DISTRICT OF COLUMBIA
DEPARTMENT OF FORENSIC SCIENCES

FORENSIC SCIENCE LABORATORY

QUALITY ASSURANCE MANUAL
(ISO/IEC 17025:2005 STANDARDS)

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INTRODUCTION

Quality performance, conforming to recognized standards of good laboratory practice, is the most important goal of the Forensic Science Laboratory (FSL) within the D.C. Department of Forensic Sciences (DFS). Just as new and improved methods of forensic analysis are developed to meet the expanding needs of the criminal justice system, it is essential for laboratory quality standards to progress in parallel. The FSL is committed to diligently implementing policy and procedure changes to ensure quality in all facets of laboratory operations.

The FSL quality system, represented by the DFS Departmental Operations Manual (DOM), departmental policies, the Quality Assurance Manual (QAM) and the Laboratory Operations Manual (LOM), provides a mechanism for identifying and implementing the practices that support excellent performance. All units within the FSL are responsible for the incorporation of quality practices and procedures consistent with the requirements of the quality system into daily unit functions.

All FSL employees share in the responsibility for adherence to the established quality measures as well as the overall success of the quality program.

The continued development and improvement of the FSL quality system serves to increase confidence in the resulting work product while strengthening the professional integrity of the FSL and its employees. Through the use of recognized quality practices and procedures, the FSL will continue to produce high quality work and meet the challenges of future laboratory accreditations.

SCOPE

The purpose of the FSL's quality management system is to ensure quality forensic services are provided to the District of Columbia's Criminal Justice System. This quality assurance manual contains or references the policies, practices and procedures of the FSL quality system that ensure technical competence and valid forensic examination results. The Quality Assurance Manual (QAM), the DFS Departmental Operations Manual, and the Laboratory Operations Manual (LOM) facilitate achieving this goal and meeting the ISO/IEC 17025:2005 Accreditation requirements.

Accreditation requirements are based on the International Organization for Standardization/International Electrotechnical Commission International Standard 17025 General Requirements for the Competence of Calibration and Testing Laboratories (ISO/IEC 17025:2005) and any supplemental requirements of the agency's accrediting body. The combined requirements of ISO/IEC 17025:2005 and any Supplemental Requirements are hereafter referred to as ISO/IEC 17025:2005. The QAM, DOM and LOM also facilitate internal and external audits of the quality system to evaluate the FSL's conformance with ISO/IEC 17025:2005 standards.

GOALS AND OBJECTIVES

It is the objective of the FSL to provide meaningful, timely and effective forensic analysis and interpretation of evidentiary materials when requested by the District of Columbia's Criminal Justice System. In order to meet this objective, the following specific goals have been established:

1. An ongoing dialogue with the law enforcement and legal communities regarding services provided by the FSL. This includes maintaining open lines of communication on active casework as well as the transmittal of policies, procedures and new forensic technology which impact evidence processing and analysis.

2. A case prioritization system which takes into account the needs of the District of Columbia's Criminal Justice System. It is the intent of the FSL to meet court and investigative time frames regarding the processing of evidentiary items. The analysis of specific items will be given priority when needed to answer particular legal or investigative issues.

3. The management and staff commit to providing a work product which is unbiased, scientifically objective and responsive to the needs of the District of Columbia's Criminal Justice System. To this end, each staff member will undergo training and demonstrate competency specific to any analysis before engaging in casework. It is incumbent upon each staff member to maintain currency in the specific forensic disciplines within which s/he is working. Each case will undergo a review process before a report is issued. Proficiency will be demonstrated on an ongoing basis by all analysts through a series of proficiency tests.

4. All personnel work to maintain an integrated approach to the evaluation of case material. To this end, a cooperative spirit and working environment will be maintained between each discipline and unit of the laboratory. The laboratory management will seek to provide a harmonious working environment where a healthy exchange of forensic information is shared amongst all staff members. Frequent staff meetings and technical exchange of information will be encouraged. Each staff member will cooperate in maintaining a safe and secure work environment for themselves and others.

QUALITY TERMINOLOGY

Accountability: The quality of subordinate workers by which they are responsible for their own work and answerable to a superior.

Acquisition: The input of images into a forensic computer imaging system.

Accreditation: A process by which an authoritative body gives formal recognition that an entity is competent to carry out specific tasks.

ACE-V (Analysis, Comparison, Evaluation, and Verification): a scientific method in the comparison and identification of friction ridge impressions.

Adequate: The principle of being sufficient for a specific requirement.

Administrative documentation: All case related documents that are not technical examination documentation, such as the *Case Activities Log* documenting case related conversations, test item (evidence) chain-of-custody receipts, submission paperwork / incident reports, the *Schedule of Analysis* documenting service request documentation, correspondence received/sent, the *Administrative Review Checklist* and other pertinent information.

Administrative error: A clerical error, such as a typographical error, that may occur in an examination report or in the preparation of a proficiency test.

Administrative personnel: Staff who provide administrative/clerical support.

Administrative review: A procedure used to check case file documentation and case reports for consistency with laboratory policy and for editorial correctness.

Administrative reviewer: The Unit Manager, designated Technical Leader or qualified designee who conducts an administrative review.

AFIS: The acronym for Automated Fingerprint Identification System, a generic term for a fingerprint matching, storage, and retrieval system.

Analysis (Latent Fingerprint Unit): The first step of the ACE-V methodology for fingerprint examinations. The assessment of a friction ridge impression to determine suitability for comparison.

Analyst: An employee or contract employee who conducts and/or directs the analysis of forensic casework samples. Some analysts also interpret data and reach conclusions. Used interchangeably with the term “examiner”.

Analytical/Interpretative error: An error in the examination process that produces an incorrect result or conclusion.

ANSI-ASQ National Accreditation Board (ANAB): The signatory of the International Accreditation Forum (IAF) multilateral recognition arrangements for quality management systems and environmental management systems; One of two brands of the ANSI-ASQ National Accreditation Board, a non-profit, non-governmental organization that provides accreditation services to public- and private-sector organizations and is jointly owned by the American National Standards Institute (ANSI) and the American Society for Quality (ASQ). ANAB provides ISO/IEC 17025 accreditation for forensic testing laboratories.

Approved Test Provider: A proficiency test provider that has complied with the test manufacturing guidelines established by an accrediting body's Proficiency Review Committees.

Assessment: A review conducted to compare the various aspects of the laboratory's quality system with criteria for that performance. Also referred to as an audit.

Assessor: A person who conducts assessments.

Audit: A review conducted to compare the various aspects of the laboratory's quality system with criteria for that performance. Also referred to as an assessment.

Auditor: A person who conducts audits.

Authority: The power to influence, or command thought, opinion and behavior.

Best Evidence: A forensic copy (image) of the original evidence that is stored, documented and treated as evidence.

Best laboratory practice: Operating practices and procedures for promoting quality and ensuring the integrity of the work product.

Blind sample: A proficiency test sample for which the analyst is unaware of the test nature of the sample at the time of analysis.

Calibration: The adjusting or standardizing of any instrument and/or equipment to ensure agreement with a reference standard or working standard of known value.

Case Documentation: All administrative and technical examination documentation for a given case.

Case File: Files containing administrative and technical examination documentation generated or received by a laboratory pertaining to a particular case.

Case Identification Number: A unique alphanumeric identifier that is assigned to an FSL case submission.

Casework: Laboratory activities concerning the examination of evidence and/or crime scenes.

Certified reference material: Reference material accompanied by a certificate, whose property values are certified by a procedure, which establishes its traceability to an accurate realization of the units in which the property values are expressed and for which each certified value is accompanied by an uncertainty at a stated level of confidence.

Chain-of-custody log: A form, or electronic equivalent, used to document all transfers of evidence.

Characteristics: Distinctive details of the friction ridges, including Level 1, 2, and 3 details.

Clarity: Visual quality of a friction ridge impression.

Cold Hit: A case-to-case or case-to-person linkage which was discovered in a forensic computer database without any prior knowledge of the cases being linked or of the individual being associated with the case.

Comparison (Firearms Examination Unit): The examination of two or more items, such as cartridges cases or bullets, to determine whether or not there are any similarities or dissimilarities.

Comparison (Forensic Biology Unit): The evaluation of two or more DNA profiles to determine whether or not there are any similarities or dissimilarities.

Comparison (Latent Fingerprint Unit): The second step of the ACE-V methodology used in fingerprint examinations. The observation of two or more friction ridge impressions to determine the existence of discrepancies, dissimilarities, or similarities within a particular area.

CODIS Administrator: An employee of a forensic DNA analysis laboratory responsible for administration and security of CODIS.

CODIS: The Combined DNA Index System administered by the FBI. CODIS has the potential to link DNA evidence obtained from crime scenes, thereby identifying serial perpetrators. CODIS also compares crime scene evidence to DNA profiles from

offenders, thereby providing investigators with an investigative lead with respect to the identity of the putative perpetrator. In addition, CODIS contains profiles from missing persons, unidentified human remains and relatives of missing persons. There are three levels of CODIS: the Local DNA Index System (LDIS), used by individual laboratories; the State DNA Index System (SDIS), used at the state level to serve as a state's DNA database containing DNA profiles from LDIS laboratories; and the National DNA Index System (NDIS), managed by the FBI as the nation's DNA database containing all DNA profiles uploaded by participating states. The FSL FBU operates as a SDIS level laboratory without a convicted offender database component.

Competency test: The evaluation of a person's ability to perform work in a functional area prior to the performance of independent casework. Expected test results are known to the laboratory but not the test taker.

Competent: Possessing the requisite knowledge, skills and abilities to perform a job.

Computer systems: A complete, working computer to include any software and peripheral devices.

Conclusion (Firearms): The outcome reached following an examination and comparison of firearms and/or toolmark related evidence (e.g., a finding of identification, elimination, inconclusive, or unsuitable).

Conclusion (Forensic Biology): The outcome reached from the comparison of a known DNA profile to an evidence DNA profile (e.g., a finding of inclusion, exclusion or inconclusive).

Conclusion (Latent Fingerprints): The outcome or result reached from the application of the Analysis, Comparison and Evaluation process to a friction ridge comparison (e.g., a finding of identification or inclusion, exclusion or inconclusive).

Condition adverse to quality: An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items and nonconformity issues.

Contributor: Law enforcement agencies that submit evidence to the laboratory.

Control (control sample): A sample analyzed in parallel with experimental samples that is designed to demonstrate that a procedure worked correctly; a standard of comparison for verifying or checking the finding of an experiment.

Controlled document: A document that is tracked when issued and/or distributed.

Controlling: Establishing standards of performance, measuring current performance in relation to established standards, and taking Quality Corrective Action as required.

Correlation (Firearms): A function performed by the NIBIN/IBIS computer imaging system which compiles the best images related to the evidence image input by an operator. In the NIBIN/IBIS computer imaging system correlation occurs automatically per IBIS User's Manual (IBIS Heritage 3.4.8 2009).

Court official: An individual such as a prosecutor, defense attorney or judge who completes an external testimony evaluation form.

Crime/forensic laboratory: A laboratory (with at least one full-time scientist) which examines physical evidence in criminal matters and provides opinion testimony with respect to such physical evidence in a court of law.

Crime scene: An area, object or person, from which evidence is identified, documented, collected and/or interpreted.

Crime scene personnel: Individuals who perform the identification, documentation, collection and/or interpretation of material at a location external to the laboratory.

Crime scene reconstruction: The process of determining the nature of events that occurred at a scene from an evaluation of physical evidence and other relevant information.

Critical reagent: A reagent that requires special attention because of the impact of the reagent on the quality of testing. Failure of the reagent due to improper preparation or degradation would affect the testing process.

Custody: The care and control of an item implying responsibility for its protection and preservation.

Deficiency: An inadequacy; lacking in some necessary quality of an element. Deficiencies include missing data, incomplete data, inaccurate data and/or incomplete reports.

Delegation: The act of empowering a person to act for another person.

Deviation: An authorized variance from a documented policy, practice, or procedure. A deviation can be major or minor depending on the circumstances.

DEU: Digital Evidence Unit. An operational unit of the Forensic Science Laboratory.

Digit (Latent Fingerprint Unit): A toe or finger.

DFS: Department of Forensic Sciences, Washington D.C.

Digital device: A device that holds data stored or transmitted in binary form. Examples include a desktop computer, laptop computer, or USB storage device.

Digital evidence: Information of probative value stored or transmitted in binary form.

Directing: The process of motivating, leading, guiding, stimulating, and activating people.

Discipline: A major area of casework for which a laboratory may seek accreditation.

Discrepancy: Being at variance or different from the accepted consensus.

Discrepancy (Latent Fingerprint Unit): The presence of observed friction ridge detail in one impression that does not exist in the corresponding area of another impression (compare with dissimilarity).

Dissimilarity (Latent Fingerprint Unit): A difference in appearance between two friction ridge impressions (compare with discrepancy). A dissimilarity between two impressions may be explainable, in consideration of the contributing factors of either the deposition of a latent impression and/or the recording mechanisms of exemplar impressions, based upon the expertise of the examiner.

Distortion: Variance in the reproduction of friction ridge skin detail caused by pressure, movement, force, contact surfaces, etc.

Document: Information in any medium including, but not limited to, paper copy, computer disk or tape, audio or video tape, electronic file, compact or digital video disc, photograph, overhead, or photographic slide.

Document control: The process of ensuring that controlled documents prescribing quality-affecting activities or specifying quality requirements, including revisions, are reviewed for adequacy, approved for release by authorized personnel and distributed for use to the personnel performing the prescribed activities.

DOM: Departmental Operations Manual

Elimination: Significant disagreement of discernible class characteristics and/or individual characteristics.

Elimination prints: Exemplars of friction ridge skin detail of persons known to have had legitimate access to an object or location.

Environmental conditions: Any characteristic of the facilities that could reasonably be expected to impact the quality of the laboratory's work product.

Evaluation (Latent Fingerprint Unit): The determination of a conclusion based upon completion of the analysis and comparison of friction ridge impressions.

Evidence: An item submitted for examination(s).

Examination: An analysis of an item or comparison of items; the procedure utilized by the laboratory analyst to obtain information from evidence in order to reach conclusions concerning the nature of and/or associations related to evidence received by the laboratory. The term examination is equivalent to the term "test" as used in this manual.

Examination documentation: Documents that are technical in nature and support the results and/or conclusions presented in a laboratory report. Examples of documents include diagrams, printouts, photographs, observations, and results of examinations.

Examiner: An employee or contract employee who conducts and/or directs the analysis of forensic casework samples. Some examiners also interpret data and reach conclusions. Used interchangeably with the term "analyst".

Exclusion: The determination by an analyst that there is sufficient quality and quantity of detail / information to conclude the questioned samples being compared did not originate from the same source (i.e., non-identification / exclusion).

Exemplar: A known sample from an object or an individual that serves as the reference or standard to identify that object or individual (i.e., DNA buccal swab, ten-print card, test-fire cartridges, etc.).

External proficiency test: A test provided by a source external to the laboratory.

F.B.I. Number: A unique number within the Criminal Justice Information Services (CJIS) Division files assigned to an individual.

FBU: Forensic Biology Unit. An operational unit of the Forensic Science Laboratory.

FEU: Firearms Examination Unit. An operational unit of the Forensic Science Laboratory.

Fingerprint: An impression of the friction ridges of all or any part of the finger.

Finding: A nonconformity identified during an audit with documented requirements.

Follow-up action: Action to eliminate the cause of a detected non-conformity. This is documented as action steps on the *Quality Corrective Action Report*.

FSL: Forensic Science Laboratory. A division under the DFS, alongside the Public Health Laboratory and the division of Crime Scene Sciences, responsible for processing forensic evidence.

Forensic Science: The application of scientific knowledge and methodology to legal problems and criminal investigations.

Friction Ridge: Raised portion of the epidermis on the palmar or plantar skin. One or more connected ridge units of friction ridge skin.

Friction Ridge Detail: An area comprised on the combination of the ridge flow, ridge characteristics, and ridge structure.

Goal: A statement of purpose that defines the mission of an organization.

Grain: A unit of weight (avoirdupois). 7000 grains equal one pound.

Hash sets: Reference data sets released by the National Institute of Technology and Standards (NIST) that provide the hash values for all known software for use in analysis of device images.

Hash value: A string of alphanumeric characters that are unique to a digital entity and are used for verifying the integrity of digital evidence.

IAFIS: The acronym for Integrated Automated Fingerprint Identification System, the FBI's national AFIS which was replaced by the Next Generation Identification (NGI) system in 2011. See NGI.

IBIS: Integrated Ballistics Identification system that allows for the comparison of digital images of bullets, cartridges, etc. from firearms between laboratories across the nation. The system is managed by the Walsh group and owned by the Bureau of Alcohol, Tobacco, Firearms and Explosives per IBIS User's Manual (IBIS Heritage 3.4.8 2009).

Identification (Firearms): Agreement of a combination of individual characteristics and all discernible class characteristics where the extent of agreement exceeds that which can occur in the comparison of tool marks made by different tools and is consistent with the agreement demonstrated by tool marks known to have been produced by the same tool (AFTE glossary 6th Edition).

Identification (Latent Prints): The decision by an examiner that there are sufficient discrimination friction ridge features in agreement to conclude that two areas of friction ridge impressions originated from the same source. Identifications of an impression to one source is the decision that the likelihood the impression was made by another (different) source is so remote that it is considered as a practical impossibility.

Image: A forensic copy of a digital device that is usually verified by a hash value.

Impression: Transferred impression of friction ridge detail; generic term used for questioned friction ridge detail.

Inclusion (Forensic Biology): Comparison of data between an unknown DNA profile and a known DNA profile are consistent with each other. A known DNA profile may be included to a single source sample or to a mixed sample.

Inconclusive (Firearms): A. Some agreement of individual characteristics and all discernible class characteristics, but insufficient for an "Identification".
B. Agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility.
C. Agreement of all discernible class characteristics, but insufficient disagreement for an "Elimination".

Inconclusive (Latent): The determination by an examiner that there is neither sufficient agreement to render a conclusion of identification, nor sufficient disagreement to render a conclusion of exclusion.

Inconclusive (Forensic Biology): There is not enough data to support an inclusion or exclusion.

Inconsistency: Any reported results that differ from the consensus results. Inconsistencies may be classified as administrative, systemic, analytical or interpretive.

Individual characteristic database: A collection, in computerized searchable form, of individual characteristics.

Individual characteristic database sample: A specimen of known origin from which individual characteristic information originates (e.g., reference blood or biological specimens, fingerprints of unknown individuals, electronic fingerprint records, test fired ammunition).

Internal proficiency test: Proficiency testing program managed and controlled within the laboratory system.

Item Identifier: A numeric designator assigned to an item submitted to the FSL.

Known Print (finger, palm, foot): A recording of an individual's friction ridges with black ink, electronic imaging, photography or other medium on a contrasting background. (See exemplar)

Known sample: A specimen of an identified source acquired for the purpose of comparison with an evidence sample; synonymous with exemplar.

Laboratory Director: The highest ranking manager within the FSL.

Latent Print: Transferred impression of friction ridge detail not readily visible; generic term used for questioned friction ridge detail.

Laboratory Support Personnel: Employees or contract employees who perform laboratory duties exclusive of analytical techniques on forensic or database samples.

Lead Auditor: An experienced auditor who is assigned the responsibility of leading a team of auditors to conduct a portion of an audit.

Level 1 detail: Friction ridge flow and general morphological information.

Level 2 detail: Individual friction ridge paths and friction ridge events, e.g., bifurcations, ending ridges, dots.

Level 3 detail: Friction ridge dimensional attributes e.g., width, edge shapes, and pores.

LFU: Latent Fingerprint Unit. An operational unit of the Forensic Science Laboratory.

Lift: An adhesive or other medium used to transfer a friction ridge impression from a substrate.

Live Scan: Digital capture of the friction ridges.

LOM: Laboratory Operations Manual; specific to each division.

Major Case Prints: A systematic recording of the friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, joints, tips, and sides of the fingers (also known as complete friction ridge exemplars).

Major deviation: A deviation that has the potential to impact the quality system, may affect multiple cases, or is applicable over an extended period of time.

Management system: The organizational structure, responsibilities, procedures, processes, and resources for implementing quality management; includes all activities which contribute to quality, directly or indirectly.

Manager: A person with the responsibility for directing and operating an organizational unit or program.

Manual Correlation: A correlation request done manually through NIBIN/IBIS. The user specifies how test exhibits are correlated against reference exhibit, overriding the

default settings used for an automatic correlation per IBIS User's Manual (IBIS Heritage 3.4.8 2009).

May: A word used when an element of the quality system is optional or discretionary.

Measurement of uncertainty: A parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed.

Media: Objects on which electronic data can be stored.

Method: The course of action or technique followed in conducting a specific analysis or comparison leading to an analytical result.

Minor deviation: A deviation that is not expected to impact the quality system and generally will not have an extended duration.

Minutiae: Distinctive details of the friction ridges, including level 1, 2 and 3 details.

Must: A word used when an element of the quality system is required.

National Measurement Standards: May be primary standards, which are primary realizations of the SI units or agreed representations of SI units based on fundamental physical constants, or they may be secondary standards which are standards calibrated by another national metrology institute such as the National Institute of Standards and Technology (NIST).

Natural science: Chemistry, biology and physics.

Negative Correlation Review: The comparison to a high confidence case demonstrates non-identification per IBIS User's Manual (IBIS Heritage 3.4.8 2009).

NGI: Next Generation Identification. It is the FBI's electronic repository of biometric and criminal history information.

NIBIN: The National Integrated Ballistics Information Network computer imaging system that allows for the comparison of digital images of bullets, cartridges, etc from firearms between laboratories across the nation. The system is managed by the Walsh group and owned by the Bureau of Alcohol, Tobacco, Firearms and Explosives per IBIS User's Manual (IBIS Heritage 3.4.8 2009).

No Value: A decision rendered during analysis by an examiner where the questioned impression does not contain a sufficient amount of discernable information in order to reach a conclusion during the subsequent examination processes. Impression is not suitable for further examination. (See Sufficient and Suitable).

Nonconformity: A situation or condition that does not adhere to policy and/or procedure and has the potential to have a fundamental impact on the quality of the work product or the integrity of the evidence (see Quality Corrective Action).

Notes: The documentation of procedures, standards, controls and instruments used, observations made, results of tests performed, charts, graphs, photos, and other documents generated that are used to support an analyst's conclusions.

Objective: A measurable, definable accomplishment that furthers the goals of the organization.

Objective Test: A test which, having been documented and validated, is under control so that it can be demonstrated that all appropriately trained staff will obtain the same results within defined limits. These defined limits relate to expressions of measurement uncertainty.

Open proficiency test: A proficiency test, known to the participant as such, prepared to evaluate the participant's competence related to casework.

Organizing: The process of identifying, specifying and assigning work, grouping work and resources into a structure and establishing a chain of command between individuals and groups.

Palm: The area of friction ridge skin area on the ventral side of the hand (Palmar Area).

Performance Check: A verification that the equipment, instrument, or process is working as expected. Analysis of a control may be used as a performance check.

Planning: The analysis of relevant information from the past and present and the assessment of probable future developments so that a course of action may be determined that enables the organization to meet its stated objectives.

Policy: A guiding principle, operating practice, or plan of action governing decisions made on behalf of an organization.

Positive Correlation Review: The comparison to a high confidence case demonstrates identification per IBIS User's Manual (IBIS Heritage 3.4.8 2009).

Practices: In this manual, a term used to describe laboratory quality affecting processes that are used by the FSL.

Primary Standard: A standard designated or widely acknowledged as having the highest metrological qualities and whose value is accepted without reference to other standards of the same quantity.

Principle: A basic rule, assumption or quality; a fixed or predetermined policy or mode of action.

Procedure: The manner in which an operation is performed; a set of directions for performing an examination or analysis – the actual parameters of the methods employed.

Proficiency Review Committee (PRC): A committee appointed by an accrediting body, whose role is to evaluate the performance of accredited laboratories in proficiency tests.

Proficiency tests: Tests to evaluate the continuing capability of analysts and the performance of the laboratory. The expected results of the test are unknown to those individuals taking the test.

Proper seal: A seal that prevents loss, cross-transfer or contamination while ensuring that attempted entry into the container is detectable. A compliant seal may include a heat seal, tape seal, or a lock with, at minimum, the initials of the person creating the seal being placed across the seal onto the container when possible.

Protocol: A directive listing the procedures to be followed in performing a particular laboratory examination or operation; the overall plan for analysis of a particular item of evidence.

Qualified: A term used to identify personnel who successfully complete a training program, pass a competency test and participate in the proficiency testing program.

Qualitative Analysis: Procedures that use visual, microscopic, or instrumental methods to determine the characteristics or constituents of a sample or specimen without regard to quantity.

Quality: The clarity of the information contained within a friction ridge impression.

Quality assurance: The planned and systematic actions necessary to provide sufficient confidence that a laboratory's product or service will satisfy given requirements for quality.

Quality Assurance Manual (QAM): A document describing the various elements of the quality system and quality practices of the organization or unit.

Quality audit: A management tool used to evaluate and confirm activities related to quality. Its primary purpose is to verify compliance with the operational requirements of the quality system.

Quality control: Activities conducted according to established standards used to monitor the quality of analytical data and to ensure that it satisfies specific criteria.

Quality Corrective Action Report (Q-CAR): A report containing a description of a nonconformity (with great impact to the quality system or frequency of occurrence), a root cause analysis and a description of the action put in place *after* a nonconformity event to identify and eliminate the cause of the undesirable situation, and to bring the deficiency into conformity with a required standard.

Quality documentation: Documents of records pertaining to the quality system such as audit reports, Quality Corrective Action forms, deviation forms and testimony evaluations.

Quality manager: An individual designated by management who, irrespective of other responsibilities, has the defined authority and obligation to ensure that the quality requirements of the management system are implemented and maintained.

Quality Preventive Action Report (Q-PAR): A report containing a description of a situation with the potential to result in nonconformance to a policy and/or procedure and the description of the action put in place *before* a potential nonconformity occurs in order to eliminate the cause of an identified undesirable situation and to bring the deficiency into conformity with a required standard.

Quality records: Documents pertaining to the quality system such as audit reports, Quality Corrective Action reports and testimony evaluations.

Quality system: The organizational structure, responsibilities, procedures, processes, and resources for implementing quality management; includes all activities that contribute to quality, directly or indirectly.

Quantitative Analysis: Analysis of a substance that determines the amount or proportion of its constituents.

Quantity: The amount of information contained within a friction ridge impression.

Questioned sample: An evidence sample to be examined for the purpose of comparison or identification.

Reagent: A substance or mixture used because of its chemical activity.

Record: A document that provides evidence of a condition, work performed, activities conducted, and/or quality for archival purposes.

Re-examination: An examination that requires a rework of all relevant evidence in a case. This may occur if the original scientist is no longer available for court testimony and/or if a specific request is made by a customer or stakeholder.

Re-examination technique: A quality assurance technique whereby a previously examined sample is re-examined by a different analyst.

Reference material: A material or substance having known properties. These materials may be used for the identification of unknown substances, calibration of instruments, assessments of a measurement method, or assigning value to materials.

Reference standard: An acquired or prepared sample that has known properties for the purpose of calibrating equipment and/or for use as a control in examinations.

Reliability: Possessing the quality of being dependable; may refer to personnel, materials or equipment.

Request: The act or an instance of a contributor asking for the examination of evidence by the laboratory.

Root cause: The fundamental reason for a condition adverse to quality, that, if corrected or precluded, would minimize or prevent that condition, and/or similar conditions, from occurring.

Routine Process/Procedure: A process or procedure that is performed on an on-going basis.

Safety manual: A document stating the safety policy and describing the various elements of the safety system of the organization.

Sampling: A process or procedure whereby a part of a substance, material or item is taken to provide for testing of a representative sample of the whole.

Scar: A permanent mark remaining after the healing of a wound that has damaged the epidermal layer of the skin.

Scientist: A person who employs scientific methods in the examination of evidence in a forensic laboratory.

Secondary evidence: Material derived from an item of evidence.

Secured area: Locked or otherwise limited access space under laboratory control that has access restricted to personnel authorized by the Laboratory Director.

Shall: A word used when an element of the quality system is required.

Should: A word used when an element of the quality system is recommended, but not required.

SI Units: The International System of Units consisting of seven base units that have been adopted by the General Conference on Weights and Measures.

Standard Ammunition File: An ammunition file consisting of cartridge, cartridge case, bullet, and the gunpowder. The objective observing and recording all of the physical features of fired bullets is to compare them side-by-side and base-to-base against known standards of as many examples of ammunition as possible

Standard Operating Procedure (SOP): A document that specifies the steps, methods, equipment, and materials necessary to perform a task properly. SOP's are written to provide instruction and standardization of activities affecting quality.

Standards: Something established by authority, custom, or general consent as a model or example.

Substrate (Latent): Surface upon which a friction ridge impression is deposited.

Sufficiency: The product of the quality of the objective data under observation (e.g., friction ridge, crease, and scar features).

Sufficient: The determination that there is sufficiency in a comparison to reach a conclusion at the evaluation stage.

Suitable: The determination that there is sufficiency in an impression to be of value for further analysis or comparison.

Technical Leader: A designated employee who is responsible for the technical operations of a laboratory unit and who may stop or suspend unit operations, if necessary.

Technical procedures: Of or relating to a practical subject organized on scientific principles.

Technical review: The review of notes, data, and other documents that form the basis for a scientific conclusion.

Technical reviewer: An employee or contract employee who is a currently or previously qualified analyst in the methodology being reviewed that has been authorized to perform a technical review of, and is not an author of, the applicable report or its contents.

Technical support personnel: A person or contract employee who performs casework related duties within the laboratory at the direction of an analyst.

Testimony: The firsthand authentication of a fact.

Trace evidence: Physical evidence from a crime that is present either in minute quantities or is physically minute as to require magnification, microscopy, and sensitive techniques in order to identify. See also, *Materials science.*

Traceability: Property of the result of a measurement or the value of a standard whereby it can be related to state references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties.

Transfer Matrix: Substance with which a questioned impression has been deposited.

Unit Manager: A person directly responsible for overseeing the work in an organizational unit.

Unsuitable: Not suitable for further examination.

Validation: The process of performing a set of experiments that establish the efficacy and reliability of a technique or procedure or modification thereof.

Value: The determination "of value" by the examiner indicated that sufficient reliable details are present in the print such that, when compared to another print, any of the three conclusions can be reached.

Verification: Confirmation of an examiner's conclusion by another qualified examiner.

Will: A word used when an element of the quality system is required.

PART 4 MANAGEMENT REQUIREMENTS

SECTION 4.1 ORGANIZATION

4.1.1 The Department of Forensic Sciences (DFS) is a public government agency that performs both state and municipal forensic investigations and examinations for the District of Columbia. The Forensic Science Laboratory (FSL) is a division of the DFS. The FSL Director has the responsibility and authority for all FSL functions and personnel.

4.1.2 The FSL provides forensic testing services to address a contributor's request for examination of evidence. These testing activities are conducted in such a way as to conform to the requirements of ISO/IEC 17025:2005 standards.

4.1.2.1 The FSL Forensic Biology Unit (FBU) is a National DNA Index System (NDIS) participating laboratory. Refer to the FBU QAM (FBUQA01) and the CODIS Procedures Manual.

4.1.3 The FSL Director oversees forensic examinations conducted by FSL personnel. The FSL quality system shall cover work performed by FSL personnel in the Consolidated Forensic Laboratory facility, or in associated temporary or mobile facilities.

4.1.4 The FSL Director is a manager and reports directly to the Director of the Department of Forensic Sciences. FSL personnel encountering situations or conditions that could cause undue pressure and adversely affect the quality of the work will inform the FSL Managers.

4.1.4.1 In general, the FSL Director is charged with the executive and administrative responsibilities for the operation of the FSL. The FSL Director maintains administrative control and governs the laboratory's activities directly or through subordinates. The FSL Director's responsibilities and authorities are defined in the associated job description.

4.1.4.1.1 The FSL Director has the authority to make and enforce decisions affecting the FSL.

4.1.5 The FSL:

a) Provides its personnel the authority and resources needed to carry out their duties including the implementation, maintenance and improvement of the quality system. Laboratory employees will identify departures

from the quality system and initiate actions to prevent or minimize any conditions adversely affecting the quality system, as per DOM08 – *Procedures for Quality Preventive Action*;

b) Has policies to ensure that all personnel are free from any undue pressures and influences that may negatively impact the quality of their work (District Personnel Manual, Chapter 18, Employee Conduct, part 1 – Supplemental Document). All laboratory personnel are responsible for ensuring the integrity of the examination process;

c) Has policies and practices to protect contributors' confidential information. These policies and practices include guidance for protecting the electronic storage and transmission of laboratory reports as well as access to test data in examination areas;

d) Has policies that provide guidance concerning any situations that could lessen confidence in the competence, impartiality, judgment or operational integrity of the FSL (District Personnel Manual, Chapter 18, Employee Conduct, part 1 – Supplemental Document);

e) Has organizational chart(s) which show the structure and the relationships between management, casework units and support services. The FSL position in the DFS is shown in the DFS Organizational Chart (Supplemental Document);

f) Defines the responsibility and authority of all FSL personnel in the FSL *QAM – Section 4.2.6* and the organizational chart(s), respectively (Supplemental Document).

   1. Lab employees will be accountable to only one immediate supervisor per function. Sworn FEU members maintain their responsibilities as police officers and may report to a different supervisor when performing sworn police functions that are separate from the responsibilities as FEU laboratory employees;

g) The Unit Manager(s) will ensure analysts, including trainees, are adequately supervised. Employees responsible for supervising personnel will be familiar with the purposes, methods and standard operating procedures of examinations conducted in their unit and will also be knowledgeable in the evaluation of assessment of the examination results;

h) The Unit Manager(s) have overall responsibility for the technical operations and the provision of the resources needed to ensure the required quality of FSL operations.

   1. The Unit Manager(s) will ensure technical responsibility is designated for each discipline. The designation shall be to an individual(s) who has (have) appropriate technical training and technical experience for that discipline;

i) The Deputy Director will ensure that the FSL quality system's effectiveness is continuously monitored, implemented and followed at all times. The Deputy Director reports directly to the DFS Director and works with the FSL Director, FSL Quality Assurance Specialist, and Unit

Manager(s) and Technical Leader(s) regarding quality assurance policies and issues for accredited disciplines.

j) As needed, executive management will appoint deputies for key managerial personnel;

k) The Unit Manager(s) will ensure that FSL personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the objectives of the quality system.

4.1.5.1 As noted in 4.1.4, the FSL Director is the lead authority over the functions of the FSL.

4.1.6 Top management laboratory manager(s) and FSL Quality personnel will communicate with FSL members through meetings, written communications or other means concerning the effectiveness of the quality system.

4.1.7 The FSL performs forensic testing at the Consolidated Forensic Laboratory (CFL) facility dedicated to the DFS. The FSL adheres to the safety procedures outlined in the DFS Health and Safety Manual. The FSL has appointed a staff member(s) in each unit to ensure the FSL program and personnel are in compliance with FSL health and safety programs.

4.1.8 Key management and top personnel are identified on the DFS and FSL organizational charts.

SECTION 4.2 MANAGEMENT SYSTEM

4.2.1 The FSL has established, implemented and maintained a quality system appropriate to its scope of activities and testing methods. The quality system is comprised of a quality assurance manual (QAM), the Departmental Operations Manual (DOM), the Laboratory Operations Manual (LOM), standard operating procedures (SOP), training manuals and instructions that assure the quality of test results. All laboratory personnel are required to read and become familiar with this *Quality Assurance Manual,* the *Departmental Operations Manual*, the *Laboratory Operations Manual*, the *Standard Operating Procedures* for their Unit, as well as all pertinent documents of the quality system within the discipline or area of employment. This review is documented in administrative records within the Qualtrax Document Control and Compliance System.

4.2.2 Top management of the FSL is dedicated to good laboratory practice and to the quality of the forensic services provided to contributors. The quality system of the FSL ensures that functions are performed as intended and conform to the requirements of ISO/IEC 17025:2005 standards. FSL employees are responsible for ensuring that they understand and apply the quality system to their daily activities.

With the support of the top FSL management and input from personnel, new policies, practices and procedures are developed and implemented when necessary. All quality system documents are reviewed annually and updated as necessary to continuously improve the effectiveness of the quality system. If conditions or situations having an adverse impact on the quality system are identified, appropriate changes will be made and/or Quality Corrective Actions will be implemented.

4.2.2.1 Quality System Goals and Objectives

The FSL quality system goals and objectives are as follows:

- To assure that FSL results provided to contributors are reliable and scientifically sound.
- To establish formal methods of quality assurance within the FSL through the implementation of recognized standards for good laboratory practice.
- To use procedures which are valid, dependable, reproducible, and adequate for their intended purpose.
- To monitor the routine operational performance of units within the FSL.
- To periodically audit all areas of the quality system for FSL management to ensure that policies, practices, and procedures are being followed.
- To maintain quality, excellence and integrity.
- To conform to the requirements of ISO/IEC 17025:2005 standards.
- To provide the necessary training for personnel to carry out the provisions of the quality system.

4.2.2.2 The laboratory staff shall maintain knowledge, skills, and abilities through required readings, training, and continuing education. This will be documented by each staff member to ensure that a minimum level of such professional involvement is met every year.

4.2.2.3 The ANAB's current, published version of the Guiding Principles of Professional Responsibility for Forensic Service Providers and Forensic Personnel, shall be reviewed annually by all FSL employees through the document management system portal.

4.2.2.3.1 The review of the document must be recorded and stored.

4.2.3 Management will communicate with FSL personnel by memorandum(s), meetings or other means regarding the development, implementation and continuous improvement of the quality system.

4.2.4 Management will advise FSL personnel of the importance of addressing contributor requests and complying with any relevant statutory and regulatory requirements.

4.2.5 Documentation Hierarchy

The FSL's quality system documentation is comprised of laboratory policies and practices, and unit policies and procedures. The authority to implement change within each category is described below.

FSL policy is set forth in this *FSL Quality Assurance Manual*. The policy statements and any subsequent revisions are approved by the FSL Director and the DFS Deputy Director, and issued by the designated FSL Quality personnel.

FSL practices are found in the *Laboratory Operations Manual*. Practices are used to implement FSL policies. These practices and any subsequent revisions are approved by FSL Director and/or the Unit Manager(s) and issued by the designated FSL Quality personnel.

Laboratory policies and procedures supplement the FSL policies and practices. Laboratory policies and procedures, and any subsequent revisions are approved by the FSL Director and/or the Unit Manager(s) or designee and issued by the designated FSL Quality personnel.

4.2.6 Authority and Responsibility for the Quality System

The Laboratory Director shall:

- Promote and support the quality system.
- Provide and promote dedicated resources to perform annual review (once per calendar year) of the laboratory's general quality system.
- Ensure that FSL personnel understand and apply current Quality Assurance policies and practices to appropriate situations.
- Appropriately delegate authority to the Unit Managers within the laboratory units to implement the quality system.
- Initiate a Quality Corrective Action Report (Q-CAR) (or delegate initiation) when a nonconformity has been identified to be of impact to the quality system and/or high frequency and monitor that the selected corrective action team in a timely manner performs the Quality Corrective Action root cause analysis, appropriately documents and carries out all action steps, and closes out the Q-CAR to ensure deficiencies found in the quality system and/or standardized operating procedures are resolved.
- Initiate a Quality Preventative Action Report (Q-PAR) (or delegate initiation) when an undesirable situation has been identified and monitor that the selected preventative action team in a timely manner

appropriately documents and carries out all action steps and closes out the Q-PAR to ensure undesirable situations that have the potential to lead to nonconformities are resolved.
- Meet the minimum education and experience requirements that must be met for ensuring competence included in the applicable position description.

The Laboratory Unit Manager shall:
- Support the quality system.
- Provide and promote dedicated resources to perform annual review (once per calendar year) of their unit's quality assurance manual and standard operating procedures and the laboratory's quality system.
- Approve the selection and use of technical procedures within the unit; establish criteria for technical procedure validations; and as necessary, review and update technical procedures.
- Initiate a Quality Corrective Action Report (Q-CAR) (or delegate initiation) when a nonconformity has been identified to be of impact to the quality system and/or high frequency and monitor that the selected corrective action team in a timely manner performs the Quality Corrective Action root cause analysis, appropriately documents and carries out all action steps, and closes out the Q-CAR to ensure deficiencies found in the quality system and/or standardized operating procedures are resolved.
- Initiate a Quality Preventative Action Report (Q-PAR) (or delegate initiation) when an undesirable situation has been identified and monitor that the selected preventative action team in a timely manner appropriately documents and carries out all action steps and closes-out the Q-PAR to ensure undesirable situations that have the potential to lead to nonconformities are resolved.
- Appropriately delegate authority within the laboratory unit to uphold the quality system.
- Ensure the completeness of FSL reports and supporting case documentation.

The Deputy Director shall:
- Promote and maintain the quality system
- Ensure conformance with ISO/IEC 17025 standards and supplemental guidelines.
- Ensure that policies and practices within the quality system are documented and implemented.
- Track reported FSL Quality Corrective Actions and Quality Preventative Actions and ensure timely reporting and subsequent review of root cause analyses.
- Initiate a FSL Q-CAR or Q-PAR, as needed.

- Ensure that the laboratory specific quality system is reviewed once per calendar year.
- Ensure that the management system is reviewed once per calendar year.
- Communicate the quality system and related policies, practices, and procedures to all employees within the laboratory.

The designated Unit Technical Leader shall:

- Support the quality system.
- Ensure that all unit personnel receive necessary training and are qualified for their assigned duties.
- Recommend and approve the selection and use of technical procedures within the unit; establish criteria for technical procedure validations; and as necessary, review and update technical procedures.
- Initiate a Quality Corrective Action Report (Q-CAR) (or delegate initiation) when a nonconformity has been identified to be of impact to the quality system and/or high frequency and monitor that the selected corrective action team in a timely manner performs the Quality Corrective Action root cause analysis, appropriately documents and carries out all action steps, and closes out the Q-CAR to ensure deficiencies found in the quality system and/or standardized operating procedures are resolved.
- Initiate a Quality Preventative Action Report (Q-PAR) (or delegate initiation) when an undesirable situation has been identified and monitor that the selected preventative action team in a timely manner appropriately documents and carries out all action steps and closes out the Q-PAR to ensure undesirable situations that have the potential to lead to nonconformities are resolved.
- Document review and approval of all unit-associated Q-CARs and Q-PARs.
- Meet the minimum education and experience requirements that must be met for ensuring competence included in the applicable position description.

The Laboratory Quality Assurance Specialist shall:

- Promote and maintain the quality system for the laboratory units.
- Ensure conformance with ISO/IEC 17025 standards and supplemental guidelines.
- Ensure that FSL personnel understand and apply current quality assurance policies and practices to appropriate situations.
- Ensure that policies and practices within the laboratory units are documented and implemented.
- Ensure that unit personnel understand and apply current quality assurance policies and practices to appropriate situations.
- Initiate a Quality Corrective Action Report (Q-CAR) (or delegate initiation) when a nonconformity has been identified to be of impact to the quality

system and/or high frequency and ensure that the selected corrective action team in a timely manner performs the Quality Corrective Action root cause analysis, appropriately documents and carries out all action steps, and closes out the Q-CAR to ensure deficiencies found in the quality system and/or standardized operating procedures are resolved.

- Initiate a Quality Preventative Action Report (Q-PAR) (or delegate initiation) when an undesirable situation has been identified and ensure that the selected preventative action team in a timely manner appropriately documents and carries out all action steps and closes out the Q-PAR to ensure undesirable situations that have the potential to lead to nonconformities are resolved.
- Keep the DFS Deputy Director, the Laboratory Director, the Unit Manager(s) and the Technical Leader(s) apprised of the status of all open Q-CARs and Q-PARs.
- Communicate the quality system and related policies, practices, and procedures to all employees within the laboratory units.
- Liaise with the DFS Deputy Director.

Analysts shall:

- Ensure compliance with current policies, practices, and procedures.
- Ensure that laboratory procedures are performed in a careful and responsible manner in accordance with current policies and practices.
- Make recommendations and suggestions for improving the FSL quality system as appropriate.
- Coordinate initiation of / initiate a Quality Corrective Action Report (Q-CAR) when a nonconformity has been identified.
- Coordinate initiation of / initiate a Quality Preventative Action Report (Q-PAR) when an undesirable situation has been identified that has the potential to lead to a nonconformity.

4.2.7 Top management shall ensure that the integrity of the quality system is maintained when changes to the quality system are planned and implemented. All quality system changes will be comprehensively reviewed and be clearly articulated to laboratory personnel for their understanding and acknowledgement.

SECTION 4.3 DOCUMENT CONTROL

4.3.1 General

The FSL manages the documents that comprise its quality system according to the Department of Forensic Sciences Department Operations Manual *DOM02 – Procedures for Document Control*. Controlled document distribution will be accomplished by the use of the Qualtrax Compliance Software.

4.3.2 Document Approval and Issue

4.3.2.1 Prior to implementation, all FSL quality system documents will be thoroughly reviewed, approved for release by authorized personnel, and made available for use by employees. The *DOM02 – Procedures for Document Control* contains provisions for identifying the current revision of documents, for distributing quality system documents, and to preclude the use of invalid and/or obsolete documents.

4.3.2.2 The DOM02 – Procedures for Document Control ensures that:

a) Current revisions of appropriate practices, procedures and instrumentation manuals will be available where critical operations are performed;
b) Quality system documents will be reviewed once per calendar year and revised as necessary to comply with applicable requirements;
c) Invalid or obsolete documents will be promptly removed;
d) Archived quality system documents will be marked as such to preclude their use.

4.3.2.3 FSL prepared quality system documents are uniquely identified according to the requirements of the *DOM02 – Procedures for Document Control.* This identification includes the document title, date of issue, revision number, and page numbering including total number of pages. The approving and issuing authorities are also identified in the document.

4.3.3 Document Changes

4.3.3.1 Revisions to FSL prepared quality system documents will be subject to the same review, approval, documentation and issuance requirements as the original document. Revisions to instrumentation manuals or externally produced quality documents will be subject to the same review and approval as the original document. Changes to policies, practices, procedures and training program manuals will be described in the history of the document within the Qualtrax Compliance Software and will be formally re-issued as soon as practical. Additionally, appropriate personnel will have access to any information necessary to conduct the review and approve the revision. *DOM02 – Procedures for Document Control]*

4.3.3.2 Altered or new text will be outlined in the history of the document contained within the Qualtrax Compliance System. Comparisons between versions of current and prior documents is capable by

Qualtrax administrators to show which changes occurred between versions of the documents.

4.3.3.3 The FSL quality system does not permit the amendment of documents by hand for internally prepared documents. Amendments by hand to externally prepared documents will be performed according to *DOM02 – Procedures for Document Control.*

4.3.3.4 The *DOM02 – Procedures for Document Control* also applies to documents maintained in computerized systems.

SECTION 4.4 EXAMINATION REQUESTS

4.4.1 The *LOM01 – Procedures for the Examination of Evidence* provides guidance for the review of requests for examinations. These practices ensure that the:

- Requirements, including the methods to be used, are adequately defined, documented and understood;
- FSL has the capability and resources to meet the requirements;
- Analyst selects an appropriate technical procedure, to the extent possible, that is dictated by the nature of the evidence and a contributor's request;
- Unanswered issues in the request are reconciled by the appropriate discipline's Unit Manager, Technical Leader, Lead Scientist or designee of the FSL Director prior to any work being performed.

4.4.1.1 The extent of database searches is communicated to customers and updated, when applicable.

4.4.2 The FSL maintains all records related to the contributor's request, including case-related discussions with the contributor in the case file. A *Case Activities Log* will be used to document discussions with a contributor relating to their request(s). Printouts of electronic mail may also be maintained for this purpose in the case file.

4.4.3 Reviews of requests on any work that is subcontracted by the FSL will be conducted by the appropriate unit manager, and decisions will be made on a case by case basis.

4.4.4 Any significant deviations from a contributor's request, such as conducting additional examinations that were not requested, will be communicated to the contributor by the FSL Director and/or Unit Manager. This communication will be documented in the *Case Activities Log* in accordance with *LOM01 – Procedures for the Examination of Evidence*.

4.4.5 Changes in requested examinations will be communicated to the respective laboratory personnel. If a change is necessitated by the laboratory, the customer will be notified as soon as practicable.

4.4.6 Re-examinations are not routine examinations at the Forensic Science Laboratory and approval is required from the Directorate or designee according to the *LOM01 – Procedures for the Examination of Evidence*.

SECTION 4.5 SUBCONTRACTING OF EXAMINATIONS

4.5.1 The FSL will select competent subcontractors to conduct forensic examinations when necessary. The Unit Manager and Deputy Director, or designee, is responsible for evaluating the competency of subcontractors. A subcontractor's competence can be demonstrated by their accreditation by an appropriate forensic accrediting body and/or by satisfactory results of an audit conducted by FSL personnel. The Unit Manager or designee may also determine a subcontractor to be competent, on a case-by-case basis, if the subcontractor is accredited by another ISO 17025 accrediting body or by accepting the results of an independent audit.

4.5.1.1 Whenever possible, the laboratory will use a subcontractor accredited to an appropriate international standard by an accrediting body that is a signatory to the ILAC Mutual Recognition Arrangement with a scope of accreditation that covers the services being subcontracted.

4.5.2 When the FSL subcontracts work, the Unit Manager or designee will advise the contributor of the arrangement in writing. This will be documented via memorandum and in the *Case Activities Log* in the FSL case file.

4.5.3 The FSL is responsible for the quality of a subcontractor's work product, unless the contributor specifies the subcontractor.

4.5.4 The Unit Manager or designee is responsible for maintaining a list of all competent subcontractors who are approved for conducting forensic examinations. Documentation will be maintained, via a departmental memorandum, of the subcontractor's conformance with the requirements of the ISO 17025:2005 standard for the work in question.

SECTION 4.6 PURCHASING OF SERVICES AND SUPPLIES

4.6.1 The District of Columbia Office of Contracts and Procurements (OCP) policies and regulations govern the procurement of products and services from external sources. The procedures for the reception and storage of reagents, chemicals,

standards and consumable materials necessary for forensic examinations are set forth in *Appendix B*.

4.6.2 Laboratory units will evaluate quality affecting supplies, reagents and consumables purchased by the FSL to ensure that they comply with specifications defined in the appropriate standard operating procedure (SOP). These materials will not be used until their compliance is verified. Verification will be performed against appropriate reference materials and documented. Laboratory units will maintain quality records of steps taken to check conformance of these materials.

4.6.3 FSL laboratory units will ensure that purchase request documents contain information describing the supplies and services ordered if they affect the quality of examinations. These requests will be reviewed and approved for technical content by the Unit Manager or designee prior to ordering.

4.6.4 FSL will evaluate suppliers of critical consumables, supplies and services and maintain records of these evaluations. The FSL will maintain a list identifying approved suppliers.

4.6.4.1 The reference standards, reference materials, and calibrations of equipment/reference standards used to establish and/or maintain measurement traceability are viewed as critical and maintained by each Unit.

SECTION 4.7 SERVICE TO THE CUSTOMER

4.7.1 FSL employees will communicate with contributors as needed to clarify their requests and to answer any questions concerning the status of the requests. The laboratory will maintain open channels of communication with contributors during lengthy or complex testing processes. All communications will be documented on a *Case Activities Log* and maintained in the case file. Printouts of electronic mail may also be maintained in the case file for documenting communications.

4.7.2 The FSL seeks feedback from its customers regarding the quality of the laboratory's work product and its service as a method of quality review. The laboratory will periodically survey customers regarding the level of satisfaction with the services provided. The results of these surveys will be reviewed by the Unit Manager and/or Deputy Director and will be used to improve the quality system, testing activities and customer service. The survey results will be maintained for at least one ISO/IEC 17025:2005 accreditation cycle or for five years, whichever is longer.

SECTION 4.8 COMPLAINTS

As part of the FSL's commitment to provide reliable forensic examinations, employees will take appropriate steps to address valid complaints regarding its services. Any employee receiving a complaint will notify the FSL Director and/or Deputy Director. The FSL Director, General Counsel, and/or Deputy Director are responsible for investigating a complaint. When necessary, the FSL will address complaints by implementing the *DOM07 – Practices for Quality Corrective Action*. Records will be maintained of all complaints, any relevant investigations and responses. Records of root cause analyses and Quality Corrective Actions implemented by the Laboratory will be maintained in accordance with the *DOM07 – Practices for Quality Corrective Action*.

4.8.1 FSL employee complaints concerning the quality system are also governed by this policy and the *DOM07 – Practices for Quality Corrective Action.*

SECTION 4.9 CONTROL OF NONCONFORMING TESTS

4.9.1 The *FSL QAM – Section 4.11* and the *DOM07 – Practices for Quality Corrective Action* will be followed when a nonconformity occurs during the examination process. This policy and practice:

a) Designates the actions to be taken and the individual responsible for managing the nonconformity;
b) Provides guidance to determine the frequency and impact;
c) Ensures that Quality Corrective Actions are implemented in a timely manner and the acceptability of the nonconformity will be evaluated;
d) Ensures that, when necessary, the contributor is notified and results of the examination are amended;
e) Defines the responsibility for authorizing the resumption of work.

4.9.2 Where the evaluation indicates that the nonconformity could recur or that there is doubt about the compliance of the laboratory's operations with its own policies and procedures, the *FSL QAM – Section 4.11* and the *DOM07 – Practices for Quality Corrective Action* will be promptly followed.

4.9.3 Practices for Authorizing Deviations

There are times when deviating from policies, practices and/or procedures is necessary. It is the policy of the FSL that deviations will be controlled to ensure that quality is not compromised.

Minor Deviation: When there is a need for a minor deviation from a policy, practice, or procedure, the requestor's designated Technical Leader and/or Unit Manager will consider the suitability and risks of a minor deviation before approving or rejecting a proposed deviation. The requestor will submit in writing the name of the policy, practice or procedure from which the deviation is sought, and a statement of the specific deviation requested. The designated

Technical Leader and/or Unit Manager will acknowledge his/her approval by signing and dating the deviation request. If the deviation is case-related, the deviation and its approval for deviation will be documented in the examination documentation. If the deviation is not case-related, the deviation and approval for deviation will be documented via memorandum. The original will be retained in the quality records and a copy will be returned to the requestor.

Major Deviation: When there is a need for a major deviation from a policy, practice, or procedure, the requestor will submit a *Major Deviation Request* form to the designated Technical Leader and/or Unit Manager. The designated Technical Leader and/or Unit Manager will evaluate the merit and risks of the deviation as well as the impact on the quality of work and the quality system. The designated Technical Leader and/or Unit Manager will document the approval or rejection of the request. The original will be retained in the quality records and a copy will be returned to the requestor. If the deviation is case related, a copy of the form will be placed in the case file and any related communications will be documented in the *Case Activities Log.* When approved major deviations have an impact within the FSL beyond the requestor's unit, the appropriate discipline Unit Manager and/or FSL Director will notify the affected units and the DFS Deputy Director.

SECTION 4.10 IMPROVEMENT

The FSL uses policies, objectives, audit results, data analysis, Quality Corrective Actions, Quality Preventive Actions and management reviews to continuously improve the effectiveness of the quality system.

SECTION 4.11 QUALITY CORRECTIVE ACTION

4.11.1 General

The laboratory Quality Corrective Action process is implemented and documented whenever nonconformities from accepted laboratory practice are identified, including those identified by external auditors. All FSL personnel, either independently or as part of an audit, may identify nonconforming work or departures from policies and procedures in the management system or in technical operations. Once nonconforming work is reported, it is evaluated for frequency and impact. The documentation of the nonconforming work will occur in accordance with the *DOM07 – Practices for Quality Corrective Action* and will consist of an entry to the nonconformity tracker or a *Quality Corrective Action Report* will be initiated. The intent of the Quality Corrective Action is to prevent recurrence of the nonconformity that affects the quality of work performed within the FSL. It is important that the Quality Corrective Actions are immediately initiated to minimize the impact of the nonconformity. The intent of

the Quality Corrective Action is to prevent recurrence of the nonconformity that affects the quality of work performed within the FSL. It is important that the Quality Corrective Actions are immediately initiated to minimize the impact of the nonconformity.

- Quality Corrective Action as defined and used in this manual is separate and distinct from "Corrective Action" as defined in the DC Government District Personnel Manual.

4.11.1.1. The timeframe for completion of corrective actions is defined by the action steps and expected completion date outlined in Q-CAR Part B.

4.11.2 Root Cause Analysis

Determining causation is an important first step in the Quality Corrective Action procedure. Root cause analysis requires an in-depth investigation of the underlying causation factors rather than cursory symptom analysis. A process review to include technical procedures, instrumentation utilization and maintenance, controls and standards requirements and employee performance may be required. The *DOM07 – Practices for Quality Corrective Action* includes initiating an investigation to determine the root cause(s) of the nonconformity.

4.11.3 Selection and Implementation of Quality Corrective Actions

The *DOM07 – Practices for Quality Corrective Action* provides guidance for determining whether or not nonconforming work will result in the initiation of a Quality Corrective Action Report (Q-CAR). Once the frequency and impact are analyzed, the appropriate personnel will discuss, select, document and implement the action(s) most likely to eliminate the nonconformity and to prevent recurrence. Quality Corrective Actions will be appropriate to the magnitude and risk of the nonconformity. The FSL will document and implement any required changes resulting from Quality Corrective Action investigations.

4.11.4 Monitoring of Quality Corrective Actions

The Deputy Director or designee will monitor and verify the results of Quality Corrective Actions to ensure that they have been effectively resolved. Documentation will be kept of all Quality Corrective Action processes for auditing compliance [*DOM07 – Practices for Quality Corrective Action*] by the Laboratory Quality Assurance Specialist.

4.11.5 Additional Audits

Situations that bring into question compliance with established policies or procedures may necessitate audits of the appropriate area(s) or of the entire quality system. These audits will be conducted and documented as set forth in Section 4.14 of this manual. If required, notification of Quality Corrective Action measures and findings will be communicated to any affected contributor. All Quality Corrective Action processes will be documented and maintained within the laboratory [*DOM07 – Practices for Quality Corrective Action*].

SECTION 4.12 QUALITY PREVENTIVE ACTION

4.12.1 Quality Preventive Actions are taken to prevent occurrence whereas Quality Corrective Actions are taken to prevent recurrence. FSL personnel, either independently or as part of an audit, may identify needed improvements, opportunities for improvement and potential sources of nonconformity. If a Quality Preventive Action is warranted, the *DOM08 – Procedures for Quality Preventive Action* will be followed.

4.12.2 The *DOM08 – Procedures for Quality Preventive Action* includes measures for verifying the effectiveness of any Quality Preventive Actions that are implemented.

SECTION 4.13 CONTROL OF RECORDS

4.13.1 General

4.13.1.1 The FSL has policies and standard operating procedures for the identification, collection, organization, accessibility, filing, storage, maintenance and disposal of quality and technical records [*LOM02 – Procedures for Case Documentation and Report Writing*]. Quality records include items such as internal audit reports, management reviews, Quality Corrective Action forms and Quality Preventive Action forms.

4.13.1.1.1 The technical and administrative records required in a case packet are specified in FSL *LOM02 – Procedures for Case documentation and Report Writing* and are further specified by each unit, if there are any differences.

4.13.1.1.2 The administrative records are identified to the specific test record through the Laboratory Information Management System (LIMS), by the associated laboratory number. The method of identification is further defined by each unit if there are any differing practices.

4.13.1.2 All FSL quality and technical records will be legible and readily retrievable from storage in appropriate DFS facilities. The retention times for records is outlined in the DFS *Policy for Retention of Records*.

4.13.1.2.1 The policy takes into consideration applicable legal requirements and ISO/IEC 17025:2005 requirements.

4.13.1.2.2 All records transcribed in the laboratory are verified prior to destruction.

4.13.1.2.3 The meaning of all abbreviations or symbols are defined in the laboratory and unit quality assurance manuals and applicable SOPs.

4.13.1.3 Access to FSL files is controlled according to DFS policies.

4.13.1.4 All electronically stored documentation must be capable of instant retrieval and stored in such a manner as to prevent unauthorized access, destruction or deterioration. The laboratory has back-up measures to ensure that electronic documents are not lost in the event of a failure of the primary storage medium. Each laboratory unit will protect and back-up records stored electronically and have procedures to prevent unauthorized access to or amendment of these records. Each unit is responsible for documenting the procedures for record protection and back-up of electronic records. The DFS follows DC Government Information Technology guidelines as governed by the *Enterprise Cloud and Infrastructure Services (ECIS) agreement*.

4.13.2 Technical Records

4.13.2.1 The FSL will retain technical examination and administrative documentation as part of the case file for a defined period of time in accordance with DFS requirements. The appropriate SOPs will contain adequate information to identify factors affecting the uncertainty of measurement, if applicable. Examination documents will be such that another qualified analyst could repeat the examination under conditions as close as possible to the original [*LOM02 – Procedures for Case Documentation and Report Writing*]. Personnel responsible for the examination of evidence, the verifier, the technical reviewer and the administrative reviewer will be identified in the case file. [*LOM03 – Procedures for Reviewing a Report of Examination*]

4.13.2.1.1 When appropriate, observations and test results must be captured by photography, digital capture, or scanning to

preserve a record of the evidence. Photocopies, tracings, and hand-drawn sketches may also be suitable when necessary [*LOM02 – Practices for Case Documentation and Report Writing*].

4.13.2.1.2 Reasons for rejecting test results or observations must be included within the case documentation, when necessary [*LOM02 – Practices for Case Documentation and Report Writing*].

4.13.2.1.3 When calculations and/or data transfers occur in the case file, which are not part of a validated process, a second analyst must check the results and record their finding within the case documentation [*LOM02 – Practices for Case Documentation and Report Writing*].

4.13.2.1.4 All technical records supporting a test report, including test results, opinions and interpretations, will be reviewed by another reviewer possessing the relevant knowledge, skills, and abilities to evaluate what was done and interpret the data.

4.13.2.1.5 Each technical record will be traceable to the corresponding case record, reflecting the date(s) testing was performed and be maintained of a permanent nature, following the guidance or record retention per the DFS Record Retention Policy.

4.13.2.2 Examination (technical) notes will include observations, data and calculations. These notes will be recorded contemporaneously with, and will be identifiable to, the specific examination performed by a specific analyst. [*LOM01 – Procedures for the Examination of Evidence*]

4.13.2.2.1 Each page will be numbered, dated, marked with the laboratory case number and initialed by the analyst. Refer to LOM02 – Procedures for Case Documentation and Report Writing.

4.13.2.3 Mistakes which occur in case documentation or records will be corrected with an initialed and dated single strike-out and the correction entered alongside. No part of case documentation or records can be erased or otherwise made illegible. In the case of electronically stored records, equivalent measures will be taken to avoid loss or change of original data. [*LOM01 – Procedures for the Examination of Evidence*].

4.13.2.3.1 Any changes (additions or strikeouts) made to case documentation will be initialed and dated by the person making the change. [*LOM01 – Procedures for the Examination of Evidence*]

4.13.2.3.2 Any change made to completed examination records generated and/or maintained in an electronic form shall be tracked by archiving the original copy with the archive date attached to the file name. The final valid examination records shall be considered completed prior to any technical or administrative review of the records. All electronic records will be stored within the file structure of the secure computer network. This network file structure undergoes a routine scheduled backup of the data, to form a redundant copy to act as an historical/archival record, which can be accessed and retrieved when necessary.

4.13.2.4 The LOM02 – Procedures for Case Documentation and Report Writing, LOM01 – Procedures for the Examination of Evidence and unit quality manuals will identify what documents will be maintained in the case file.

4.13.2.5 Examination documentation will be such that, in the absence of the analyst, another competent reviewer could evaluate the examinations performed and interpret the data. [*LOM01 – Procedures for the Examination of Evidence* and *LOM03 – Procedures for Reviewing a Report of Examination*]

4.13.2.5.1 Records to support conclusions in all disciplines shall meet all applicable requirements addressed in ISO/IEC 17025:2005 materials.

4.13.2.5.2 When instrumental analyses are conducted, operating parameters shall be recorded. The laboratory may document operating parameters in their procedures, examination documents, log book, etc.

4.13.2.6 The FSL case number and the analyst's handwritten, or electronic equivalent, initials (or signature) will be on each page of the examination documentation [*LOM02 – Practices for Case Documentation and Report Writing*].

4.13.2.7 When examination documentation is prepared by an individual(s) other than the analyst who interprets the findings, prepares the report and/or testifies concerning the documentation, the handwritten initials (or electronic equivalent of initials or signature) of that individual(s) will be

on each page(s) of the examination documentation representing his/her work [*LOM02 – Procedures for Case Documentation and Report Writing*]. The electronic equivalent may be a digital signature or initials adopted with the intent to be the equivalent of a handwritten signature or initials and may be further defined in an individual unit's quality assurance manual.

4.13.2.8 All administrative documents received or generated by the FSL for a specific case, will be identified with the FSL case number on each page.

4.13.2.9 The FSL case number for each case for which data was generated shall be appropriately recorded on the printout when data from multiple cases is recorded on a single printout.

4.13.2.10 Every effort will be made to avoid having information recorded on the front and back of an examination document. However, when this is necessary, each side will be identified as an individual page. Each side of the page will be labeled with the FSL case number, date (for technical documents) and analyst's initials.

4.13.2.11 Handwritten case documentation will be in ink. Exceptions will be made when environmental conditions, such as extreme cold or rain, prevent the use of inks. Pencil (including color) may be used for diagrams or tracings. Computer generated notes are acceptable, and will be retained within the file system of the secure computer network.

4.13.2.12 A verification of an identification or association will be conducted by another qualified individual (verifier). A qualified individual is someone who has expertise gained through training and experience and is currently authorized to perform the testing. A record of this review is documented by a unit specific procedure/form. At a minimum, the identity of the verifier, when the verification was performed, and the results of the verification will be recorded. If there is not a qualified person within the FSL for the discipline being reviewed, an external qualified individual may perform the verification.

4.13.2.13 Abbreviations and notations will be acceptable if they are clearly documented and readily comprehensible to the technical and/or administrative reviewer. A list of common abbreviations and/or symbols used will be found in the *FSL Quality Assurance Manual – Appendix A*.

4.13.2.14 All technical pages within the DFS case records must be paginated using the procedure set forth in *LOM02 – Procedures for Case Documentation and Report Writing*.

SECTION 4.14 INTERNAL AUDITS

4.14.1 The *DOM06 – Procedures for Internal and External Audits* will be followed when conducting scheduled audits to verify that operations conform to the requirements of the FSL quality system and ISO/IEC 17025:2005. Audits are performed to measure and evaluate the effectiveness of the quality system, to verify the effectiveness of Quality Corrective Actions, and to recommend improvements for FSL operations. The Deputy Director is responsible for planning and organizing annual audits as required and as requested by the FSL Director. FSL Quality personnel may also conduct periodic audits of its activities to verify that its operations continue to comply with requirements of the management system and as requested by FSL management.

4.14.1.1 Internal audits will be conducted, at minimum, once per calendar year according to the *DOM06 – Procedures for Internal and External Audits*. The audits shall be carried out by trained/qualified personnel who are, wherever resources permit, independent of the activity being audited.

4.14.1.2 Internal audit records will be retained for at least one ISO/IEC 17025:2005 accreditation cycle or five years, whichever is longer.

4.14.1.3 Internal audits will include direct observation of a sampling of testing within each discipline.

4.14.2 When an audit identifies a nonconformity, the Deputy Director or Lead Auditor will address the nonconformity according to the *DOM06 – Procedures for Internal and External Audits*. When necessary, the FSL will notify contributors, in writing, if FSL results have been affected.

4.14.3 An audit report will be issued for every internal audit according to the *DOM06 – Procedures for Internal and External Audits*.

4.14.4 The effectiveness of a Quality Corrective Action resulting from an audit finding will be verified within a 6-month time period [*DOM07 – Practices for Quality Corrective Action*] and written notification provided to the auditee when the nonconformities have been adequately remediated. [D*OM06 – Procedures for Internal and External Audits*]

4.14.5 The Laboratory Manager or designee will submit an Annual Accreditation Audit Report to the accrediting body annually and prior to any assessment performed by the accrediting body.

SECTION 4.15 MANAGEMENT REVIEW

4.15.1 The FSL Director, Unit Managers, and Deputy Director will periodically evaluate the quality system and examination activities to ensure their continued suitability and effectiveness. This management review will be used as the foundation for future development of FSL goals and objectives as well as any necessary changes or improvements to the quality system.

This review shall assess:

- The suitability, adequacy and completeness of FSL policies, practices and procedures for meeting the quality objectives of the FSL and the standards of ISO/IEC 17025:2005.
- Any reports from technical management;
- The outcome of recent internal audits;
- Any preventive, follow-up and/or Quality Corrective Actions;
- Any external assessments;
- The proficiency testing program;
- Changes in the volume and type of work being performed by the FSL;
- Any feedback or complaints from contributors and FSL personnel;
- Any recommendations for improvement;
- The adequacy of the organizational structure, staff training and resources to implement the FSL quality system.

4.15.1.1 Management reviews will be conducted at least once per calendar year.

4.15.1.2 Management reviews will be documented and retained for at least one ISO/IEC 17025:2005 accreditation cycle or five years, whichever is longer.

4.15.2 Findings from management reviews and the actions that arise from them shall be documented. Management will ensure that these actions are carried out within an appropriate and agreed timescale. Any nonconformities identified through the management review process will be appropriately documented and remediated by implementing the *DOM07 – Practices for Quality Corrective Action*.

PART 5 TECHNICAL REQUIREMENTS

SECTION 5.1 GENERAL REQUIREMENTS

5.1.1 The FSL ensures correct and reliable forensic examinations by using adequately trained personnel, appropriate facilities, validated standard operating procedures, properly maintained and calibrated equipment and instrumentation, the uncertainty of measurement, and by maintaining the integrity of evidence. When applicable, traceable reference standards and materials and suitable sampling procedures are utilized.

5.1.2 The FSL will consider the factors cited in the *FSL QAM – Section 5.1.1* when developing and validating standard operating procedures, in the training and qualification of personnel, and in the calibration and maintenance of the equipment that is being utilized in the laboratory.

5.1.3 The FSL casework units will have procedures for routinely checking the reliability of their reagents.

5.1.3.1 Refer to *Appendix B* for information regarding the labeling of reagents prepared in the FSL as well as what information is recorded and maintained by the casework units. Reliability testing of critical regents shall occur before use or, if appropriate, concurrent with the test. Unit specific procedures may establish additional requirements regarding the preparation of reagents.

SECTION 5.2 PERSONNEL

5.2.1 The designated Technical Leader or Unit Manager will ensure that only qualified technical personnel conduct forensic examinations, operate specific equipment, confirm identifications and associations, review results and issue examination reports. Personnel who are undergoing training will be appropriately supervised. Sufficiently detailed training records of personnel can demonstrate the successful completion of a specific training program.

5.2.1.1 Each casework unit within the FSL will have a documented training program that is used to develop an individual's knowledge, skills, and abilities required to perform forensic examinations. The designated Technical Leader or Unit Manager, with approval of the Deputy Director, will ensure that, at a minimum, each trainee successfully completes a competency test in the relevant discipline prior to conducting independent casework. The Unit specific training manuals outline the acceptance criteria for each training module, where applicable. A trainee's successful completion of the training program

will be documented by the Technical Leader, Unit Manager, Deputy Director, or designee identifying the discipline(s) or sub-discipline(s) a trainee is qualified in. Such documentation will be maintained in the employee's training documentation file.

5.2.1.2 Where applicable, training programs will include training in the presentation of evidence in court.

5.2.1.3 Training should include the application of ethical practices in forensic sciences, a general knowledge of forensic science, and applicable criminal and civil law procedures.

5.2.1.4 The re-training of an analyst may occur when findings from a Quality Corrective Action or preventative action indicate that it is necessary. The Deputy Director shall be notified when an employee must undergo re-training. The Deputy Director, with designated subject matter experts, will establish a training plan for the individual based on the root cause findings of deficiencies and develop a re-training program to address those discrepancies. This will be followed with a competency test, which must be successfully completed prior to the scientist being allowed to perform casework. For all documented instances of re-training, there will be a 60-day evaluation of the re-trained analyst following the return to casework duties.

5.2.2 Initial training and continuing education of laboratory personnel is an ongoing function of the laboratory. Specific analytical disciplines will list any special educational class requirements or certifications in their individual job descriptions. Personnel who issue a report that includes the result of a test, a series of tests, an opinion, or an interpretation will meet the minimum education requirements outlined in the position description. Analytical unit training programs are structured to provide the highest level of education to the staff. Each unit-specific training program comprehensively covers all work performed by the unit and requires competency testing upon its conclusion.

Continuing education and professional development are extremely important and strongly encouraged.

The Deputy Director, or designee, will (at least annually) provide a survey to staff members. The survey will seek feedback from DFS scientists on individual and unit specific training needs. The survey is an opportunity for the scientists to describe any training needs that that will assist them in successfully performing the duties of their position. In addition, staff members are encouraged to provide all training desires to their Unit Manager, FSL Director,

and/or the Deputy Director as training needs arise. Requests will be granted in accordance with needs, requirements, and budget when necessary.

Laboratory management encourages membership for scientists in professional organizations as a means of continued professional development. The laboratory encourages scientists to attend meetings and seminars presented by professional organizations and will attempt to give duty time, travel, per diem and lodging for the scientist if funds are available to help defray their expense to attend. Staff members presenting technical papers at recognized symposiums, requiring specialized technical training, or training to maintain certifications will be given due consideration. The DFS may provide opportunities for external training from vendors or other agencies or internal training using DFS resources. Formal requests for training must follow the procedures outlined in the DFS Training and Travel Request Policy.

Some disciplines are required by standards to have at least eight (8) hours of continuing education in their discipline. These hours may be completed at external or internal training sessions. If training occurs internally, the resume of the individual presenting the training, the topic, content and date it occurred, along with the duration of training shall be documented. Such documentation will be maintained in the Unit training documents.

When internal training is provided to DFS staff the effectiveness of that training will be addressed through the customer feedback survey. Each scientist should take time to read periodicals, journals, articles, and in order to remain proficient in the field. The review of scientific periodicals and journals is an important step in the continuing education and professional development of employees.

The FSL also ensures the development of employees via annual performance evaluations which begin and end with each fiscal year. It is the responsibility of both supervisor and staff to meet to establish goals, objectives and/or projects for an employee to complete. Mid-year meetings occur to allow for the supervisor and employee to discuss the progress of the employee or to determine if any areas warrant improvement. The FSL uses the performance evaluation system from the District of Columbia Department of Human Resources.

5.2.3 The FSL uses qualified technical personnel who are employed by, or under contract to, the DFS. Unit management will ensure that competent contractors and key support personnel are supervised and that they work in accordance with the FSL's quality system.

5.2.4 Current job descriptions for all FSL personnel are maintained in the DFS Human Resources Department administrative records.

5.2.5 The Unit Manager, or designee, issues competency memorandums that clearly identifies the jobs FSL employees are approved to conduct. The appropriate manager authorizes qualified personnel to perform forensic examinations and particular types of sampling. Each unit will compile records of an employee's qualifications to include education, professional experience, competency test results, proficiency test results and memos documenting successful completion of the training program(s). All records will be held by the Deputy Director regarding training. The above requirements also apply to contractors.

5.2.5.1 As applicable, authorization will also address personnel performing the technical review of a test record and related test report and personnel performing specific tasks that create items that could be used for testing.

5.2.6 Scientist Qualifications

5.2.6.1 Education

5.2.6.1.1 Scientists working in the Forensic Biology discipline of forensic science shall possess a baccalaureate or an advanced degree in a natural science or a closely related field and, if performing DNA analysis and where applicable, shall meet the education requirements of the *FBI Quality Assurance Standards for DNA Testing Laboratories and/or Quality Assurance Standards for Databasing Laboratories*.

5.2.6.1.2 The minimum education and experience requirements that must be met for ensuring competence of personnel regarding employees performing specific tasks related to testing and employees performing specific tasks that create items are detailed in the applicable position description or Unit QAM.

5.2.6.2 Competency Testing

5.2.6.2.1 All scientists, regardless of academic qualifications or past work experience, must complete a competency test by achieving the intended results prior to assuming casework responsibilities in the FSL.

5.2.6.2.1.1 Each competency test will include, at a minimum, a practical examination covering the spectrum of anticipated work to be performed.

5.2.6.2.1.2 Issuing a test report and providing testimony will also be covered in a module of the training program, as applicable.

5.2.6.2.2 Technical support personnel, regardless of academic qualifications or past work experience, shall satisfactorily complete a competency test prior to assuming independent responsibility for any task that could reasonably be expected to affect the outcome of any examination reported by the laboratory.

5.2.6.2.3 All scientists working in any discipline of forensic science must satisfactorily complete competency testing in each component/parameter or characteristic tested or prior to assuming casework.

5.2.6.2.4 Successful and/or unsuccessful completion of competency testing will be documented by the designated Technical Leader or Unit Manager of such discipline. Documentation will be forwarded to the scientist and the original copy will be maintained by the Deputy Director.

5.2.6.2.4.1 Unsuccessful completion of competency testing will be further documented through a Quality Corrective Action with a mandatory requirement of retraining and re-assessment of the analyst following the re-training.

5.2.7 The FSL maintains relevant books, journals and articles dealing with its accredited disciplines. Literature is available in hard and electronic form. Employees have access to the internet to search and read relevant information in the forensic field.

SECTION 5.3 FACILITIES AND ENVIRONMENTAL CONDITIONS

5.3.1 The DFS Forensic Science Laboratory (FSL) is housed within the Consolidated Forensic Laboratory (CFL) at 401 E Street SW, Washington D.C. 20024. The laboratory facility permits the correct performance of forensic examinations. Casework units will ensure that the environmental conditions do not adversely affect the quality required of any measurement. Any environmental conditions that can affect the results of examinations will be documented in the appropriate standard operating procedure. All examinations require normal laboratory environmental conditions unless noted in a standard operating procedure. Extreme care will be taken when sampling and/or examinations are undertaken at sites other than the CFL facility.

5.3.2 If environmental conditions affect the quality of an examination, casework units will monitor, control and record those conditions as required by a standard operating procedure. Examinations will be stopped when the environmental conditions jeopardize the results or evidence.

5.3.3 FSL units will be responsible for maintaining effective separation between incompatible activities to prevent cross-contamination. [*LOM01 – Procedures for the Examination of Evidence*]

5.3.4 Access to and use of all FSL examination and technical records areas in the CFL facility are controlled and limited. [*DOM01 – Security Procedures*]

5.3.4.1 The disciplines of the FSL located in the CFL facility conform to the policies and/or practices for security which are found in the FSL *DOM01 – Security Procedures*. These policies and practices ensure that:

- Visitors have restricted access to the operational areas of the FSL.
- All exterior entrance/exit points have proximity badge readers.
- FSL internal areas requiring limited/controlled access have a key lock system, biometric scanners and/or access badge card readers.
- Accountability of all FSL access is documented.
  - The DFS Security Office, under control of the PSPD, maintains documentation of assigned access badges.
  - The DGS Facilities Manager maintains documentation and control over the physical keys for the CFL.
  - The FSL Director acts as the security access coordinator and authorizes access to all unit areas within the CFL.
  - Keys and access badges are limited to those individuals designated by the FSL Director to have access to the FSL units in the CFL facility.
- Evidence storage areas are secured and the storage conditions are such as to prevent loss, deterioration and contamination as well as to maintain the integrity of the evidence. This applies both before and after examinations have been performed.

5.3.5 The *DFS Health and Safety Manual* requires good housekeeping in the CFL facility. FSL personnel who perform work in the CFL facility must follow housekeeping procedures in the *DFS Health and Safety Manual*. When necessary, FSL casework units will create special housekeeping procedures to ensure the quality of examinations.

5.3.6 The FSL personnel performing work in the CFL facility shall follow and adopt the DFS health and safety program. The *DFS Health and Safety Manual*

outlines the health and safety program and DFS personnel must demonstrate adherence to this program. FSL personnel performing work in the CFL facility must follow the DFS *Health and Safety Manual*.

SECTION 5.4 TEST AND CALIBRATION METHODS AND METHOD VALIDATION

5.4.1 General

Standard operating procedures (SOPs), including validated technical procedures, are a key element in establishing and maintaining quality within the FSL. Thus, it is the policy of the FSL for casework units to have and use written procedures for all examinations within their scope. [*DOM03 – Procedures for Writing Standard Operating Procedures].* These procedures include, when necessary, handling, transfer, storage and preparation of evidence to be examined. Where applicable, SOPs will have sections for the estimation of the measurement of uncertainty; sampling; calculations, including any statistical techniques for the analysis of examination data; and limitations of the procedure including any quality affecting environmental conditions. All SOPs used in the FSL will be reviewed and authorized prior to implementation according to the *DOM03 – Procedures for Writing Standard Operating Procedures.*

Casework units will have procedures for operating all FSL equipment and for handling and preparing evidence for examination to ensure the quality of the results. Any deviations from a standard operating procedure will be documented, justified and authorized according to *FSL QAM Section 4.9.3*.

5.4.1.1 The Unit Manager or designee will be responsible for maintaining standard operating procedures and ensuring that procedures are readily available to appropriate personnel through the use of the Qualtrax Compliance Software and other sources.

5.4.1.1.1 The Unit Manager, Technical Leader, Lead Scientist, or designee will be responsible for ensuring the laboratory uses appropriate procedures for test data interpretation.

5.4.1.1.2 Test methods involving the comparison of an unknown to a known are outlined by the units. The unit guidelines include:

- An evaluation of the unknown item(s) to identify characteristics suitable for comparison.

And / Or

- If applicable, an evaluation of characteristics suitable for statistical rarity calculations, prior to comparison to one or more known items.

5.4.1.2 Standard operating procedures specify the use of appropriate standards and controls. Any standards or controls used will be recorded in the examination documentation. [*DOM03 – Procedures for Writing Standard Operating Procedures*; *LOM01 – Procedures for the Examination of Evidence*]

5.4.2 Selection of Technical Procedures

When the contributor does not specify the method to be used, the laboratory shall select the appropriate analytical method(s). The Unit Manager or designee shall inform the contributor when the method proposed by the contributor is considered to be inappropriate or out of date. Analysts will select appropriate technical procedures to meet the needs of the contributor while taking into account the nature of the evidence and the facts of the case. These technical procedures should be published either in international, regional or national standards, or by reputable technical organizations, or in relevant scientific texts or journals, as specified by the manufacturer of the equipment or developed by the FSL. If the FSL uses a standard procedure, it will use the latest edition when possible. The standard procedure will be supplemented with additional details to ensure consistent application. The FSL will confirm that it can properly use a standard procedure prior to introducing it for forensic examinations. If the standard procedure changes the confirmation will be repeated. FSL developed technical procedures or procedures adopted by the FSL, including standard procedures, are used as appropriate.

5.4.2.1 The reliability of a validated technical procedure that is new to the FSL will be confirmed in-house against any documented performance characteristics of that procedure prior to use on casework. Records of performance checks conducted during the validation process will be maintained in the casework units for future reference.

5.4.2.2 If within a 6-month window a validated test or analysis has not been performed, it will be considered an infrequently utilized process within the FSL.

5.4.2.2.1 If an infrequently utilized process is needed for casework, a successful verification of the process must be performed and documented using a reference standard prior to testing the casework sample.

5.4.2.3 The quality of all reference materials and reagents must be successfully verified and documented before they are used in casework. Documentation must include, at a minimum, the lot number or batch number associated with the reference material or reagent.

5.4.2.4 All critical reagents must be successfully tested and documented before they are used in casework. Documentation must include, at a minimum, the lot number or batch number associated with the reference material and the critical reagent.

5.4.2.5 All reference materials and reagents must be barcoded, where the electronic system retains the associated labeling information, or must be labeled with the following: name, concentration (when appropriate), preparation date and/or expiration date (where appropriate), initials of the preparer, storage conditions (where applicable), and hazard warnings (where applicable).

5.4.3 FSL Developed Technical Procedures

When a casework unit develops a technical procedure, it will be a planned activity that is performed by qualified personnel with adequate resources. Any significant changes occurring during the development of the procedure will be effectively communicated to all personnel involved in the development process. See *DOM04 – Procedures for Validating Technical Procedures*.

5.4.4 Deviation from Technical Procedures

Casework units will use validated technical procedures; however, this does not prevent the analyst from deviating from a procedure if the nature of the evidence precludes the use of a standard operating procedure. Changes to or deviations from a technical procedure must be within the bounds of good laboratory practice, documented, justified and authorized according to *FSL QAM Section 4.9.3*. Methods that deviate from standard operating procedures shall be subject to agreement with the contributor and shall include a clear specification of the contributor's requirements and the purpose of the test. The method must be validated appropriately before use.

5.4.5 Validation of Technical Procedures

5.4.5.1 Appropriate validation studies will be conducted on all new technical procedures used for the analysis of evidence.

5.4.5.1.1. If in extraordinary cases when circumstances of the case and the analytical processes used are fully documented but where methods are employed without prior performance verification, the agency cannot claim accredited status for test results obtained through the use of the non-validated procedure(s).

5.4.5.2 Validations for new technical procedures will be performed according to the *DOM04 – Procedures for Validating Technical Procedures* to ensure the procedure produces reliable results. The validation process determines the limitations of the procedure, the conditions under which reliable results can be obtained, and the critical aspects of the procedure that must be carefully controlled and monitored. Units will maintain records of the validation including, but not limited to, the procedure used, the results, and a statement as to whether the technical procedure is fit for its intended use.

5.4.5.2.1 When implementing DOM04, each unit will ensure the procedure for method validation:

- Encompasses the test process to include data interpretation.
- Establishes the data required to report a test result, opinion, or interpretation.
- Identifies limitations of the test method, reported test results, opinions and interpretations.
- Specifies when a currently validated method, including associated data interpretation, needs additional validation.
- Requires a validation plan providing direction for parameter evaluation and parameter acceptance criteria to determine if the method is fit-for-purpose prior to starting a method validation.

5.4.5.3 When validating a technical procedure, the scope and accuracy will be assessed to ensure that the procedure meets the requirements of a given application and shall be relevant to the contributor's needs.

5.4.5.4 Prior to implementation of a validated method new to the laboratory, the reliability of the method shall be demonstrated in-house against any documented performance characteristics of that method. Records of performance verification shall be maintained for future reference.

5.4.6 Estimation of Uncertainty of Measurement

5.4.6.1 The FSL is not a calibration laboratory or a testing laboratory that performs its own calibrations. The laboratory uses outside vendors to perform calibrations. These vendors shall have and apply a procedure to estimate the uncertainty of measurement for all calibrations and types of calibrations. Conformance shall be accomplished as per FSL unit-specific SOP's.

5.4.6.2 Standard operating procedures, when applicable, will include considerations for estimating the uncertainty of measurement. If the

nature of the examination procedure precludes a metrologically and statistically valid calculation of uncertainty of measurement, the units will attempt to identify all the components of uncertainty and produce a reasonable estimate.

Casework units will identify each SOP in which uncertainty of measurement may be reported. If a quantitative numerical measurement result is included in an FSL *Report of Examination*, the uncertainty of measurement must be reported. Additionally, an FSL *Report of Examination* must not give a wrong impression of the uncertainty of measurement.

All units reporting quantitative test results will have and apply a procedure to estimate the uncertainty of measurement. The procedure for estimation of measurement uncertainty:

- Requires the specific measuring device or instrument used for a reported test result to have been included in or evaluated against the estimation of measurement uncertainty for that test method.
- Includes the process of rounding the expanded uncertainty.
- Requires the coverage probability of the expanded uncertainty to be a minimum of 95.45%.
- Specifies the schedule to review and/or recalculate the measurement uncertainty.

Records will be maintained by the casework units to describe the process used to develop the estimation of uncertainty. Estimates of uncertainty of measurement must be available for review when any of the following conditions exist:

- The measurement of uncertainty is relevant to the validity or interpretation of the examination results.
- The measurement of uncertainty is required by the contributor.
- The measurement of uncertainty affects compliance to a specific limit.

5.4.6.3 Estimation of measurement of uncertainty will be based on knowledge of the performance of the method, previous experience and validation data as well as any significant parameters that affect the measurement result as per unit-specific SOP's.

5.4.6.4 The following records are maintained for each estimation of measurement uncertainty:

- A statement defining the measurand,
- A statement of how traceability is established for the measurement,
- The equipment (e.g. measuring device(s) or instrument(s) used,
- All uncertainty components considered,

- All uncertainty components of significance and how they were evaluated,
- Data used to estimate repeatability, intermediate precision, and/or reproducibility,
- All calculations performed,
- And the combined standard uncertainty, the coverage factor, the coverage probability, and the resulting expanded uncertainty.

5.4.7 Control of Data

5.4.7.1 Casework units will ensure that calculations and data transcriptions are systematically checked for accuracy via technical review of the casework, as per *LOM03- Procedures for Reviewing a Report of Examination.*

5.4.7.1.1 The test record will indicate the check was performed and who performed the check as indicated in LOM03.

5.4.7.2 When computers or automated equipment are used for forensic examinations, acquisition, processing, recording, reporting, storage, or retrieval of test data, the casework units will ensure that:

- Computer software developed in-house is documented, evaluated and validated prior to use;
  - All records of the validation are maintained.
- Procedures for protecting test data maintain the integrity and confidentiality of the data.

5.4.7.2.1 Operating and environmental conditions are maintained such that computers and automated equipment function properly to maintain the integrity of the test data (See NTI Now Technologies Inc. *FiiS Back-up Procedure, April 10, 2013*, and the *Enterprise Cloud Infrastructure Services (ECIS)* agreement.

SECTION 5.5 EQUIPMENT

5.5.1 The FSL is furnished with, or has access to, all items needed for the correct performance of forensic examinations. All instruments and equipment having an effect on the accuracy or validity of forensic examination results will be properly maintained and calibrated. Requirements for instrument calibration and maintenance are specified in the *DOM05 – Procedures for Instrument Calibration and Maintenance*. In those cases where a casework unit needs to use equipment outside its permanent control, it will ensure that the requirements of ISO/IEC 17025:2005 are met as per unit specific SOP's.

5.5.2 Equipment and its software used for the examination of evidence must meet the requirements of the relevant standard operating procedure. Before being placed into service, equipment will be calibrated and/or checked by the casework unit to verify that it meets the unit's specifications. Units will, as appropriate, establish calibration programs for equipment having a significant effect on the results. Equipment will also be calibrated and/or checked before use in accordance with a unit specific SOP. [*DOM05 – Procedures for Instrument Calibration and Maintenance*]

5.5.3 FSL equipment will be operated by qualified personnel. [*FSL QAM – Section 5.2*] Units will keep up-to-date instructions for the use and maintenance of equipment. The manufacturer's manuals for equipment will also be available to the appropriate personnel.

5.5.4 FSL instruments, equipment and their associated software used for forensic examinations will be uniquely identified.

5.5.5 Casework units will maintain records of each instrument and its associated software used for forensic examinations according to the *DOM05 – Procedures for Instrument Calibration and Maintenance*.

5.5.6 Casework units will have procedures for appropriate storage, transportation, use and planned maintenance of portable equipment to ensure proper functioning. [*DOM05 – Procedures for Instrument Calibration and Maintenance*]

5.5.7 Any instrumentation that is malfunctioning will be taken out of service and clearly labeled to prevent use until repairs are completed. Only when it is shown by calibration or a performance check to operate correctly will the instrument be returned to service. [*DOM05 – Procedures for Instrument Calibration and Maintenance*] Units will determine the effect of the malfunction, if any, on test results and implement "Control of Nonconforming Testing" in the *FSL QAM – Section 4.9*, when necessary.

5.5.8 FSL instrumentation requiring calibration will be labeled or otherwise identified to indicate the calibration status, when practicable. [*DOM05 – Procedures for Instrument Calibration and Maintenance*]

5.5.9 Calibration procedures or performance checks must be satisfactorily completed by the appropriate casework unit on any instrument that goes outside the control of the FSL prior to its return to service. [*DOM05 – Procedures for Instrument Calibration and Maintenance*]

5.5.10 When necessary, performance checks will be carried out on calibrated equipment according to the appropriate SOP. [*DOM05 – Procedures for Instrument Calibration and Maintenance*]

5.5.11 Where instrument calibrations or performance checks produce a set of correction factors, the casework units will have measures to ensure that the correction factors are made available to appropriate personnel.

5.5.12 Casework units will ensure that instrumentation used for forensic examinations, including both hardware and software, will be safeguarded from adjustments which would invalidate the test results. These measures may include the use of passwords.

5.5.13 Disposable equipment shall not be reused and shall be disposed of after use to ensure reuse and/or contamination does not accidentally occur.

SECTION 5.6 MEASUREMENT TRACEABILITY

5.6.1 General

The FSL requires that instrumentation will be calibrated prior to being put into service for forensic examinations according to the *DOM05 – Procedures for Instrument Calibration and Maintenance*.

5.6.1.1 FSL unit specific SOP's will document established calibration or performance check intervals for each instrument requiring calibration. Intervals will generally not be longer than the manufacturer's recommendations. However, instruments that are not calibrated or performance checked according to the manufacturer's recommended interval will be calibrated or performance checked prior to use. If an instrument can be affected by a power interruption, unit personnel will check the calibration after a shutdown, whether deliberate or otherwise. Instrument calibration will be checked following service or other substantial maintenance. [*DOM05 – Procedures for Instrument Calibration and Maintenance*]

5.6.2 Specific Requirements

5.6.2.1 Calibration
The FSL is not a calibration laboratory.

5.6.2.1.1 The FSL uses outside vendors for equipment calibration. The traceability of measurement shall be assured by using vendors that can demonstrate competence, measurement capability and traceability. The calibration certificates issued by these

laboratories shall contain the measurement results, including the measurement of uncertainty and/or a statement of compliance with an identified metrological specification. If the outside vendor is conducting a calibration on instrumentation that has a significant effect on the accuracy or validity of sampling or test results, the outside vendor must be accredited to ISO/IEC 17025:2005 by an accrediting body that is a signatory to the ILAC Mutual Recognition Arrangement, with the calibration to be performed listed on the scope of accreditation or a National Metrology Institute that is a signatory to the BIPM - CIPM Mutual Recognition Arrangement with the calibration to be performed listed in Appendix C of the BIPM key comparison database.

- If an external calibration service supplier meeting the above requirement is not available, the laboratory will confirm competence, measurement capability, and measurement traceability for the supplier and the service being purchased and maintain record of the confirmation.

5.6.2.1.2 Each unit will maintain a list of the equipment requiring calibration, any specifications for the calibration vendor, any specified requirements of the calibration, and the interval of calibration.

5.6.2.1.3 The frequency of the checks will be outlined in the SOPs.

5.6.2.1.4 Any extension of the interval of intermediate checks and the interval of calibration will be based on empirical data and an evaluation of risk.

5.6.2.2 Testing

5.6.2.2.1 If it has been established that an instrument's calibration contributes little to the total uncertainty of the test result, casework units will ensure that the instrument used can provide the necessary uncertainty of measurement. If the calibration is a significant component of the measurement uncertainty, casework units must establish traceability to the International System of Units (SI units) for the calibration as per unit specific SOP's.

5.6.2.2.2 Measurements made by casework units should be traceable to SI units. The link to SI units may be achieved by reference to national measurement standards.

Where traceability of measurements to SI units is not possible and/or not relevant, casework units will establish traceability to other appropriate measurement standards such as certified reference materials or reference standards.

5.6.3 Reference Standards and Reference Materials

5.6.3.1 Reference Standards

Casework units will have procedures for the calibration of their reference standards to ensure that the calibrating organization provides traceability to SI Units by a means of an unbroken chain of calibrations or comparisons linking the reference standards to the relevant primary standards of the SI units of measurement. Units will only use a reference standard for calibration purposes unless it can be shown that any additional use will not invalidate it. When appropriate, reference standards will be calibrated before and after any adjustment (see unit specific SOP's).

5.6.3.2 Reference Materials

Reference materials, where possible, will be traceable to SI units or to certified reference materials. Internal reference materials will be checked to verify their suitability.

5.6.3.2.1 Casework units utilizing reference collections for identification, comparison or interpretation purposes will document, uniquely identify and properly control such references. These references may include infrared spectra, mass spectra, DNA profiles and frequency databases (see unit specific SOP's).

5.6.3.2.2 The DFS will utilize suppliers of certified reference material who are either a National Metrology Institute that is a signatory to the BIPM - CIPM Mutual Recognition Arrangement with the certified reference material listed in the BIPM key comparison database (KCDB) or an accredited reference material producer that is accredited to ISO 17034:2016 by an accrediting body that is a signatory to a mutual or multilateral recognition arrangement in an ILAC recognized regional accreditation cooperation or the ILAC Mutual Recognition Arrangement, with a scope of accreditation covering the certified reference material.

5.6.3.2.2 If a reference material supplier who meets the above conditions is not available, the DFS will confirm competence, measurement capability, and measurement traceability for the supplier and product being purchased. Objective evidence of the confirmation will be maintained.

5.6.3.2.3 If a certified reference material is changed in a way that alters the traceable measurement value, the equipment used to alter the certified reference material will be evaluated for applicability of measurement traceability accreditation requirements.

5.6.3.3 Intermediate Checks

Casework units will perform checks on reference, primary, or working standards as well as reference materials to maintain confidence in their calibration status in accordance with the appropriate SOPs.

5.6.3.3.1 Any extension in the interval of intermediate checks will be based on empirical data and an evaluation of risk.

5.6.3.4 Transport and Storage

To protect the integrity of reference standards and materials, casework units will have procedures for their handling, transport, storage and use.

5.6.3.5 Reference Collections

5.6.3.5.1 Casework units utilizing reference collections for identification, comparison or interpretation purposes will document each entry, uniquely identify and properly control such references, protecting the characteristics of interest. These references may include infrared spectra, mass spectra, bullets, cartridges DNA profiles and frequency databases (see unit specific SOP's).

SECTION 5.7 SAMPLING

Sampling plans are required when taking part of a representative sample of a substance, material or item to provide for testing and reporting on the whole substance, material or item.

5.7.1 Each casework unit, when necessary, will have plans and procedures for the sampling of evidence included in the appropriate SOPs. Sampling plans will be

based on statistical methods when reasonable. The sampling plans will address the factors to be controlled to ensure the validity of the examination results.

5.7.1.1 At a minimum, unit sampling plans will ensure:

- An evaluation of the selected population for homogeneity is performed.
- The population has a reasonable expectation of homogeneity.
- The sampling plan makes use of probability and provides and opinion or interpretation with a minimum confidence level of 95% (specifically, 95.45%).
- Each item selected meets the sampling plan level of confidence to be tested completely.
- Appropriate action is taken if one or more of the selected items demonstrates a lack of homogeneity.

5.7.2 If the contributor or the nature of the evidence requires deviation or exclusion from the sampling plan described in the appropriate SOP, the deviation will be approved by the Unit Manager or designated Technical Leader and documented by the analyst. This deviation will be recorded in detail in the examination documentation and follow policies addressed in Section 4.9.3.

5.7.3 Casework units, as applicable, will document appropriate sampling data and activities relating to the forensic examination process. Records maintained in the FSL file will include the sampling procedure used, the identification of the individual performing the sampling, any relevant environmental conditions, diagrams of the sampling location as necessary and, if relevant, the statistical basis for the sampling procedures.

SECTION 5.8 HANDLING OF TEST ITEMS

5.8.1 The FSL maintains practices for the transportation, receipt, handling, protection, storage, retention and/or disposal of items of evidence. These practices give guidance for protecting the integrity of evidence, protecting the interest of the FSL and the interests of the contributor. [*DOM10 – Procedures for Handling Evidence and Clinical Specimens; LOM01 – Procedures for Examination of Evidence*]

5.8.1.1 The FSL uses a *Chain of Custody Report* to document all internal transfers of evidence in chronological order from the time of receipt. This documentation illustrates that the evidence examined and reported on was that which was submitted to the FSL. The *Chain of Custody Report* securely and accurately identifies each person taking possession of an item of evidence or the location of that item. This log includes:

- A signature (handwritten or electronic), or equivalent identification, of the person/location receiving and/or transferring the evidence;
- The date of receipt or transfer;
- The unique identifier of the evidence.

5.8.1.1.1 For all internal transfers, tracking evidence on a chain of custody applies to all evidence items received, in addition to, sub-items created when evidence is sub-divided.

5.8.1.1.2 The laboratory shall ensure that the evidence accepted and stored in the laboratory is properly packaged and sealed according to the *DOM10 – Procedures for Handling Evidence and Clinical Specimens*.

- This is done in order to protect the integrity of all items while in the possession of the laboratory.
- Evidence items will be re-sealed as soon as practicable after the requested testing is completed.

5.8.1.1.3 The *DOM10 – Procedures for Handling Evidence and Clinical Specimens* describes the measures taken to secure unattended evidence which is in the process of being examined. All evidence not in the process of examination will be maintained in an appropriate storage area.

5.8.1.2 Evidence disposition is included on the unit *Report of Examination* and provided to the requesting customer when the case is fully completed.

5.8.2 The FSL will identify evidence items using a laboratory number and item number. The identification of evidence will remain in place while the items are in the FSL. These practices ensure that items of evidence are uniquely identified and provide for subdivided and secondary evidence. Evidentiary items will be transferred within and from the FSL according to the *DOM10 – Procedures for Handling Evidence and Clinical Specimens*.

5.8.3 Upon receipt of the evidence, the condition of the evidence will be evaluated and any conditions adverse to quality will be recorded. When the suitability of an item of evidence for examination is questionable, or there is a discrepancy between the evidence and the request for examination, or the request for examination is unclear, the Unit Manager will contact the contributor for clarification prior to proceeding with any testing. This communication will be documented in the *Case Activities Log*. Print-outs of electronic communications may supplement the *Case Activities Log* in the case file.

5.8.4 The FSL will ensure the integrity of evidence by protecting items from loss, cross-transfer or deleterious change during storage, handling and preparation

according to the *DOM10 – Procedures for Handling Evidence and Clinical Specimens* and *LOM01 – Procedures for the Examination of Evidence*. Appropriate handling instructions provided with an item will be followed. When evidentiary items have to be stored or handled under specified environmental conditions, these conditions will be maintained, monitored and recorded. The *DOM10 – Procedures for Handling Evidence and Clinical Specimens* describes how drug and valuable evidence will be stored and handled.

5.8.4.1 Any evidence not in the process of examination must be placed in a container to protect it from loss, cross-transfer or contamination and will be stored under proper seal. [*DOM10 – Procedures for Handling Evidence and Clinical Specimens*]

5.8.4.1.1 All evidence not in the process of examination will be maintained in an appropriate storage area according to the *DOM10 – Procedures for Handling Evidence and Clinical Specimens*.

5.8.4.2 The *DOM10 – Evidence Handling Procedures* describes the measures taken to secure unattended evidence which is in the process of being examined. All evidence not in the process of examination will be maintained in an appropriate storage area.

5.8.4.2.1 Evidence in the process of examination/analysis will not be open-ended. Scientists will make every effort to complete analyses within the goal turnaround times for each unit. Circumstances to which this time frame might need to be extended will be brought to the attention of the Unit Manager.

5.8.4.3 Each item of evidence will be marked to ensure that it is uniquely identified and traceable to the FSL number. If the evidence does not lend itself to marking, its proximal container or identifying tag will be marked. When original evidence is returned to the owner, marking on the proximal container (e.g., evidence bag) is acceptable.

5.8.4.4 When evidence, such as latent prints and impressions, can only be recorded or collected by photography or digital capture and the print or impression itself is not recoverable, the photograph, negative or digital image of the print or impression will be treated as evidence. This excludes documentation photos of digital evidence where a “best evidence” copy it retained as evidence and the photos only document the condition of the device.

5.8.4.5 Evidence collected by FSL personnel from a crime scene will be protected from loss, cross-transfer, contamination and/or deleterious

change whether in a sealed or unsealed container during transfer to the FSL or appropriate evidence facility. Where appropriate, further processing to preserve, evaluate, document, or render evidence safe shall be accomplished prior to final packaging. Crime scene evidence will be properly identified, packaged and entered into the evidence control system as soon as possible.

5.8.4.6 Appropriate casework units will have procedures for the operation of individual characteristic databases (ICD).

5.8.4.6.1 Appropriate casework units will establish whether individual characteristic database samples are treated as evidence, reference materials, or examination documentation.

5.8.4.6.2 ICD samples under the control of the laboratory shall be uniquely identified.

5.8.4.6.3 ICD samples not treated as evidence and under control of the FSL will be uniquely identified. They will also be protected from loss, cross transfer, contamination and/or deleterious change.

5.8.4.6.4 Access to ICD samples will be restricted to those persons authorized by the Unit Manager.

SECTION 5.9 ASSURING THE QUALITY OF TEST RESULTS

5.9.1 FSL units will have quality control procedures for monitoring the reliability and validity of forensic examinations. The resulting data of each quality control activity will be recorded in such a way that trends are detectable. Where practicable, statistical techniques will be applied when reviewing the results. Quality control measures may include, but are not limited to, the following:

- Routine use of certified reference materials and/or secondary reference materials;
- Participation in proficiency testing programs;
- Replicate tests using the same or different methods;
- Retesting of retained items;
- Correlation of results for different characteristics of an item of evidence.

5.9.1.1 Appropriate controls and standards shall be specified in the methods and their use recorded in the case record.

5.9.2 FSL units will have procedures for evaluating quality control data against best professional practice. When the data is found to be outside the defined criteria,

appropriate actions will be taken to correct the problem to prevent incorrect results from being reported.

5.9.3 Proficiency testing is an integral part of the FSL quality system. It is one of many quality control measures used to monitor the FSL's own performance as well as identify areas where improvement may be needed. The proficiency testing process is designed to demonstrate FSL personnel performing forensic examinations produce reliable work and analytical procedures are conducted within the established performance criteria. Proficiency testing applies to FSL personnel documented as competent in a particular forensic discipline, to include all applicable sub disciplines.

5.9.3.1 Casework units will follow the appropriate SOP(s) when participating in proficiency testing programs. While proficiency tests are to be completed as one would complete casework, proficiency testing participants shall limit their discussion of the test to direct supervisors and technical leaders and not those who are participating in the round of testing.

5.9.3.1.1 Successful completion of proficiency tests will be determined upon receipt of the results from the vendor or after review of the proficiency test against the expected results for an internal proficiency test. A test without any discrepancies will be considered a successful and passing proficiency test. A test with any discrepancies will be evaluated by the unit manager, technical leader, or designee for the type of error (administrative, interpretive, systemic, systematic, etc.) and will be determined as satisfactory with comments to support the determination or unsatisfactory with comments to support the result.

5.9.3.1.1.1 Any discrepancies will be documented and will be addressed as appropriate. When addressing a discrepancy, the frequency and impact of the error will be evaluated and corrective action will be implemented as applicable. If the error is determined to be a personnel issue and not a quality issue, it will be handled by management and not through the quality system. Management review of proficiency test discrepancies may result in termination of position.

5.9.3.1.2 The evaluation of the proficiency test will be documented and acknowledged by the participant. The proficiency test evaluation will contain, at a minimum: the name of the test participant, the discipline tested, the test identification number,

the results (satisfactory or unsatisfactory) and when appropriate, a description of any discrepancies and any corrective action(s). The evaluation will be signed by both the evaluator and the proficiency testing participant.

Note: In the event the proficiency testing participant has separated from the agency or refuses to sign the evaluation, the unit manager or designee may document the separation or refusal in place of the signature with the date of the evaluation or refusal noted.

5.9.3.2 The FSL proficiency testing program will comply with the ISO/IEC 17025:2005 and ANAB supplemental requirements.

5.9.3.2.1 The FSL ensures expected proficiency test results are not known or readily available to the test taker.

5.9.3.3 At least one external proficiency test will be completed for each discipline listed on the laboratory's scope of accreditation at the location(s) listed on the scope with authorized release of the results to the accrediting body from the test provider.

5.9.3.3.1 Scientists performing DNA analysis will comply with the proficiency test requirements of the Quality Assurance Standards for Forensic DNA Testing Laboratories.

5.9.3.3.2 All authorized personnel engaged in testing activities shall be internally or externally proficiency tested at least once per calendar year, in each discipline of testing appearing on the laboratory's scope of accreditation, in which the individual performs testing. The Quality team maintains a schedule for proficiency testing.

5.9.3.3.3 Proficiency tests will be completed as casework, utilizing only approved test methods.

5.9.3.3.4 All appropriate technical records will be retained.

5.9.3.3.5 External proficiency test results will be submitted to the proficiency test provider on or before the due date.

5.9.3.4 Proficiency test providers accredited to ISO/IEC 17043 will be used, where available and appropriate for the testing conducted.

5.9.3.4.1 The Deputy Director or designee will ensure the proficiency test discipline is listed on the scope of accreditation of a proficiency test provider accredited to ISO/IEC 17043 by an accrediting body that is a signatory to the APLAC MRA or IAAC MLA.

5.9.3.4.2 If there is not an accredited test provider available for a particular discipline, the laboratory will submit an alternative plan to the accrediting body for approval in order to assess the laboratory's performance.

5.9.3.5 The Deputy Director or designee maintains proficiency testing records.

5.9.3.6 Proficiency testing records will be retained not less than one full ISO/IEC 17025:2005 accreditation cycle or four years, whichever is longer, by the Deputy Director or designee. Those records will include, at a minimum: test identification number (test set identifier), discipline tested, method used to obtain or create samples, the proficiency test results, documentation of the release of results to the accrediting body or documentation of the direct reporting to the accrediting body, an evaluation of the results and the action taken for unexpected results, documentation of feedback provided to the participants. Any additional records or components of the proficiency testing process will be maintained as applicable.

5.9.4 Technical reviews of examination documentation and *Reports of Examination* will be conducted according to the *LOM03 – Procedures for Reviewing a Report of Examination*.

5.9.4.1 The *LOM03 – Procedures for Reviewing a Report of Examination* delineates the scope of the technical review.

5.9.4.2 Technical reviews will be conducted by individuals having expertise gained through training and experience in the discipline being reviewed, as well individuals having knowledge of the laboratory's technical procedures. Additionally, technical reviewers will have been competency tested for the task encompassed in the review, documented with an authorization memorandum. The designated Technical Leader or Unit Manager will maintain a list of approved technical reviewers.

5.9.4.3 Technical reviews shall not be conducted by the author or co-author(s) of the examination records or test report(s) under review. Individuals who perform verifications are not considered as authoring examination

records and therefore, if approved as a technical reviewer, can perform technical reviews.

5.9.4.4 Technical reviewers will ensure the results, opinions, and interpretations are accurate, properly qualified, and supported by the technical record. Further, technical reviewers will ensure conformance with test methods and applicable policies and procedures. If a discrepancy is found, the technical reviewer will follow the course of action outlined in *LOM03 – Procedures for Reviewing a Report of Examination*.

5.9.4.4.1 In the event a discrepancy found during technical review is the result of a nonconformance to a policy or procedure, refer to *DOM07 – Practices for Quality Corrective Action*.

5.9.5 Administrative reviews will be conducted on all documentation in the FSL file as well as the FSL *Report of Examination* prior to its release according to the *LOM03 – Procedures for Reviewing a Report of Examination*. Individuals will be trained to gain the necessary expertise to perform administrative reviews on casework. The designated Technical Leader or Unit Manager will maintain a list of approved administrative reviewers. Administrative reviews shall be conducted by someone other than the author(s) of the report.

5.9.5.1 The scope, content of and documentation of an administrative review is defined according to the *LOM03 – Procedures for Reviewing a Report of Examination*.

5.9.6 The FSL will follow the *LOM04 – Practices for Court Testimony Monitoring* whereby the testimony of all testifying personnel is monitored and evaluated at least once per year. Each individual will be given feedback by the Unit Manager or designated Technical Leader. If the evaluation is less than satisfactory, the Unit Manager, or designated Technical Leader may initiate remedial action(s) according to the *LOM04 – Practices for Court Testimony Monitoring*.

5.9.7 Records on testimony monitoring will be retained in the employee's personnel file according to *LOM04 – Practices for Court Testimony Monitoring*. Records will be retained not less than one full ISO/IEC 17025:2005 accreditation cycle or five years, whichever is longer.

SECTION 5.10 RESULTS REPORTING

5.10.1 General Requirements

FSL personnel will accurately, clearly, unambiguously and objectively report the results of each examination according to the *LOM02 – Procedures for Case Documentation and Report Writing*. FSL *Reports of Examination* will include information regarding the examinations conducted and any information necessary for the interpretation of the examination results.

5.10.1.1 The FSL shall have a policy describing reasons or conditions for not producing a test report of examination results.

5.10.2 Content of Reports of Examination

The *LOM02 – Procedures for Case Documentation and Report Writing* provides guidance for the content of an FSL *Report of Examination*. Analysts must limit their conclusions to those that logically follow from the underlying data and analytical results, and cannot base conclusions on unstated assumptions or information that is collateral to the examinations performed. Also, an analyst must not draw conclusions that overstate the significance of the technical or scientific examinations.

5.10.2.1 The units are responsible for outlining how to properly qualify the significance of associations whether by a statistic or qualitative statement.

5.10.2.2 Further, the units will also address how the analyst will clearly communicate the reason(s) when the reported results indicate that no definitive conclusion can be reached.

5.10.3 Additional Report of Examination Guidelines

5.10.3.1 An FSL *Report of Examination* may include additional information, deviations from, additions to, or exclusions from the test method and information on specific test conditions such as statement on the uncertainty of measurement or a statement of the compliance / non-compliance to the standards when it is necessary for the interpretation of the examination results according to the *LOM02 – Procedures for Case Documentation and Report Writing.*

5.10.3.1.1 The estimated uncertainty is required to be included in the test report when it impacts the evaluation of a specification limit stated by a regulatory body, a statute, case law, or other legal requirement. When reported, the uncertainty statement is required to include the measured quantity value, y, along with the associated expanded uncertainty, U, and the coverage probability and in the format of y ± U and the units of y and U to be consistent. The rounded expanded uncertainty is limited

to at most two significant digits, unless there is documented rationale for reporting additional significant digits; and the rounded expanded uncertainty is to be reported to the same level of significance as the measurement result.

5.10.3.2 An FSL *Report of Examination* may include additional information regarding sampling, when it is necessary for the interpretation of the examination results according to the *LOM02 – Procedures for Case Documentation and Report Writing*.

5.10.3.2.1 Sampling details may include, but are not limited to, the date of sampling, the identification of the substance, material, or product sampled, the location of sampling, environmental conditions, a reference to the sampling plan, to include confidence levels and corresponding inferences regarding the population, and any other standards or specifications, or deviations, additions, or exclusions from such specifications, when present.

5.10.3.3 FSL *Reports of Examination* are issued according to the *LOM02 – Procedures for Case Documentation and Report Writing.*

5.10.3.3.1 This includes the reporting of initial database entry (e.g., CODIS, AFIS, NIBIN).

5.10.3.3.2 Reporting of an association resulting from a database search is further detailed in LOM02 and the SOPs of the applicable unit.

5.10.3.4 Analysts who issue findings, including writing reports and providing testimony, based on examination documentation generated by another person will document the review of examination documentation according to the *LOM02 – Procedures for Case Documentation and Report Writing.*

5.10.3.5 The significance of an association will be included in the FSL *Report of Examination*.

5.10.3.6 When a definitive conclusion cannot be reached, the reason will be clearly stated, as applicable, in the FSL *Report of Examination* (*LOM02 – Practices for Case Documentation and Report Writing*.)

5.10.3.7 Analysts who prepare a FSL *Report of Examination* will have participated in, observed, supervised, or technically reviewed the examination(s) being reported.

5.10.3.8 A FSL *Report of Examination* may include additional information required by specific methods or contributors.

5.10.4 Calibration Certificates

The FSL does not issue calibration certificates.

5.10.5 Opinions and Interpretations

Opinions and interpretations are identified in FSL *Reports of Examination* according to the *LOM02 – Procedures for Case Documentation and Report Writing*. An analyst will document the basis for his/her opinions and/or interpretations in the examination documentation [*FSL QAM – Section 5.10.2*].

5.10.6 Testing Results Obtained from Subcontractors

When the FSL subcontracts or facilitates forensic examinations, the entity conducting the examinations will provide a report of their results, in writing or electronically, to the appropriate casework unit. A copy of this report will be retained within the FSL. When an FSL *Report of Examination* contains results of tests performed by an expert outside the FSL, those results will be clearly identified. If the examination results are not included in the *Report of Examination*, the Unit Manager or designee will ensure that the contributor receives a copy of the subcontractor's report.

5.10.6.1 Results of subcontracted tests included in a test report that makes reference to accreditation will obtain approval from the subcontractor to include excerpts from the subcontractor's report of certificate and will not include the accreditation symbol of the subcontractor on the report if the subcontractor is not accredited by ANAB.

5.10.7 Electronic Transmission of Results

ISO/IEC 17025:2005 requirements apply to the transmission of FSL Reports of Examination and examination results by telephone, facsimile or other electronic or electromagnetic means.

5.10.8 Format of Report of Examination

An FSL Report of Examination is formatted according to the *LOM02 – Procedures for Case Documentation and Report Writing*.

5.10.9 Amendments to Reports of Examination

Once an FSL Report of Examination has been issued, any amendments must be made in the form of an Amended Report of Examination according to the *LOM02 – Procedures for Case Documentation and Report Writing*. An Amended Report of Examination will meet all requirements of the FSL QAM – Section 5.10.1, 5.10.2, 5.10.3. An Amended Report of Examination will be uniquely identified and will contain a reference to the original Report of Examination it is replacing.

5.10.10 Use of the Accreditation Symbol

5.10.10.1 If reference is made to accreditation in any communication (e.g., report, internet, documents, brochures, or advertising) by use of an accreditation symbol (alone or in combination with the ILAC mark), business name or business acronym, DFS will ensure:

- use will only be by the legal entity accredited and as named on the certificate of accreditation,
- the accreditation symbol or statement used is specific to the ANAB Forensic Testing accreditation program,
- non-accredited testing is clearly identified as such by a disclaimer,
- there is no misleading or unauthorized representation of accreditation status,
- there is no implication that the accreditation body accepts responsibility for test results,
- and there is no implication that a product, process, system or person is approved by the accreditation body.

5.10.10.2 In addition to the requirements of 5.10.10.1 for reports, DFS will ensure:

- there is no reference made to accreditation when none of the testing included in the test report is within the scope of accreditation.
- in reports that make reference to accreditation:
  - opinions or interpretations included are based on those test results for which accreditation is held,
  - opinions or interpretations outside the scope of accreditation, but based on those test results for which accreditation is held, are clearly identified as such by a disclaimer.

NOTE: This is applicable to subcontractor results included in a test report.

5.10.10.3 When the ILAC mark is used it will be in conjunction with the ANAB accreditation symbol and in accordance with the conditions for use set forth by ANAB.

REFERENCES

ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories, International Organization for Standardization, Geneva, Switzerland (current revision).

ANAB™ ISO/IEC 17025 Accreditation Requirements for Forensic Testing Laboratories, ANSI-ASQ Accreditation Board, Alexandria, VA (current revision)

Quality Assurance Standards for Forensic DNA Testing Laboratories, Federal Bureau of Investigation, (current revision).

Departmental Operations Manuals (DOMs) (current revisions)

FSL Laboratory Operations Manuals (LOMs) (current revisions)

Unit-specific Quality Assurance Manuals (current revisions)

Unit Standard Operating Procedures (current revisions)

APPENDIX A

This is the approved list of common abbreviations used by the employees of the FSL. Other abbreviations used should have the approval of the FSL Director. This list does not purport to include all abbreviations used and new approved abbreviations will be added to the list no later than the annual quality audit. Capitalization of any of the letters in the abbreviation is not mandatory.

	ABBREVIATION	MEANING
	~ *or* ≈ *or* approx	Approximately
	+ *or* pos	Positive
	+	And
	=	Equals, consistent with
	≠	Does not equal, not consistent with
	>	Greater than
	<	Less than
	?	Don't know
	(-) *or* neg	Negative
	#	number
	2° evid or 2°	Secondary evidence
A	AAFS	American Academy of Forensic Sciences
	AB	Black Powder/Antique
	Acq	Acquired
	Acr	acrylic
	Als or ALS	Alternate light source
	Amp	amplification
	Amt	amount
	Anim	animal
	ANSI	American National Standards Institute
	AP	Assault Pistol
	AR	Assault Rifle or Administrative Review
	AS	Assault Shotgun
	Admin Rev.	Administrative review
	Art	Artificial

	ABBREVIATION	MEANING
	Art treat	Artificially treated
	a/s	Adhesive-sealed
	ASCII	American Standard Code for Information Interchange
	ASTM	American Society for Testing and Materials
B	BA	Blood alcohol
	BIOS	Basic Input/Output Services
	Bit	Binary data
	bl *or* bld	Blood or blond
	Blk	Black
	BP	BB/Pellet Pistol
	Bp	Boiling point
	Bpb	Brown paper bag
	BR	BB/Pellet Revolver
	Br	Breath
	Brn	Brown
	bt#	Bottle number
C	C	Change
	C-1	Computer Number Latent Entry
	c/ *or* cont	Containing
	CD	Compact Disk
	CDR	Compact Disk-Recordable
	CDROM	Compact Disk-Read Only Memory/Compact Disk Drive
	CG	Combination Gun
	Code 1	Value
	Code 2	No Value
	Com	Compare *or* comparison
	Comp	Component
	cont. subs. *or* cs	Controlled substances
	cont'd *or* cont.	Continued
	Cor	Coroner
	CSS	Crime Scene Sciences
	Ctfg	Centrifuge

	ABBREVIATION	MEANING
	Ctl *or* ctrl	Control
D	DB	Digest buffer
	DEU	Digital Evidence Unit
	dH_20	Distilled water
	DFS	Department of Forensic Sciences
	Dia	Diameter
	Diff	Differential *or* different
	diH_20	Deionized water
	Dil	Dilution
	Dispo	disposition
	Dist	distal
	Dk	dark
	DNA	Deoxyribonucleic Acid
	DOM	Department Operational Manual
	DOS	Disk Operating System
	DTT	dithiothreitol
E	e cells *or* ec	Epithelial cells
	Ea	each
	EF	Epithelial fraction, or non-sperm fraction
	EIA	Enzyme immunoassay
	ELIM	Elimination
	Env	Envelope
	EtOH	Ethanol
	Evid	Evidence
	E or Exp	Expiration
	Ext	Extract or Extraction
F	FAT	File Allocation Table
	FBU	Forensic Biology Unit
	FDD	Floppy disk drive/Floppy diskette
	FEU	Firearms Examination Unit
	FIIS	Forensic Imaging and Information System
	FITS	Firearms Intelligence Tracking System

	ABBREVIATION	MEANING
	FIU	Forensic Intelligence Unit
	Fr	Forcibly removed
	Frag	Fragment
	frz.*or* fzr.	Freezer
	FSL	Forensic Science Laboratory
	F's	Fibers
	FTP	File Transfer Protocol
G	Grn	Green
	GSR	Gunshot residue
	GUI	Graphical User Interface
H	Gw	Gross weight
	HC	Hydrocarbon
	HDD	Hard disk drive/Hard drive
	Hh	Head hair
	HP	Hewlett-Packard Company
	Hr	Hour or Hair
	Hrs	Hours or Hairs
	hs *or* h/s *or* h-s	Heat sealed
	H's	Hairs
	HTML	Hypertext Markup Language
I	IBIS	Integrated Ballistics Identification System
	IBM	International Business Machines
	ID	identification
	immed.	Immediately
	IMP	Impression
	Inc	Inconclusive
	Indiv *or* ind.	Individual
	Int	Interference
	IP	Internet Protocol
	ISP	Internet Service Provider
	ISTD	Internal standard
J	juv. or juv	Juvenile

	ABBREVIATION	MEANING
K	K *or* Kn	Known
	KM	Kastle-Meyer
L	L *or* lft	Left
	L/	Labeled
	Lab	Laboratory
	LAN	Local Area Network
	Lg	Large
	LFU	Latent Fingerprint Unit
	LOD	Limit of detection
	LOQ	Limit of quantitation
	LP	Left Palm
	Lt	Light
M	MB	Mega-byte
	Mb	Mega-bit
	MeOH	Methanol
	Mito or mit or mt	Mitochondrial
	MLE	Medical-Legal exam
	Mod	Moderate *or* modified *or* modacrylic
	Mp	Melting point
	MPD	Metropolitan Police Department
	Ms	Millisecond
	Mted	mounted
	mDNA or mt DNA	Mitochondrial DNA
	MW	Molecular weight
N	N/A	Not applicable
	N/R	No results obtained
	NAS	Nothing of apparent significance
	NA	Not analyzed
	NAV	Norton Anti-virus software
	ND	Not detected
	nDNA	Nuclear DNA
	NE	Not examined

	ABBREVIATION	MEANING
	Neg	Negative
	NFE	No further examination
	NFT	No further testing
	NIBIN	National Integrated Ballistics Information Network
	NIST	National Institute of Standards and Technology
	NR	No reaction *or* no results
	NR	No Results
	Nsfcp	Not suitable for comparison purposes
	NT	Not tested
	Num	numerous
	NV *or* no val	No value
	Nw	Net weight
O	O/N	Overnight
	Opag	Opaque
	Orig	Original
	OS	Operating System
	Ø	Identification Symbol
P	p.frz *or* PF	Personal freezer
	PA	Pistol Automatic
	PB	Plastic Bag or Pistol bolt action
	Pb	Plastic bag
	PBS	Phosphate buffered saline
	PC	Personal Computer
	PCR	Polymerase Chain Reaction
	PD	Pistol Derringer
	PDA	Personal Digital Assistant
	PI	Pistol Semi Automatic
	PR	Pistol Revolver
	P	Permount
	Pers	Personal
	Pet	Petroleum
	Ph	Pubic hair

	ABBREVIATION	MEANING
	phr or PHR	Peak height ratio
	Poly	Polyester
	Poss	possible
	Pp	Polypropylene
	Prob	Probably
	Prof	Proficiency
	proK	Proteinase K
	Prox	Proximal
	PS	Pistol Single Shot
	Pt	Point or Proficiency Test
	PT	Printrak Entry
	PVC	Poly-vinyl Chloride
Q	Q	Question
	Q value	Quantitation value
	QA	Quality Assurance
	QC	Quality control
	QNS	Quantity not sufficient
	Qty	Quantity
	Quant or QT	Quantitation
R	R	Retardation
	R *or* Rt	Right *or* retention time
	RA	Rifle Full Auto
	RT	Room temperature
	RAM	Random Access Memory
	RB	Rifle Bolt Action
	RC	Rifle Carbine
	Rbs	Reddish brown stain
	Rded	Rounded
	Ref	Reference
	Refrig	Refrigerator
	Rep samp *or* rs	Representative sample
	Resp	Response

	ABBREVIATION	MEANING
	ret'd	Returned
	RF	Response factor
	RI	Rifle Semi Automatic
	RL	Rifle Lever Action
	ROM	Read Only Memory
	RP	Rifle Pump Action
	Rp	Right Palm
	RSS	Rifle Single Shot
	Rxn	Reaction
S	S	Suspect *or* subject
	SAK	Sexual Assault Evidence Collection Kit
	Samp	Samples
	SDS	Safety Data Sheet
	SF	Sperm Faction
	SB	Shotgun Bolt Action
	SE	Shotgun Double Barrel
	Sec	Second
	SI	Shotgun Semi Automatic
	Sfscp	Suitable for significance comparison purposes
	SI *or* sld	slide
	Sm	Small
	SN *or* S/N	Serial number
	SO	Shotgun Over Under
	SP	Shotgun Pump Action
	Soln *or* sol	Solution
	sp	Sperm
	SS	Shotgun Single Shot
	Ss	Sperm search
	Std	Standard
	Stn	Stain
	STP	Shielded Twisted Pair
	STR	Short tandem repeat

	ABBREVIATION	MEANING
	Sub	Subtracted
	Subj	Subject
	Substr	Substrate
	Suit	Suitable
	Susp	Suspect
	Svt	Small volume transfer
	Syn	Synthetic
	SWG	Scientific working group
T	T	Temperature
	TA	Toy Assault Rifle
	TB	Toy Submachine Gun
	Tc or t/c	To contain *or* tape closed
	TD	To deliver
	TP	Toy Pistol
	TE	Tris EDTA buffer
	Tgt	Target
	Tis	tissue
	TI	Tape lifts
	TR	Technical review or Toy Revolver
	T_R	Room temperature
	Ts or t/s	Tape seal/tape-sealed
U	UPS	Uninterruptible Power Supply
	USAO	United States Attorney's Office
	UV	Ultraviolet
V	V *or* vic	Victim
	V	Very
	Val	value
	VC	Vehicle code
	VGA	Video Graphics Array
	Vol	Volume
W	w/	With
	w/o	Without

	ABBREVIATION	MEANING
	Wbs	Whole bloodstain
	WIF or Wkfrz	Walk-in freezer
	Win2K	Microsoft Windows 2000 Operating System
	Win9x	Microsoft Windows 9x Operating System
	WinNT	Microsoft Windows NT Operating System
	Wk	Weak
	Wmt	Wet mount
	Wpb	White paper bag
	Ws	Whitish stain
	Wt	Weight
X	XB	Blank/Starter/Teargas/Pen gun
	x-ref	Cross-reference
	Xs	Cross-section
Y	Yel	Yellow
	Ys	Yellowish Stain
Z	ZA	Replica Assault Rifle
	ZB	Replica Submachine gun
	ZP	Replica Pistol
	Zplb *or* zlpb *or* Z/L	Ziplock plastic bag
	ZR	Replica Revolver

APPENDIX B

FSL PRACTICES FOR RECEIPT AND STORAGE OF REAGENTS, CHEMICALS, STANDARDS AND CONSUMABLE MATERIALS

SECTION 1 RECEIPT, OPENING, AND VERIFICATION OF COMMERCIAL REAGENTS, CHEMICALS, STANDARDS AND CONSUMABLE MATERIALS

1.1 Upon receipt of all reagents, chemicals, standards and consumable materials, the packing slip will be checked for agreement with the items received as well as against the *DFS Purchase Request Form*.

1.1.1 Some of the items listed on the invoice might be received in different shipments (e.g., if an item is backordered). Check off the items received in the current shipment.

1.1.1.1 Bring any discrepancies to the attention of the Unit manager.

1.1.2 A copy of each packing slip initialed and dated by the receiver will be maintained as a permanent record.

1.1.3 If the packing slip does not contain the lot number of the reagent / chemical / standard / consumable material (if applicable), the individual inventorying the item will add the lot number to the packing slip.

1.2 All incoming reagents / chemicals / standards / consumable materials will be marked with:

1.2.1 The date of receipt and/or of inventory of shipment contents.

1.2.2 The initials of the person receiving the reagent / chemical / standard / consumable material.

1.3 All incoming reagents / chemicals / standards / consumable materials (when applicable) will be checked to ensure the label / packaging clearly reflects the identity of the item and the expiration date.

1.3.1 Commercial reagents / chemicals / standards / consumable materials (when applicable) without a supplied expiration date will be given a date of three (3) years from the date of receipt.

1.4 When a reagent / chemical / standard / consumable material is opened, it will be marked with the date and initials of the person opening the reagent / chemical / standard / consumable material.

1.5 When applicable, post-verification, the date of verification and initials of the person performing the verification will be marked on all incoming commercial reagents / standards prior to their use on casework.

NOTE: Reagents / chemicals / standards / consumable materials (when applicable) which have passed their expiration date will not be used on casework. However, these reagents / chemicals / standards / consumable materials may be used on non-critical samples (e.g., training samples) and will be appropriately labeled as such.

SECTION 2 MATERIAL SAFETY DATA

2.1 The SDS received from the manufacturer for each chemical used in the laboratory can be found in the designated Unit SDS book. These data sheets will be kept current and readily available to all laboratory personnel.

SECTION 3 LABORATORY PREPARED REAGENTS AND SOLUTIONS

3.1 All laboratory prepared reagents and solutions will be made with great care and using good laboratory practices.

3.2 A log will be maintained in each Unit for each laboratory prepared reagent / solution. Each reagent / solution prepared will have the following information recorded in the log book:

- chemicals used
- commercial sources of chemicals
- lot numbers of chemicals
- expiration date
- other pertinent data, if applicable, such as pH, QC check/results, autoclave indicator, etc.
- lot / batch number
- date prepared (not necessary if lot / batch number is preparation date and preparer's initials)
- initials of individual preparing reagent / solution (not necessary if lot / batch number is preparation date and preparer's initials)

NOTE: The lot / batch number assigned to laboratory prepared reagents / solutions will consist of the date prepared (two digit numerical representation for month, day and year) and the initials of the preparer.

Example: Lot number 101513MSC represents a reagent/solution prepared on October 15, 2013 by Marie S. Curie.

3.3 All laboratory prepared reagents / solutions will be clearly labeled or will include a barcode label. Labels will include the following:

- reagent / solution identity
- lot / batch number (which is comprised of the date of preparation and the initials of preparer)
- expiration date (as specified in the Unit procedure manual or labeled “no expiration”, if applicable)
- as appropriate, storage requirements

SECTION 4 STORAGE AND DISPOSAL

4.1 All chemicals must be stored, used, and disposed of in a manner conforming to established safety requirements for that chemical.

SECTION 5 CRITICAL REAGENTS AND CONSUMABLE MATERIALS

5.1 All critical reagents and consumable materials must be quality control tested / verified for accurate, reliable performance prior to being used on casework. Refer to each Unit manuals for specifics regarding quality control of critical reagents and consumable materials. The results of all quality control tests will be maintained in a ring binder or properly labeled file.