has taken steps to ensure that the Chemistry and Trace Evidence Units adhere to the Laboratory's quality standards, we examined reports of all internal audits,

⁴Since 2000, the FBI has routinely used DNA analysis to examine hair evidence. Therefore, the review focuses on microscopic hair comparison cases analyzed prior to 2000, and is to extend back at least to the early 1980s or earlier if cases can be identified.

⁵*FBI Laboratory Quality Assurance Manual* (issued Sept. 9, 2015, revision 9) and, for example, *FBI Laboratory Operations Manual - Practices for Addressing a Nonconformity* (issued Sept. 8, 2014, revision 8).

⁶ISO/IEC 17025 *General Requirements for the Competence of Testing and Calibration Laboratories* (2005), *ASCLD/LAB-International Supplemental Requirements for the Accreditation of Forensic Science Testing Laboratories* (2011), and the American Board of Forensic Toxicology's *Toxicology Laboratory Accreditation Program standards* (2014).

external audits, and corrective actions issued by the Chemistry and Trace Evidence Units and accrediting bodies from calendar years 2008 through 2015 to identify trends and determine the effectiveness of the quality assurance process.⁷ We also examined the individual training records of all 47 examiners and technicians that conducted casework or provided testimony in the disciplines practiced by the Chemistry and Trace Evidence Units from fiscal year 2011 to July 2016 to assess the extent to which the staff have been trained and qualified to conduct and report the results of forensic examinations in accordance with FBI policies and accreditation standards.⁸

We further examined the FBI Laboratory's review process and testimony monitoring program to determine the extent to which it has taken steps to ensure that laboratory reports and testimony adhere to FBI standards for quality.⁹ For all 164 testimonies provided by FBI Laboratory Chemistry and Trace Evidence Unit examiners from fiscal years 2011 through 2015, we reviewed related laboratory reports and available evaluations of the testimonies to ensure that they had been reviewed in accordance with FBI Laboratory and accreditation standards.¹⁰ Specifically, we reviewed the laboratory reports to ensure that they had undergone the proper technical and supervisory reviews. We further reviewed evaluations of Chemistry and Trace Evidence Unit examiner testimonies to understand the breadth and use of evaluations provided by external parties, such as court officials, and internal evaluations of testimony transcripts conducted by FBI Laboratory management and subject matter experts. We also determined whether the Laboratory had obtained all transcripts for testimony provided by Chemistry and Trace Evidence Unit examiners

⁷We selected the time period of calendar years 2008 through 2015 to coincide with the accreditation of the FBI Laboratory to international standards in 2008 through the most recent reports available at the time of our review. The scope of our review was limited to a review of the managerial standards, policies, and procedures in place for ensuring the quality of the FBI Laboratory's examinations and testimony. We did not assess the scientific bases of the discipline(s) and procedure(s) practiced at the FBI Laboratory.

⁸We selected the time period of fiscal year 2011 to July 2016 to include the staff that conducted casework or provided testimony in these disciplines during the 5 fiscal years prior to our review. We also reviewed ASCLD/LAB annual reports from 2011 to 2015 to determine the extent to which these staff met annual proficiency test requirements in accordance with accreditation standards.

⁹A laboratory report includes information regarding the examinations conducted by FBI personnel and any information necessary for the interpretation of examination results.

¹⁰We selected the period of fiscal year 2011 to 2015 to analyze the FBI's testimony monitoring program over 5 fiscal years.

during this period, and whether Laboratory officials had reviewed the obtained transcripts according to FBI policies and accreditation standards. Furthermore, we attempted to obtain any transcripts that the FBI Laboratory was unable to obtain by searching the Public Access to Court Electronic Records system (PACER) and contacting the courts or court reporters directly.

To inform our review for both objectives, we conducted interviews with FBI officials responsible for overseeing the Chemistry and Trace Evidence Units and quality assurance processes, and we visited the FBI Laboratory at Quantico, Virginia, to observe examples of examination methods used by the Chemistry and Trace Evidence Units. We also met with a representative from ASCLD/LAB to discuss the organization's accreditation requirements and methodology for assessing the FBI Laboratory for accreditation. In addition, for background purposes, we met with officials from the Department of Commerce's National Institute of Standards and Technology (NIST) to discuss ongoing forensic science efforts.

We conducted this performance audit from October 2015 to June 2017 in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

FBI Laboratory

The FBI Laboratory, located in Quantico, Virginia, provides a full range of forensic services including forensic examinations, technical support, and expert witness testimony. As of fiscal year 2015, the FBI Laboratory had an operational budget of approximately \$102.4 million and a staffing budget of approximately \$97.9 million.¹¹ The FBI Laboratory employed 651 full-time staff at the end of fiscal year 2015 across five sections: Biometrics Analysis, Forensic Response, Forensic Science Support, Scientific Analysis, and the Terrorist Explosive Device Analytical Center.

¹¹As of fiscal year 2016, the FBI Laboratory had an operational budget of approximately \$103.6 million and a staffing budget of approximately \$99.5 million.

The units discussed in this report, the Chemistry and Trace Evidence Units, are both located within the Scientific Analysis Section.

The Chemistry Unit conducts scientific analyses in four disciplines: general chemistry, toxicology, paints and polymers, and metallurgy.¹² The Chemistry Unit had an operational budget of approximately \$807,500 and a personnel budget of approximately \$3.2 million in fiscal year 2015, and employed 15 caseworking staff.¹³ The Trace Evidence Unit conducts scientific analyses in three disciplines: hair and fiber, geology and mineralogy, and forensic anthropology.¹⁴ The Trace Evidence Unit had an operational budget of approximately \$122,700 and personnel budget of approximately \$2.6 million in fiscal year 2015, and employed 16 caseworking staff. The combined operational budgets of the Chemistry and Trace Evidence Units accounted for about 20 percent of the Scientific Analysis Section's fiscal year 2015 operational budget and 1 percent of the FBI Laboratory's overall operational budget.

In fiscal year 2015, the Chemistry Unit received 324 requests for examinations, and the Trace Evidence Unit received 637 requests for examinations. From fiscal years 2011 to 2015, the total number of requests for examinations submitted to the Chemistry and Trace Evidence Units declined from 1,159 requests to 961 requests.

¹²As used in the report, general chemistry is the analysis of unknown powders, liquids, stains, and other substances to determine the chemical identity or the chemical characteristics of the substances. Toxicology is the analysis of biological samples and food evidence for the presence of poisons and drugs. Paints and polymers include paints, tapes, and adhesives. Metallurgy is the analysis of metals and their properties.

¹³According to the FBI, a caseworking employee is one who conducts activities related to the examination of evidence or requests for examination. Forensic examiners and technicians are the two primary types of caseworking employees. A forensic examiner is a person qualified by the FBI Laboratory to conduct examinations, write laboratory reports, and provide testimony to convey the results of those examinations. A technician is a person qualified by the FBI Laboratory to work under the direction of an examiner in conducting examinations (such as preparing evidence for examination) within a particular discipline or category of testing.

¹⁴As used in the report, hair and fiber analysis includes the analysis of human and animal hair, natural and manmade fibers, and fabric. Geology and mineralogy is the analysis of soil, glass, building materials, and gemstones. Forensic anthropology is the analysis of human skeletal remains for solving criminal cases and for other medico-legal reasons.

International Standards and Accreditation

FBI Laboratory Chemistry and Trace Evidence Unit Accreditation

The American Society of Crime Laboratory Directors/Laboratory Accreditation Board accredits the FBI Laboratory as a testing laboratory in the following disciplines and categories of testing practiced by the Chemistry and Trace Evidence Units.

Chemistry Unit:

Drug chemistry

- controlled substances
- general chemical testing

Toxicology

- human performance forensic toxicology
- post-mortem forensic toxicology

Trace evidence

- paint
- general physical and chemical analysis

Trace Evidence Unit:

Trace evidence

- fiber and textiles
- glass
- hair

Source: The American Society of Crime Laboratory Directors/Laboratory Accreditation Board and FBI information. | GAO-17-516

A testing and calibration laboratory may opt to follow international standards to ensure that it is technically competent, has a management structure, and is able to generate technically valid results. The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) develop and publish standards for various industries worldwide, including laboratories.¹⁵ Laboratories can use the *ISO/IEC 17025:2005 General Requirements for Competence of Testing and Calibration Laboratories* standard to govern operations.

Accreditation bodies can use the ISO/IEC 17025:2005 standard as the basis to accredit participating laboratories.¹⁶ The ISO/IEC 17025:2005 standard specifies the general requirements for laboratories to competently carry out tests, including sampling. The standard specifies, among other things, that a laboratory shall have a quality manual and a quality policy statement, define the roles and responsibilities of management, and have policies and procedures that institute many parts of a quality assurance framework. For example, the standard requires laboratories to have policies and procedures to handle nonconformities in their work, including a corrective action process; conduct periodic internal audits and management reviews; and ensure that staff performing testing are qualified on the basis of appropriate education, training, experience, and/or demonstrated skills.¹⁷

For the period of our review's focus from 2008 to 2015, the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) accredited the FBI Laboratory to demonstrate that it met the ISO/IEC 17025:2005 requirements, as well as additional ASCLD/LAB requirements specific to forensic science laboratories, or the *ASCLD/LAB-International Supplemental Requirements for the*

¹⁵The ISO is an international, independent, non-governmental organization with a membership of 163 national standards bodies, including the American National Standards Institute. According to its website, the group has published more than 21,000 international standards and additional documentation across almost every industry. The IEC prepares and publishes international standards for all electrical, electronic, and related technologies.

¹⁶Accreditation serves to demonstrate that a laboratory has a management system, is technically competent, and is able to produce technically valid results based on the accrediting bodies' standards.

¹⁷The FBI Laboratory defines a nonconformity as the non-fulfillment of a requirement.

Accreditation of Forensic Science Testing Laboratories.¹⁸ ASCLD/LAB accredits forensic science laboratories in specific disciplines.¹⁹

ASCLD/LAB accredits laboratories on a 5-year cycle.²⁰ The accreditation process begins with ASCLD/LAB ensuring that the policies and procedures of a laboratory meet the ISO/IEC and ASCLD/LAB standards. The laboratory undergoes a full accreditation assessment consisting of a document review of policies and procedures, meetings with the laboratory director and other appointed individuals, an on-site assessment, and corrective actions to address identified nonconformities. ASCLD/LAB then provides an assessment report and certifies that the laboratory is accredited, if applicable. Following the full on-site assessment, the laboratory must provide a performance declaration to ASCLD/LAB periodically, participate in and abide by the rules of the ASCLD/LAB proficiency testing program, disclose all significant events and nonconformities, and undergo scheduled surveillance visits.²¹ ASCLD/LAB determines the frequency of performance declaration submissions based on the performance of the laboratory during the previous accreditation cycle. One scenario is the submission of a

¹⁸*ASCLD/LAB-International Supplemental Requirements for the Accreditation of Forensic Science Testing Laboratories* (2011). ASCLD/LAB is a not-for-profit corporation specializing in the accreditation of public and private crime laboratories. In April 2016, ASCLD/LAB announced a merger with ANSI-ASQ National Accreditation Board (ANAB), another major accreditation organization. ANAB provides accreditation for ISO/IEC 17025 testing, calibration, and forensics laboratories, among other organizations. According to a senior ASCLD/LAB representative, the merger will bring some changes to the accreditation requirements; however, ASCLD/LAB customers will continue to be accredited under the ASCLD/LAB brand and symbol.

¹⁹See side bar on the previous page for the disciplines and categories of testing in which ASCLD/LAB accredits the FBI Laboratory Chemistry and Trace Evidence Units. The Trace Evidence Unit practices one discipline for which ASCLD/LAB accreditation is not available—forensic anthropology. The Laboratory requires its forensic anthropologists to be certified by the American Board of Forensic Anthropology, as discussed later in this report.

²⁰Effective with all applications for initial ASCLD/LAB accreditation and renewal of accreditation received on or after July 1, 2014, the length of the accreditation cycle was changed to 4 years. The 4-year accreditation cycle will apply to the FBI Laboratory starting after its next full accreditation assessment in 2018.

²¹Surveillance visits are on-site visits that are less comprehensive than a full assessment, but are to be sufficiently comprehensive to monitor ongoing conformance with selected accreditation requirements. Surveillance visits are required within 2 years of the previous surveillance visit or full assessment. Nonconformities identified in a surveillance visit are handled in the same manner as nonconformities identified in a full assessment.

performance declaration only when a laboratory does not undergo an on-site visit.

Legal Standards for Assessing the Reliability of Forensic Evidence in Court

Federal jurisdictions and states use different standards for determining the reliability of expert testimony in court. Under the Federal Rules of Evidence, Rule 702, an expert witness is considered qualified to testify if, among other things, the testimony is the product of reliable principles and methods. The 1993 Supreme Court case, *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (509 U.S. 579), significantly changed the assessment of reliability of scientific evidence for federal trial courts, making trial judges responsible for acting as gatekeepers to exclude unreliable scientific expert testimony. The *Daubert* case listed factors for judges to use in assessing the reliability of scientific expert testimony, including (1) whether the expert's technique or theory can be or has been tested, (2) whether the technique or theory has been subjected to peer review, (3) the known or potential rate of error of the technique or theory when applied, (4) the existence and maintenance of standards and controls, and (5) whether the technique or theory has been generally accepted in the relevant scientific community. The *Daubert* factors are not meant to be exclusive and other courts have found additional factors relevant in determining the reliability of expert testimony. Most states generally follow the *Daubert* standard, while some use the *Frye* test, developed by the Court of Appeals of the District of Columbia in 1923 (*Frye v. U.S.*, 293 F. 1013). The *Frye* test requires that the scientific principle be generally accepted in the relevant scientific community. A minority of states have not adopted either the *Daubert* factors or *Frye* test and have their own rules for admitting scientific evidence into court.²²

²²For example, Virginia Rules of Evidence, Rule 2:702, allows for the admissibility of scientific evidence by an expert in a criminal trial if it will assist the jury in understanding the evidence and the court finds that the subject matter is beyond the knowledge and experience of ordinary persons and the jury needs expert opinion in order to comprehend the subject matter, form an intelligent opinion, and draw its conclusions.

Challenges With Certain Forensic Standards, Methods, and Practices

Forensic discipline, category of testing, and method

A **discipline** is a major area of casework as specified by ASCLD/LAB for which a laboratory can seek accreditation, such as trace evidence.

A **category of testing** is a specific type of analysis within an accredited discipline of forensic science, such as hair analysis.

A **method** is the course of action or technique followed in conducting a specific analysis or comparison leading to an analytical result, such as microscopic hair comparison.

Source: FBI Laboratory Operations Manual | GAO-17-516

Since the publication of the 2009 National Academy of Sciences (NAS) report titled *Strengthening Forensic Science in the United States: A Path Forward*, the standards, methods, and practices of the forensic science community have been the subject of considerable discussion.²³ The NAS report highlighted that there is wide variability across forensic science disciplines with regard to techniques, methodologies, reliability, types and numbers of potential errors, research, general acceptability, and published material. Further, while some of the disciplines and methods used by the forensic science community—such as DNA analysis, serology, toxicology, and chemical analysis—are built on solid bases of theory and research,²⁴ many of the pattern-based disciplines—such as microscopic hair comparison, latent fingerprints, and tool marks—were developed based on observation, experience, and reasoning.²⁵ As such, the scientific rigor, accuracy, and reliability of certain methods and the specificity with which examiners may report opinions and conclusions in laboratory reports and court testimony vary substantially by forensic discipline and method.

The forensic science community has initiated a number of efforts to strengthen the forensic sciences. For example, in February 2013, DOJ, in partnership with the Department of Commerce’s National Institute of Standards and Technology (NIST), established the National Commission on Forensic Science to enhance the practice and improve the reliability of forensic science. The Commission included federal, state and local forensic science service providers; research scientists and academics; law enforcement officials; prosecutors, defense attorneys, and judges;

²³National Academy of Sciences, *Strengthening Forensic Science in the United States: A Path Forward* (Washington, D.C.: 2009).

²⁴As the NAS report stated, though DNA analysis is considered the most reliable forensic tool available today, laboratories nonetheless can make errors working with either nuclear DNA or mitochondrial DNA—errors such as mislabeling samples, losing samples, or misinterpreting the data.

²⁵Pattern-based disciplines include methods for visually comparing the pattern of evidence found at a crime scene—such as fingerprints, firearms examination, tool marks, bite marks, impressions (tires, footwear), bloodstain pattern analysis, and hair—to the pattern of an item obtained from a suspect or other source using a microscope or other instrument.

and other stakeholders from across the country.²⁶ Further, in February 2014, NIST, with support from DOJ, established the Organization of Scientific Area Committees (OSAC) for Forensic Science with the stated goal of creating an infrastructure that produces consensus-based documentary standards and guidelines for forensic science. OSAC is designed to provide leadership in the following areas: (1) facilitating the development and promulgation of consensus-based documentary standards and guidelines for forensic science, (2) promoting standards and guidelines that are fit-for-purpose and based on sound scientific principles, (3) promoting the use of OSAC standards and guidelines by accreditation and certification bodies, and (4) establishing and maintaining working relationships with similar organizations. The organization is a collaborative body of more than 500 forensic science practitioners and other experts who represent local, state, and federal agencies; academia; and industry.

FBI Has a Framework In Place To Help Ensure Quality In Its Forensic Examinations of Chemical and Trace Evidence

The FBI Laboratory has established a quality assurance framework through its policies and procedures to help ensure quality in its forensic examinations of chemical and trace evidence. According to the FBI, the policies and procedures that establish the quality assurance framework are designed to adhere to ISO/IEC and ASCLD/LAB standards. ASCLD/LAB accreditation results and our review of the framework found it to meet international and accreditation standards.²⁷

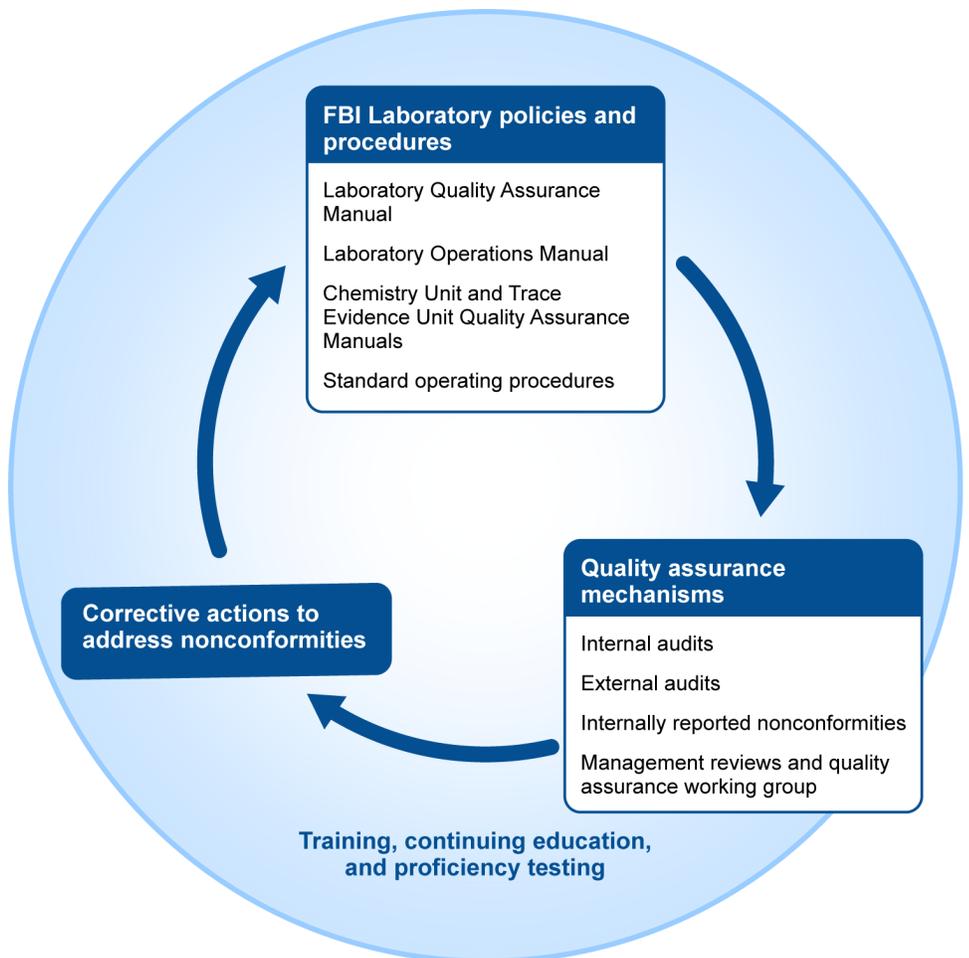
Ensuring that forensic examiners produce scientifically sound, valid, and reliable examination results is a stated goal of the FBI Laboratory quality system. The FBI Laboratory's quality assurance framework consists of several components: policies and procedures, quality assurance mechanisms, corrective actions to address nonconformities, and training

²⁶This Federal Advisory Committee adopted and submitted 20 Recommendation documents to the Attorney General and 23 position papers termed Views documents during two, 2-year terms. Its charter expired on April 23, 2017, and it was not renewed. The Commission's views and recommendations may be found at <https://www.justice.gov/ncfs>. The Commission also issued a final report summarizing the Commission's accomplishments and identifying work to be addressed (see National Commission on Forensic Science, *Reflecting Back—Looking Toward the Future* (Washington, D.C.: Apr. 11, 2017)).

²⁷The FBI Laboratory's framework follows ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories* standards. The Laboratory formally instituted a quality assurance framework in the late 1990s and revised it in 2006 to follow the international standards.

requirements designed to ensure quality in its forensic examinations. The quality assurance mechanisms are programs designed to ensure that the policies and procedures are followed correctly in the Laboratory. The corrective actions are designed to address nonconformities and correct issues within the Laboratory. Based on the results of corrective actions, the FBI Laboratory updates policies and procedures as needed. Overall, the framework is also reliant on a structure of training, continuing education, and proficiency testing to ensure forensic examiners and technicians are qualified to conduct casework. Figure 1 depicts the continuous nature of the FBI Laboratory’s quality assurance framework.

Figure 1: FBI Laboratory Quality Assurance Framework



Source: GAO analysis of FBI Laboratory information. | GAO-17-516

The two main documents establishing the policies and procedures under the FBI Laboratory's quality assurance framework are the Laboratory Quality Assurance Manual and the Laboratory Operations Manual. The Quality Assurance Manual contains the policies, practices, and procedures that all units are to follow to ensure technical competence and valid forensic examination. The Laboratory Operations Manual is a collection of Laboratory-wide quality assurance practices that outline how to implement portions of the Quality Assurance Manual, as well as generalized Laboratory practices such as the security of evidence storage rooms and the handling of different types of evidence.

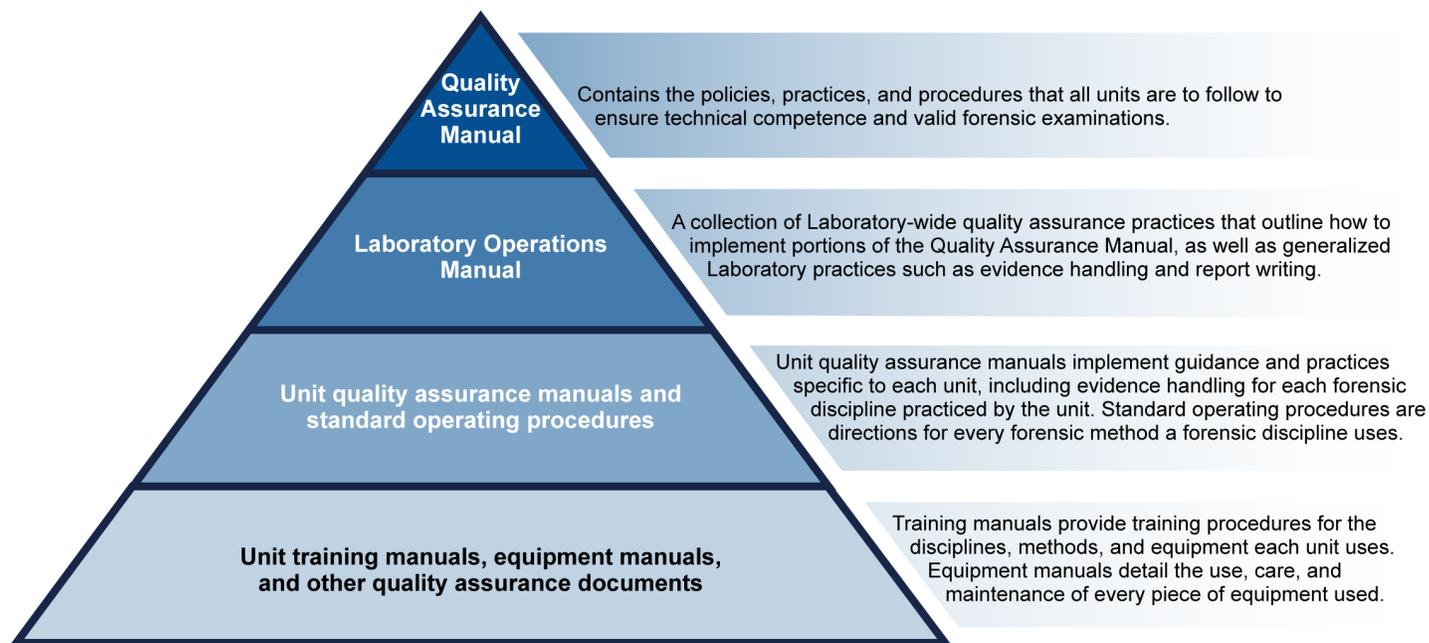
The individual caseworking and quality assurance units of the Laboratory supplement the Laboratory Quality Assurance Manual and Laboratory Operations Manual with their own unit-specific quality assurance manuals. The unit-specific quality assurance manuals include standard operating procedures that apply to a specific unit, but they do not supersede the Laboratory-wide manuals. The Chemistry Unit and Trace Evidence Unit quality assurance manuals provide each unit's mission statement, scope of work, and administrative structure, as well as unit-specific guidance on evidence handling, validation of methods, training, and proficiency testing, among other areas.

In addition to unit-specific quality assurance manuals, every caseworking and quality assurance unit in the Laboratory has a collection of standard operating procedures for each forensic method practiced within the unit. For example, there are standard operating procedures that describe how to analyze opioids in hair and how to conduct forensic hair examinations. The standard operating procedures also cover other aspects of daily work such as report writing procedures and FBI approved standards for scientific testimony and report language, specific to the disciplines practiced by the unit.

Every FBI Laboratory unit also has a collection of unit-specific training manuals and equipment manuals. The training manuals provide the basic training procedures for the forensic disciplines, methods, and pieces of equipment used in each unit. The equipment manuals detail the use, care, and maintenance of every piece of equipment in the Laboratory. Furthermore, all Laboratory quality assurance documents undergo document control procedures to ensure that they are adequate, approved

for use, and that only the current versions are in use.²⁸ Figure 2 shows the relationship of the FBI Laboratory quality assurance policies and procedures.

Figure 2: Relationship of the FBI Laboratory Quality Assurance Policies and Procedures



Source: FBI Laboratory Quality Assurance Manual. | GAO-17-516

²⁸Document control procedures include the preparer writing the document with the level of detail commensurate to the complexity of the activity; a technical reviewer ensuring the accuracy, sufficiency, and clarity of the document; and the unit chief, quality assurance manager, and Laboratory director, as appropriate, reviewing and approving the document for issuance, among other things.

FBI Laboratory Generally Ensures Chemistry and Trace Evidence Units Adhere to Quality Standards, but Could Review More Testimonies

We found that the FBI Laboratory generally ensures the Chemistry and Trace Evidence Units adhere to a variety of quality standards, including conducting audits, implementing corrective actions, ensuring staff have appropriate training, and reviewing laboratory reports. However, the Laboratory's testimony monitoring program is limited by difficulties in acquiring testimony transcripts.

Internal Audits of the Chemistry and Trace Evidence Units Complied with FBI Policies and International Standards; External Audits of These Units Confirmed Compliance with Accreditation Requirements

The FBI Laboratory has mechanisms that are intended to ensure adherence to its quality assurance framework. These mechanisms include internal audits, external audits, internally reported nonconformities, and management reviews and a quality assurance working group.

Internal Audits

The FBI Laboratory's Forensic Analysis Support Unit manages the internal audit program for the entire Laboratory. The internal audit program consists of at least eight annual audits for each caseworking unit in the Laboratory. Currently, the FBI Laboratory requires that every unit complete audits of the following eight areas: case file, evidence security and seal, proficiency tests, training records and continuing education, instrument calibration and maintenance, purchasing services and supplies, document control, and court testimony monitoring. The Laboratory may then conduct additional audits as it sees fit. To conduct internal audits, auditors are to review records, interview personnel, and observe operations and facilities. The auditor is to complete a checklist of requirements that are to be met, and, once the audit is complete, the auditors are to produce an audit report that lists all audit outcomes and any corrective actions. When the unit has resolved all corrective actions from an audit, the audit is closed.

Based on our review of internal audit reports from 2008 to 2015 we found that all of the internal audits of the Chemistry and Trace Evidence Units functioned in accordance with FBI policies and procedures, and international standards. The program identified nonconformities and followed the required corrective action process to correct the nonconformities, and no trends were identified to signal possible problems in a specific discipline or procedure. We noted two instances of issues in record keeping. In one instance, we found that a notation in an internal audit checklist was not noted in the audit report. The problem pertained to equipment calibration documentation and did not have any negative impact on the Laboratory's performance. In the other instance, the Laboratory was unable to provide us a 2013 audit report upon request. To provide the audit report, the Laboratory had to reissue the report with signatures of the current supervisors. We determined that neither of these record keeping issues was detrimental to the audit program or any of the casework conducted by the units.

External Audits

The FBI Laboratory contracts with accreditation bodies to conduct external audits of the FBI Laboratory at least once every 2 to 5 years.²⁹ These audits range from the accreditation of the Laboratory's quality assurance process and overall management systems to an assessment of how Laboratory staff carry out specific methods and follow standard operating procedures.³⁰

As noted above, ASCLD/LAB is the main accreditation organization that the FBI Laboratory utilizes. In addition to the full on-site assessment of the Laboratory every 5 years, ASCLD/LAB also conducts abbreviated reviews of specific Laboratory processes and records annually. According to an ASCLD/LAB representative, ASCLD/LAB provides an audit team made up of a lead assessor, employed by ASCLD/LAB, and subject matter experts from other accredited laboratories for on-site assessments. The subject matter experts represent every forensic discipline in which the Laboratory seeks accreditation. The subject matter experts participate on a voluntary basis and receive training from

²⁹As noted previously, effective with all applications for initial ASCLD/LAB accreditation and renewal of accreditation received on or after July 1, 2014, the length of the accreditation cycle was changed to 4 years. The 4-year accreditation cycle will apply to the FBI Laboratory starting after its next full accreditation assessment in 2018.

³⁰Accreditation serves to demonstrate that a laboratory has a management system, is technically competent, and is able to produce technically valid results based on the accrediting bodies' standards.

ASCLD/LAB.³¹ ASCLD/LAB first accredited the FBI Laboratory in 1998, and then later accredited it to the international program (meeting the ISO/IEC 17025:2005 standard) in 2008. ASCLD/LAB reassessed the FBI Laboratory in 2013 to maintain the accreditation. ASCLD/LAB also conducted surveillance visits of the FBI Laboratory in 2009, 2010, 2011, and 2015; and off-site document reviews in 2012 and 2014. On the basis of our review of ASCLD/LAB documents from 2008 through 2015, the FBI Laboratory generally met accreditation requirements in each instance. The ASCLD/LAB representative stated that the FBI Laboratory will undergo its next full assessment for accreditation in April 2018.

In addition, the American Board of Forensic Toxicology conducts on-site audits of the toxicology subunit, within the FBI Laboratory Chemistry Unit, every 2 years and off-site reviews in the intervening years. The audits examine the toxicology subunit based in part on the Society of Forensic Toxicology/American Academy of Forensic Sciences standards that go beyond ASCLD/LAB standards, and according to an FBI official, are more specific to the subunit's work. The American Board of Forensic Toxicology has accredited the toxicology subunit of the FBI Laboratory since 2007, and the subunit has met accreditation requirements in each instance.

Internally Reported Nonconformities

The FBI Laboratory has a process for staff to internally report any issues that may appear in Laboratory work or the day-to-day administration of the Laboratory. The process allows any employee to report nonconformities that occurred during Laboratory work, improvements to processes that they identify, or mistakes they may have made. According to FBI Laboratory officials, the internal process allows employees the ability to correct and improve Laboratory processes before they are identified through the internal or external audits. Once the issues are reported to management through the internal reporting process, they are assessed through the Laboratory's corrective action process, which is described in more detail below.

Management Reviews and Quality Assurance Working Group

The FBI Laboratory uses management reviews and a quality assurance working group as additional quality assurance mechanisms. The management review is a synthesis by the FBI Laboratory's Forensic Analysis Support Unit of all quality assurance actions taken by the

³¹ASCLD/LAB provides two levels of auditor training; one is to conduct internal audits at the volunteer examiner's own laboratory, and the next level is to conduct audits as part of a team at any other accredited laboratory.

Laboratory over the previous year. It identifies the Laboratory's adherence to international and ASCLD/LAB standards, outcomes of any internal and external audits, the number and nature of external complaints about the Laboratory, recommendations for improvements, and the overall workload of the Laboratory. The review results in an annual report for Laboratory management and ASCLD/LAB. According to the FBI Laboratory, the review keeps upper level management engaged in the detailed aspects of the Laboratory and provides management with insight into trends within the Laboratory's workload.

The quality assurance working group is a group of representatives from every caseworking unit within the Laboratory who meet monthly to discuss ongoing quality assurance issues within the Laboratory. According to the FBI Laboratory, the group examines improvements that can be made to the quality assurance framework and examines case studies of useful quality assurance practices from around the Laboratory. FBI Laboratory officials told us the monthly meetings typically involve ensuring consistency of language across all quality assurance documents and a presentation from one of the unit representatives on handling a recent nonconformity. Officials maintain agendas and meeting minutes for future review by management, quality assurance representatives, or accrediting bodies.

FBI Has Fully Addressed All But One Corrective Action for the Chemistry and Trace Evidence Units from 2008 to 2015

The FBI uses a corrective action process to address nonconformities that have been identified through internal and external audits and through internally reported nonconformities. Regardless of how the nonconformity is identified, the Laboratory uses the same corrective action process. According to FBI Laboratory officials, the quality assurance manager and unit management evaluate the reported nonconformity to determine how to address it. The Laboratory, following ISO/IEC standards, uses different types of corrective actions based on the nonconformity's possible impact on Laboratory casework, as shown in table 1.³²

³²On December 15, 2016, the way the FBI Laboratory classifies corrective actions changed due to changes from ASCLD/LAB and revisions to Laboratory policy manuals. The descriptions shown here were used during the scope of our audit of quality assurance mechanisms (2008 to 2015).

Table 1: Types of Corrective and Preventive Actions to Address and Prevent Nonconformities from 2008 through 2015

Level 1 Corrective Action	An action to eliminate the cause of a situation or condition that directly affects and has a fundamental impact on the quality of the work, the integrity of the evidence, or the quality of the testimony.
Level 2 Corrective Action (Follow-up Action)	An action to eliminate the cause of a situation or condition that may affect the quality of the work product or testimony but does not, to any significant degree, affect the fundamental reliability of the work, the integrity of the evidence, or the quality of the testimony.
Correction	An action to eliminate an identified nonconformity.
Concession	An acknowledgment that a nonconformity has occurred, but the work is deemed acceptable and will not be corrected.
Preventive Action	An action taken prior to any nonconformity occurring that is intended to eliminate the cause of a potential nonconformity or other undesirable potential situation.

Source: FBI Laboratory Operations Manual (revision 7, issued Sept. 8, 2014). | GAO-17-516

Note: On December 15, 2016, the way the FBI Laboratory classifies corrective actions changed due to changes from ASCLD/LAB and revisions to Laboratory policy manuals.

According to FBI Laboratory policy, level 1 corrective actions deal with situations or conditions that directly affect the quality of Laboratory work. For example, a level 1 corrective action in the Trace Evidence Unit may be used to address the possible contamination of evidence. Possible contamination happens when evidence from two different sources is processed in the same room on the same day.³³

According to FBI policies, the first step of addressing a nonconformity is to notify the appropriate technical manager and quality manager, if necessary, of the nonconformity and document the issue in the relevant database or forms. If the nonconformity requires a level 1 or 2 corrective action, the nonconformity is to undergo a root cause analysis to determine why the nonconformity occurred. Then quality assurance personnel or the technical manager are to ensure that the appropriate action steps are taken to correct the nonconformity. Depending on the nature of the nonconformity, the action steps may include the following: notifying the contributor of the evidence of the corrective action, reviewing and correcting any previous findings, issuing amended reports, reassigning casework duties, remedial training, revising standard

³³Although the Laboratory handles all corrective actions through the same process, the impact that a corrective action may have on the Laboratory may vary, even within the same level of action. For example, the Laboratory issued a level 1 corrective action because items from a victim and a suspect were processed in the same room on the same day, possibly leading to cross-contamination. This corrective action affected one case and a few staff members in the Laboratory. Another level 1 corrective action was issued because 16 testimonies were not reviewed by a subject matter expert. According to the FBI, this corrective action affected 15 different cases and 7 staff members.

operating procedures, adopting additional quality control measures, or indefinitely removing an employee from casework. Once the action steps are completed, the appropriate personnel must verify the effectiveness of the corrective action and close the corrective action, as appropriate.

We examined all 57 corrective actions produced by the Laboratory for the Chemistry and Trace Evidence Units from calendar years 2008 to 2015 as a result of external audits, internal audits, and internally reported nonconformities. Our analysis of the corrective actions issued by the Laboratory during this period found that all nonconformities except one have been addressed, reviewed, and verified in accordance with the FBI Laboratory's corrective actions process. In the one case, the FBI Laboratory issued a level 1 corrective action in September 2015 resulting from its ongoing review of cases involving microscopic hair comparison examinations conducted by the FBI Laboratory from the mid-1970s through 1999. In December 2015 and January 2016, the Laboratory convened a root cause panel to begin gathering evidence and mapping possible causes that contributed to examiners making erroneous statements in laboratory reports and testimonies. In February 2017, the FBI posted a request for proposal for a third-party contractor to conduct a full root cause analysis. The FBI Laboratory in its correspondence with ASCLD/LAB noted that until the root cause analysis is completed, the corrective action will remain open.

The internal audits, external audits, and internally reported nonconformities all produced corrective actions. The number and types of corrective actions varied based on the originating mechanism. For example, the internally reported nonconformities resulted in 7 level 1 corrective actions and 14 level 2 corrective actions for these two units. The internal audits produced 1 level 1 corrective action and 25 level 2 corrective actions. In a separate case, demonstrating the effectiveness of the corrective action process, the Laboratory issued a level 2 corrective action concerning the handling of chemical materials, based on an internal audit finding in 2011. The Laboratory then reviewed the effectiveness of the corrective action in 2012, through the normal quality assurance mechanisms, and discovered that the original issue persisted. The Laboratory issued another corrective action through its internally reported process to supersede the previous action and corrected the issue.

Overall, the FBI Laboratory's corrective action process serves to identify areas for improvement and results in changes in operating procedures intended to improve the FBI Laboratory's quality assurance framework.

Chemistry and Trace
Evidence Unit Staff Met
Annual Proficiency Testing
Requirements and Their
Training Files Were
Generally Complete and
Met FBI and Accreditation
Requirements

The FBI Laboratory has developed a training approach to help ensure all caseworking employees are trained and qualified to conduct forensic casework. According to ASCLD/LAB, the training program's requirements are consistent with international and accreditation standards for personnel conducting casework in forensic laboratories.³⁴

Forensic examiners and technicians are the two primary types of employees who conduct casework within the FBI Laboratory.³⁵ In accordance with the FBI Laboratory's Quality Assurance Manual, all FBI examiners and technicians are to complete an initial training program in which they must satisfactorily demonstrate competency in the relevant discipline(s) or category(ies) of testing they will practice prior to assuming independent casework responsibilities.³⁶ To help ensure competency prior to assuming casework responsibilities, the Laboratory's training approach employs unit-specific training. For example, the Chemistry and Trace Evidence Units have each developed unit-specific training programs and manuals to train staff on their specific disciplines and positions. While training and testing requirements are specific to the discipline(s) and role the employee is to perform, every employee must pass competency tests and oral board examinations. In addition, forensic examiners, who provide testimony in court proceedings, must also complete moot court and admissibility hearing exercises, such as a *Daubert* hearing.³⁷ Successful completion of all training requirements is to

³⁴As stated previously, ASCLD/LAB has accredited the FBI Laboratory to ISO/IEC 17025, *General Requirements for the Competence of Testing and Calibration Laboratories* (2005) and *ASCLD/LAB-International Supplemental Requirements for the Accreditation of Forensic Science Testing Laboratories* (2011).

³⁵According to the FBI, a forensic examiner is a person who is qualified by the FBI Laboratory to write laboratory reports and provide testimony to convey the results of those examinations. A technician is a person who is qualified by the FBI Laboratory to work under the direction of an examiner in conducting examinations, such as preparing evidence for examination.

³⁶A category of testing is a specific type of analysis within an accredited forensic science discipline (such as the analysis of controlled substances within the drug chemistry discipline). In the FBI Laboratory, forensic anthropology is also considered a category of testing.

³⁷According to the FBI, moot court and admissibility hearing exercises are to test a trainee's ability to accurately and clearly explain his or her qualifications as an expert and the scientific theories and limitations of the science, discipline, and method(s) the examiner used in the relevant examination. They are also to test a trainee's ability to accurately and clearly explain examination analyses, including the resulting opinions or interpretations, in lay terms in a courtroom setting. For these exercises, an admissibility hearing, such as a *Daubert* hearing, is a hearing before the judge to resolve issues regarding the validity and admissibility of expert testimony.

be documented in a “qualification and authorization” memorandum prepared by the unit chief or designee. Table 2 provides additional information on the initial training and qualification requirements for examiners and technicians in the Chemistry and Trace Evidence Units.

Table 2: FBI Laboratory Initial Training Program Requirements for Examiners and Technicians in the Chemistry and Trace Evidence Units

Requirement	Description
Competency tests	<p>For examiners, a competency test is to include, at a minimum: (1) examination of sufficient unknown samples to cover the anticipated spectrum of assigned duties and evaluate the individual’s ability to perform proper testing methods; (2) a written laboratory report to demonstrate his/her ability to properly convey results and/or conclusions and their significance; and (3) a written or oral examination to assess his/her knowledge of the discipline, category of testing, or task being performed.</p> <p>For technicians, a competency test includes successfully completing a mock case and/or multiple practice samples. In the Chemistry Unit, each subunit defines the number of competency tests that must be completed.</p>
Oral board examinations	<p>Examiners must complete the appropriate number of oral board exercises (determined by the unit) that cover the examiner’s expertise in each discipline(s) and categor(y/ies) of testing practiced.</p> <p>Technicians must complete one oral board exercise on their duties.</p>
Moot court and admissibility hearing exercises (examiners only)	<p>Examiners must successfully complete a minimum of three moot court exercises, including one admissibility hearing exercise.^a Moot court and admissibility hearing exercises are to test a trainee’s ability to accurately and clearly explain his/her qualifications as an expert and the scientific theories and limitations of the science, discipline, and method the examiner used in the relevant examination. The exercises also are to test a trainee’s ability to accurately and clearly explain examination analyses, including the resulting opinions or interpretations, in lay terms in a courtroom setting.</p>

Sources: FBI Quality Assurance Manual (issued Sept. 9, 2015); FBI Laboratory Operations Manual Practices for Oral Board Exercises and Practices for Moot Court and Admissibility Hearing Exercises (both issued Sept. 8, 2014); Chemistry Unit Training Manual subunit modules (issued 2013 to 2015); and Trace Evidence Unit Physical Scientist Training Manual (issued Jan. 27, 2014). | GAO-17-516.

Note: Training requirements listed are as of July 2016. Training requirements have changed over time and not all listed initial training requirements applied to the 47 caseworking individuals we reviewed. Also, FBI policies allow for the modification of training requirements based on the trainee’s previous qualifications, such as prior training.

^aFor these exercises, an admissibility hearing, such as a *Daubert* hearing, is a hearing before the judge to resolve issues regarding the validity and admissibility of expert testimony.

After completing the initial training program, caseworking employees must complete continued education and proficiency test requirements each year. For example, Chemistry and Trace Evidence Unit employees must complete a minimum of 15 hours of continued education related to job requirements or job performance each year. Chemistry Unit policy states that the continued education should focus on maintaining technical skills and expertise. In addition, each examiner and technician must complete an annual proficiency test in each category of testing that he or she

performs.³⁸ According to accreditation and FBI requirements, the Laboratory must use proficiency tests developed by an external test provider where available. On the basis of ASCLD/LAB assessments, all FBI Laboratory staff conducting casework or providing testimony in disciplines in which the Chemistry and Trace Evidence Units are accredited had successfully met annual proficiency testing requirements in their respective discipline(s) from 2011 to 2015 as required by accreditation standards.³⁹

Additionally, we observed that for the forensic anthropology discipline, wherein ASCLD/LAB does not provide accreditation, the two Trace Evidence Unit examiners who conducted casework in forensic anthropology completed annual proficiency testing in forensic anthropology from 2011 to 2015.⁴⁰ Furthermore, the FBI Laboratory requires that all staff conducting casework in forensic anthropology obtain certification by the American Board of Forensic Anthropology.⁴¹ According to the Board, these two examiners were board-certified in 2012 and 2013, respectively, and have maintained certification.⁴²

The combination of training, continued education, and annual proficiency testing are intended to help provide reasonable assurance that the FBI

³⁸*FBI Laboratory Operations Manual Practices for Open Proficiency Testing* (issued Sept. 8, 2014).

³⁹Based on our analysis of ASCLD/LAB accreditation documentation and interviews with ASCLD/LAB officials, we determined the ASCLD/LAB assessment to provide reasonable assurance that caseworking staff met required annual accreditation proficiency test standards in effect during the scope of our review (2011 to 2015). See *ASCLD/LAB-International 2011 Supplementary Requirements for the Accreditation of Forensic Science Testing Laboratories*.

⁴⁰As noted previously, ASCLD/LAB does not provide accreditation in forensic anthropology; however, FBI policy requires all caseworking employees to complete at least one proficiency test per calendar year in his/her category of testing. Forensic anthropology is considered a category of testing in the FBI Laboratory.

⁴¹The American Board of Forensic Anthropology was incorporated in 1977 as a non-profit organization to provide a program of certification in forensic anthropology. The FBI Laboratory established the forensic anthropology training program in March 2006. According to a senior FBI Laboratory official, the Laboratory required board certification because forensic anthropology was a relatively new discipline for the FBI Laboratory, and it previously had little expertise in the area.

⁴²Eligible applicants for American Board of Forensic Anthropology certification must have completed at least 3 years of professional experience in forensic anthropology after being awarded a doctoral degree or its equivalent.

Laboratory's caseworking staff are appropriately trained and qualified. We reviewed the initial training records for the 47 employees who conducted casework in the Chemistry and Trace Evidence Units or provided court testimony related to chemical or trace evidence from fiscal year 2011 to July 2016 and found that the records were generally complete and met FBI requirements.⁴³

FBI Laboratory Has Processes to Review Laboratory Reports and Testimony, but Could Review More Examiner Testimonies

The FBI Laboratory implemented a monitoring program to help ensure that the results of its forensic examinations and any related examiner testimony are presented consistently with what is known about each forensic method. However, the testimony monitoring program is limited by difficulties in acquiring testimony transcripts.

Laboratory reports documenting the results of forensic examinations and related testimony are to adhere to FBI quality assurance policies and the FBI Approved Standards for Scientific Testimony and Report Language.⁴⁴ Each laboratory report is to be reviewed by a FBI Laboratory employee with expertise in the reported discipline to ensure that (a) appropriate examinations were performed, (b) identifications or associations were confirmed and recorded, (c) conclusions were supported in the examination's records, and (d) conclusions are within the limitations of the discipline or category of testing. In addition, each report is to undergo an administrative review by a unit supervisor (or qualified designee) to ensure correct format and compliance to FBI Laboratory policies,

⁴³Of the 47 individuals, we found that training records were complete according to FBI training and training record requirements at the time of training for 42 individuals and partially complete for 5 individuals. We determined that the missing information for the 5 individuals was relatively minor (such as 1 out of 10 required practice laboratory reports was missing). In all cases, the FBI Laboratory provided other documentation, such as a "qualification and authorization" memorandum signed by the unit chief, to provide reasonable assurance that these employees had met the training requirements that were in place at the time they were trained.

⁴⁴FBI, *FBI Approved Standards for Scientific Testimony and Report Language* for Chemistry Unit and Trace Evidence Unit forensic disciplines (Washington, D.C.: May 2014 to Nov. 2015). See the side bar below for additional information about the standards. The FBI Laboratory began developing and implementing these standards in 2014. In late 2015 and 2016, the Laboratory began training Chemistry and Trace Evidence Unit examiners on the testimony and report standards and supporting memoranda developed by the FBI Laboratory and FBI Office of General Counsel. As of March 2017, all Chemistry Unit and Trace Evidence Unit examiners had completed training on the standards for their respective disciplines. In December 2016, the Laboratory required that oral board exercises for examiner trainees cover the appropriate limitations of the science and the relevant testimony and report standards for each discipline(s) or category(y/ies), as required by the trainee's training program.

FBI Approved Standards for Scientific Testimony and Report Language

These standards document examples of the statements the FBI Laboratory has determined to be scientifically-supported and approved for its examiners to use when reporting examination conclusions and expert opinion in laboratory reports and court testimony for certain methods.

For example, according to the standards, FBI fiber examiners may state or imply that a textile fiber is natural or manufactured (man-made) and its type (e.g., cotton, wool, polyester). However, the examiner may not state or imply that a fiber came from a particular source to the exclusion of all others. The examiner also may not state or imply a statistical weight or probability to a conclusion or provide a likelihood that the questioned fiber originated from a particular source. The FBI Laboratory began developing and implementing these standards in 2014.

Source: FBI Approved Standards for Scientific Testimony and Report Language and FBI information. | GAO-17-516

practices, and unit procedures. Our review of the 166 laboratory reports produced by the Chemistry and Trace Evidence Units and used as the basis of testimonies from fiscal years 2011 through 2015 found that all had been technically and administratively reviewed in accordance with FBI requirements.

The court testimony monitoring program, in contrast, includes both internal and external reviews. Specifically, the court testimony monitoring program's two key monitoring and oversight components include the following: (1) obtaining and reviewing transcripts of examiner testimonies to determine their compliance with FBI standards, referred to as internal evaluations;⁴⁵ and (2) obtaining feedback on the quality of examiners' testimonies directly from court officials, referred to as external evaluations.⁴⁶ The FBI's internal evaluation required that the reviewer—an appropriate manager and, when necessary, with assistance from a subject matter expert in the same area as the individual testifying—assess the examiner's testimony against seven technical criteria.⁴⁷ These include whether the examiner (1) testified accurately; (2) testified within the scope of his or her expertise; and (3) declined to answer questions beyond his or her expertise or beyond scientific limitations for the

⁴⁵For purposes of this report, we use the term transcript to account for all four acceptable forms of observation for informing internal evaluations. These include a review of a transcript, audio recording, video recording, or direct observation of the examiner's testimony.

⁴⁶In accordance with ASCLD/LAB standards, the FBI Laboratory Operations Manual Practices for Court Testimony Monitoring requires that the testimony of all testifying personnel be monitored and evaluated at least once each calendar year. Acceptable forms of evaluation include a review of a transcript, audio or video recording, direct observation of the examiner's testimony, or feedback on the examiner's testimony from a court official, such as a prosecutor or defense attorney.

⁴⁷*FBI Laboratory Operations Manual Practices for Court Testimony Monitoring* (issued Sept. 8, 2014, revision 8). This version was in effect at the time of our review. In December 2016, the FBI Laboratory clarified the policy to state that, if the testifying individual's manager is not a subject matter expert, then a subject matter expert in the same category of testing as the individual testifying is to conduct the internal evaluation. For more information about the FBI Laboratory's court testimony monitoring procedures, see appendix I.

discipline, among other things.⁴⁸ External evaluations, on the other hand, rely on the feedback of court officials who are not scientific or technical experts and who are asked to evaluate factors such as an examiner's appearance, demeanor, promptness, ability to maintain composure as an expert witness, and ability to communicate results. See appendix I for further details about the FBI Laboratory's practices for internal and external evaluation of testimony.

From fiscal years 2011 through 2015, a total of 22 forensic examiners in the FBI Laboratory's Chemistry and Trace Evidence Units produced a total of 164 testimonies. However, the FBI Laboratory did not acquire transcripts and conduct internal evaluations for nearly half of these testimonies (78 of 164).⁴⁹ As such, the 78 testimonies were not reviewed by a subject matter expert or against technical discipline-specific criteria, as provided for by internal evaluations.

The FBI obtained transcripts for 86 of the 164 testimonies and conducted an internal evaluation of the 86 transcripts. Additionally, of the 164 testimonies, the FBI obtained an external evaluation of the examiner's performance for 99 testimonies.⁵⁰ All of the internal evaluations of examiner testimonies that we reviewed received satisfactory

⁴⁸The seven internal evaluation criteria include assessing whether the examiner (1) testified accurately; (2) testified within the scope of his or her expertise; (3) declined to answer questions beyond his or her expertise or beyond scientific limitations for the discipline; (4) completely disclosed his/her involvement in the case; (5) was clear, straightforward, and objective in his/her answers on direct and cross-examination; (6) limited his/her conclusions to those that logically followed from the underlying data and analytical results; and (7) maintained the appropriate demeanor/composure while testifying. In addition, as of December 2016, the internal evaluation is to assess the examiner's statements against the FBI Approved Standards for Scientific Testimony and Report Language, which, as stated earlier, outline what FBI examiners may and may not state in court based on the known scientific limitations of the given discipline. See the side bar on the previous page for an example.

⁴⁹For these 78 testimonies, the FBI obtained an external evaluation of the examiner's performance for 37.

⁵⁰Of the 164 testimonies, 62 received both an internal and external evaluation.

assessments from an FBI manager.⁵¹ Also, in conformance with accreditation and FBI requirements and on the basis of our review of ASCLD/LAB reports, the FBI Laboratory met the accreditation requirement for testimony monitoring during this period.⁵²

While the FBI Laboratory's testimony monitoring program meets current accreditation requirements, it could be improved by enhancing its testimony acquisition approach to allow it to conduct additional internal evaluations. Subjecting testimonies to an internal evaluation provides the strongest basis for understanding the extent to which examiners are adhering to FBI technical and reporting standards while also ensuring that examiner testimony is factually accurate. Furthermore, in March 2017, the merged accrediting body issued updated testimony monitoring requirements requiring that examiner testimony in each discipline be reviewed by an individual that has been competency tested in the task(s) that the review is encompassing.⁵³ To meet the revised requirement, the FBI Laboratory will need to conduct an internal evaluation of examiner testimony. In other words, external evaluations by court officials, alone, will no longer satisfy the requirement for accreditation.

⁵¹The majority of comments provided by FBI reviewers were generally neutral or positive in nature, but some reviewers suggested changes to the language used by the examiner. For example, in four of the evaluations, reviewers noted that the examiner under review should refrain from making certain statements. For example, one reviewer cited that an examiner should refrain from saying that he would not expect to see two individuals with the same hair characteristics. In another case, the reviewer stated that certain examiner statements were acceptable prior to the issuance of the FBI Approved Standards for Scientific Testimony and Report Language and recommended that the examiner avoid using them in the future.

⁵²ASCLD/LAB-*International Supplemental Requirements for the Accreditation of Forensic Science Testing Laboratories* (2011). ASCLD/LAB requirement 5.9.6 states that laboratories must monitor the testimony of all testifying personnel on an annual basis. In accordance with ASCLD/LAB standards, the FBI Laboratory Operations Manual Practices for Court Testimony Monitoring requires that the testimony of all testifying personnel be monitored and evaluated at least once each calendar year. Acceptable forms of evaluation include a review of a transcript, audio or video recording, direct observation of the examiner's testimony, or feedback on the examiner's testimony from a court official.

⁵³As previously stated, in April 2016, ASCLD/LAB announced a merger with ANSI-ASQ National Accreditation Board (ANAB), another major accreditation organization. However, ASCLD/LAB customers will continue to be accredited under the ASCLD/LAB brand and symbol. In March 2017, ANAB published updated accreditation requirements, which became effective June 1, 2017, and all currently accredited ASCLD/LAB-*International* forensic service providers, including the FBI Laboratory, will be required to be in conformance with the new requirements by December 31, 2018.

In explaining why the 78 testimony transcripts were not acquired, FBI Laboratory officials told us that because they could not compel courts to provide them with responses or transcripts, they have no way of knowing exactly why courts or court reporters did not provide specific transcripts. Anecdotally, they provided us with the following challenges and limitations they often encounter in their efforts to obtain transcripts:

- There is no clear point of contact, or there is lack of responsiveness from points of contact, such as prosecutors or court reporters;
- There is a lack of uniform computer and business systems across the separate federal, state and local courts in which they testify;
- Some courts store their transcripts manually and lack electronic databases, making it difficult to locate and acquire transcripts;
- In some cases, transcripts may not be accessible because they have been sealed or may not have been generated.⁵⁴

While FBI cannot compel courts to provide transcripts in all instances, there are opportunities for the FBI to improve its ability to obtain more transcripts. To better understand the factors cited by the FBI Laboratory, we sought to obtain the remaining 78 transcripts directly from the courts. During this effort, we obtained 36 of the 78 transcripts (46 percent) that the FBI Laboratory did not obtain. Of the 36, we obtained:

- 16 transcripts by searching the Public Access to Court Electronic Records (PACER), an electronic public access service that allows users to obtain case information from federal appellate, district, and bankruptcy courts. This did not require personal contact with any court officials involved with the case;
- 9 transcripts by directly contacting and coordinating with the court or court reporter; and
- 11 transcripts through third-party transcription services or by directly visiting the court.

We were unable to obtain the remaining 42 of 78 transcripts for various reasons. In several cases, the information provided by the FBI was incomplete or additional information would be needed to locate the case and associated transcript. However, while attempting to obtain the

⁵⁴Courts seal cases to, for example, protect the identity of someone cooperating with the prosecution or to protect the identity of a juvenile defendant, among other reasons.

outstanding transcripts, we also confirmed some of the reasons the FBI identified for not acquiring transcripts. For example, after identifying the court reporter, sometimes the reporter did not respond to our request(s) or provide us with the documentation necessary to request the transcript. Further, some testimonies could not be released because the cases were sealed. Lastly, some testimonies were not transcribed at the time of our review.⁵⁵

To develop better controls in its testimony monitoring program activities, in May 2013, the FBI Laboratory implemented a Testimony Tracker System (Tracker) to capture and monitor information on internal and external evaluation of examiner testimony and to help ensure that transcripts are requested, obtained, and reviewed. As of May 2013, FBI policy requires that appropriate data regarding the monitoring and evaluation of examiner testimonies—including when a testimony occurred, whether a transcript was requested, whether follow-up occurred, and when a transcript was received and reviewed, among other things—be recorded in the Tracker system.⁵⁶ In addition, in December 2016, the FBI updated its policy to require that a unit chief or designee check the Testimony Tracker System monthly to ensure testifying individuals are entering required information.⁵⁷ However, we found that the Tracker is not currently set up to routinely capture certain additional information that could help examiners conduct more effective follow up. For example, the Tracker does not capture the specific reason that a transcript has not been acquired. If a court reporter indicates to an examiner that a transcript will not be available for 1 year, being able to note the reason and the availability date or timeframe in the Tracker would better enable the examiner to follow up at the specified time. Or, if a specific transcript will not be available until after the case is completed, configuring the Tracker or revising the testimony monitoring policy to require examiners to record this information would better enable them to follow up on the transcript at a future date. Other information that could be

⁵⁵In some cases, transcripts may become available for acquisition at a later date.

⁵⁶*FBI Laboratory Operations Manual Practices for Court Testimony Monitoring*, section 4.10, Testimony Tracker Sharepoint Site (issued May 8, 2013, revision 7). Data in the FBI's Testimony Tracker System only covers 67 of the 164 testimonies we reviewed from fiscal years 2011 through 2015 because the Tracker was implemented in May 2013. Based on our review of the Tracker data, the examiners recorded they had requested and followed up on nearly all of the 67 testimonies as required.

⁵⁷*FBI Laboratory Operations Manual Practices for Court Testimony Monitoring* (issued Dec. 15, 2016, revision 9).

helpful in obtaining a transcript includes the court's jurisdiction, address, and a point of contact for the transcript. FBI officials confirmed that the Tracker is not currently configured to routinely record this type of information but did acknowledge that some information would be useful. A senior FBI Laboratory official also stated that recording more information, such as point of contact information, could help the FBI obtain more transcripts.

Obtaining transcripts and subjecting them to an internal evaluation is a key control in FBI's efforts to ensure the quality of examiner testimonies. To facilitate this, each time an examiner testifies, FBI policy requires the examiner to request a transcript of the testimony from the respective court official so that it may be reviewed by an appropriate FBI manager or other subject matter expert. Further, *Standards for Internal Control in the Federal Government* calls for, among other things, controls to be designed to assure that ongoing monitoring occurs.⁵⁸ The standards also state that relevant, reliable, and timely information is needed throughout an agency to control operations, achieve its objectives, and carry out its oversight responsibilities. Consistent with internal control standards, the FBI Laboratory could better ensure that it obtains more transcripts by routinely capturing and using additional information and data that are critical to their acquisition, such as the reason a transcript is unavailable, when it is expected to be available, the court jurisdiction, and a point of contact for the transcript. Increasing the number of transcripts acquired could help the FBI Laboratory expand its monitoring of examiners' testimonies, which helps ensure that they are accurate, supported by the underlying analyses, and within the scientific limits of the given forensic discipline, as defined by FBI and accreditation standards.

Conclusions

The FBI Laboratory's forensic work is used to support law enforcement across all levels of government. Forensic evidence can help solve crimes and influence whether a criminal defendant is acquitted, convicted, or even charged. Ensuring that forensic examiners produce scientifically valid and reliable examinations, laboratory reports, and testimonies for such cases is a stated goal of the FBI Laboratory quality system. The FBI Laboratory has a quality assurance framework that meets international

⁵⁸GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: November 1999). GAO has revised and reissued *Standards for Internal Control in the Federal Government*, with the new revision effective as of October 1, 2016. See [GAO-14-704G](#) (Washington, D.C.: September 2014).

and accreditation standards, including those for monitoring examiner testimonies. For example, the FBI Laboratory has established standards for scientific testimony and report language, employs training to help ensure its examiners adhere to the standards, and uses laboratory report and testimony review processes to help ensure examiners adhere to the standards. We found that the FBI Laboratory generally ensures that the Chemistry and Trace Evidence Units adhere to a variety of quality standards, including conducting audits, implementing corrective actions, ensuring staff have appropriate training, and reviewing laboratory reports.

The Laboratory's internal evaluation of examiner testimony provides the strongest basis for understanding the extent to which examiners are adhering to FBI technical and reporting standards while also ensuring that examiner testimony is factually accurate. We found, however, that the FBI Laboratory could obtain more transcripts by enhancing the current procedure for acquiring testimony transcripts. Specifically, the Laboratory could ensure that it captures and uses information that facilitates the retrieval of a transcript, such as the reason the transcript may not be available and its court jurisdiction. Routinely capturing additional information could help the FBI Laboratory successfully obtain more transcripts to review, which can help better ensure that its examiners are providing testimony in court that is accurate, supported by the underlying analyses, and within the scientific limits of the given forensic discipline, as defined by FBI and accreditation standards.

Recommendation for Executive Action

To better ensure that the FBI Laboratory obtains additional transcripts, the FBI Director should require that the FBI Laboratory's procedure for tracking and obtaining transcripts routinely captures and uses additional information and data critical to transcript acquisition, such as the reason a transcript is unavailable, when it is expected to be available, the court jurisdiction, and a point of contact for the transcript.

Agency Comments

We provided a draft of this report to the Departments of Justice and Commerce. In response, the FBI provided written comments, which are reproduced in full in appendix II. FBI concurred with the recommendation, and described actions planned to address it. Specifically, FBI concurred

with GAO that the use of additional information and data is helpful in obtaining testimony transcripts. As such, the FBI Laboratory plans to modify its Testimony Tracker System accordingly to add additional information and available data for transcript acquisitions. The Department of Commerce did not provide written comments on our draft report. The FBI and the Department of Commerce also provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the Attorney General and the Secretary of Commerce and appropriate congressional committees, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions, please contact Diana Maurer at (202) 512-8777 or maurerd@gao.gov. Contact points for our Offices of Congressional Relations Public Affairs may be found on the last page of this report. GAO staff that made significant contributions to this report are listed in appendix III.



Diana C. Maurer
Director, Homeland Security and Justice Issues

Appendix I: FBI Laboratory Practices for Internal and External Evaluations of Court Testimony

Listed below are the key steps involved in each of the internal and external evaluations of examiner testimonies delivered during court proceedings.¹

Internal Evaluations

1. Each time the examiner testifies he or she is responsible for requesting a transcript of the testimony from the court reporter(s), prosecutor, or other appropriate individual so it may be reviewed by an appropriate FBI manager or other subject matter expert.
2. If a copy of the transcript is not received after the initial request, the examiner is required to follow-up at least twice within 6 months of his or her testimony.
3. If a transcript is received, within 45 days of receipt, an appropriate FBI manager is required to review it and assess whether the examiner's statements comply with the seven criteria in the Internal Evaluation of Testimony (7-256).
4. If the manager is not a subject matter expert, then a subject matter expert is to assist the manager in the evaluation.²
5. After the review is complete, the manager and subject matter expert, if appropriate, who completed the Internal Evaluation of Testimony (7-256) is/are to review the completed evaluation with the examiner within 45 days of receiving the transcript, and all parties are to document this review in the form.

External Evaluation

1. After each testimony, examiners are required to provide court officials, such as a prosecutor or defense attorney, with an External Evaluation of Testimony (7-257) to provide feedback on the examiner's testimony.
2. The manager and subject matter expert, if appropriate, who received the External Evaluation of Testimony (7-257) is/are to review the completed evaluation with the examiner within 45 days of receipt, and all parties are to document this review in the form.

¹*FBI Laboratory Operations Manual Practices for Court Testimony Monitoring* (issued Sept. 8, 2014, revision 8). This version was the current version at the time of our review.

²In December 2016, the FBI Laboratory clarified the policy to state that, if the testifying individual's manager is not a subject matter expert, a subject matter expert in the same category of testing as the individual testifying is to conduct the internal evaluation.

Appendix II: Comments from the Federal Bureau of Investigation



U. S. Department of Justice
Federal Bureau of Investigation

Washington, D. C. 20535-0001

June 9, 2017

Diana Maurer
Director, Homeland Security and Justice Issues
Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Maurer:

Thank you for the opportunity to review and comment on the GAO's draft report entitled **FBI Laboratory: Chemistry and Trace Evidence Units Generally Adhere to Quality Standards, but Could Review More Examiners Testimony**. The FBI concurs with Recommendation Number 1. Please find our response to that Recommendation below.

Recommendation Number 1: To better ensure that the FBI Laboratory obtains additional transcripts, the FBI Director should require that the FBI Laboratory's procedure for tracking and obtaining transcripts routinely captures and uses additional information and data critical to transcript acquisition, such as the reason the transcript is unavailable, when it is expected to be available, the court jurisdiction and the point of contact for the transcript.

FBI Response: The FBI concurs with the GAO that the use of additional information and data is helpful in obtaining testimony transcripts. As such, the FBI Laboratory's Testimony Tracker will be modified accordingly to add additional information and available data for transcript acquisitions.

Sincerely,

A handwritten signature in black ink that reads "Christopher Todd Doss".

Christopher Todd Doss
Assistant Director
FBI Laboratory Division

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Diana C. Maurer, (202) 512-8777 or MaurerD@gao.gov

Staff Acknowledgments

In addition to the contact named above, Joseph P. Cruz (Assistant Director), Hazel Bailey, Amy Bowser, Jennifer Bryant, Clifton Douglas, Michele Fejfar, April Gamble, Susan Hsu, Kyle Maksuta, Claire Peachey, Lerone Reid, Sushil Sharma, Jack Sheehan, and Helina Wong made key contributions to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's website (<http://www.gao.gov>). Each weekday afternoon, GAO posts on its website newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to <http://www.gao.gov> and select "E-mail Updates."

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's website, <http://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

Connect with GAO

Connect with GAO on [Facebook](#), [Flickr](#), [LinkedIn](#), [Twitter](#), and [YouTube](#). Subscribe to our [RSS Feeds](#) or [E-mail Updates](#). Listen to our [Podcasts](#). Visit GAO on the web at www.gao.gov and read [The Watchblog](#).

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Website: <http://www.gao.gov/fraudnet/fraudnet.htm>

E-mail: fraudnet@gao.gov

Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Katherine Siggerud, Managing Director, siggerudk@gao.gov, (202) 512-4400, U.S. Government Accountability Office, 441 G Street NW, Room 7125, Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800, U.S. Government Accountability Office, 441 G Street NW, Room 7149, Washington, DC 20548

Strategic Planning and External Liaison

James-Christian Blockwood, Managing Director, spel@gao.gov, (202) 512-4707, U.S. Government Accountability Office, 441 G Street NW, Room 7814, Washington, DC 20548



Please Print on Recycled Paper.